Naval Aviation
Medical Treatment Protocols

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PROTOCOLS APPROVAL

The Search and Rescue Medical Program Directors (MPD) have approved this document as Standing Orders of patient treatment protocols for Rescue Swimmers (RS), EMT-Basics, Search and Rescue Medical Technicians (SMT), Paramedics (EMT-P), and Critical Care Paramedics. Medicine is a practice, ever changing, and requires updates. To keep up with medical advancements, each section should be reviewed and updated as appropriate; at a minimum, every 2 years or upon change of the Medical Director. Changes and revisions will be issued only after approval from the Medical Director.

This document is *not* intended to be a comprehensive patient care manual. Rather, it specifies standard operation procedures (SOP) and treatment protocols to operate under emergency medical conditions without the direct supervision of a Medical Director.

The introduction and Administrative sections establish the standard by which personnel shall abide. All other sections are designed for use by basic and advanced providers. While they should be followed, there is no substitute for logical thinking, common sense, and professional performance by the provider employing them. Mission requirements or a patient's emergency condition may require the provider to deviate from the stated protocol without the benefit of immediate access to medical direction. Under such circumstances, deviations should be limited to the provider's level of training, common sense, and the dictum "Primum Non Nocere" ("First, do no harm").

Each treatment protocol presents the basic life support tasks separate from the advanced life support tasks. This was done so providers have a sensible order of patient treatment. In the event a provider responds to an unusual case, or where the illness or injury does not fall into a treatment protocol, the provider will seek directives from Medical Control. If Medical Control is unavailable, the provider shall apply aforementioned skills with common sense and seek to maintain Airway, Breathing, and Circulation. Remember, start with the basics and fall back on the basics.

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DEPARTMENT OF THE NAVY
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IN REPLY REFER TO:
3130
Ser N00/002
12 Jan 18

From: Commander, Helicopter Sea Combat Wing Atlantic
To: LCDR Paul J. D. Roszko, MC, USN

Subj: DESIGNATION AS SEARCH AND RESCUE MEDICAL PROGRAM DIRECTOR FOR COMMANDER, HELICOPTER SEA COMBAT WING ATLANTIC

Ref: (a) OPNAVINST 3130.6E
(b) OPNAVINST 3710.7

1. Per reference (a), you are hereby designated as the Search and Rescue (SAR) Medical Director for the SAR Medical Technician Program for Commander, Helicopter Sea Combat Wing Atlantic.

2. You are to familiarize yourself with the functions and responsibilities listed in references (a) and (b).

3. This designation will remain in effect until your detachment or unless otherwise revoked.

A. M. WORTHY

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From: Commander, Helicopter Sea Combat Wing Pacific
To: CDR Benjamin D. Walrath, MC, USN

Subj: DESIGNATION AS SEARCH AND RESCUE MEDICAL PROGRAM DIRECTOR FOR HELICOPTER SEA COMBAT WING PACIFIC

Ref: (a) OPNAVINST 3130.6E
(b) OPNAVINST 3710.7V

1. Per reference (a), you are hereby designated as the Search and Rescue (SAR) Medical Director for the SAR Medical Technician Program for Helicopter Sea Combat Wing Pacific.

2. You are to familiarize yourself with the functions and responsibilities listed in the cited references.

3. This designation will remain in effect until your detachment or unless otherwise revoked.

K. M. KENNEDY

"PRIVACY ACT PROTECTED – FOR OFFICIAL USE ONLY"

INTRODUCTION TO NAVAL AVIATION MEDICAL TREATMENT PROTOCOLS:

This document has been prepared for use by Emergency Room Physicians, Aviation Medical Director's / Naval Hospital flight surgeons, and Search and Rescue Medical Technicians (SMT), who are engaged in the conduct of Search and Rescue with Air Medical Transport (AMT) operations, Aero-Medical Evacuation (MEDEVAC), and Tactical Evacuations (TACEVAC).

This document is intended to provide a consistent framework of medical treatment guidelines for Naval Aviation Search and Rescue, as discussed on the following page. The document has been created to reflect current prehospital medical trends. It has been adapted for use by the Search and Rescue (SAR) Medical Technician (SMT/NEC L00A), SMT Paramedics, Rescue Swimmers, and EMT-Rescue Swimmers providing medical care. No protocol template can address every eventuality or medical condition in a universally accepted format. The basic protocols provided in this document will, however, provide a consistent set of medical treatment standards that can be delegated from the Medical Director to the infield providers. Protocols provide consistent standards for training and performance improvement monitoring: they are one of the cornerstones of every EMS system development.

The SMTs possess varying levels of experience from the recently qualified SMT with National Registry of Emergency Medical Technician (NREMT)-Basic (NREMT) certification up to the SMT with NREMT-Paramedic certifications. Between the Basic EMT and the Paramedic lies the nebulous EMT intermediate (which has no consistent skill set from state to state). Each SMT possesses a different skill proficiency level depending on his/her previous experience and patient care history. Unlike the civilian Paramedic who uses his/her skills on a daily basis, the SMT may only use his/her skills occasionally for actual patient care in the station SAR environment. All SMTs have received training and certifications in Intravenous therapy, however it is encouraged and recommended that all SMTs receive continuing education on ALS classes to include; Advanced Cardiac Life Support (ACLS), Advanced Pre-Hospital Trauma Life Support (PHTLS), Tactical Combat Casualty Care (TCCC), Pediatric Advanced Life Support (PALS), Pediatric Education for the Prehospital Provider (PEPP), Neonatal Resuscitation Provider (NRP) and Operational Emergency Medical Services (OEMS).

The Rescue Swimmers and Rescue Swimmer/EMT possess a base knowledge of first responder/EMT Basic qualification. Their skill set is a tremendous help in the triage, treatment, and turnover of patients. Each Rescue Swimmer/EMT medical capabilities is covered in these protocols.

The intent of these protocols is to allow all of the SAR Members to best utilize the skills that they do currently possess to treat their patients. This is dependent on the validation of any advanced skills (such as endotracheal intubation, cricothyroidotomy, chest decompression, advanced cardiac life support and pharmacology) at the unit level by the Petty Officer designated by the Medical Director or Commanding Officer as the Standardization Petty Officer. SAR Members will perform only those skills with which he/she is proficient. If he/she is not proficient in a skill that he/she has been taught or if he/she is not confident with his/her ability to correctly perform a procedure, he/she will consult his/her Standardization Petty Officer for further training. Regular training and practice will be ongoing, so there should be ample opportunity to become proficient and confident with all of the skills detailed in these protocols!

In practical terms, this means providing care IAW the guidance above without deviation. If there is a needed deviation, your medical director is responsible for any directed deviation during on-line Medical Control. If you provide care outside the scope of your practice during off-line Medical Control, you are personally responsible for any adverse outcome. *DO NOT PROVIDE CARE THAT DEVIATES FROM WHAT YOU ARE TRAINED AND ALLOWED TO DO.*

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II. ADMINISTRATIVE

1. MEDICAL DIRECTOR

The Medical Director should be a licensed physician and Emergency Room physician, or Trauma Surgeon, or EMS Director. The Medical Director will advise the Unit's Commanding Officer on all medical components of the Unit's operations as required by the CO. The Medical Director will also serve as medical control authority for all patient care performed by unit SMTs. The Medical Director will be available for consultation, provide retrospective Quality Assurance/Quality Improvement (QA/QI) review, supervise continuing education (CE) programming, and will serve as a medical liaison between this unit and other services, facilities, and physicians. The Medical Director may delegate his or her authority to the senior SAR Medical Technician (typically Standardization PO) as he or she deems appropriate.

ON-LINE Medical Control: A physician is present at the scene or available through communication. Although this is the ideal and preferred method it is uncommon in most Rescue operations. Order of precedence for on-line medical control:

On scene:
Senior Medical Officer (SMO of Ship)
Senior U.S. Military Physician present on scene
Senior Allied Military M.D. (equivalent to US Military Physician)
Civilian M.D. who can prove credentials and assumes responsibility
Senior Military Physician Assistant
Senior SOCM / 18D

Off scene:
U.S. Military Physician in direct contact via audio/visual communication

Off-line Medical Control: Contact with a Physician is impossible or impractical. Care is based on approved protocols and procedures. This is the most common scenario.

In Off-line control situations,

Note: These sources cover the vast majority of care you will provide. Instances where deviation may occur more frequently would be in remote situations where certain medications are not available, and the local medical authority has directed the use of locally available meds, and has provided the adequate in-service education with proper documentation. Also, certain regions may have diseases and treatments that are endemic and require unique care that should be added to the protocols in that area of operation.

2. STANDING ORDERS/TREATMENT PROTOCOLS

Designated SMTs will maintain professional certifications, continuing medical education, and military credentials in accordance with OPNAVINST 3130.6 series, the National Registry of Emergency Medical Technicians, and local command directives.

II. ADMINISTRATIVE

A. Skill Sets:

Skill	Rescue Swimmer (RS)	RS / EMT	SMT	EMT-P
Airway				
Oral/Nasalpharyngeal Airway		x	x	x
L.M.A or Combi-tube			x	x
King Airway			x	x
Magill Forceps Use			x	x
CPAP/Bipap			x	x
Cricothyrotomy			x	x
Chest Decompression			x	x
Finger Thoracotomy / Chest Tube				FP-C / TP-C
Automated Ventilator			x	x
Bag Valve Mask	x	x	x	x
Pocket Mask	x	x	x	x
Circulatory Support				
Peripheral IV			x	x
Intraosseous Cannulation			x	x
External Jugular Cannulation			x	x
Glucometry		x	x	x
Automatic External Defibulator	x	x	x	x
Defibrillation - Automatic/Manual			x	x
Synchronized Cardioversion			x	x
Pacing			x	x
Vital Signs - Automatic/Manual		x	x	x
Medications				
Assisted Medications		x	x	x
Inhaled Medications - Nebulizer			x	x
IM Medications			Limited	x
IV Medications			Limited	x
IO Medications			Limited	x
PO Medications		x	x	x
SL Medications			x	x
SQ Medications			x	x
Transdermal Medications			x	x
Blood Products				x

II. ADMINISTRATIVE

A. Skill Sets:

All provider levels shall perform

Only qualified SMT's shall perform

SMT's are permitted to perform all skill sets

Only qualified Paramedics shall perform

Paramedics' are permitted to perform all skill sets up to this level.

II. ADMINISTRATIVE

B. SMTs who are QUALIFIED and designated are authorized to utilize, at the discretion of the Medical Director, the following medications:

***** Medications that Highlighted are only for SMT-Paramedic use**
++ Controlled Substance ++

1) Administration of the following medications according to treatment protocols:

Acetaminophen (Tylenol)
Activated Charcoal
Adenosine (Adeonocard)
Albuterol 0.5%
Amiodarone
Aspirin
Atropine Sulfate
Calcium Chloride
Calcium Gluconate
Cefazolin Sodium (ANCEF)
Ceftraixone (Rocephin)
Dextrose 25% / 50%
Dexamethasone
Diamox
Diazepam (Valium) ++
Diltiazem ++
Diphenhydramine (Benadryl)
Dopamine
Ertapenem (INVANZ)
Erythromycin Ophthalmic Ointment
Etomidate
Epinephrine
Fentanyl ++
Flumazenil (Romazicon)
Furosemide (Lasix)
Glucagon / Insta Glucose
Hetastarch
Ipratropium
Ketamine ++
Ketorolac
Lactated Ringers (LR)
Lidocaine (Xylocaine)
Lorazepam (Ativan) ++
Magnesium Sulfate 10%
Meloxicam (Mobic)
Methylprednisolone
Midazolam (Versed) ++
Moxifloxacin (Avelox)
Morphine Sulfate ++
Naloxone (Narcan)
Nitroglycerin SL spray / tablets
Ondansetron (ZOFRAN)
Oxymetazoline (Afrin)
Oxygen
Promethazine
Rocuronium
Sodium Bicarbonate
Sodium Chloride 0.9% (NS)
Succinylcholine
Vecuronium
Vasopressin
Thiamine
Terbutaline
Tranexemic Acid (TXA)

2) The following are to be utilized only if the SMT possessed at EMT-P and or FP-C certification. If the SMT does not possess the certification, the SMT shall have at a minimum a nurse or higher during transport.

Blood Products
Fresh Frozen Plasma (FFP)
Freeze Dried Plasma

II. ADMINISTRATIVE

3. Principles of Medical Care:

1. MARCH PAWS: A pneumonic device used to cover the vast majority of care required during medical/tactical field care and medical/tactical Evacuation. It covers the care of any medical/trauma patient. Other than the **"M"**, it covers the care for most medical patients since it is just a variation of the ABC'S. This approach allows for the SAR medical community to treat in an organized manner ensuring he/she doesn't neglect any treatment in the event of a break in care.

M – Massive bleeding
A – Airway
R – Respirations
C – Circulation
H – Head and hypothermia
P – Pain
A – Antibiotics
W – Wounds
S – Splinting

The approach/Treatments below include practices & principles from the NREMT, ATLS, TCCC, PHTLS/ITLS, data from the OCO, Joint Trauma Registry, and past experiences.

2. Principle of the assessment**:**

a. PPE
b. Scene safety & security
c. Mechanism of injury/illness (MOI)
d. # of patients
e. Call for additional resources as applicable
f. General impression
g. **MARCH**:
   - **M** – Tourniquet, hemostatic gauze, pressure dressing, pelvic sling/junctional tourniquet, suture/staple, clamp, direct pressure, junctional hemorrhage device, elevate.
   - **A** – Chin lift/Jaw thrust, recovery position, sit up and lean forward position, NPA, OPA, supra-glottic device, ET tube, cricothyrotomy.
   - **R** – Chest seal, needle decompression, BVM, SpO_2, finger or tube thoracostomy.
   - **C** –Diagnose (Weak or absent radial pulse, decreased mental status) and treat shock.
   - **H** – Head; diagnose increased intracranial pressure (AVPU, pupils, posturing, irregular respirations, $EtCO_2$). Treatment; Secure the airway, IV/IO. Keep B/P >100, SpO_2 >93%, $EtCO_2$ 30-35 mmHg.
   - **H** – Hypothermia; Dry patient, insulate from the ground, casualty blanket, HPMK, hat.

h. Vital Signs – AVPU, HR, BP, RR, SpO_2%, $EtCO_2$%, Temp. Blood Sugar, 4 Lead / 12 Lead (as applicable)
i. Secondary survey (**PAWS**) – head to toe: DCAP-BTLS, LOBOS, TIC, step in/off
   - **P** – Pain Meds as applicable per protocol.
   - **A** – Antibiotics – PO or IV/IO, for all open combat wounds.
   - **W** – Wounds – clean (remove debris, irrigate) and dress.
   - **S** – Splinting- Perform orthopedic related care, address ortho/PMS; SAM, KTD, spinal immobilization (per protocol), rigid eye shield.
j. Reassess – every 5 minutes for critical / 15 minutes for non-critical / as needed / feasible.
k. Document – Casualty card, medical report.
l. Package for evacuation / transport.

II. ADMINISTRATIVE

4. **Assessment Checklist:**

Scene Size Up

- Scene safety / security
- BSI / PPE
- Determine the mechanism of injury / illness (MOI)
- Determine the # of patients (in case triage is necessary)
- Request additional help if necessary, determine availability of resources
- Verbalize initial impression: "Sick or not Sick

Primary Assessment

- C-Spine as needed unless ruled out
- AVPU
- Massive Hemorrhage – Visualize and feel (sweep) for life threatening hemorrhage:
  - All 4 extremities
  - Junctional Sites (Neck, Axillae, Groins)
  - Torso and back
  - Pelvic stability
- Airway - Open and maintainable (LOBOS)
- Respirations – Assess rate, depth, quality, auscultate lung sounds, apply finger pulse oximeter (as needed or available)
  - Look: Chest rise and fall, paradoxical motion, chest wall injuries.
  - Listen: if possible with a stethoscope.
  - Feel: chest wall: rips, subcutaneous air, holes or defects.
- Circulation – Diagnose shock (Radial / carotid pulse, assess skin color and temp, cap refill).
  - Reassess bleeding control interventions
  - Check pulses for: Rate, strength, and quality
- Head – Rule out severe intracranial pressure (TBI) by identifying mental status, pupils, posturing or snoring respirations.
  - Glasgow Coma Score (GCS)
  - Assess Cranial Nerves
- Hypothermia – Dry and cover patient, use HPMK or blanket/Emergency blanket, insulate from ground.
- Transport decision

Secondary Assessment

- Vital signs - AVPU, HR, BP, RR, SpO_2%, $EtCO_2$%, Temp. Blood Sugar, 4 Lead / 12 Lead (as applicable)
- Head to toe examination:
  - Head: inspect head and face for DCAP-BTLS, reassess airway (LOBOS), ears for drainage, pupils (PERRLA), nose for bleeding and stability, jaw for stability.
  - Neck: Assess for JVD, Subcutaneous air, hematoma, Tracheal deviation, C-Spine deformity / tenderness / Step-off/in.
  - Shoulders/Clavicles: DCAP-BTLS
  - Chest: Expose and inspect, DCAP-BTLS, Reassess the same as primary assessment
  - Abdomen: Normal= soft, flat, non-tender. Assess for tenderness, rigidity, distension, and pulsating masses (TRD-P)
  - Pelvis: Check pelvis once (do not rock), document status of genitals if amputations, priapism.
  - Extremities: DCAP-BTLS, PMS, strength and ROM.
  - Spine: Only log roll if appropriate, DCAP-BTLS, step-off/in.

- Secure to spine board / rescue litter as required.
- Pain – Pain regimen per protocol
- Antibiotic – Antibiotic per protocol
- Wounds – identify potential life threatening wounds
- Splint – perform orthopedic related care as needed.
- Reassess airway / interventions after move or litter placement
- Do not delay transport for IV/IO, drug therapy, or non-critical interventions
- S.A.M.P.L.E / O.P.Q.R.S.T as available.

Documentation and Verbal Report

- Verbal Report:
  - Age
  - Time of incident / illness
  - MOI
  - Signs and symptoms
  - Treatment and interventions
- Written Report:
  - C – Chief complaint
  - H – History
  - A – Assessment
  - R – Treatment
  - T – Transport

Prolonged Field or Extended Field Care

SAR Medical Technicians may be put in a positon for caring for injured/ill patients for periods of up to 24 hours. In these situations, refer to protocols as a baseline and seek online medical control whenever feasible or available.

- For these situations, the acronym **HITMAN** should be used:
  - **H** – Hydration, hypothermia, hygiene
    - Hydration – PO / IV/ IO / NG Tube (PRN), Urine output should be approx. 1-1.5ml/kg/HR. Starting maintenance IVF – rate should be approx. 125 ml/hr.
    - Hypothermia – Insulate from the ground, keep warm and dry
    - Hygiene – Prevent sores / roll and pad the patient, keep patient clean and dry.
  - **I** – Infection: Monitor compartment syndrome, change dressings 12-24hrs, antibiotics as per protocol.
  - **T** – Tubes: Neat and tight, continue to suction as needed.
  - **M** – Medications: 6 Rights: Patient, med, dose, time, route, documentation.
    - Monitoring Vitals: If stable, q2-4 h. At a minimum no less than q 12h.
  - **A** – Analgesic: Document pain scale, Pain regime per protocol.
  - **N** – Nutrition: If able, 1500 calorie a day intake.
    - Extremely important for all patients that are alert and oriented and can swallow without difficulty and for the SMT caring for the patient. (Tubed or altered mental status patients should not be given food)

If a patient becomes unstable during any extended care, restart back at the MARCH PAWS phase and reassess history once stability is regained.

II. ADMINISTRATIVE

5. Refusal of medical care and/or transport:

In general, Active Duty military members may not refuse life-saving medical care. Mentally competent adult civilians (including dependents, spouses and retired military members) may refuse medical care, even if refusing medical care endangers their lives. SMT's should make every effort to ensure that patients refusing medical care are aware of the possible consequences of their actions. The patient should be urged to seek other medical care as soon as possible.

• If the patient is unconscious, or unable to make a rational decision (secondary to head injury or any other cause of altered mental status) the principle of ***Implied Consent*** assumes that a normal, rational person would consent to life-saving medical treatment.

• If the patient is a minor or mentally incompetent adult, permission to treat must be obtained from a parent or guardian before treatment can be rendered. If a life-threatening condition exists, and the parent or guardian is unavailable for consent, treatment shall be rendered under the principle of implied consent, as noted above.

• If an alert, oriented patient with normal mental status refuses medical care, then care cannot be rendered. Medical control should be contacted (if possible) if such a situation occurs.

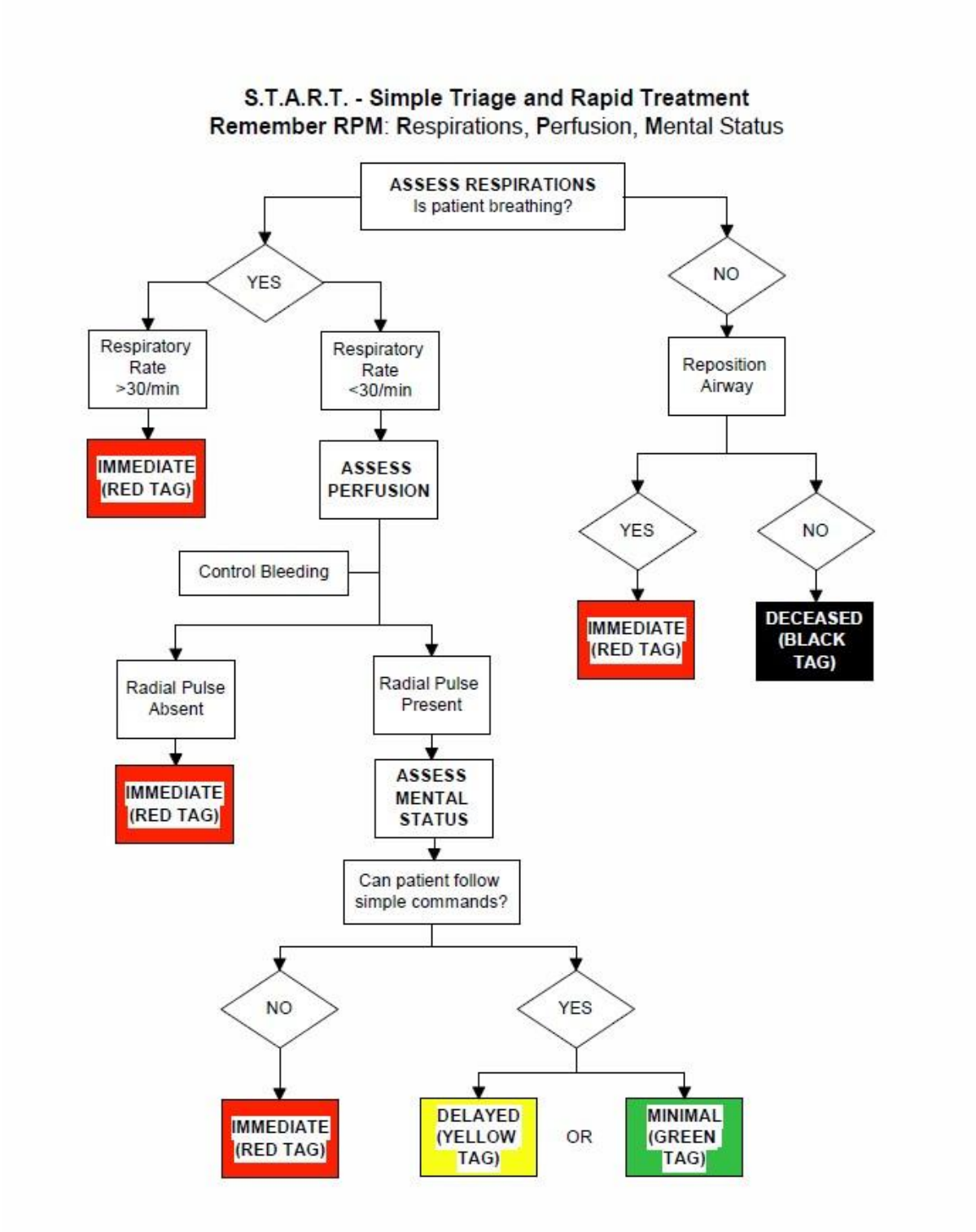
• If a patient refuses medical care the following statement must be written on the medical treatment form and signed by the patient:

"I, THE UNDERSIGNED HAVE BEEN ADVISED THAT MEDICAL ASSISTANCE ON MY BEHALF IS NECESSARY AND THAT REFUSAL OF SAID ASSISTANCE MAY RESULT IN DEATH, PERMANENT INJURY OR IMPERIL MY HEALTH. I REFUSE TO ACCEPT TREATMENT, AND ASSUME ALL RISK AND CONSEQUENCES OF MY DECISION. I RELEASE THE UNITED STATES AIR FORCE AND THE DEPARTMENT OF DEFENSE FROM ANY LIABILITY ARISING FROM MY REFUSAL TO ACCEPT MEDICAL CARE."

- **Note:** The statement must be signed and dated by the patient, and countersigned by a witness. The medical record should completely document that the patient is awake, alert, oriented and has normal mental status. If the patient refuses to sign the form, and still refuses medical care, the patient's refusal to sign should be documented and signed by the treating SMT and preferably by at least one other witness.

II. ADMINISTRATIVE

6. **Triage – S.T.A.R.T Flowchart**



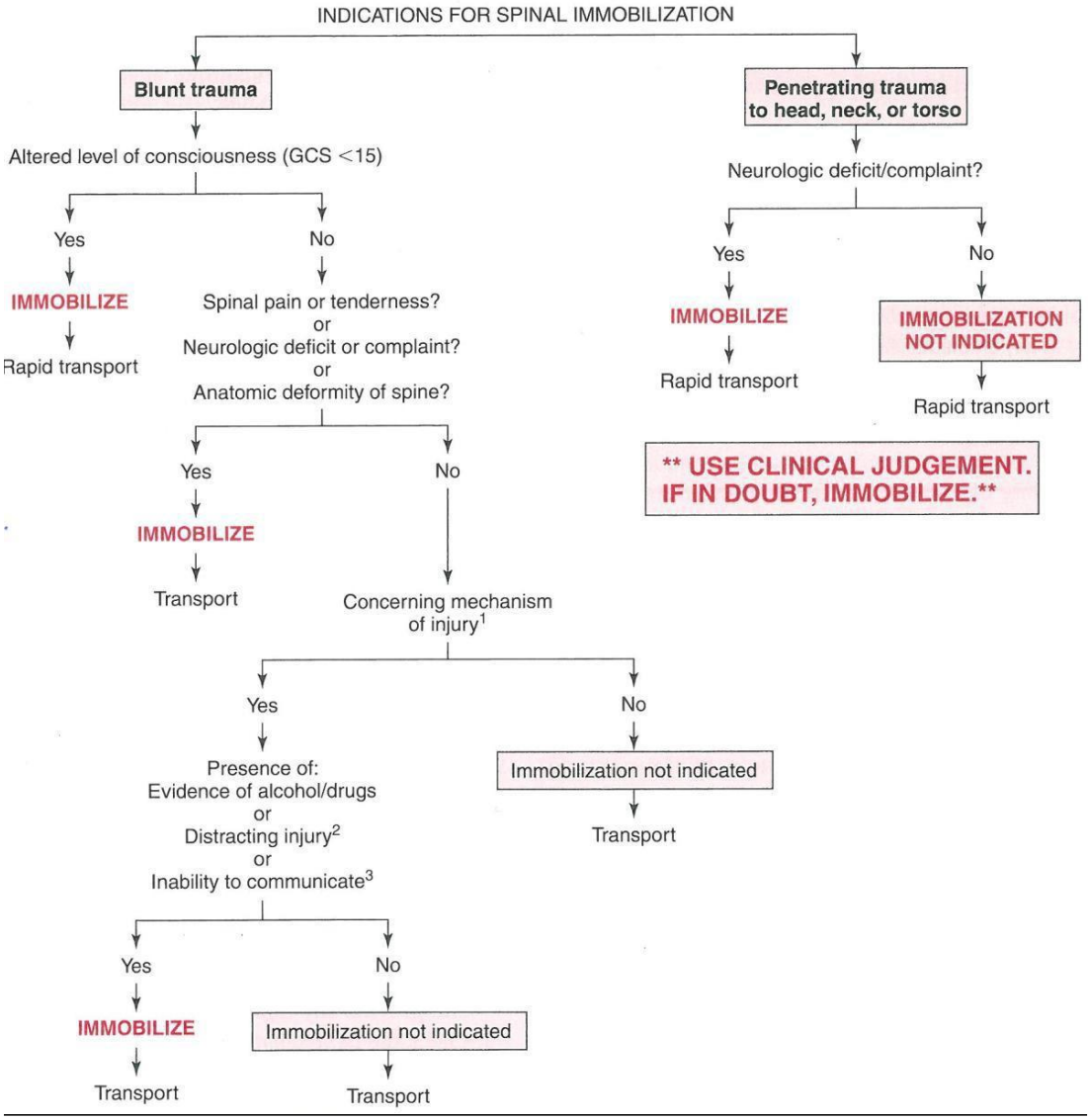
II. ADMINISTRATIVE

7. Spinal Immobilization

Spinal Immobilization is indicated for trauma patients where there is a suspicion of spinal injury or the patient complains of pain associated with the spinal column. Special consideration should be given when the patient age is <8 or >70 years of age.
The provider may decide to forgo spinal immobilization if the following criteria are met:

-No significant mechanism of injury (MOI)
-No loss of consciousness (LOC)
-No altered level of consciousness (LOC)
-Patient is able to communicate and is a reliable historian
-No signs of intoxication
-No distracting injuries
-No midline back or neck pain with or without movement
-No midline pain or tenderness or deformity present in back or neck upon palpation
-No pain present through full range of motion

Risk of spinal immobilization versus benefits should be weighed in special circumstances such as; prolonged extrication from wilderness setting and technical rescue situations. Risks include; emesis with airway compromise, pressure sores, extreme patient discomfort. Index of suspicion for injury should be carefully weighed.



1- Concerning mechanisms of injury

-Any mechanism that produced a violent impact to the head, neck, torso or pelvis
-Incidents producing sudden acceleration, deceleration, or lateral bending forces to the neck or torso (moderate to high speed mva, cars vs pedestrian, explosions, etc.)
-Any fall, especially in elderly patients
-Ejection or fall from any motorized or otherwise-powered vehicle (scooters, skateboards, bicycles, motorcycles, motor vehicles, or recreation vehicles)
-Victims of shallow water diving accidents

2- Distracting Injury

-Any injury that may have the potential to impair the patient's ability to appreciate other injuries, (long bone fractures, visceral injuries, large lacerations, degloving injuries, crush injury, large burns, or any other injury causing acute functional impairment)

3- Inability to communicate

-Any patient who for reasons not specified above cannot clearly communicate so as to actively participate in their assessment (speech or hearing impairment, those who only speak a foreign language, small children, etc.)

8. 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 MH-60S 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 SpO_2. At no time should the patient's SpO_2 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.

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III. ADULT PATIENT CARE PROTOCOLS

1. ***Airway / Oxygenation / Ventilation***

A. Objectives:

1) When possible, a room air pulse oximetry reading should be obtained and documented.

2) The goal is to maintain SP02 > 94%, $EtCO_2$ 35-45mmHg unless suspected Head Trauma.

3) Establish an airway for all patients who cannot maintain their own.

B. Warnings/Alerts:

1) Failure to use end-tidal C02 monitoring increases the risk of an unrecognized misplaced tube. $EtCO_2$ Shall be used in all Post Intubation, Cricothyrotomy, or king/supraglottic airway's.

2) Failure to confirm tube placement prior to securing or following patient movement may lead to unrecognized tube displacement.

3) Apnea is an absolute contraindication to nasal intubation.

4) Unable to open or effectively ventilate the patient with the inability to clear, two failed Supraglottic/ET airway attempts, or intubation is contraindicated shall warrant the performance of a Cricothyroidotomy.

5) All advanced airway patients shall require at a minimum, a c-collar to prevent dislodgement of the airway device.

C. Medications:

1) Post-intubation Sedation:

a) 2-5mg Valium IV or 2mg Versed IV

APPENDIX A : TRAUMA AIRWAY ASSESSMENT

Trauma Airway Management

Airway Assessment

- All trauma airways are potentially high-risk. Anticipate a difficult airway.
- Identify critical team members and verbalize role assignments.
- Initiate pre-oxygenation (1,2).
- Consider Ketamine (0.5-1.0 mg/kg IV/IO) for delayed sequence intubation if combative or otherwise uncooperative patient (3,4,5).
- Recall that the neutral position ("C-spine stabilization") degrades the laryngoscopic view.

Rapid Sequence Induction (RSI) and Intubation Pathway

1. **Confirm equipment availability and function** IV/IO, suction, self-inflating bag and mask, oxygen source, laryngoscope- direct and video (5), ETT with stylet and/or gum elastic bougie, oral & nasal airways, surgical airway kit, drugs, C02 detector, monitors, other rescue equipment
2. **Pre-Oxygenate (Denitrogenate) the lungs (1,2,6)**
   - Prolongs tolerance of apneic period
   - Goal is ≈ 3 minutes of tidal volume breathing at 90% FiO2
   - With standard reservoir facemask set flow rate of oxygen as high as possible
   - Recommend augmenting with nasal cannula at 15L/min oxygen in preparation for apneic oxygenation, leave in situ throughout procedure (2,8)
   - Elevate head of bed if not contraindicated
3. **Maintain cervical spine stabilization**
4. **Remove front of cervical collar**
5. **Consider cricoid pressure simultaneous w/ medication administration (9,10)**
6. **Administer medications** : Initiate RSI

Sedative/hypnotic
- Ketamine (First Line): 2 mg/kg IV/IO
- Etomidate (Second Line): 0.3 mg/kg IV/IO

Unstable patients require reduced dosage of induction agent.

Neuromuscular Blockade
- Rocuronium: 1.2 mg/kg IV/IO or
- Vecuronium: 0.1 mg/kg IV/IO or
- Succinylcholine: 1.5 mg/kg IV/IO

7. **Perform laryngoscopic tracheal intubation**
   - Following onset of neuromuscular blockade
   - Recommend gum elastic bougie as primary ETT stylet
8. **If laryngoscopic view is poor:**
   - Apply external laryngeal manipulation technique(s)
   - Consider alternative visualization method or Supraglottic airway device
9. **Confirm tracheal intubation**
   - Visualize tube passing between the vocal cords (First Line)
   - Wave form or digital capnography when available (Second Line)
   - Easy chest rise, equal axillary breath sounds/absence of gastric insufflation, CO2 Calorimeter, and "fog" in ETT
   - Esophageal detector bulb or fiber optic confirmation during cardiac arrest
10. **Provide continuing care IAW Anesthesia CPG**

Recommendations for Pediatric Patients

1. Train to expect pediatric patients. Have a dedicated pediatric airway cart, including Broselow tape or equivalent.
2. Pre-dose with atropine IV/IO (0.02mg/kg, minimum dose 0.1mg, maximum dose 0.5mg) in all <1 years old, those <5 who are receiving succinylcholine, and in all who receive a 2nd dose of succinylcholine
3. Induction -
   - Ketamine (first line) 2mg/kg IV/IO
   - Etomidate (second line) 0.3mg/kg IV/IO
4. Neuromuscular blockade -
   - Succinylcholine 1.5mg/kg IV/IO (2mg/kg <5 years old) or
   - Rocuronium 1mg/kg IV/IO
5. Avoid surgical airway in <12 years old - use needle cricothyroidotomy (12-14 gauge), tracheostomy preferred over surgical cricothyroidotomy

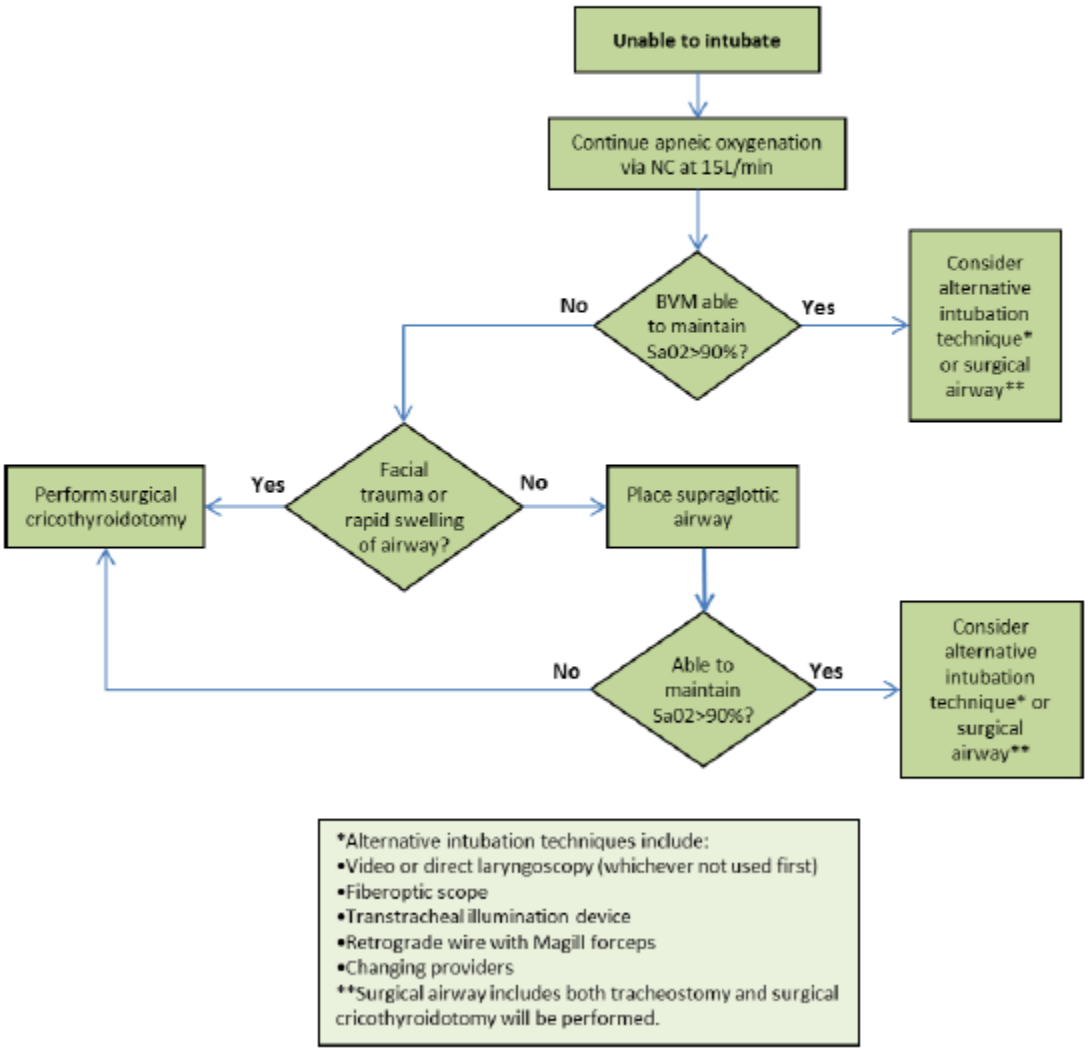
Unable to Intubate: Can You Mask Ventilate?

Mask Ventilation Pearls
- Skilled operator
- Good seal
- Jaw thrust
- Oral airway
- Nasal airway(s)
- Two operator mask ventilation

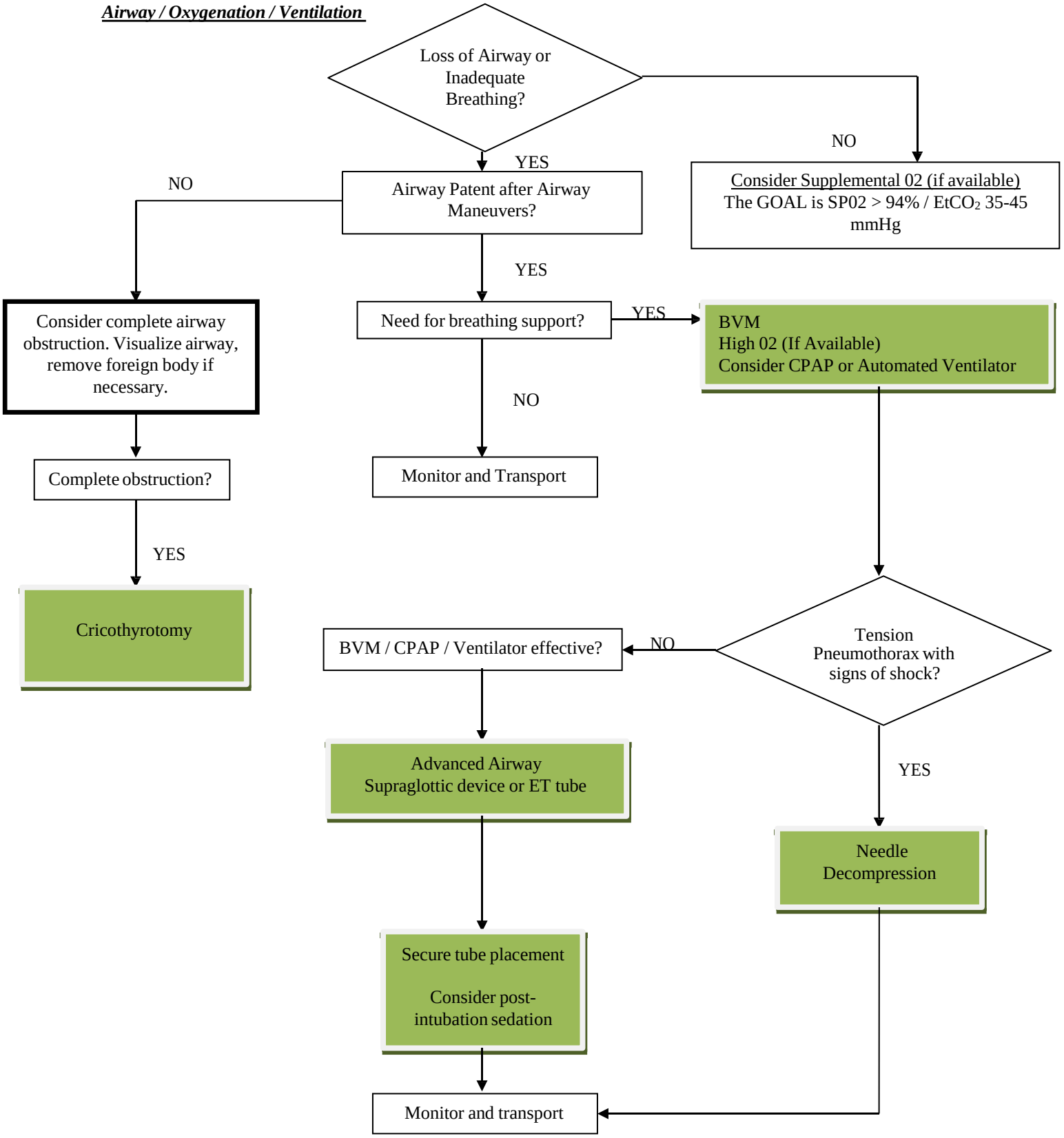
YES
- Improve position, change blade/operator, laryngeal manipulation technique, gum elastic bougie.
- Attempt alternate technique: Fiber optic, video laryngoscope, tracheal trans illumination device.
- More than ≈ 3 attempts at intubation may abolish your ability to mask ventilate due to edema caused by laryngoscopy.
- Surgical airway (Cricothyroidotomy or tracheostomy)

NO
- Emergency pathway...seconds matter.
- Supraglottic airway or
- Surgical cricothyroidotomy

APPENDIX B: DIFFICULT AIRWAY MANAGEMENT ALGORITHM



Airway / Oxygenation / Ventilation



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III. ADULT PATIENT CARE PROTOCOLS

2. ***Allergic / Anaphylactic Reaction***

A. Objectives:

1) To assess and appropriately treat patients with allergic reaction and/or anaphylaxis.

2) To differentiate between an allergic reaction and anaphylaxis.

B. General Information:

1) Rapidly progressing signs and symptoms shall be treated as anaphylaxis.

2) RS or RS-EMT's may use patients EPI-Pen or EPI-Pen from Med Kit.

3) In severe anaphylaxis with hypotension and/or severe airway obstruction, medical control may order Epinephrine 1: 10,000 IV.

4) Solu-Medrol should not be routinely administered to pediatric patients, however may be considered by medical control for extended transports.

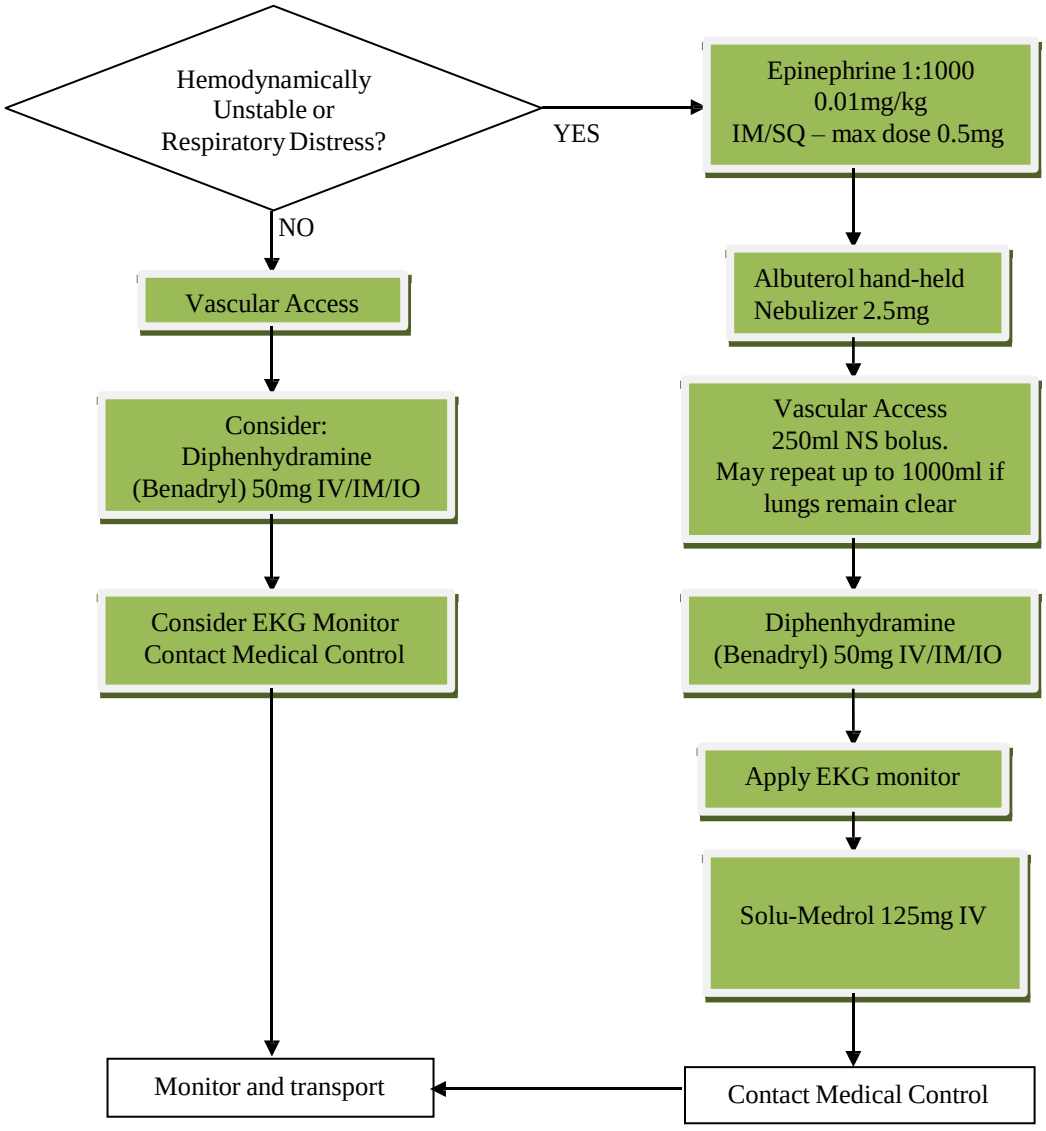
C. Warnings/Alerts:

1) Epinephrine 1:1000 shall not be given IV.

2) Contact medical control before administering Epinephrine to patients with cardiac HX or 40 years or older.

3) Maximum dose of Epinephrine 1:1000 is 0.5mg.

Allergic / Anaphylactic Reaction



III. ADULT PATIENT CARE PROTOCOLS

3. Altered Mental Status / Syncope

A. Objective:

1) To appropriately assess and treat patients with Altered Mental Status / Syncope

B. General Information:

1) Consider alternate causes using AEIOU-TIPS:
- Alcohol / Acidosis
- Epilepsy
- Insulin
- Overdose
- Uremia / Renal Failure
- Trauma
- Infection
- Psychosis
- Seizures

2) Rechecking glucose after all interventions.

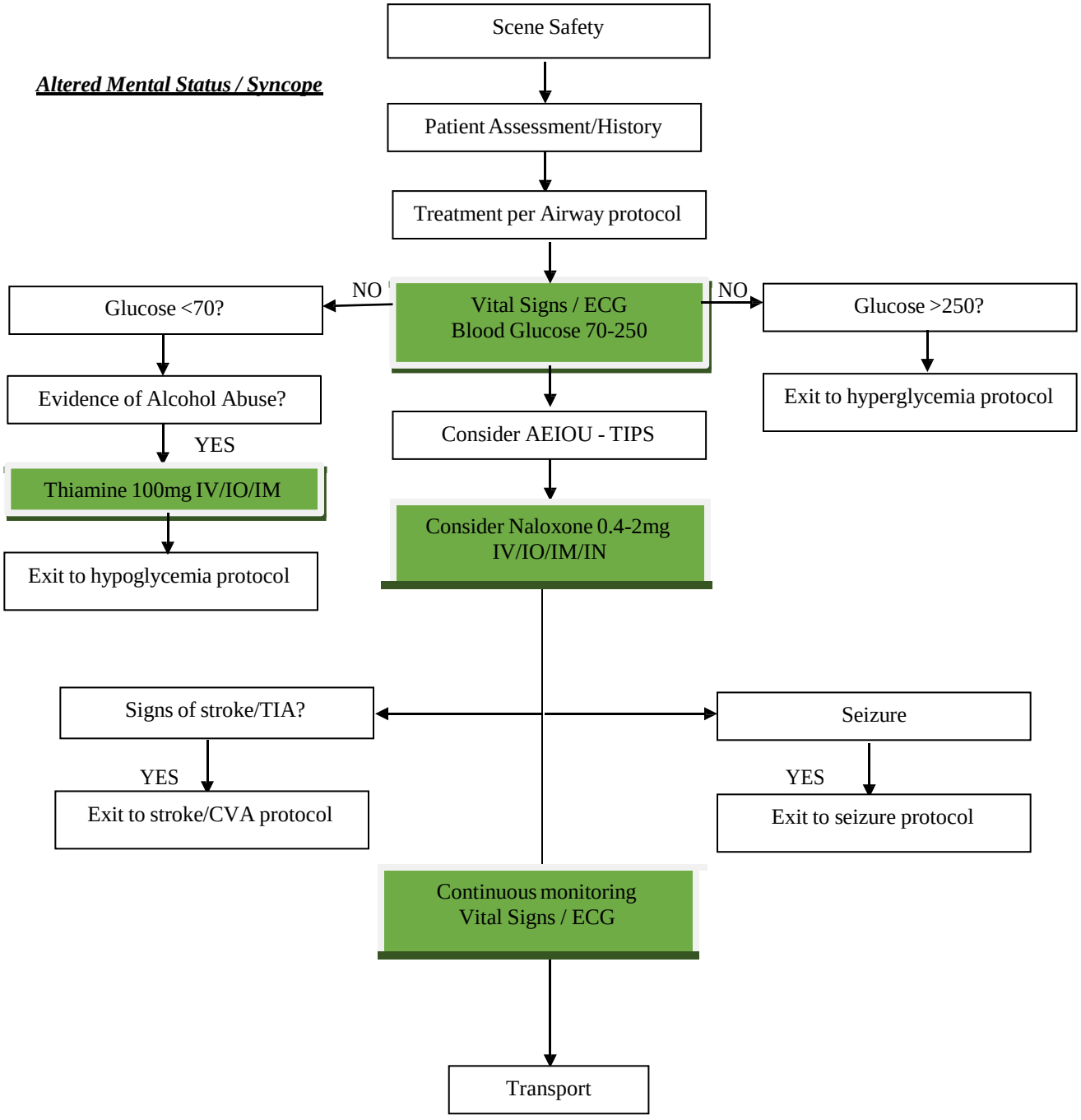
3) Assess for signs of trauma in any syncopal event.

4) EKG monitoring should be obtained in all suspected toxin or diabetic ketoacidosis events.

C. Warnings/Alerts:

1) Be aware of AMS as a presentation of environmental exposure, toxins, and hazmat. Use proper PPE and Decontamination procedures as appropriate.

Altered Mental Status / Syncope



III. ADULT PATIENT CARE PROTOCOLS

4. Altitude Medical Emergencies

D. Objective:

1) To appropriately assess and treat patients with Altitude Illness.

2) Descend to safe appropriate altitude and if symptoms do not resolve, begin treatment.

E. General Information:

1) Acute Mountain Sickness (AMS): Usually occurs at altitudes 8,000ft and higher. Symptoms can occur as quickly as 3 hours after ascent. Signs and symptoms are generally benign and self-limiting, but can become debilitating. Anorexia, nausea, vomiting, insomnia, dizziness, lassitude, and or fatigue.

2) High Altitude Pulmonary Edema (HAPE): Caused by hypoxia of altitude. HAPE is the most common cause of death at altitude. Usually occurs above 8,000ft. Respiratory distress at altitude is HAPE until proven otherwise. Hallmark sign is dyspnea at rest. Other symptoms may include cough, crackles upon auscultation, tachypnea, tachycardia, fever, or low SpO_2 sat disproportionate to elevation.

3) High Altitude Cerebral Edema (HACE): Rare below 11,500ft. Headache is common at altitude and not always associated with HACE. Ataxia and altered mental status at altitude are HACE until proven otherwise. Symptoms include unsteady, wide unbalanced gait and AMS.

F. Warnings/Alerts:

1) HAPE and HACE may coexist in the same patient. If suspected, treat both
2) HAPE and HACE should prompt emergent evacuation and descent
3) Individuals with HACE should not be left alone or allowed to descend alone
4) GAMOW Bag treatment is not a substitute for descent.
5) Minimize patient exertion during descent since this will exacerbate symptoms

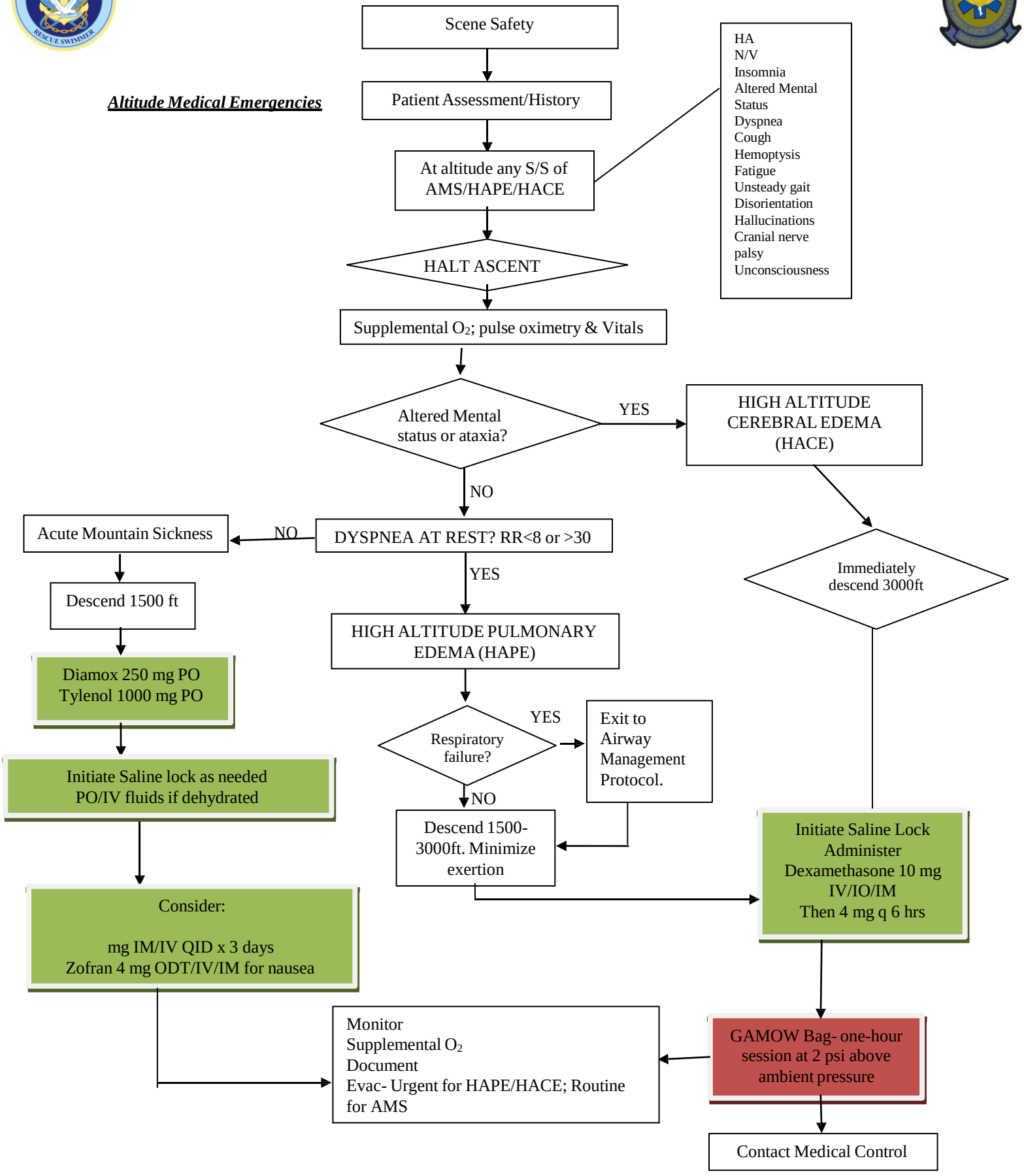
G. Medications/Treatments:

1) Diamox (Acetazolamide)- FOR AMS- 250 mg PO BID; contraindicated in patients with allergy to sulfa

2) Dexamethasone (Decadron)- FOR AMS- 4 mg PO q 6 hours (do not ascend until patient asymptomatic for 24 hours after administration); FOR HAPE/HACE- 10 mg IV/IO/IM STAT, then 4 mg IV/IO/IM q 6 hours

3) GAMOW Bag- One-hour session with bag inflated to 2 PSI above ambient pressure (approx.100 mmHg); repeat four to five times if tactically feasible

Altitude Medical Emergencies



III. ADULT PATIENT CARE PROTOCOLS

5. Bites and Stings

A. Objectives:

1) To appropriately assess and treat patients who receive bites and stings.

2) To identify source of bite and sting.

B. General Information:

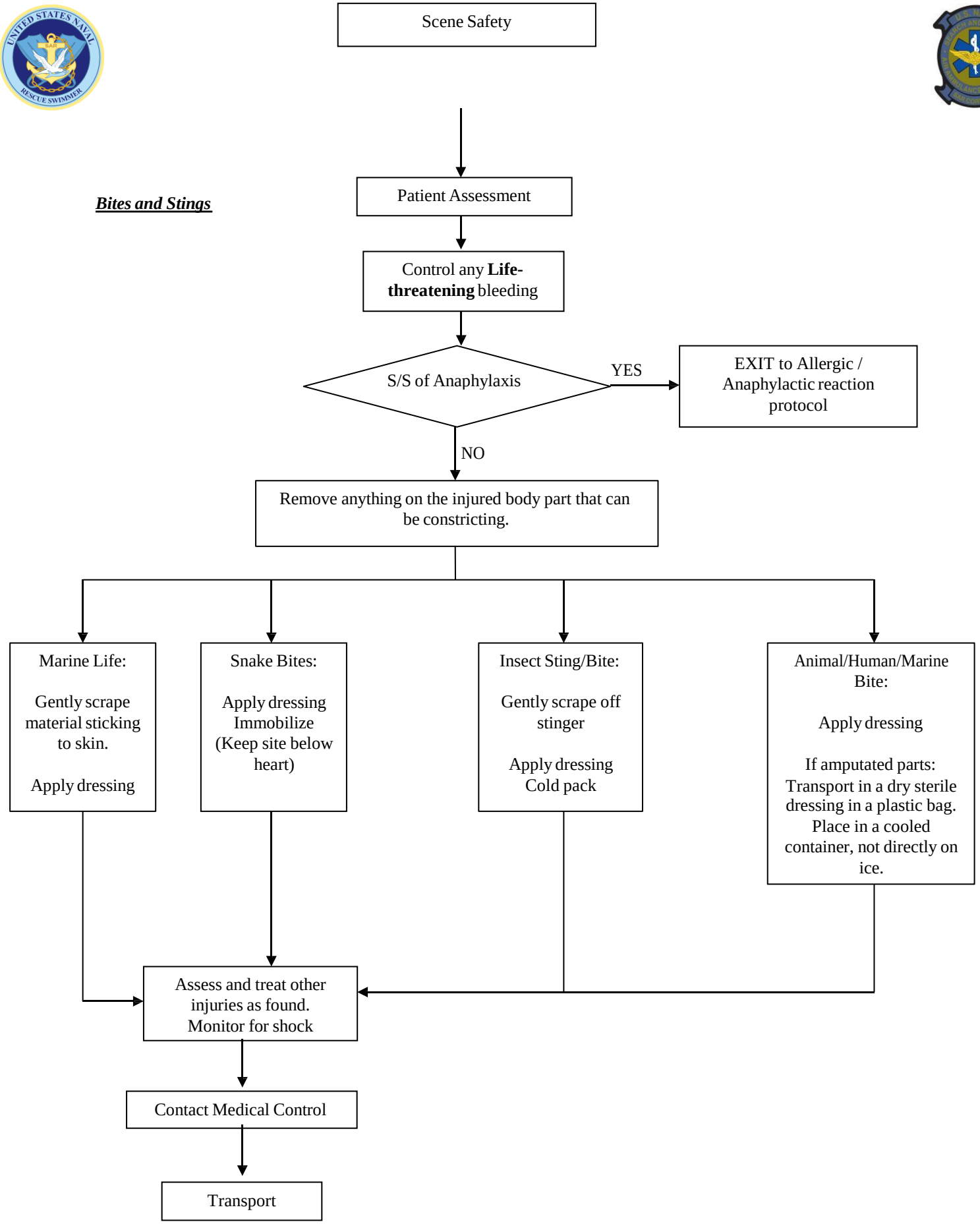
1) The use of constriction bands requires an order from Medical Control.

C. Warnings/Alerts:

1) Make no attempt to capture or kill the animal or insect that inflicted the bite or sting.

2) Shall not transport live animals in the Aircraft. Crew should consider extreme caution in transporting dead animal or consider taking picture of the animal to show Medical Control.

Bites and Stings



III. ADULT PATIENT CARE PROTOCOLS

6. Blood Component / Fresh Whole Blood Use:

A. Objectives:

1) Administration of Blood Components and Whole Blood as per JTS CPG's and DOD TCCC Protocols.

2) Calcium shall be pushed on all patients in hypovolemic shock, requiring blood products, or suspected trauma. 1gm Calcium slow IV/IO push via patent line.

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

CONTRAINIDICATIONS:

- 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

Blood Component / Fresh Whole Blood Use:

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

Blood Component / Fresh Whole Blood Use:

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.

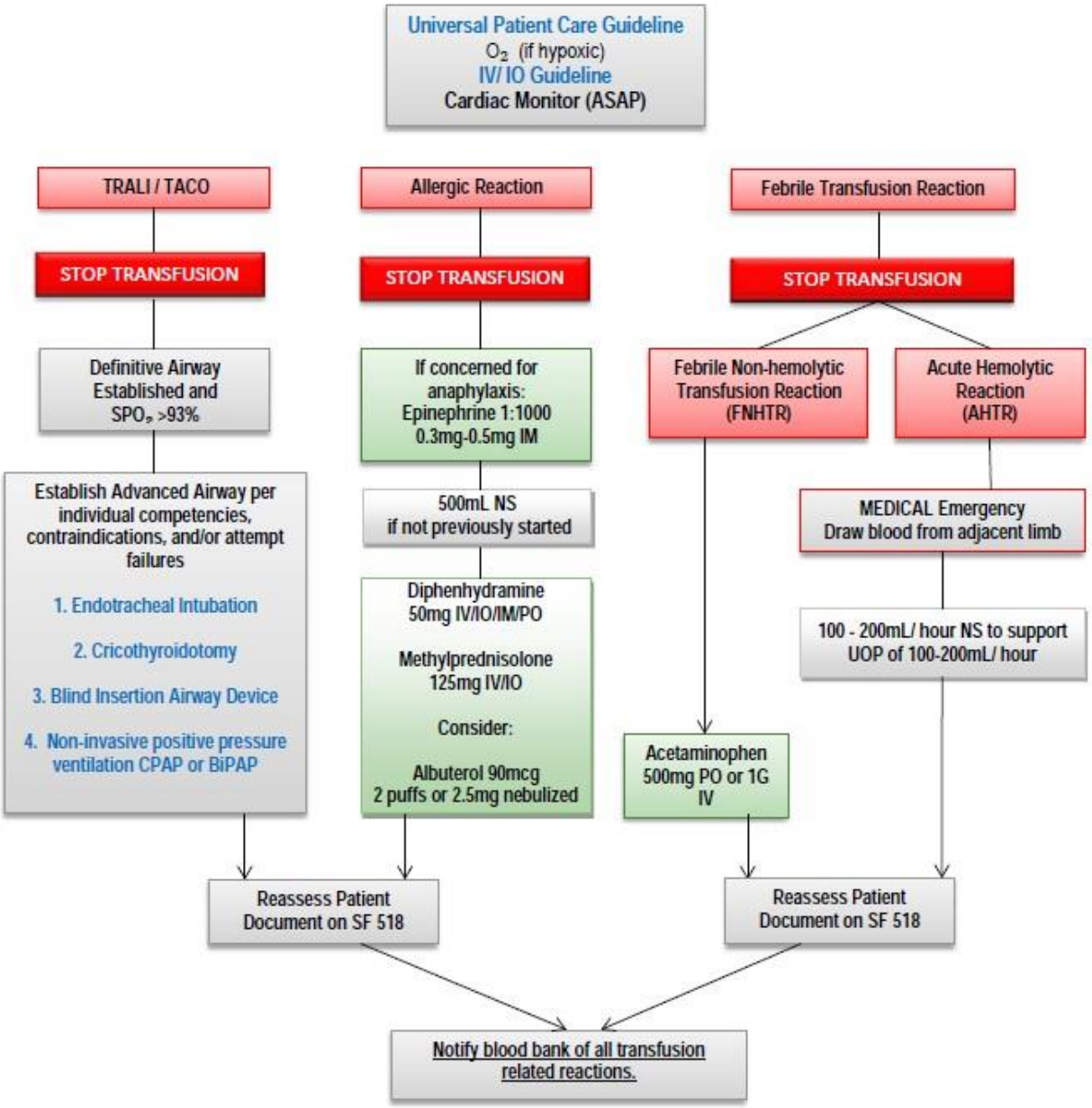
*** Blood component therapy is location specific and is not standard for all missions OCONUS and CONUS. Whole Blood not FDA approved will not be utilized on MEDEVAC air craft unless otherwise specified by area policy or Joint/Army Blood Program.

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

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 is 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.

Blood Component / Fresh Whole Blood Use:



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.

III. ADULT PATIENT CARE PROTOCOLS

7. *Breathing Difficulty:*

A. Objectives:

1) To assess and treat patients with breathing difficulty.

2) To determine the most likely cause of the patients breathing difficulty.

B. General Information:

1) A patient with a HX of CHF that has wheezing upon auscultation of lung sounds should not be automatically classified as asthma / COPD patient.

2) Congestive Heart Failure (CHF) is primarily a cardiac event, not a respiratory event. Treatment should be focused on reducing preload and after load. CPAP or aggressive BVM treatment is an appropriate first line treatment. Patients in end stage renal failure should get Medical Control orders before the administration of Lasix.

3) Bronchoconstriction (Asthma, COPD) patients in severe distress may receive Albuterol 2.5mg/ Atrovent 0.5mg duo Nebulizer as first line treatment. Atrovent shall only be used once.
For severe asthma Medical control may order:
- Epinephrine 1:1,000 0.01mg/kg IM, max dose of 0.5mg

C. Warnings/Alerts:

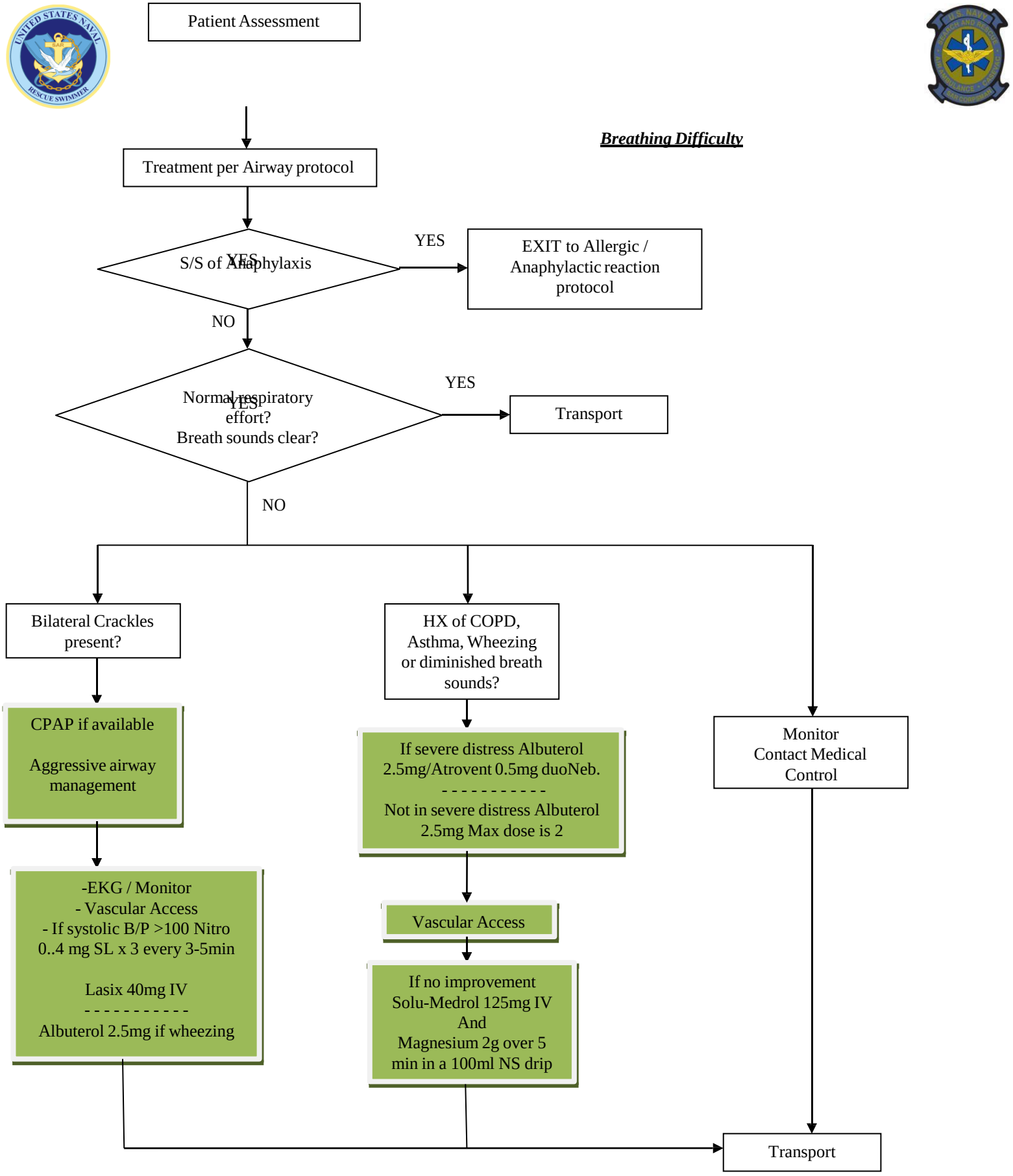
1) Do not administer Epinephrine 1:1,000 IV/IO

2) Do not administer Nitroglycerin to patients that have taken PDE inhibitors in the past 72 hours.

3) CPAP may worsen existing hypotension.

4) Patients must be conscious with regular respirations for CPAP to be effective.

5) Consider spontaneous pneumothorax vs. tension, monitor closely for s/s of shock.


Patient Assessment
Breathing Difficulty
Treatment per Airway protocol
S/S of Anaphylaxis
YES
YES
EXIT to Allergic / Anaphylactic reaction protocol
NO
Normal respiratory effort?
Breath sounds clear?
YES
YES
Transport
NO
Bilateral Crackles present?
HX of COPD, Asthma, Wheezing or diminished breath sounds?
Monitor
Contact Medical Control
CPAP if available
Aggressive airway management
If severe distress Albuterol 2.5mg/Atrovent 0.5mg duoNeb.
- - - - - - - - - - -
Not in severe distress Albuterol 2.5mg Max dose is 2
-EKG / Monitor
- Vascular Access
- If systolic B/P >100 Nitro 0..4 mg SL x 3 every 3-5min
Lasix 40mg IV
- - - - - - - - - - -
Albuterol 2.5mg if wheezing
Vascular Access
If no improvement
Solu-Medrol 125mg IV
And
Magnesium 2g over 5 min in a 100ml NS drip
Transport

III. ADULT PATIENT CARE PROTOCOLS

8. *Burns*

A. Objectives:

1) To assess and appropriately treat patients with burn injuries.

2) To determine the extent and severity of burn injuries.

B. General Information:

1) Stop the burning process.

2) Remove affected clothing, if clothing is stuck to skin cut the clothing instead of pulling it away.

3) Burned areas shall be covered with dry sterile dressings.

4) Parkland formula for IV Fluid Replacement

$$\frac{2ml \times BSAB \times weight}{} = total\ fluid\ in\ ml$$

Give this amount over first 8 hrs from time of injury, then equal amount over the next 16 hours

5) Urinary Output is the MOST reliable guide in predicting adequate resuscitation:
Adult: 0.5ml per kg per hour (100ml/hr for Electrical Burns)
Children: <40kg: 1ml/kg/hr

C. Warnings/Alerts:

1) Do not delay transport to start IV's or perform other non-life saving ALS interventions.

2) In mass casualty situations from Lighting Strikes, reverse triage should be performed (I.E. those in cardiac arrest should be resuscitated first). Ventricular fibrillation and asystole are the most common dysrhythmias.

3) Inhalation burns with impending airway compromise should be treated with aggressive airway management. Burns with >40%, will likely require RSI due to airway edema from inflammation/fluid resuscitation.

4) Burn patients are prone to hypothermia and shall be protected from the environment. Avoid using ice to cool "large" affected areas.

5) Never use nitrates for suspected Cyanide toxicity in enclosed space fires, it can worsen hypoxia. If a suspected cyanide toxicity, consider use of hydroxcobalmin (CYANOKIT)

Burns

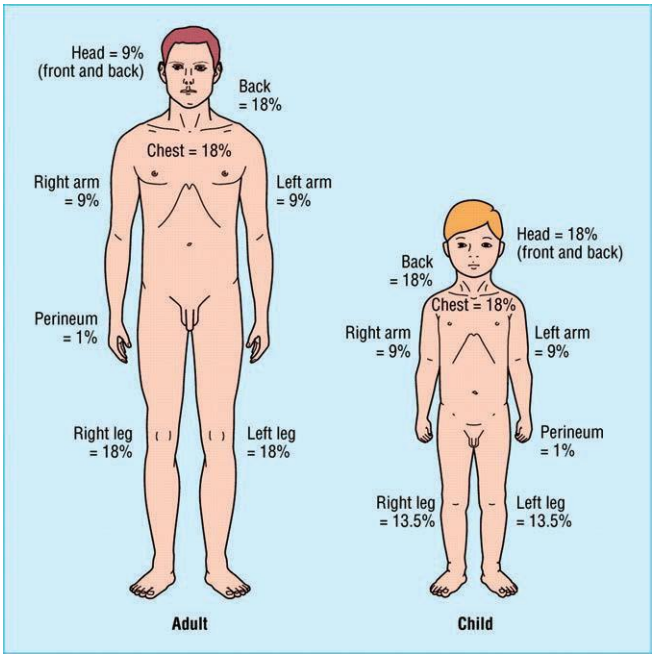
Patient Assessment

Treatment per Airway protocol

Stop the burning process

Consider aggressive airway management for inhalation injury

Estimate body surface burned



Monitor
Prevent and
Treat for Hypothermia

All Electric burns or possible electrocutions require EKG Monitoring.

Vascular Access
2ml X BSAB x weight = total fluid in ml

Pain medications per Pain Protocols

Transport to burn center or Level 1 trauma center as appropriate.

III. ADULT PATIENT CARE PROTOCOLS

9. *Cerebral Vascular Accident*

A. Objectives:

1) To assess and appropriately treat patients with suspected CVA or Stroke.

B) General Information:

1) Obtain specific history:
- Onset of stroke symptoms
- List of signs/symptoms
- Previous CVA?
- New onset dysrhythmias

2) From time of first signs and symptoms to advance level of care, timeline of transport should be under 90 minutes.

3) Cincinnati Prehospital Stroke Scale is preferred method of prehospital determination. In the event that the assessment of the patient is done in the aircraft, the Los Angeles Pre-Hospital Stroke Screen (LAPSS) should be done.

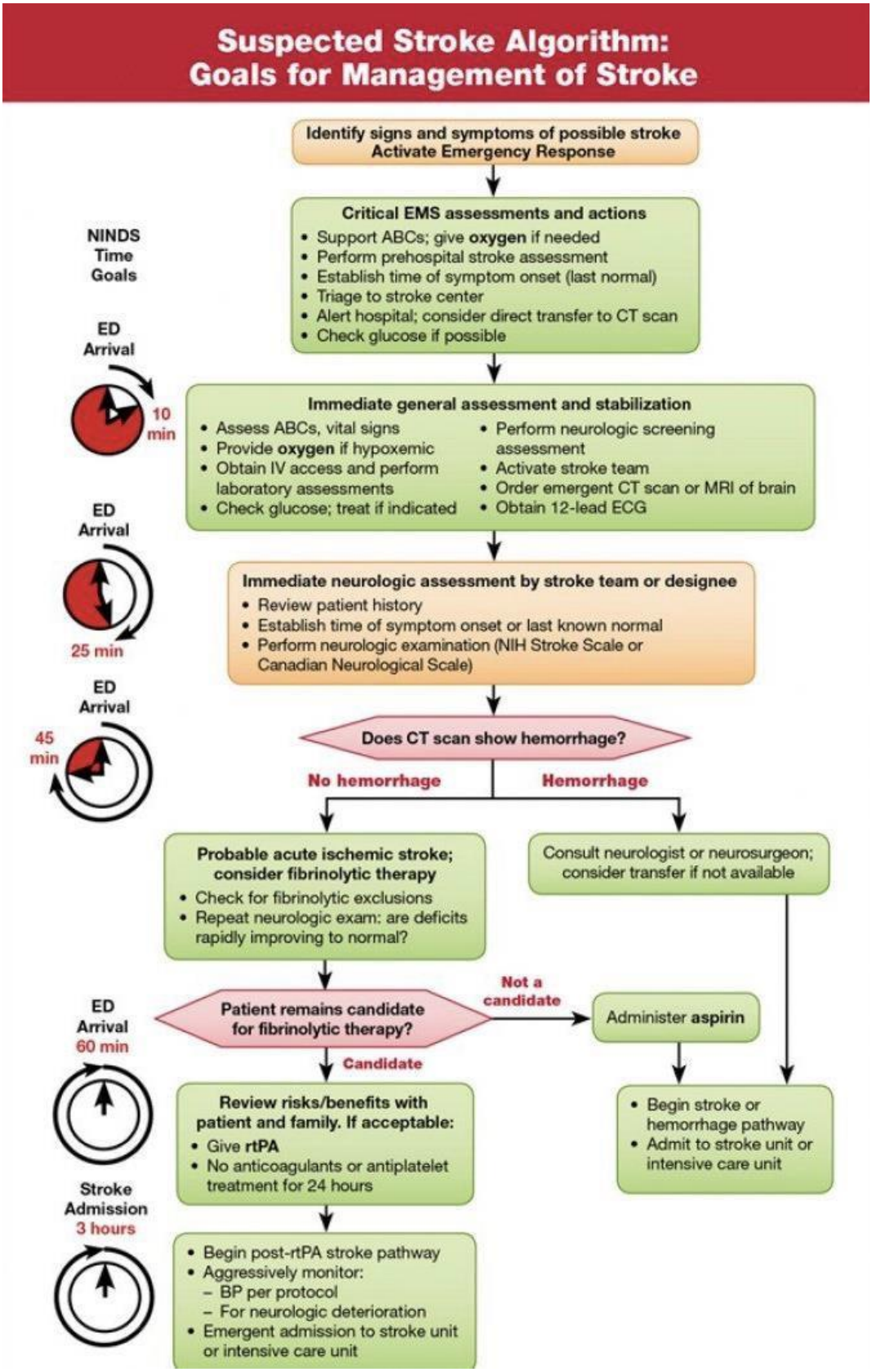
4) Using the Cincinnati Scale, if any of the screening questions are answered yes and the exam is positive for any one Stroke signs and symptoms then the patient should be treated as a Cerebral Vascular Accident. Information shall be relayed to the appropriate next level of care to relay the Cincinnati Stroke Scale results.

C. Warnings/Alerts:

1) Do not delay transport to start IV's or perform other non-life-saving ALS interventions.

2) Patients with stroke symptoms are at high risk for airway compromise.

3) Hypoxemia will worsen stroke outcomes.


Suspected Stroke Algorithm:
Goals for Management of Stroke
Identify signs and symptoms of possible stroke
Activate Emergency Response
NINDS Time Goals
Critical EMS assessments and actions
• Support ABCs; give oxygen if needed
• Perform prehospital stroke assessment
• Establish time of symptom onset (last normal)
• Triage to stroke center
• Alert hospital; consider direct transfer to CT scan
• Check glucose if possible
ED Arrival
10 min
Immediate general assessment and stabilization
• Assess ABCs, vital signs
• Provide oxygen if hypoxemic
• Obtain IV access and perform laboratory assessments
• Check glucose; treat if indicated
• Perform neurologic screening assessment
• Activate stroke team
• Order emergent CT scan or MRI of brain
• Obtain 12-lead ECG
ED Arrival
25 min
Immediate neurologic assessment by stroke team or designee
• Review patient history
• Establish time of symptom onset or last known normal
• Perform neurologic examination (NIH Stroke Scale or Canadian Neurological Scale)
ED Arrival
45 min
Does CT scan show hemorrhage?
No hemorrhage
Hemorrhage
Probable acute ischemic stroke; consider fibrinolytic therapy
• Check for fibrinolytic exclusions
• Repeat neurologic exam: are deficits rapidly improving to normal?
Consult neurologist or neurosurgeon; consider transfer if not available
ED Arrival 60 min
Patient remains candidate for fibrinolytic therapy?
Not a candidate
Administer aspirin
Candidate
Review risks/benefits with patient and family. If acceptable:
• Give rtPA
• No anticoagulants or antiplatelet treatment for 24 hours
• Begin stroke or hemorrhage pathway
• Admit to stroke unit or intensive care unit
Stroke Admission 3 hours
• Begin post-rtPA stroke pathway
• Aggressively monitor:
– BP per protocol
– For neurologic deterioration
• Emergent admission to stroke unit or intensive care unit

Out-of-Hospital Assessment of the Patient With Acute Stroke

- Ensure adequate airway
- Measure vital signs frequently
- Conduct general medical/trauma assessment
  - Trauma of head or neck
  - Cardiovascular abnormalities
  - Check pupils
  - Check glucose level
- Conduct neurologic examination
  - Level of consciousness
  - Cincinnati Prehospital Stroke Scale (+/–)
  - Los Angeles Prehospital Stroke Screen (+/–)
  - Glasgow Coma Scale (score/15)
  - Report right and left limb movements
  - Report meningeal signs (yes/no)
  - Report time of onset of symptoms
  - Report any seizure activity
  - Provide prearrival notification to receiving hospital of potential stroke patient

Glasgow Coma Scale

	Score (maximum = 15)
Eye opening	
Spontaneous	4
In response to speech	3
In response to pain	2
None	1
Best verbal response	
Oriented conversation	5
Confused conversation	4
Inappropriate words	3
Incomprehensible sounds	2
None	1
Best motor response	
Obeys	6
Localizes	5
Withdraws	4
Abnormal flexion	3
Abnormal extension	2
None	1

Interpretation:
Score 14 to 15: Mild dysfunction
Score 11 to 13: Moderate to severe dysfunction
Score 10: Severe dysfunction

The Cincinnati Prehospital Stroke Scale

(Kothari R, et al. *Acad Emerg Med*. 1997;4:986-990.)

Facial Droop (have the patient show teeth or smile):
- Normal—both sides of face move equally
- Abnormal—one side of face does not move as well as the other side

Arm Drift (patient closes eyes and extends both arms straight out, with palms up, for 10 seconds):
- Normal—both arms move the same *or* both arms do not move at all (other findings, such as pronator drift, may be helpful)
- Abnormal—one arm does not move *or* one arm drifts down compared with the other

Abnormal Speech (have the patient say "you can't teach an old dog new tricks"):
- Normal—patient uses correct words with no slurring
- Abnormal—patient slurs words, uses the wrong words, *or* is unable to speak

Interpretation: If any *1* of these 3 signs is abnormal, the probability of a stroke is 72%.

Left: normal. Right: stroke patient with facial droop (right side of face).

Los Angeles Prehospital Stroke Screen (LAPSS)

For *evaluation of acute, noncomatose, nontraumatic neurologic complaint*. If items 1 through 6 are ***all* checked "Yes"** (or "Unknown"), provide prearrival notification to hospital of potential stroke patient. If any item is checked "No," return to appropriate treatment protocol. *Interpretation:* 93% of patients with stroke will have a positive LAPSS score (sensitivity = 93%), and 97% of those with a positive LAPSS score will have a stroke (specificity = 97%). Note that the patient may still be experiencing a stroke if LAPSS criteria are not met.

Criteria	Yes	Unknown	No
1. Age >45 years	❑	❑	❑
2. History of seizures or epilepsy **absent**	❑	❑	❑
3. Symptom duration <24 hours	❑	❑	❑
4. At baseline, patient is **not** wheelchair bound or bedridden	❑	❑	❑
5. Blood glucose between 60 and 400	❑	❑	❑

6. ***Obvious asymmetry*** (right vs left) in ***any*** of the following 3 exam categories **(must be unilateral):**

	Equal	R Weak	L Weak
Facial smile/grimace	❑	❑ Droop	❑ Droop
Grip	❑	❑ Weak grip	❑ Weak grip
		❑ No grip	❑ No grip
Arm strength	❑	❑ Drifts down	❑ Drifts down
		❑ Falls rapidly	❑ Falls rapidly

Kidwell CS, Saver JL, Schubert GB, Eckstein M, Starkman S. Design and retrospective analysis of the Los Angeles prehospital stroke screen (LAPSS). *Prehosp Emerg Care*. 1998;2:267-273.

Kidwell CS, Starkman S, Eckstein M, Weems K, Saver JL. Identifying stroke in the field: prospective validation of the Los Angeles Prehospital Stroke Screen (LAPSS). *Stroke*. 2000;31:71-76.

One-sided motor weakness (right arm).

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III. ADULT PATIENT CARE PROTOCOLS

10. *Chemical Exposure*

A. Objectives:

1) To assess and treat patients who have been poisoned by various substances.

B. General Information:

1) If the scene is unsafe, do not put your aircraft in an unsafe environment.

2) Dry chemicals shall be brushed off before flushing the skin or eyes with water.

3) Chemical exposure to eyes can be flushed with IV saline.

4) Removed all contaminated clothing.

5) Asphyxiants:
- Examples – Carbon monoxide, cyanide, hydrogen sulfide
- Pulse oximetry may be unreliable due to effect on red blood cells

Cholinergic:
- Examples – Organophosphates, carbamates, military nerve agents

SLUDGE – Salvation, Lacrimation, Urination, Defecation, Gastro cramping, Emesis

Corrosives:
- Examples – Acids and Bases

Do not induce vomiting. Consider aggressive airway management because of mucous membrane swelling.

Hydrocarbons:
- Examples – Gasoline, methane, toluene

Do not induce vomiting.

Irritant Gas:
- Examples – Chlorine, ammonia, phosgene

Aggressive airway management per protocol.

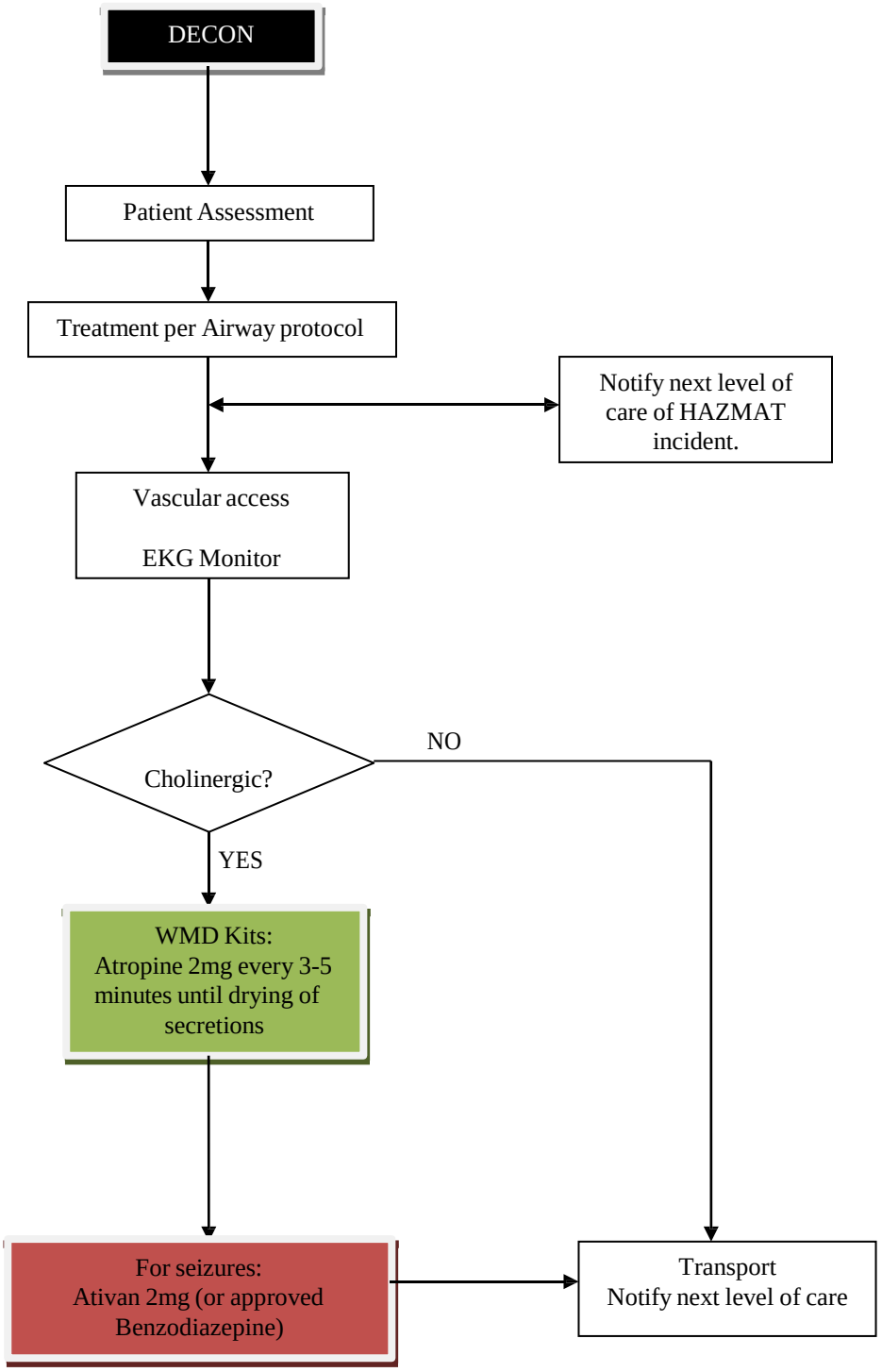
C. Warnings/Alerts:

1) Do not bring any hazardous material in the aircraft.

2) Do not use diuretics or nitroglycerin for patients with non-cardiogenic pulmonary edema.

3) PPE for the crew/providers is paramount when treating any suspected chemical exposure.

Chemical Exposure



III. ADULT PATIENT CARE PROTOCOLS

11. ***Chest Pain / AMI / ACS***

A. Objectives:

1) To assess and appropriately treat patients with chest pain or suspected AMI.

2) To eliminate patient's chest pain.

B. General Information:

1) Do not administer Aspirin in the following cases:
- HX of GI bleeding or bleeding disorders.
- HX of recent surgery
- Already taken max dose of Aspirin (324mg)
- Sensitivity / Allergy to aspirin

2) Nitroglycerin should be given to patients without IV/IO access only if blood pressure is > 100 mmHg.

3) Morphine may be administered concurrently with nitroglycerin.

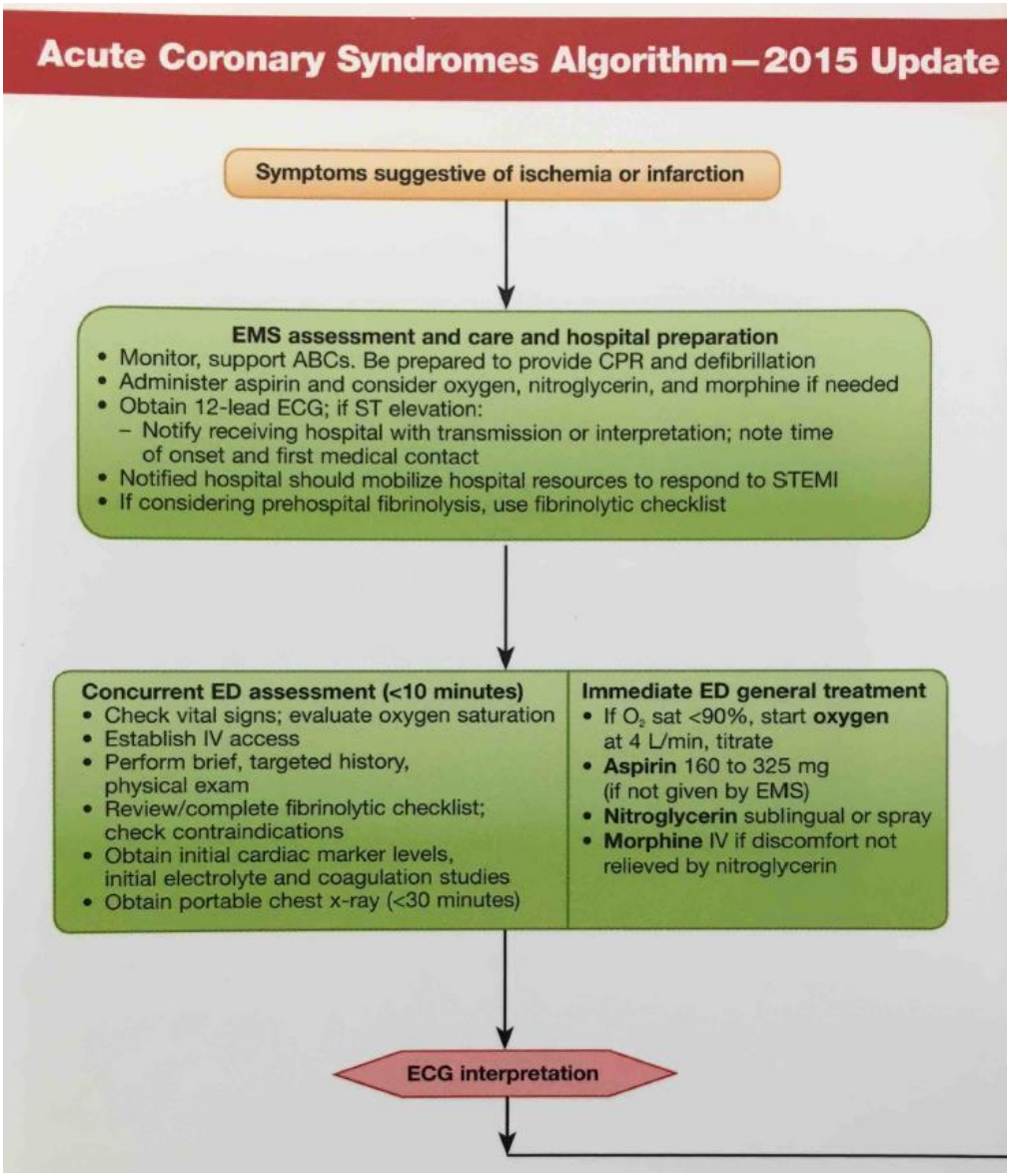
4) If the patient has cocaine-induced chest pain, Valium 5mg IV/IM may be given at discretion of Medical Control.

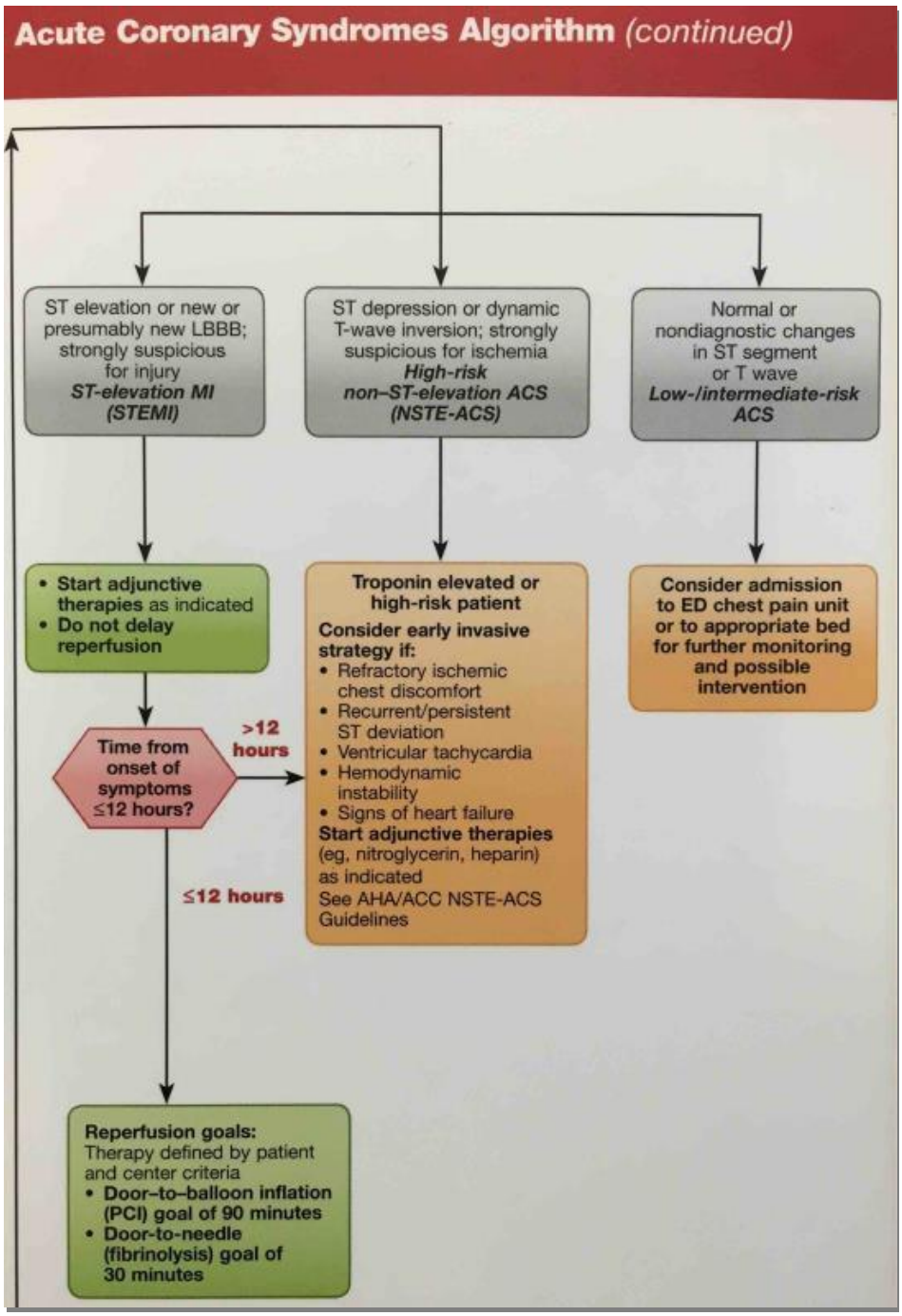
5) Do not delay patient treatment to obtain 12 Lead EKG.

C. Warnings/Alerts:

1) Do not administer nitroglycerin to patients that have taken PDE inhibitors in the past 72 hours.

2) Do not administer more than three nitroglycerin doses in a 15-minute time period.


Acute Coronary Syndromes Algorithm—2015 Update
Symptoms suggestive of ischemia or infarction
EMS assessment and care and hospital preparation
• Monitor, support ABCs. Be prepared to provide CPR and defibrillation
• Administer aspirin and consider oxygen, nitroglycerin, and morphine if needed
• Obtain 12-lead ECG; if ST elevation:
– Notify receiving hospital with transmission or interpretation; note time of onset and first medical contact
• Notified hospital should mobilize hospital resources to respond to STEMI
• If considering prehospital fibrinolysis, use fibrinolytic checklist
Concurrent ED assessment (<10 minutes)
• Check vital signs; evaluate oxygen saturation
• Establish IV access
• Perform brief, targeted history, physical exam
• Review/complete fibrinolytic checklist; check contraindications
• Obtain initial cardiac marker levels, initial electrolyte and coagulation studies
• Obtain portable chest x-ray (<30 minutes)
Immediate ED general treatment
• If O_2 sat <90%, start **oxygen** at 4 L/min, titrate
• **Aspirin** 160 to 325 mg (if not given by EMS)
• **Nitroglycerin** sublingual or spray
• **Morphine** IV if discomfort not relieved by nitroglycerin
ECG interpretation


Acute Coronary Syndromes Algorithm (continued)
ST elevation or new or presumably new LBBB; strongly suspicious for injury
ST-elevation MI (STEMI)
ST depression or dynamic T-wave inversion; strongly suspicious for ischemia
High-risk non–ST-elevation ACS (NSTE-ACS)
Normal or nondiagnostic changes in ST segment or T wave
Low-/intermediate-risk ACS
• Start adjunctive therapies as indicated
• Do not delay reperfusion
Time from onset of symptoms ≤12 hours?
>12 hours
≤12 hours
Troponin elevated or high-risk patient
Consider early invasive strategy if:
• Refractory ischemic chest discomfort
• Recurrent/persistent ST deviation
• Ventricular tachycardia
• Hemodynamic instability
• Signs of heart failure
Start adjunctive therapies (eg, nitroglycerin, heparin) as indicated
See AHA/ACC NSTE-ACS Guidelines
Consider admission to ED chest pain unit or to appropriate bed for further monitoring and possible intervention
Reperfusion goals:
Therapy defined by patient and center criteria
• Door–to–balloon inflation (PCI) goal of 90 minutes
• Door-to-needle (fibrinolysis) goal of 30 minutes

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III. ADULT PATIENT CARE PROTOCOLS

12. ***Combative Patient***

A. Objectives:

1) To assess and appropriately treat a patient who is combative.

2) To ensure patient safety and safety for Aircrew.

B. General Information:

1) All patients shall be disarmed by ground medics before transport to aircraft.

2) Physical Restraint Guidelines:
- Soft restraints may be sufficient
- If Law enforcement is available, use their restraints under their supervision
- Do not endanger yourself, crew, or aircraft
- Flex cuffs, zip ties, or tie downs are authorized for in-flight environment restraints

3) Avoid placing restraints in such a way as to preclude evaluation of the patient or will cause further harm.

4) Chemical Restraint Guidelines:
- Sedative agents may be used to provide safe, humane method of restraining the violently combative patient. Ativan 2mg IM or Ketamine 2-4mg/kg
- Consider 50mg IV/IM diphenhydramine (Benadryl) if patient exhibits signs of dystonic reaction.

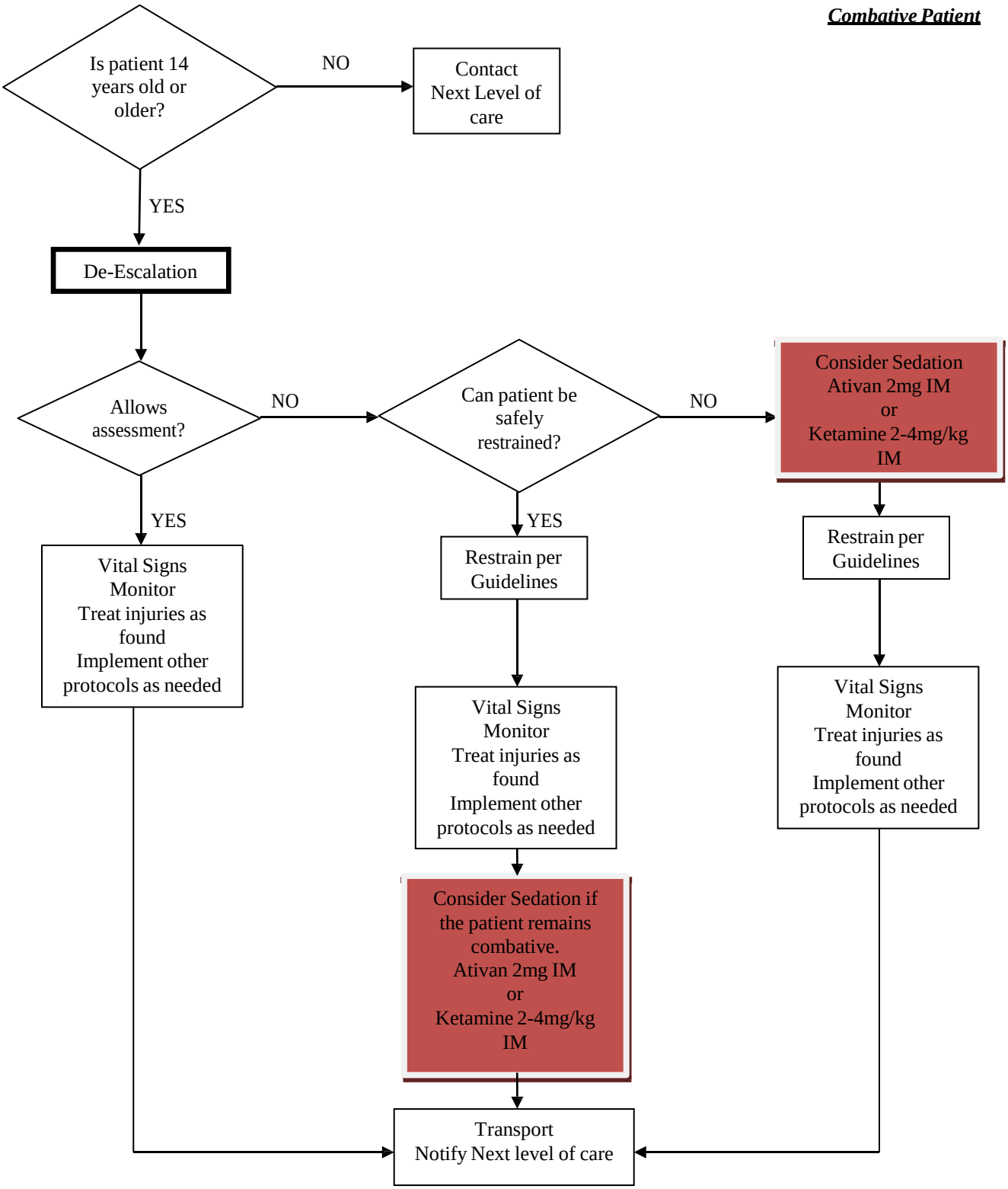
C. Warnings/Alerts:

1) All patients who receive chemical restraints shall be physically restrained.

2) Consider closed head injury/brain bleed in cases of combative patients. Complete neurologic assessment shall be completed and documented.

3) Providers shall avoid using any other restraints other than the once listed.

Combative Patient



III. ADULT PATIENT CARE PROTOCOLS

13. *Crush Syndrome*

A. Objectives:

1) To assess and appropriately treat patients with suspected crush injuries/syndrome.

B. General Information:

1) Entrapped patients under heavy loads greater than 30 minutes shall be treated as suspected crush syndrome.

2) Serious signs and symptoms are:
- Hypotension
- Hypothermia
- Abnormal ECG findings
- Pain
- Anxiety

C. Warnings/Alerts:

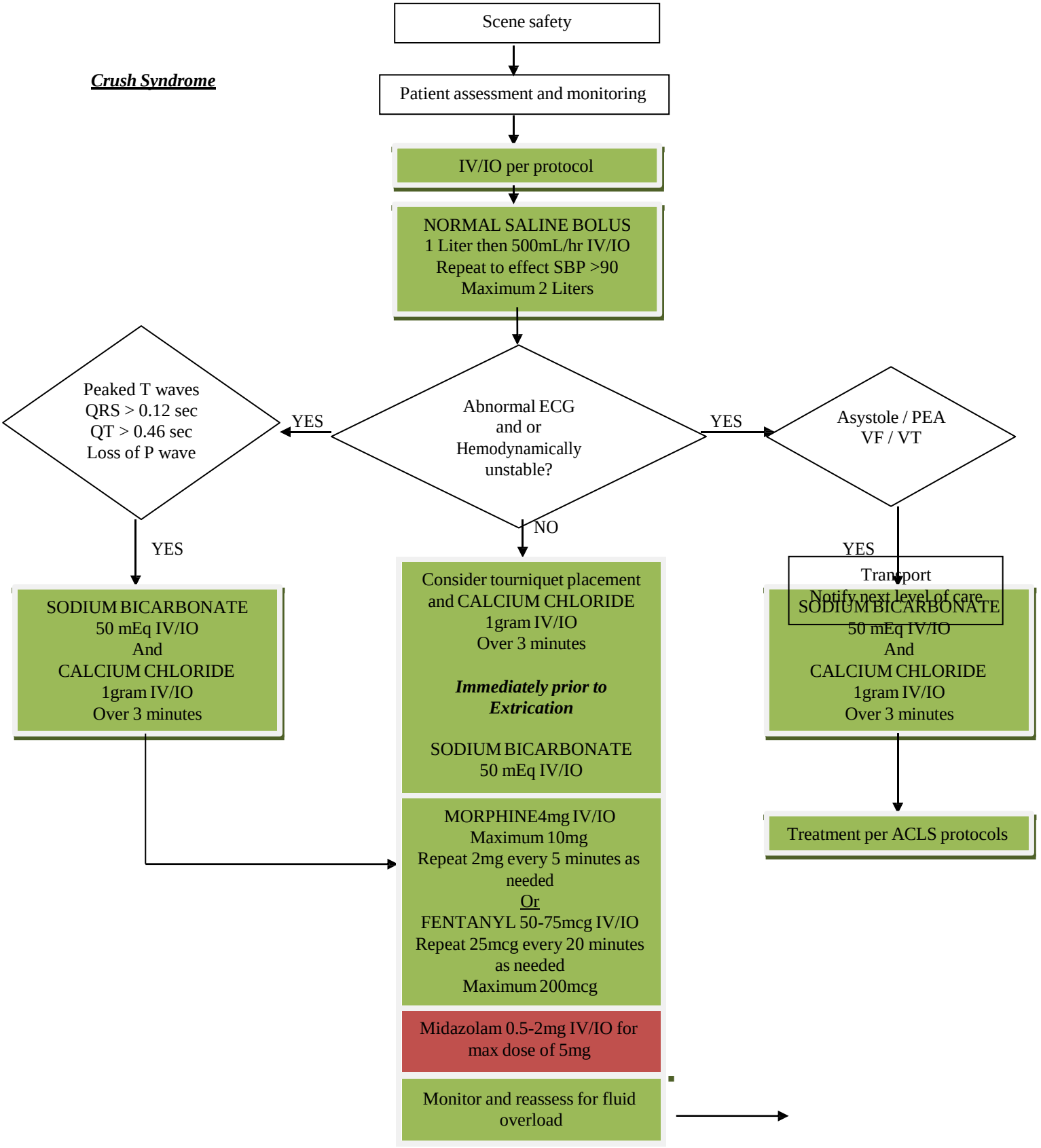
1) Scene safety is of paramount importance as typical scenes pose hazards to rescuers. Call for appropriate resources.

2) Avoid Ringers Lactate IV solution due to potential worsening of hyperkalemia.

3) Hyperkalemia from crush syndrome can produce ECG changes described in protocol, but may also be a bizarre wide complex rhythm. Wide complex rhythms should also be treated using VF/Pulseless VT Protocol with the focus on hyperkalemia.

4) Patients may become hypothermic even in warm environments.

Crush Syndrome



III. ADULT PATIENT CARE PROTOCOLS

14. *Dialysis/ Renal Failure*

A. Objectives:

1) To assess and appropriately treat patients who receive dialysis.

B. General Information:

1) Dialysis patients are very susceptible to electrolyte imbalances and hypoglycemia.

2) Serious signs and symptoms of electrolyte imbalances are:
- Weakness
- Chest pain / pressure
- Peaked T waves on an EKG
- Hypo/Hypertension
- Pulmonary Edema
- Headaches
- Dizziness

3) Blood pressure and IV's shall not be taken or given on extremities with shunts.

4) Bleeding from shunts can be difficult to control, do not apply tourniquet directly on top of shunt. If possible, apply tourniquet above the affected area.

5) For cardiac arrest in dialysis patients, calcium chloride 1g IV/IO followed by 40ml flush and sodium bicarbonate 1 meq/kg IV/IO should be administered as first line medications.

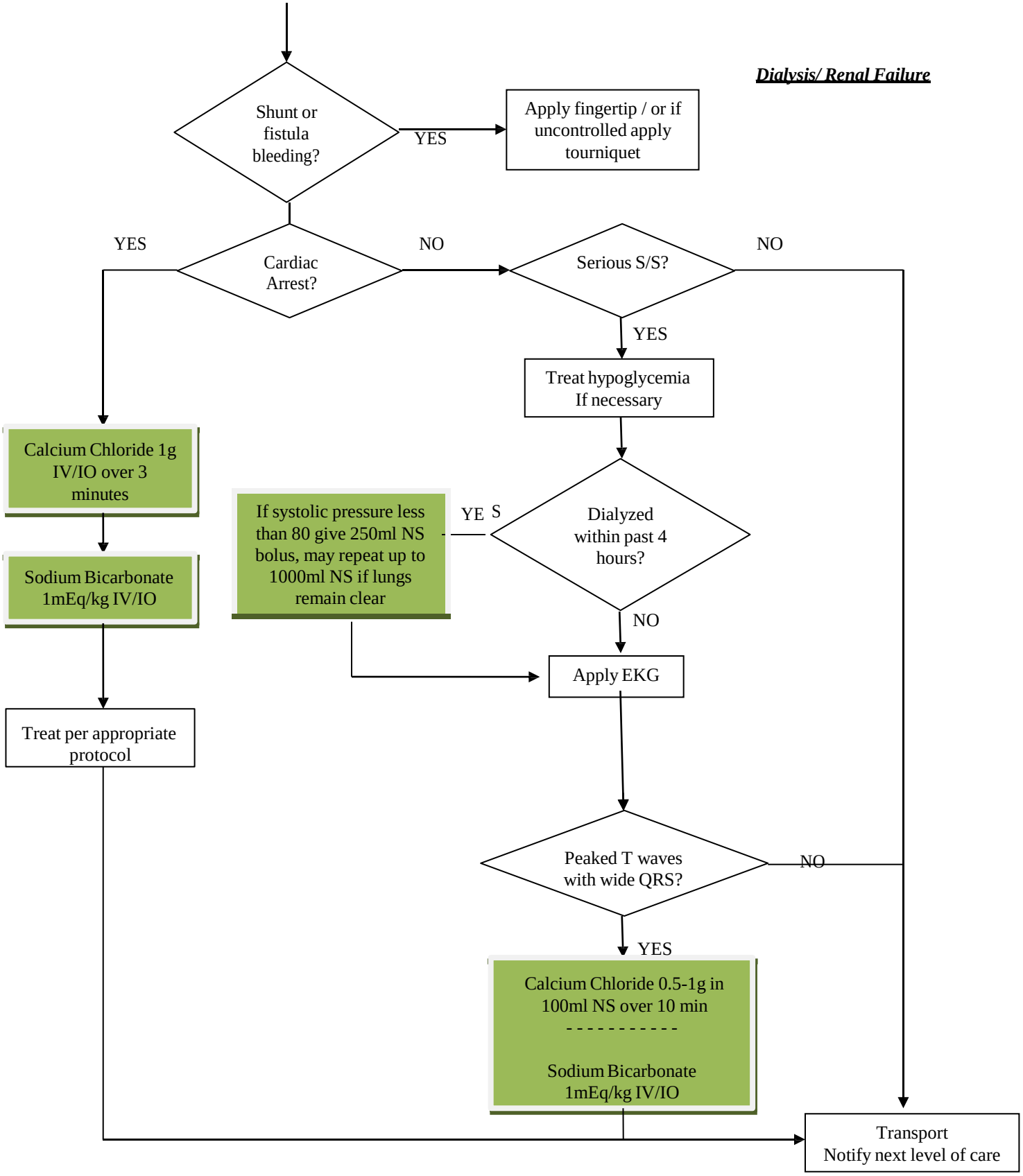
C. Warnings/Alerts:

1) Do not use tourniquets directly on shunt or fistula.

2) Do not give magnesium sulfate to renal failure patients.

3) Flush IV lines thoroughly between sodium bicarbonate and calcium chloride administration.

Dialysis/ Renal Failure



III. ADULT PATIENT CARE PROTOCOLS

15. ***Diving Medical Disorders / Flight Physiology Events***

A. Objectives:

1) To assess and appropriately treat patients who are experiencing a diving medical disorder

B. General Information:

1) Altitude precautions shall be considered in transporting these patients.

2) 100% O_2 via non rebreather if patient is conscious shall be applied, to flush out all N2 from the blood stream.

3) The patients diving gear shall be transported with the patient. (I.E tanks, depth gauge, dive watch, rebreathing apparatus, etc…)

4) Maintain Carboxyhemoglobin levels via RAD57 Device at 1-5%. Any reading over 5% after a Flight Physiology event shall be placed on 100% O_2 via NRB until levels are less than 5%.

C. Warnings/Alerts:

1) Transport patients in supine position.

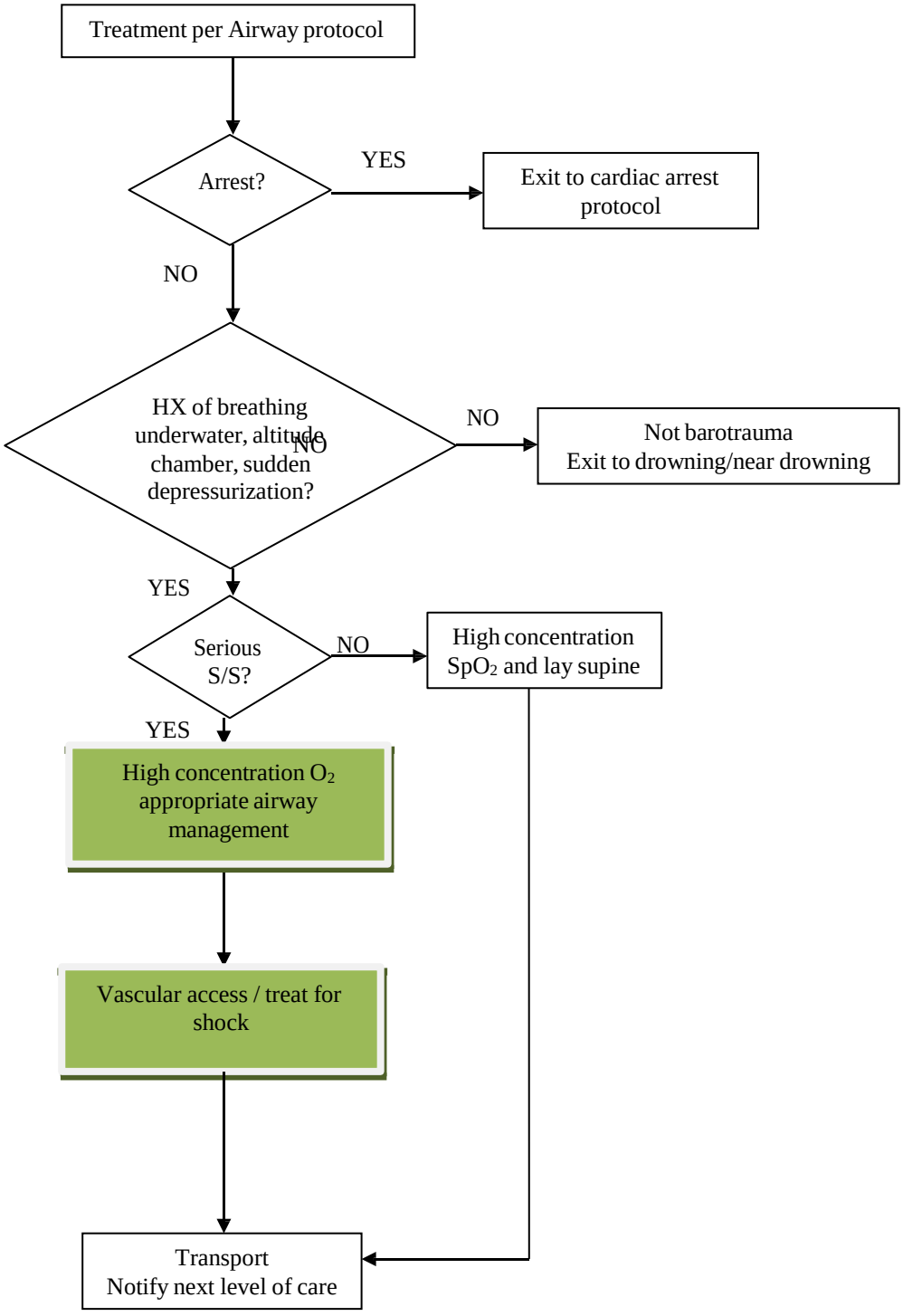
2) Only transport to facilities with hyperbaric chambers in local area.
Diving Alert Network (Duke University): 919-684-9111
For information on closest chamber: http://www.diversalertnetwork.org/

3) Increasing altitude for these patients can severely increase signs and symptoms or cause fatal harm.

D. Notes:

1) Dive Medical HX:
   a. Type of dive performed, depth, duration.
   b. Number of dives in the last 24hrs.
   c. When were the symptoms noticed: Before, during, or after the dive.
   d. Was it during descending, the bottom or ascending?
   e. Has the symptom/s increased, decreased, or stayed the same.
   f. Have you ever had DCS or AGE before, when?

Diving Medical Disorders



III. ADULT PATIENT CARE PROTOCOLS

16. *Drowning / Near Drowning*

A. Objectives:

1) To assess and appropriately treat patients who have experienced a submersion injury.

B. Warnings/Alerts:

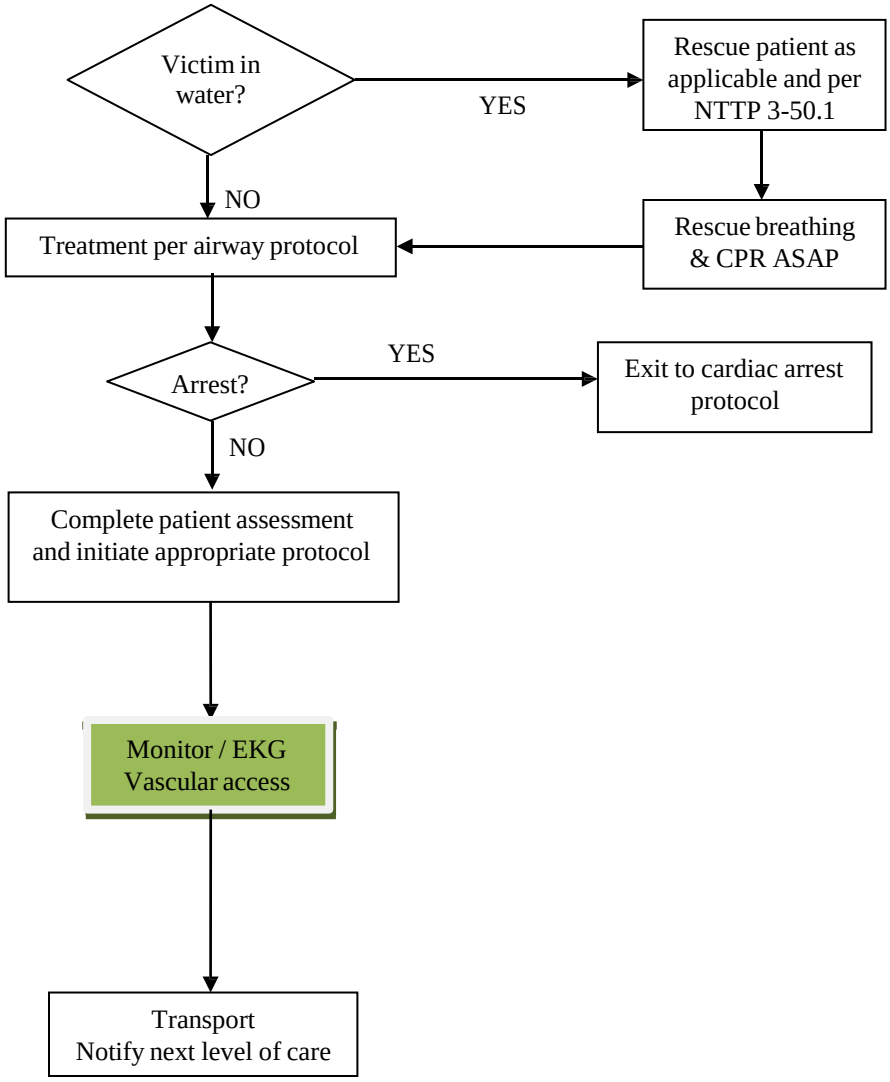
1) All patients with submersion incidents shall be transported for evaluation. Patients are in high risk of developing life-threatening pulmonary edema within 72 hours of incident.

2) Do not insert an NG tube without securing the airway with an ET tube.

3) Patients shall be considered for C-spine precautions, as diving injuries are associated with spinal injury.

4) Drowning is the leading cause of death among would-be rescuers.

Drowning / Near Drowning



III. ADULT PATIENT CARE PROTOCOLS

17. *Head Injury / Suspected TBI*

A. Objectives:

1) To appropriately assess, treat, and manage patients with head injuries / suspected traumatic brain injuries.

2) To maintain adequate airway and oxygenation, maintain $EtCO_2$ 35-40 mmHg.

3) Establish and maintain adequate perfusion to vital organs or to sustain life until further care.

4) Appropriately administer the Military Acute Concussion Evaluation (MACE).

B. General Information:

1) Little that can be done to correct the primary injury in the prehospital environment. The primary goal is to prevent secondary injuries associated with hypoxia, hypotension, anemia, and both hyper/hypothermia.

2) The hallmark sign is altered level of consciousness. The optimal assessment includes AVPU, neurological evaluation, and MACE 2 exam.

3) The use of low altitude flight shall be considered in transportation of these patients.

C. Warnings/Alerts:

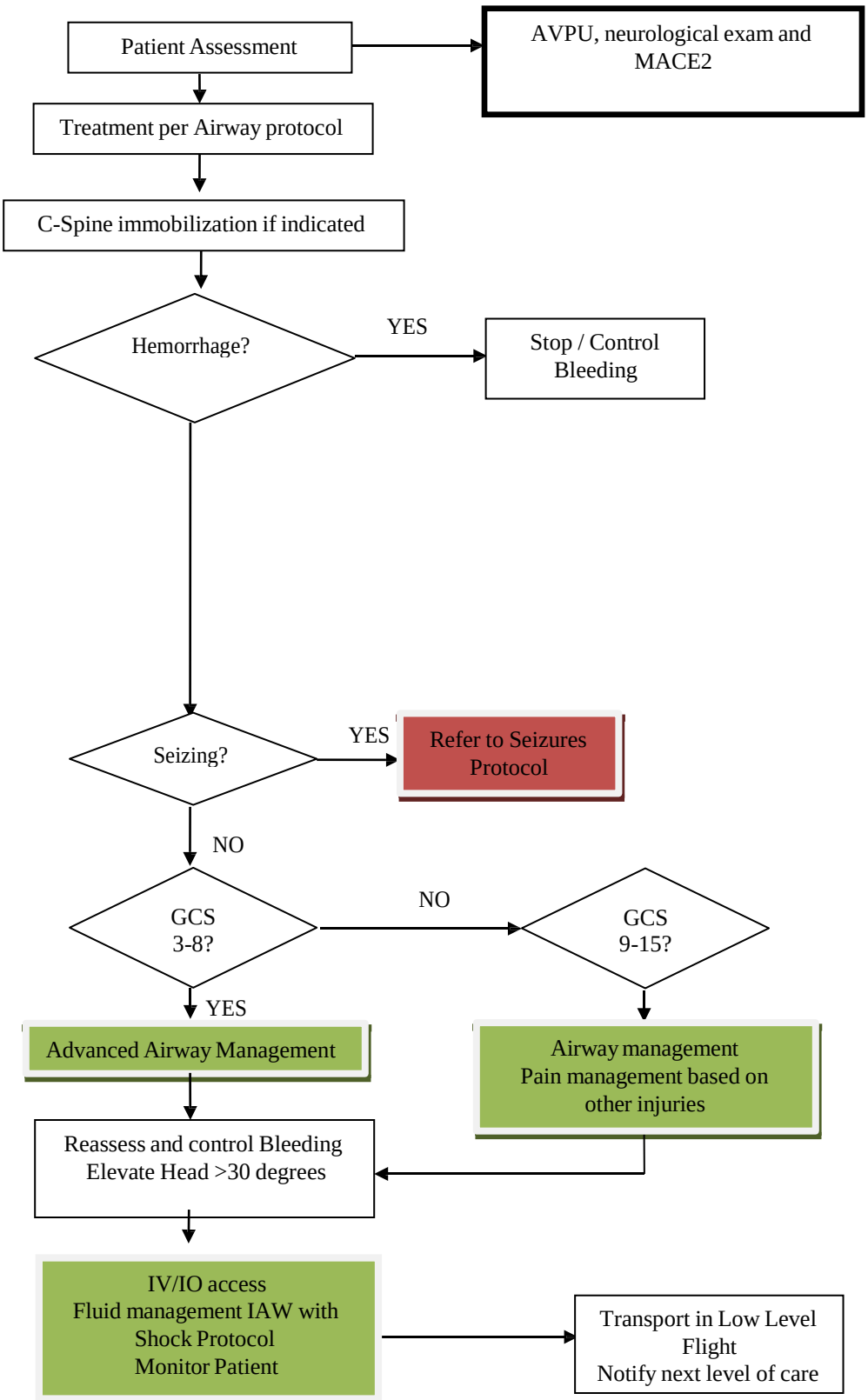
1) Do not elevate the feet to treat for shock.

2) Administer fluids to maintain MAP of 85mmHg.

3) There are many medications with contradictions associated with ICP, with most of them being Analgesics. Be cautious in the medication given and consult OMD or the medication reference in the back of these protocols for further guidance.

4) Hyperventilation is NOT recommended in treatment of these patients.

Head Injury / Suspected TBI



Refer to XI. MILITARY ACUTE CONCUSSION EVALUATION

(MACE) 2ND EDITION on page 206, for all suspected Head Injury

and Traumatic Brain Injury patients that ARE DOD entities.

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III. ADULT PATIENT CARE PROTOCOLS

18. *Hyper / Hypoglycemia*

A. Objectives:

1) To assess and appropriately treat patients with Hyper / Hypoglycemia.

B. General Information:

1) Dextrose 50% may be administered rectally.

2) Dextrose administration requires a patent IV line, not a saline lock.

3) Malnourished patients or suffering from severe dehydration may need Thiamine to properly metabolize dextrose.

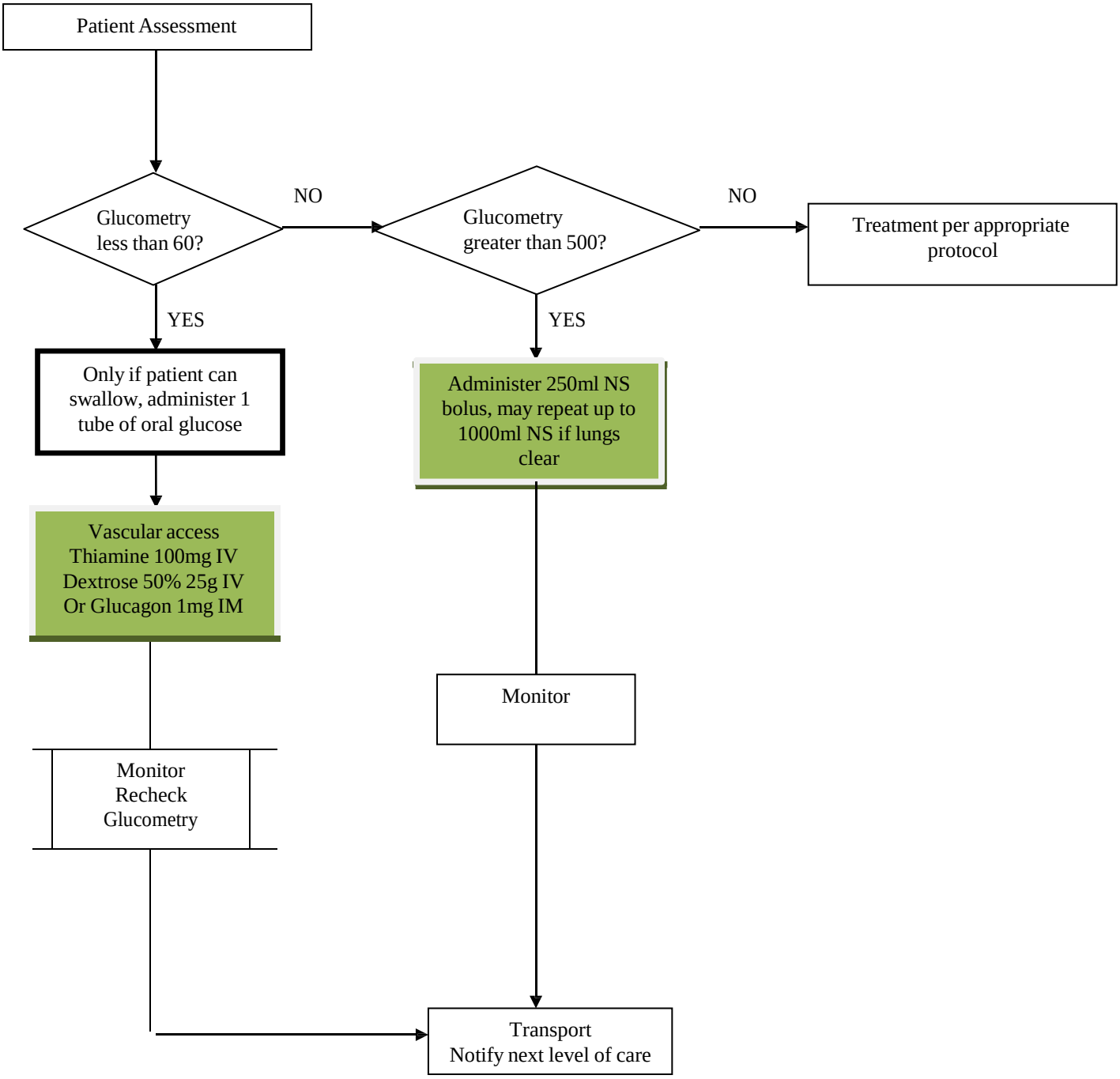
C. Warnings/Alerts:

1) Do not administer oral glucose to patients that are not able to swallow or protect their own airway.

2) If the IV line infiltrates while administering Dextrose, stop dextrose administration immediately.

3) Patients shall have their weapons removed for patient safety.

Hyper / Hypoglycemia



III. ADULT PATIENT CARE PROTOCOLS

19. ***Hyperthermia***

A. Objectives:

1) To assess and appropriately treat patients who are hyperthermic.

B. General Information:

1) Administer oral fluids if patient can swallow – water and half-strength electrolyte solution

2) Active cooling measures:
- Air moving across wet skin
- Ice packs at axilla, groin, neck
- Doors and windows of aircraft should be open based on environment to help cooling

C. Warnings/Alerts:

1) Heat stroke is a life-threatening emergency, do not delay transport.

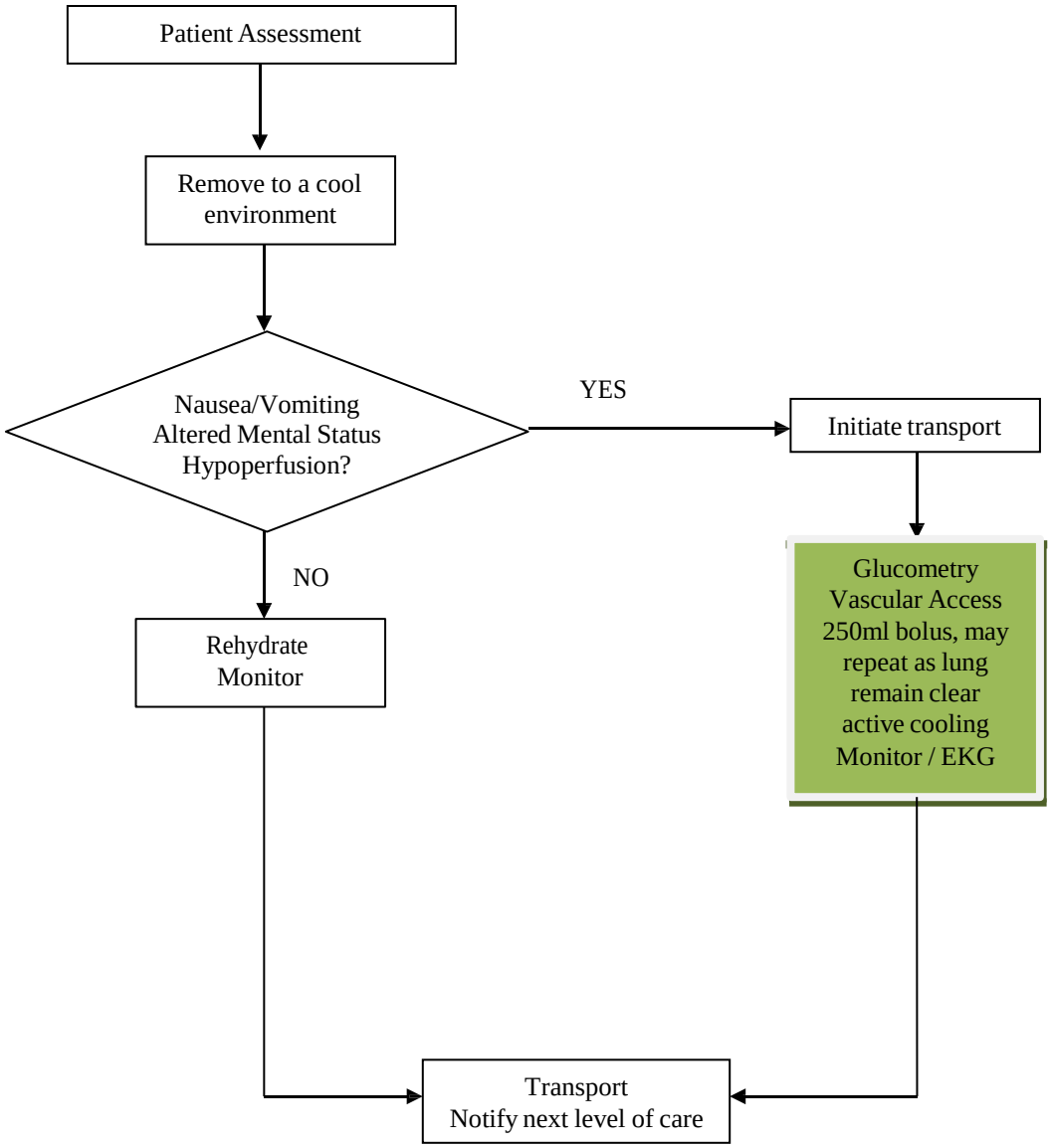
2) Patients shall have their weapons removed for patient safety.

3) Do not exceed 2000ml of IV fluids unless directed to by Medical Control.

4) Cease active cooling when core temperature has been lowered to102 degrees F and continue to monitor.

5) Cocaine, ecstasy, amphetamines, and aspirin toxicity can all raise body temperatures.

Hyperthermia



III. ADULT PATIENT CARE PROTOCOLS

20. *Hypothermia*

A. Objectives

1) To assess and appropriately treat patients who are hypothermic.

B. General Information:

1) Remove all of the patient's wet clothing.

2) Cover the patient with blankets or Hypothermia Kits.

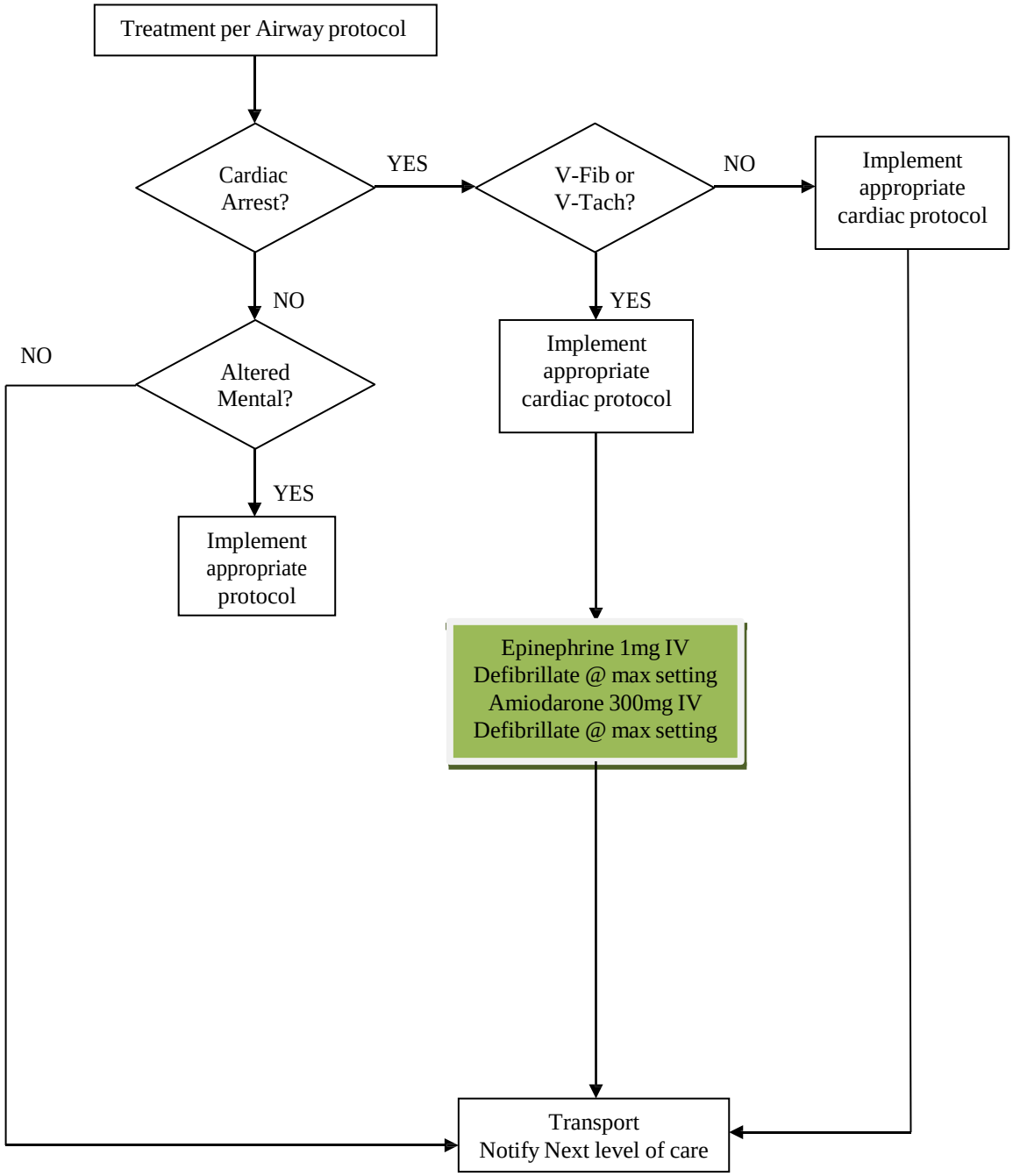
3) Hypothermia is defined as a core temperature <95F (35C)
- With temperatures <31C (88F) ventricular fibrillation is common. Cardiac muscle is very irritable and rough handling of patients at these temperatures can result in cardiac dysrhythmias.
- Core temperatures below 30C (86F) ceases shivering.

C. Warnings/Alerts:

1) 1) Handle hypothermic patients gently to avoid spontaneous conversion into ventricular fibrillation. Avoid aggressive rewarming, sudden movements, and/or rough handling in severe hypothermia patients.

2) Severe hypothermic patients can present with Rigor Mortis. Providers should attempt resuscitation unless clear evidence of irreversible death.

Hypothermia



III. ADULT PATIENT CARE PROTOCOLS

21. *Nausea / Vomiting*

A. Objectives

1) To assess and appropriately treat patients who are profoundly nauseous and vomiting.

B. General Information:

1) Nausea and Vomiting generally are not life-threatening conditions.

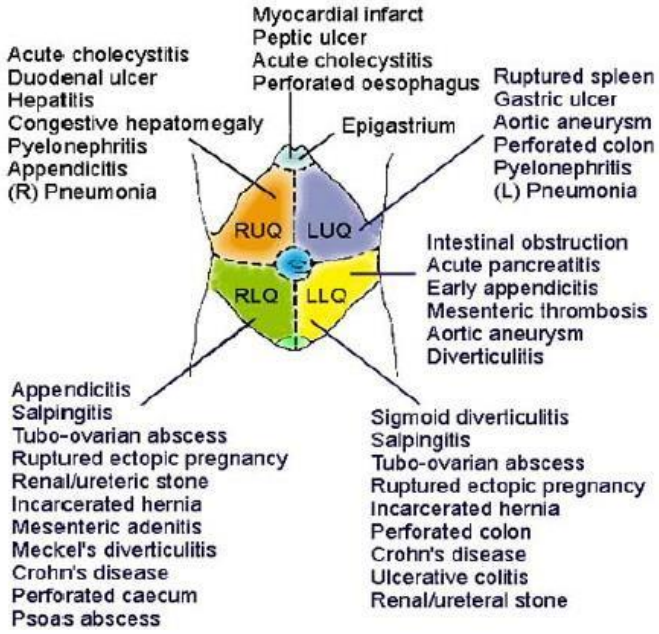
2) Suction should be readily available.

3) Zofran (Ondansetron) or Phenergan (Promethazine) may be administered to patients with vomiting. Medication is highly recommended for in-flight transport.

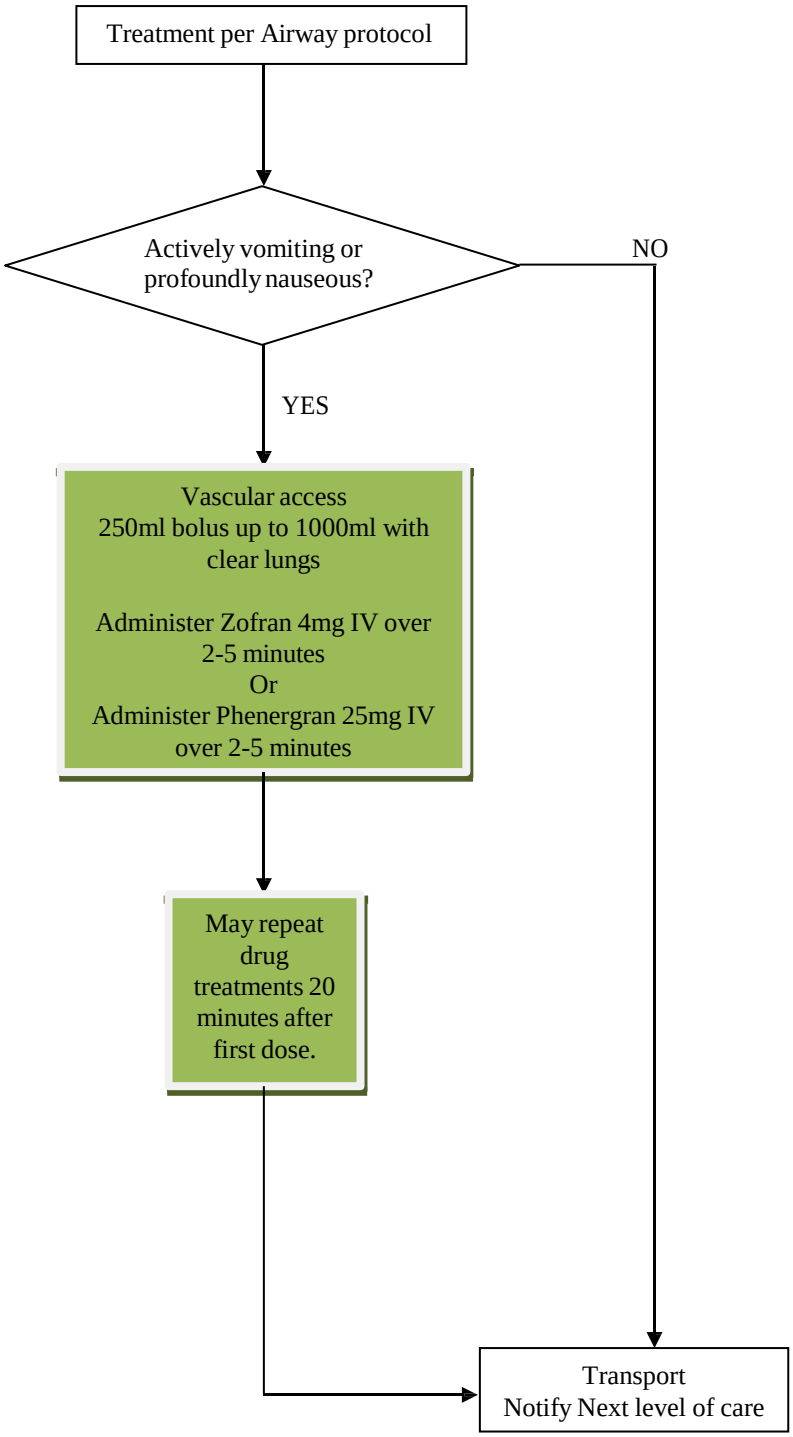
4) Zofran – 4mg slow IV push or IM if IV not available
Phenergan – 25mg IV push or IM if IV not available

C. Warnings/Alerts:

1) Ventilating an unconscious vomiting patient will produce aspiration and airway obstruction, suctioning and advanced airway management is essential.



Nausea / Vomiting



III. ADULT PATIENT CARE PROTOCOLS

22. ***OB / GYN – Pregnancy / Delivery / Vaginal Bleeding***

A. Objectives

1) To appropriately access and manage out-of-hospital births.

2) To appropriately access and manage patients with vaginal bleeding.

B. General information:

1) Obtain functional HX:
- Premature?
- Multiple births?
- Meconium?
- Prenatal care?
- Narcotic use?

2) Transport patients in left lateral recumbent position.

3) Vaginal bleeding is considered moderate to severe if the patient has lost more than 500ml of blood or if she is using 1 heavy pad/hour or more.

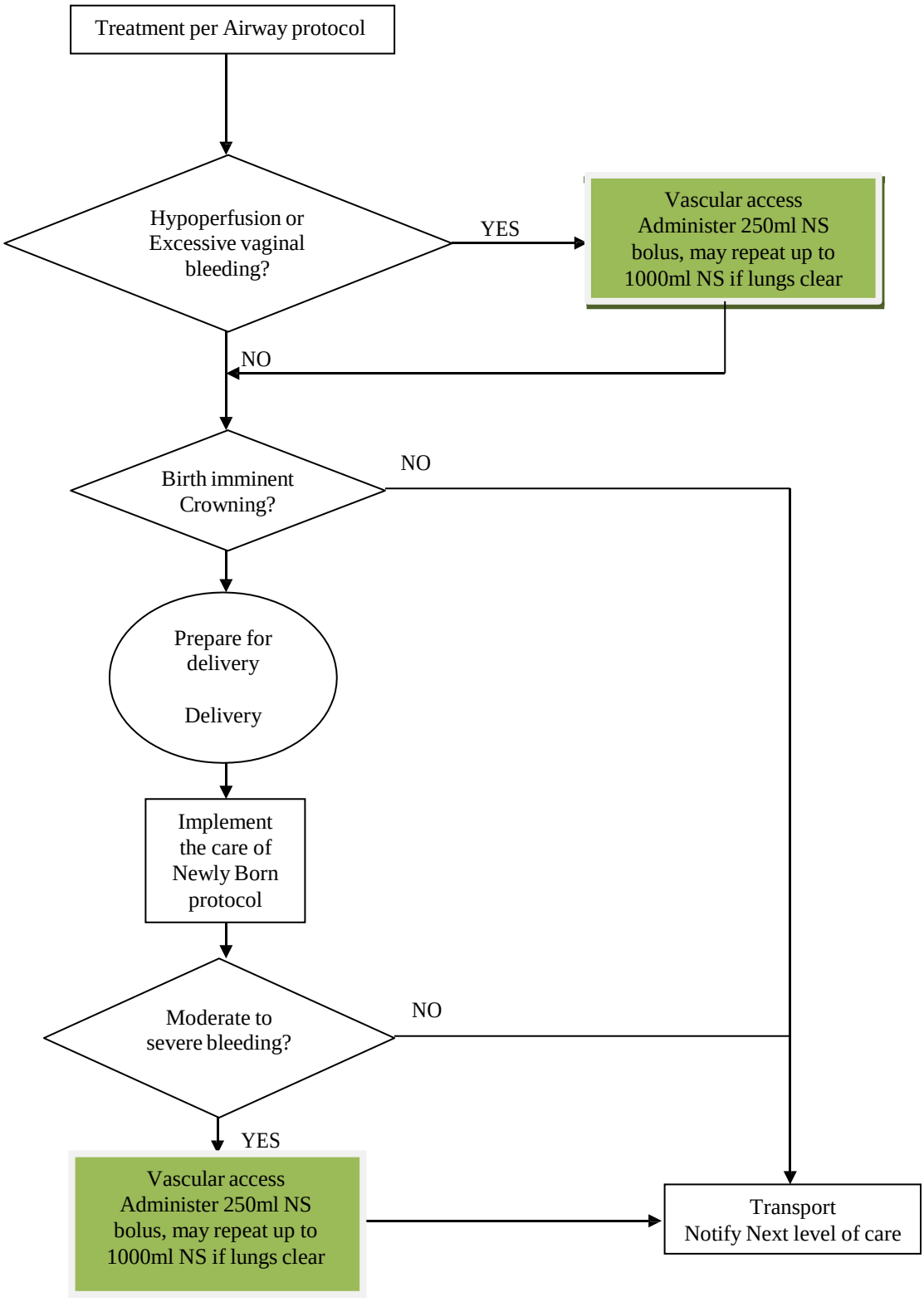
4) With severe vaginal bleeding post birth, consider uterine massage for placental delivery.

C. Warnings/Alerts:

1) Do not assume that vaginal bleeding is due to normal menstruation.

2) Third-trimester bleeding is never normal and can be life-threatening to the mother and fetus.

OB / GYN – Pregnancy / Delivery / Vaginal Bleeding



III. ADULT PATIENT CARE PROTOCOLS

23. *OB / GYN – (Pre) Eclampsia*

A. Objectives

1) To appropriately access and treat patients with pre-eclampsia or eclampsia.

B. General Information:

1) Pre-eclampsia may occur for up to 18weeks pre-birth - 8weeks post-partum.

2) Ativan (lorazapam) is preferred drug for seizures
- Dose is 2mg slow IV push, dilute in NS

Valium (Diazepam) is first line treatment for seizing patients
- Dose is 5mg slow IV push over 2 minutes

Magnesium Sulfate is treatment to control eclampsia
- Dose is 2g in 100ml over 5 minutes

3) Transport patient in left lateral recumbent position.

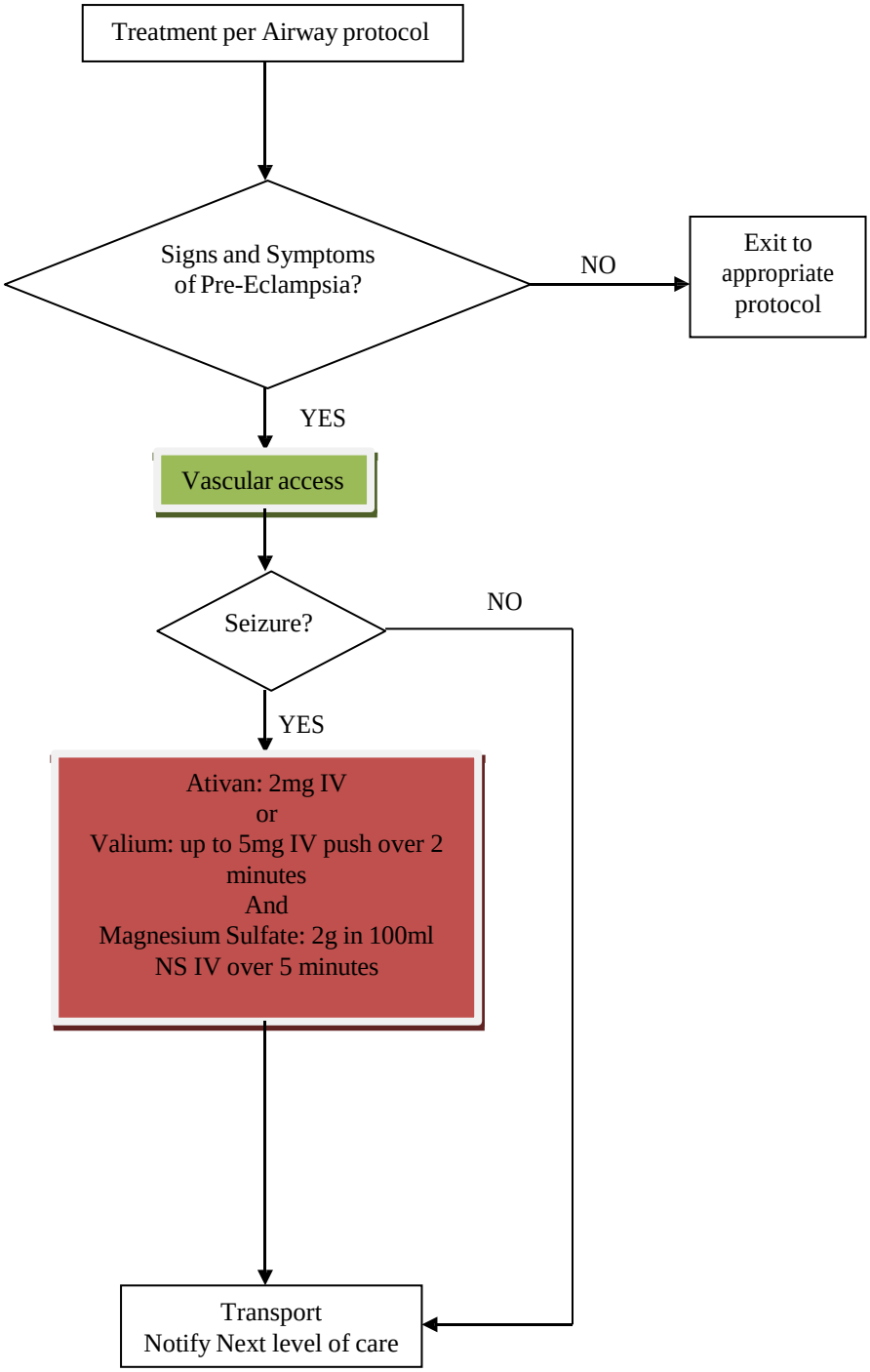
C. Warnings/Alerts:

1) Use caution in administering magnesium sulfate to patients in renal failure.

2) Valium has the potential to cause respiratory depression and bradycardia, patients shall be monitored. After Valium administration, flush IV lines thoroughly.

3) Monitor closely for elevated blood pressure based on the patient's normal baseline.

OB / GYN – (Pre) Eclampsia



III. ADULT PATIENT CARE PROTOCOLS

24. *Pain Management Non-Cardiac*

A. Objectives

1) To assess and appropriately treat non-cardiac pain.

B. General Information:

1) Pain is an important indicator of disease or injury, but generally under treated in the prehospital environment. Pain management is associated with a reduction in PTSD symptoms after traumatic injury.

2) Pain management medications:
- Morphine: 2mg IV or IM with a maximum total dose 10mg
- Should be administered via slow IV push

- Fentanyl: 1mcg/kg, for a max dose of 100mcg.
- Shall be slow IV push
- May be used IM or IN.

- Ketamine: 20mg IV/IO over 1 minute
50mg IM
50mg Intranasal / Atomizer every 30-60min as needed for severe pain

3) Implement Nausea / vomiting protocol as needed.

C. Warnings/Alerts:

1) Patients who receive pain medications shall receive cardiac and SpO_2 monitoring.

2) Naloxone shall be on hand with the administration of opioid medications to counter-act respiratory depression.
- Naloxone: 0.4-2mg titrated to effect, or respiratory depression improves.

3) The mixing the of analgesics should be avoided in pain management. In the event mixing of analgesics, documentation of why needs to be completed on the DA4700.

Treatment per Airway protocol

Assess pain and severity

Mild/Moderate pain 1-5?

Severe pain 6-10?

Vascular access

Fentanyl 1mcg/kg IV/IO, for a max dose of 100mcg fix

Vascular access

Fentanyl 1mcg/kg IV/IO, for a max dose of 100mcg

Or

Ketamine 20mg IV/IO
50mg IM/IN

Nausea / Vomiting protocol as needed

Transport
Notify Next level of care

III. ADULT PATIENT CARE PROTOCOLS

25. *Post-Operative & CC Interfacility Transfer*

CLINICAL INDICATIONS:

- Patient at outlying MTF requiring transfer to higher role of care for more definitive surgery/treatment

PRE-TRANSFER Patient Status Requirements:

a. JTS CPG – Intra-theater Transfer and Transport – recommends clinical parameters that should be met prior to transfer; if parameters are not met, they should be addressed and en-route mitigation plans formulated BEFORE departure / transfer:
   1) Heart rate 50><120 bpm
   2) SBP 70-80mmHg, MAP >60mmHg (permissive hypotension)
   3) If elevated ICP or CPP, maintain MAP 80><110mmHg, SBP 110><160mmHg
   4) Hematocrit >24% (or Hgb >8g/dL)
   5) Platelet count >50/mm^3
   6) INR <2.0
   7) pH >7.3
   8) Base deficit <5mEq/L
   9) Temperature >35.5ºC or 96ºF
   10) $ETCO_2$ 35><45, SPO_2 ≥92%, and/or $PaCO_2$ 35><45mmHg

If these criteria are not met, the transferring physician should continue resuscitation or provide documentation indicating limitations that compel urgent transfer. This can be documented in the comments section of the **Standard Order Set for Critical Care Transfers** document.

b. The four *MINIMUM* requirements which will be met prior to patient transfer are hemorrhage control, adequate shock resuscitation (SBP 70-80 mmHg, MAP >60 mmHg, UOP >0.5 mL/kg/hr, and/or BD <2, Temp >97ºF and <100ºF), stabilization of fractures, and initial post-operative recovery.
c. Attempt to keep patient packaging time at <25 minutes; use of warming devices in accordance with the JTS Hypothermia Prevention CPG.
d. Movement of Deceased Patients:
   1) In general, patients who meet clinical criteria for death are not to be transported by MEDEVAC, with the exception of extreme extenuating circumstances, such as emergency exfiltration during CSAR.
   2) If vital signs are absent prior to launch, make all reasonable attempts to resuscitate as clinical and tactical circumstances permit. If unsuccessful, consider basic cardiac ultrasound (as available) to determine whether any signs of cardiac activity are present. If absent, mission abort is warranted.

3) In such circumstances, contact and consultation with medical control or other available physician is suggested, in order to facilitate field determination of death and cessation of resuscitative efforts.

PROCEDURE:

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

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

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

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

1) Obtain orders for en route care from transferring physician; review orders and discuss potential en route problems with transferring physician, reconcile medications (ensure needed medications, specific to patient's condition, are obtained and prepared), allergies and patient's weight, confirm patient's identification, and secure personal effects.
2) Perform primary & secondary assessment ensuring an understanding of the patient's injuries / illness / procedures performed.
3) Spinal immobilization is indicated during transfer if ordered by transferring physician.
4) Assess placement and secure all tubes, lines, and drains & ensure proper functioning.
5) Ensure endotracheal tube is secure; secure pulse oximeter / $ETCO_2$ monitor.

6) Review ABG – ABG should be done within 30 minutes of flight; patient should be on transport ventilator with vent settings for transport; ABG obtained 15 minutes after being placed on transport ventilator.
7) Ensure vascular access X 2 - peripheral, central or IO and A-line as needed.
8) Check all bandages, splints, dressing, fixation devices and tourniquets for placement and ensure no evidence of ongoing hemorrhage.
9) If indicated, insert OG/NG tube for gastric decompression, especially in intubated patients; cap or place to suction.
10) Empty Foley catheter bag prior to flight; ensure UOP documentation by transferring facility.
11) For an intubated patient, provide adequate analgesia and sedation PRIOR to giving additional paralytic medications. Re-dose medications as needed prior to flight in accordance with transferring physician's orders.
12) Continue administration of blood products if ordered by transferring physician. If anticipated administration of blood products enroute, Flight Paramedic/Provider should request orders for blood products and appropriate blood products from the transferring physician and use FDA approved fluid warming device as appropriate for warming fluids.
13) Collect all patient care documentation for transport with patient, i.e. pre-hospital, transport, labs, x-rays, transferring facility notes, etc.
14) Remove all air from IV fluid bags and place all free flowing bags in pressure bags.
15) Ensure patient is properly packaged in a warming device unless contraindicated prior to transfer. Follow directions specific to each warming device ensuring over heating or thermal burns do not occur. Hypothermia, acidosis and coagulopathy constitute the "triad of death" in trauma patients.
16) Securely affix all equipment, supplies, loose tubing and lines to NATO litter prior to moving the patient to the vehicle or aircraft.
17) Once patient is packaged, ensure all lines are leveled and monitors are zeroed.
18) Provide eye and ear protection to patient.

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)

Post-Operative & CC Interfacility Transfer

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.

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

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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.

Post-Operative & CC Interfacility Transfer

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.

III. ADULT PATIENT CARE PROTOCOLS

26. ***Rapid Sequence Induction-RSI***

A. Objectives:

1) To facilitate airway management through the use of sedatives and paralytics.

B. General Information:

1) Patients presenting or have the potential for severe airway compromise require sedatives and paralytics to secure the airway.

2) Patients with the following should be considered for RSI:
- Burns to the face with suspected inhalation injury
- Severe trauma to the face that may occlude airway
- Patients who must have prolonged ventilator assistance
- GCS less than 8, with associated TBI or Head injury

C. Warnings/Alerts:

1) This procedure shall be done with at least 2 providers. Divide the work load- ventilate, suction, cricoid pressure, drugs, and intubation

2) Shall use end-tidal CO2 monitors and SpO_2 monitoring. Suspected TBI/Head trauma patients end-tidal CO2 shall be kept between 35-40 mmHg.

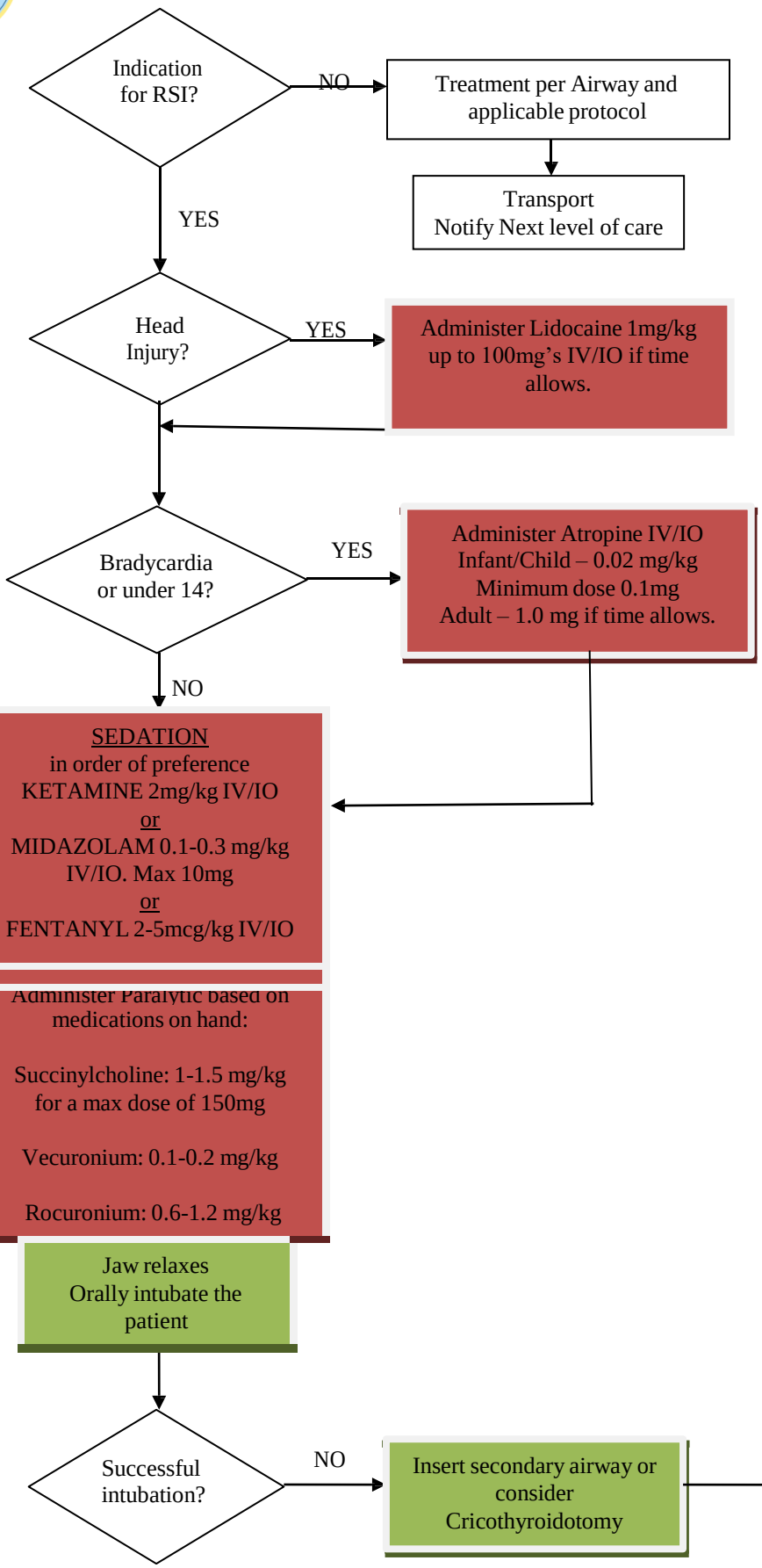
3) Protect the patient from self-extubation.

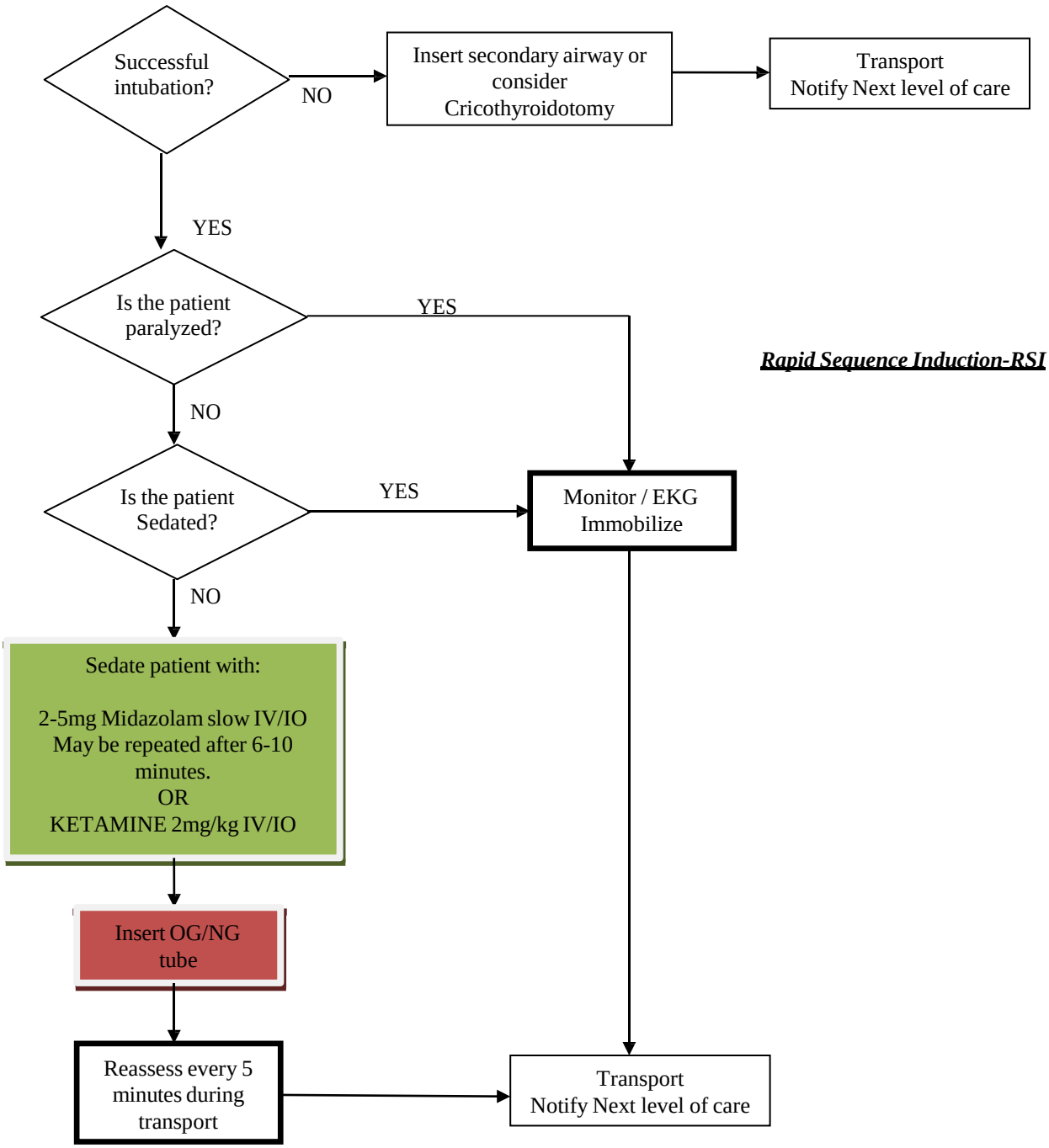
4) Do not administer Succinylcholine to patients with a HX of Malignant Hyperthermia.

5) Administration of analgesics is required on patients requiring advanced airway procedures.

6)

Rapid Sequence Induction-RSI





Rapid Sequence Induction-RSI

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III. ADULT PATIENT CARE PROTOCOLS

27. ***Seizures***

A. Objectives:

1) To assess and treat patients with seizures.

2) To protect the airway of a seizing patient.

B. General Information:

1) Medications shall only be given to patients having active seizure lasting greater than 2 minutes.

2) All patients who receive Ativan, Valium, and Versed shall have cardiac and SpO_2 monitoring.

3) - Ativan (Lorazepam) is the preferred drug for seizures.
Dilute in equal amount of NS before administration IV/IO
2mg slow push
Can be given IM/IN if no vascular access, do not dilute

- Versed (Midazolam)
2mg slow IV/IO push
Can be given IM/IN if no vascular access

- Valium (Diazepam)
Up to 5mg slow IV push IV/IO
Can be given IM/IN if no vascular access

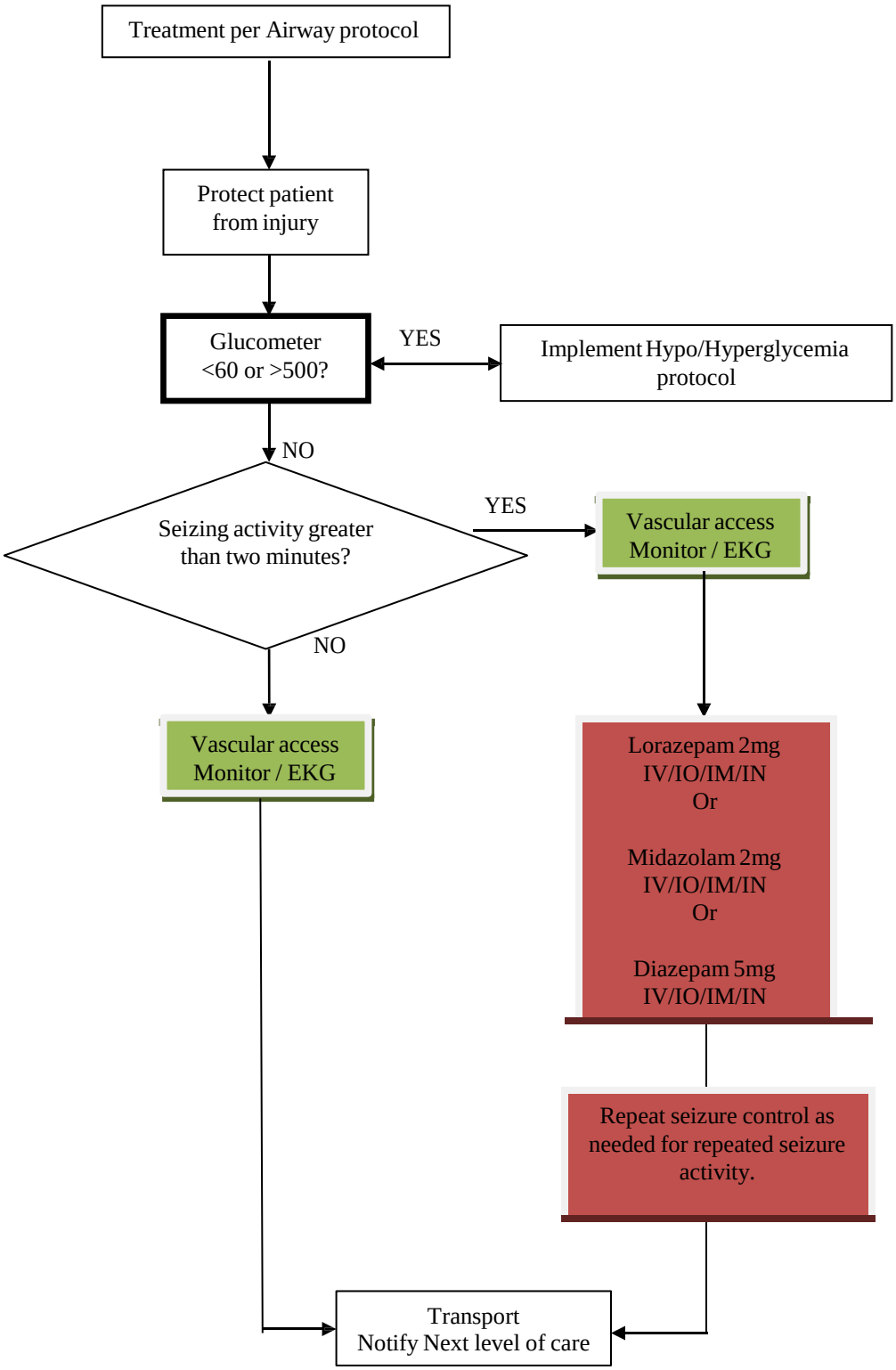
C. Warnings/Alerts:

1) Ativan, Valium, and Versed all have the potential to cause respiratory depression and bradycardia. Patients shall have continuous cardiac and SpO_2 monitoring.

2) Flush IV lines thoroughly after Valium administration. Valium is incompatible with most other medications.

3) After two attempts of controlling a seizure, seizure activity continuing, implement RSI protocol.

Seizures


Treatment per Airway protocol
Protect patient from injury
Glucometer <60 or >500?
YES
Implement Hypo/Hyperglycemia protocol
NO
Seizing activity greater than two minutes?
YES
Vascular access Monitor / EKG
NO
Vascular access Monitor / EKG
Lorazepam 2mg IV/IO/IM/IN Or
Midazolam 2mg IV/IO/IM/IN Or
Diazepam 5mg IV/IO/IM/IN
Repeat seizure control as needed for repeated seizure activity.
Transport Notify Next level of care

III. ADULT PATIENT CARE PROTOCOLS

28. ***Shock***

A. Objectives:

1) To assess and treat patients with tissue perfusion.

B. General Information:

1) Types of shock:
- Hypovolemic: Hemorrhage / Fluid loss
- Cardiogenic (Pump failure)
- Distributive (Sepsis)
- Obstructive (Tension Pneumo)

2) All patients being treated for shock shall be given a blanket or hypothermia prevention kit.

3) 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" appropriate resultative fluid per JTS CPG to **maintain MAP >60, NIBP Systolic BP >90 , palpable Radial pulse (Femoral pulse preferred), (if NIRS device available, STO_2 >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.**

- Calcium shall be administered on all trauma patients with suspected internal bleeding or hypovolemic shock, as is directly helps with clotting factors. This may be given in conjunction with TXA and blood products, however if only one IV/IO access is present do not delay the administration of blood products.

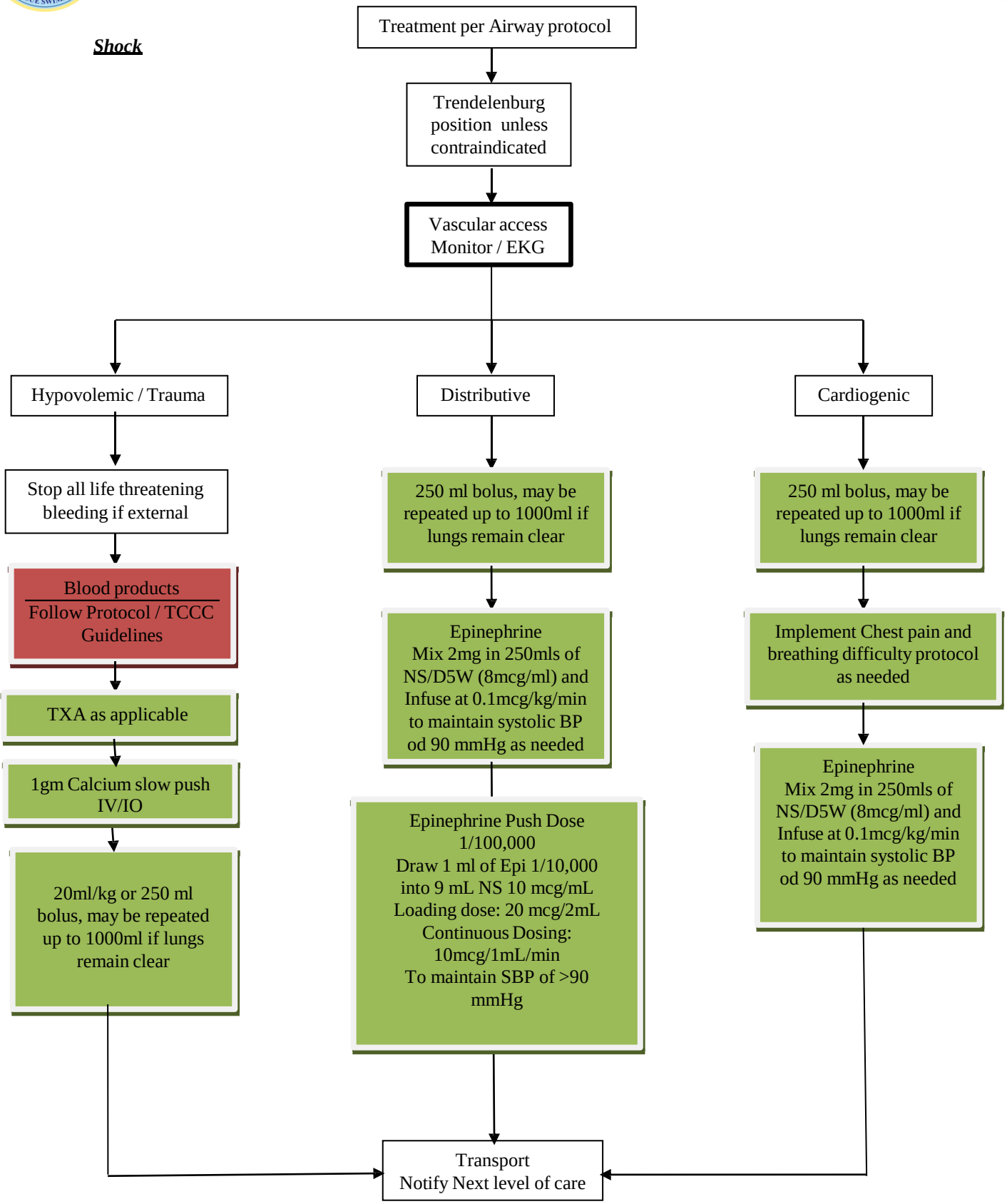
C. Warnings/Alerts:

1) Avoid Pressors as able (use as LAST RESORT in TRAUMA) – Always continue IVFs: Optimize hemostasis and correct volume loss.

D. Notes:

1) The goal of hypovolemic shock management is to prevent the lethal triad of hypothermia, acidosis, and coagulopathy.

Shock


Treatment per Airway protocol
Trendelenburg position unless contraindicated
Vascular access Monitor / EKG
Hypovolemic / Trauma
Distributive
Cardiogenic
Stop all life threatening bleeding if external
Blood products
Follow Protocol / TCCC Guidelines
TXA as applicable
1gm Calcium slow push IV/IO
20ml/kg or 250 ml bolus, may be repeated up to 1000ml if lungs remain clear
250 ml bolus, may be repeated up to 1000ml if lungs remain clear
Epinephrine
Mix 2mg in 250mls of NS/D5W (8mcg/ml) and Infuse at 0.1mcg/kg/min to maintain systolic BP od 90 mmHg as needed
Epinephrine Push Dose 1/100,000
Draw 1 ml of Epi 1/10,000 into 9 mL NS 10 mcg/mL
Loading dose: 20 mcg/2mL
Continuous Dosing: 10mcg/1mL/min
To maintain SBP of >90 mmHg
250 ml bolus, may be repeated up to 1000ml if lungs remain clear
Implement Chest pain and breathing difficulty protocol as needed
Epinephrine
Mix 2mg in 250mls of NS/D5W (8mcg/ml) and Infuse at 0.1mcg/kg/min to maintain systolic BP od 90 mmHg as needed
Transport
Notify Next level of care

III. ADULT PATIENT CARE PROTOCOLS

29. *Needle Chest Decompression/Thoracostomy-finger or tube*

A. Objectives:

1) To provide guidance for how and when providers should perform needle decompression.

2) Insertion of a chest tube is an advanced level practice to be performed only by those providers certified as FP-C, TP-C, or RN and above.

B. General Information:

1) Management of Tension Pneumothorax and or Massive Hemothorax requires chest decompression.

2) Needle decompression is the primary relief of a Tension Pneumothorax pre-hospital.
- Midclavicular – 2nd intercostal space
- Anterior axillary – 5th intercostal space

3) After needle decompression a chest seal or occlusive dressing shall be placed over site to prevent sucking chest wound.

4) If needle decompression is ineffective, prolonged transport time or distance expected, or in the presence of massive barotrauma, a chest tube or finger thoracostomy may be the most effective for maintaining chest decompression.
- Incision site: Affected side, anterior axillary- 5th intercostal space

5) Consider pain management/sedation prior to procedure. Do not delay treatment for sedation.

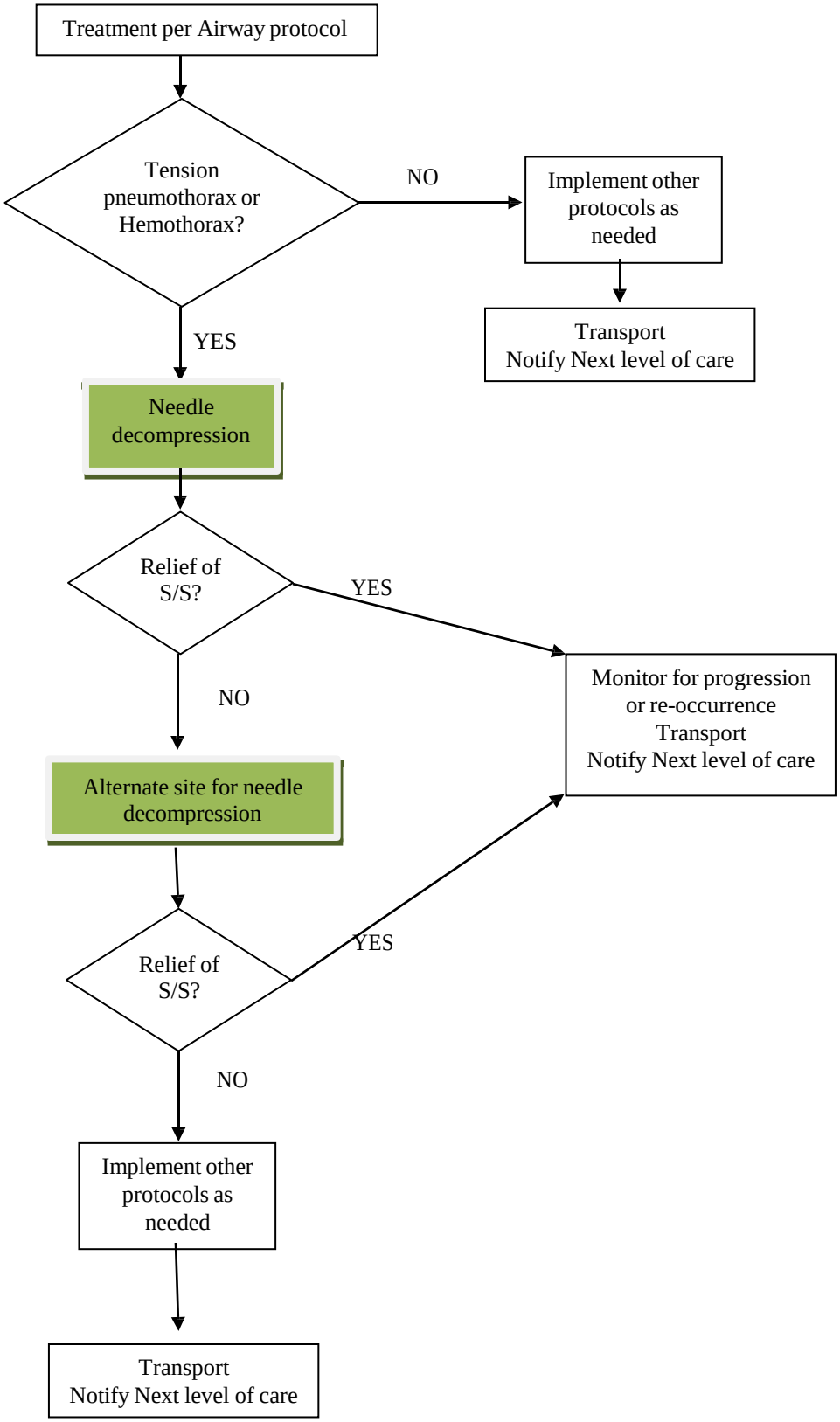
C. Warnings/Alerts:

1) Larger patients may require multiple needle decompressions or alternate anterior axillary site.

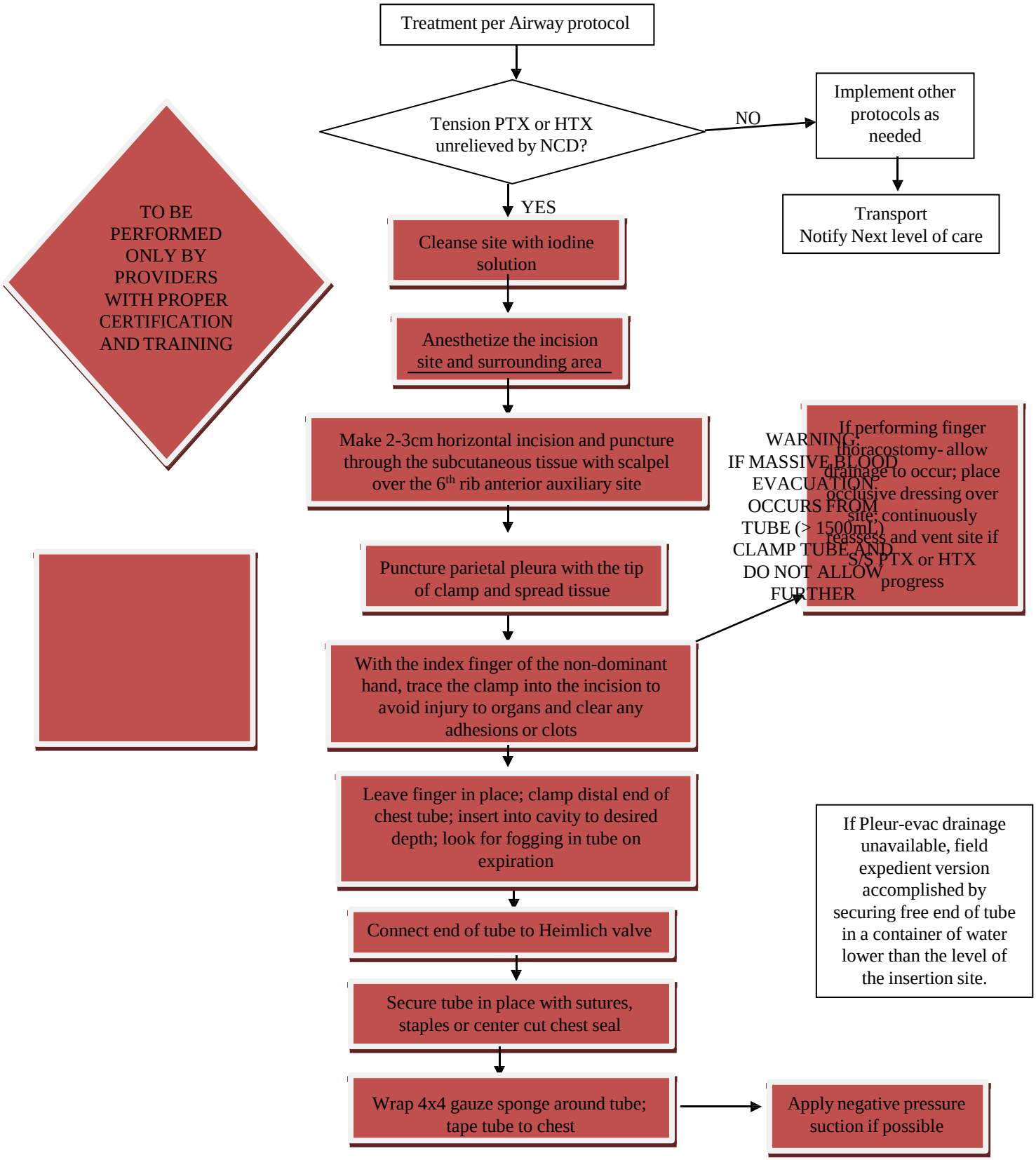
2) Do not insert any needle/tube/finger medial to the Anterior axillary line as there is risk to damage the great vessels and impact the myocardium.

3) Avoid Needle decompression in patients that are hemodynamically stable.

Needle Chest Decompression



Chest Tube Insertion/Finger Thoracostomy



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III. ADULT PATIENT CARE PROTOCOLS

30. ***Toxicological Emergencies (Overdose)***

A. Objectives:

1) To assess and treat patients who have a toxicological medical emergency.

B. General Information:

1) CNS depressants (Symptoms may include: respiratory depression, pinpoint pupils, bradycardia, and hypotension)
- Examples: Opiates, Benzodiazepines, Ethyl Alcohol

2) Hallucinogens (Symptoms may include: Hallucinations, Hypertension, and Tachycardia)
- Examples: LSD, Cannabis, PCP, Mushrooms, Ecstasy, Jimson Weed, Spice, Nutmeg

3) CNS stimulants (Symptoms may include: Hypertension, tachycardia, dysrhythmias)
- Examples: Cocaine, amphetamines, methamphetamines, Dexedrine, caffeine, ephedrine

4) Tricyclic Antidepressants (Symptoms may include: Altered mental status, seizure, depressed respirations, and coma)
- Examples: Amitrptyline (Elavil), Amoxapine (Asendin), Flexeril (Cyclobenzaprine), Imipramine (Trofanil), etc…

C. Warnings/Alerts:

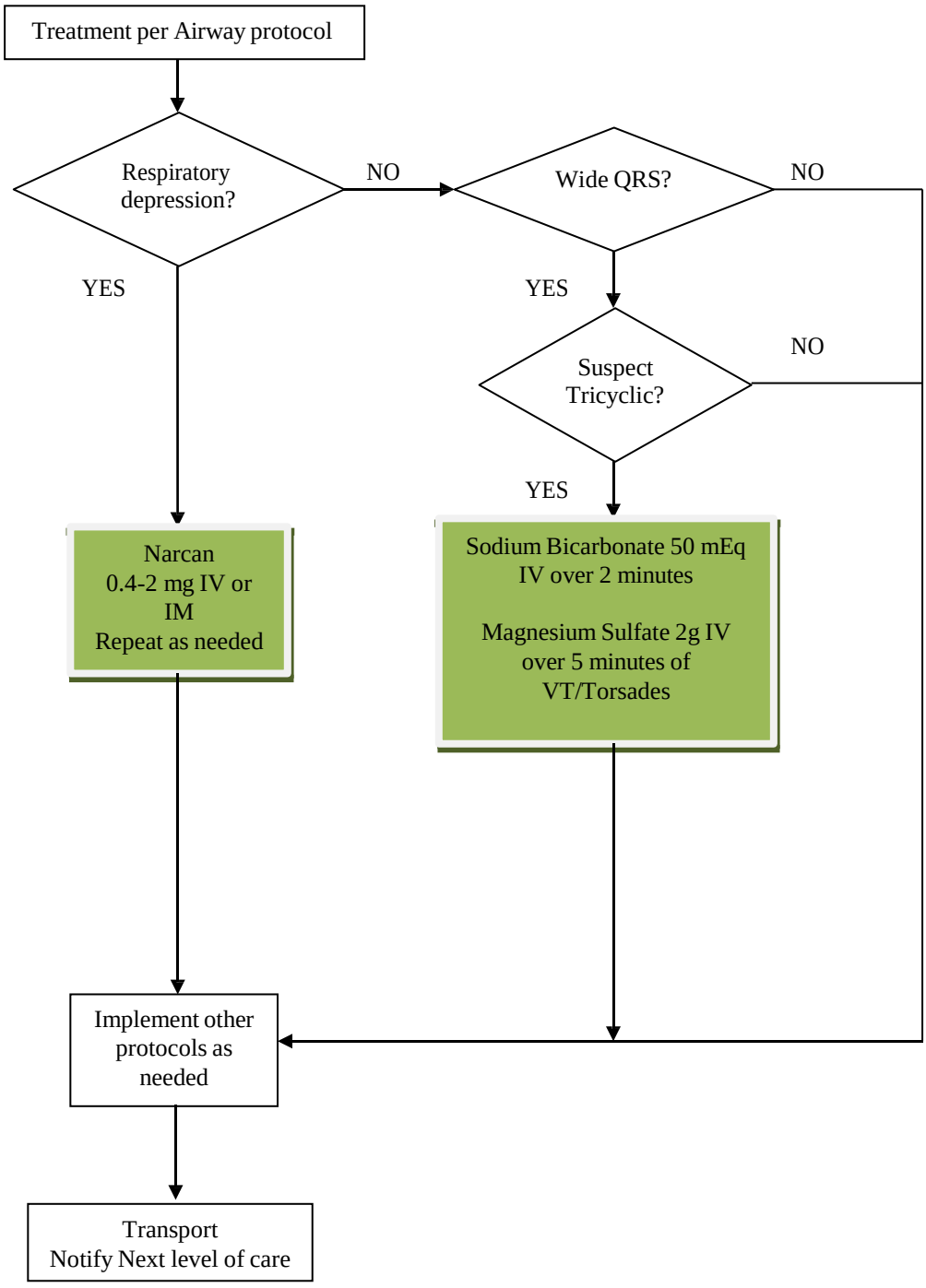
1) Narcan can precipitate seizures in patients with seizure HX or in long term narcotic addicts.

2) The goal of Narcan is to establish adequate respiratory rate and drive, not to return the patient to full consciousness.

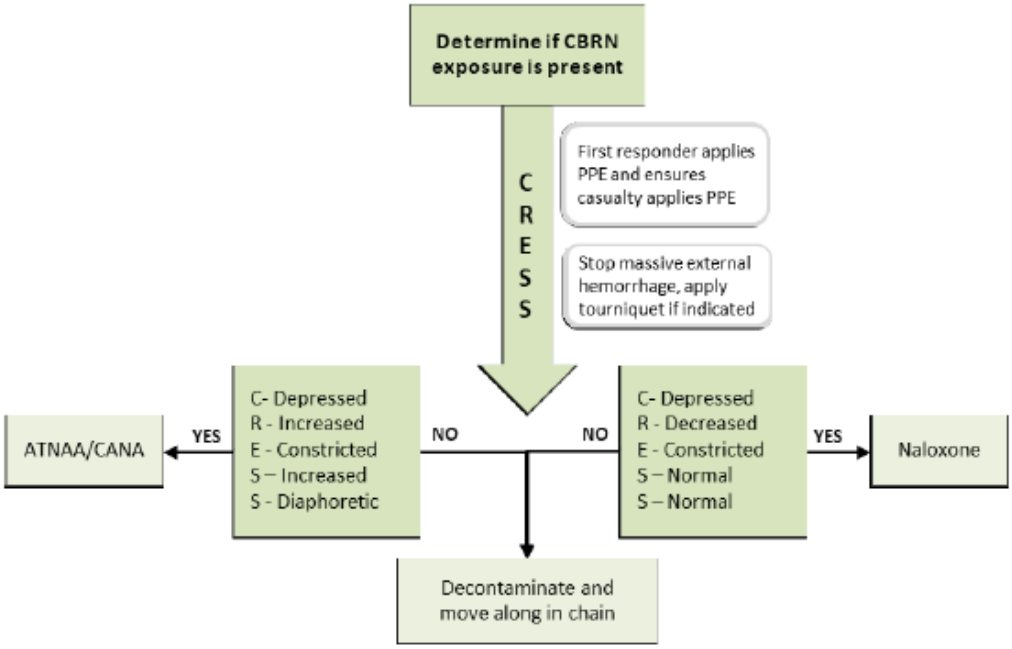
3) Narcan has a short half-life and may need to be repeatedly dosed until transfer of care is complete.

4) If at all possible, documentation or collection of medications suspected to be used by the patient should be transported.

Toxicological Emergencies (Overdose)



C	Consciousness (unconscious, seizures, depressed consciousness, agitation)
R	Respirations (present or absent, labored, increased or decreased)
E	Eyes (constricted, dilated, normal)
S	Secretions (dry, normal, increased)
S	Skin (diaphoretic, dry, hot, cyanosis)



Nerve agents: The signs and symptoms of nerve agent poisoning will depend on the dose and route of the exposure. In general, larger doses and direct inhalation of nerve agent vapor result in quicker onset and greater severity of effects. The most important effects of nerve agents are on the lungs, airway and the nervous system. Nerve agents exert their toxic effects by inhibiting or blocking the action of acetylcholinesterase (AChE), a critical enzyme. AChE is found in the plasma, red blood cells and nervous tissue. Although nerve agents will affect the enzyme in all three areas, it is the neurological effects which are the most important.

The mnemonic SLUDGE helps identify some of these findings:

- Salivation
- Lacrimation
- Urination
- Defecation
- Gastric
- Emptying

Key Measures in Resuscitating Nerve Agent Patients
• Secure the airway and provide positive pressure ventilation
• Administer atropine and 2-Pam-Chloride
• Administer Valium if supplied. Otherwise utilize Versed.
• Repeat atropine as needed

III. ADULT PATIENT CARE PROTOCOLS

31. *Trauma / Traumatic Arrest*

A. Objectives:

1) To appropriately assess and treat patients who have traumatic injuries.

B. General Information:

1) Control all life-threatening bleeding
- Direct pressure / wound packing
- If direct pressure does not work, Tourniquet if appropriate

2) Lifesaving interventions that may be performed pre-transport:
- Control of all Arterial or massive bleeding
- Emergency Cricothyroidotomy of an Obstructed Airway
- Needle decompression or Chest tube relief of a Tension Pneumothorax or massive Hemothorax. Chest tubes are indicated for long transports or no relief from needle decompressions.
- Stabilization of Pelvic injury with use of Pelvic sling device
- Management of a Flail Chest- positive pressure support or if indicated, Intubate and assist in ventilations as needed.

3) The goal of IV fluid administration is to maintain a systolic BP of >90 mmHg. Should be practiced with caution in cases of abdominal injuries.

4) For patients with head injuries and a GCS < 8, the goal of IV fluid administration is to maintain a systolic BP of >110 mmHg and establish a secure airway.

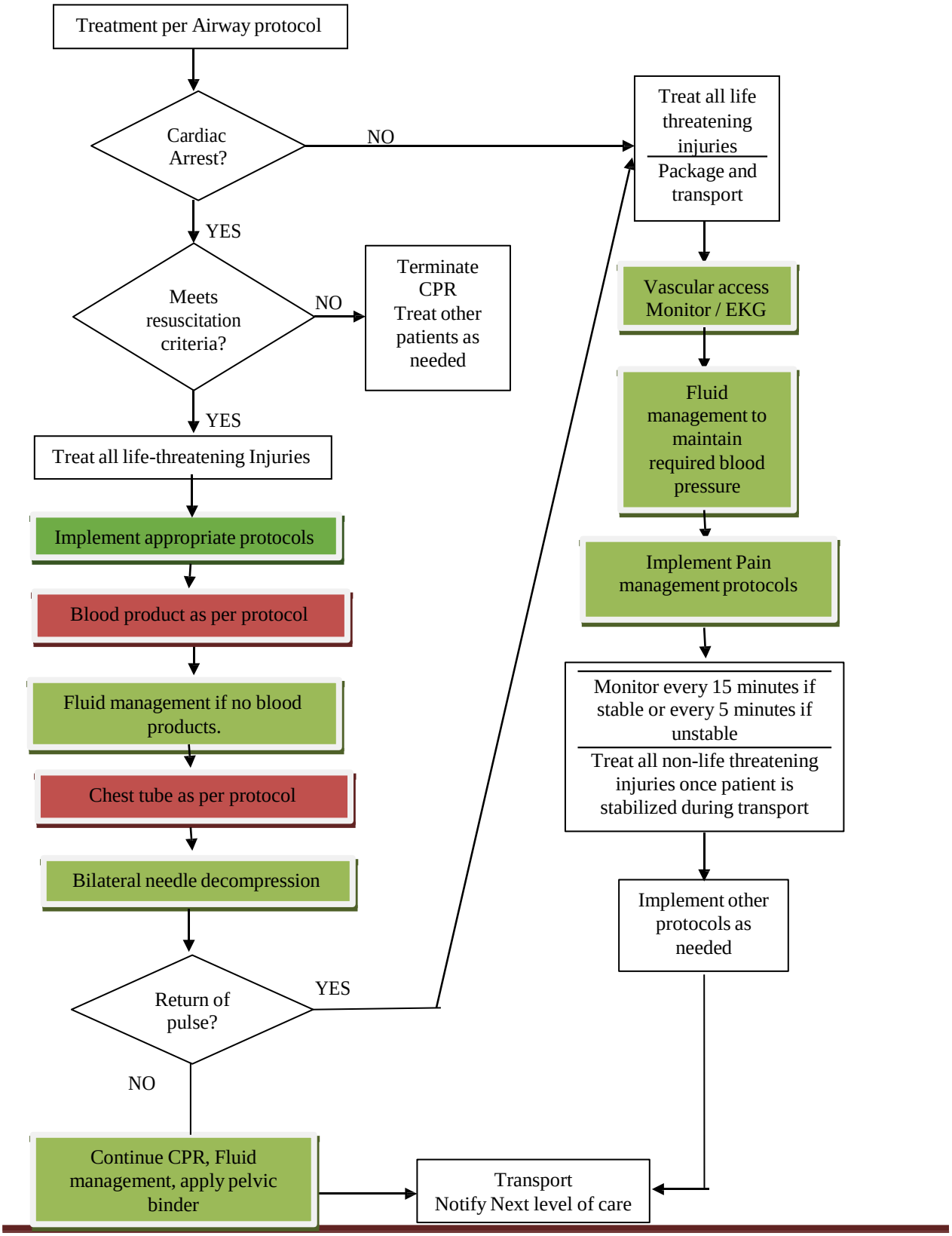
5) Trauma resuscitation Criteria:
- Should be discontinued if injuries are incompatible with life (rigor mortis, lividity, etc.)
- Mass casualty situation, patients with no breathing and pulse shall follow START algorithm.

6) All treatments to Trauma patients shall be in accordance with International Trauma Life Support guidelines (ITLS), Pre-Hospital Trauma Life Support (PHTLS), Tactical Combat Casualty Care Guidelines (TCCC), and/or Clinical Practice Guidelines (CPG's).

C. Warnings/Alerts:

1) Do not delay transport to perform NON-lifesaving interventions on scene.

Trauma / Traumatic Arrest



III. ADULT PATIENT CARE PROTOCOLS

32. *Vascular Access*

A. Objectives

1) To provide guidance for how and when providers should obtain vascular access.

B. General Information:

1) Fluid management standing orders for hyperprofusion:
- Adults: 250mL bolus with reassessment up to 1000mL

2) All bolus medications shall be followed by an appropriate flush, 20-30ml.

3) Site selection for peripheral access shall start distally in the extremities.

4) Indications for Intraosseous access:
- Cardiac arrest
- Profound hypovolemia
- Patients's with immediate need for medications or fluids.

5) IO's shall be flushed prior to administering any fluid/medications into the site.

6) IO approved sites:
- Sternal (F.A.S.T 1 Device only)
- Proximal Tibia – 1-2 finger width medial to the tuberosity
- Proximal Humerus – Directly in the greater tubercle (Lateral, upper aspect of the humerus)

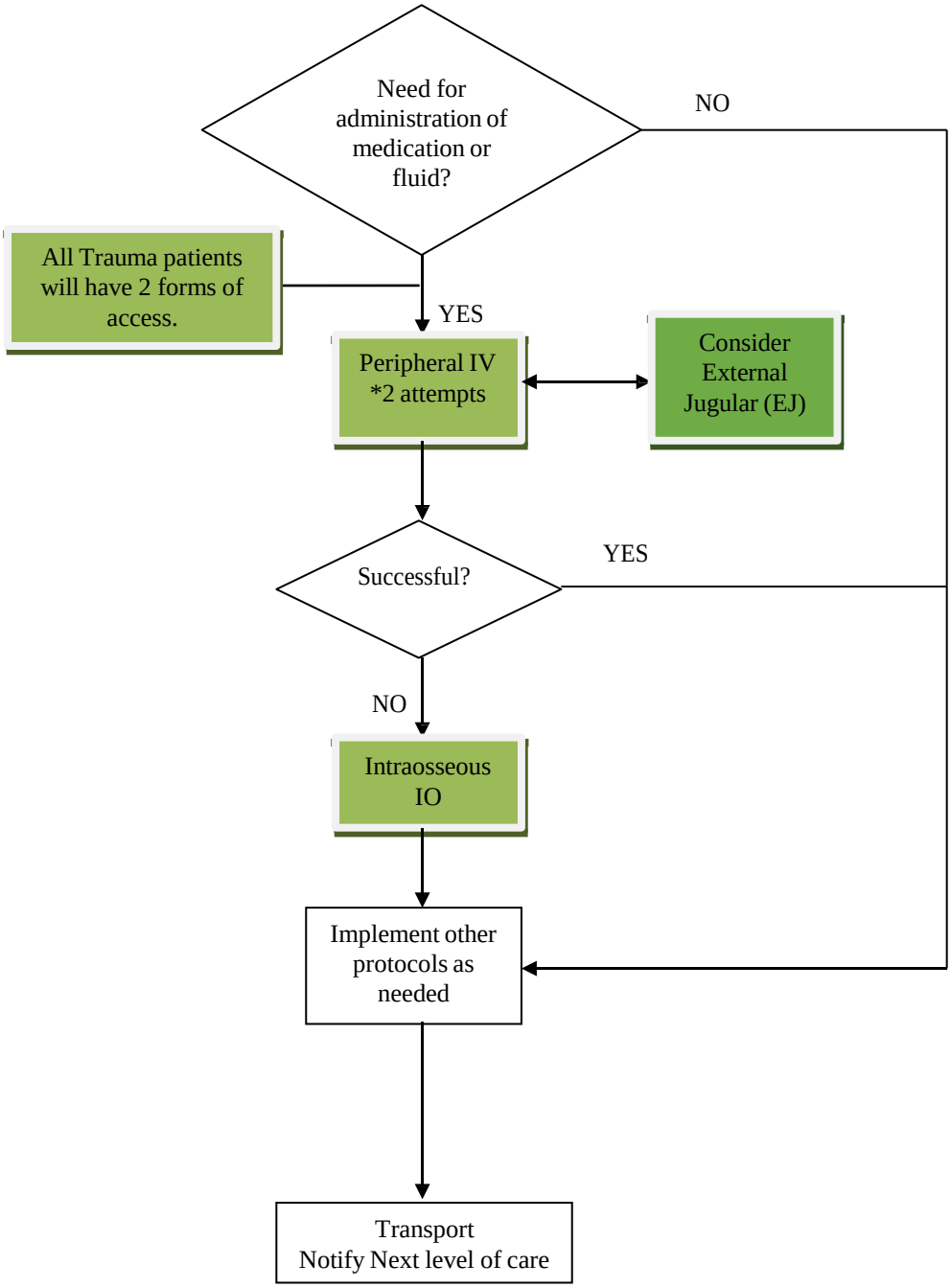
C. Warnings/Alerts:

1) Do not use a 14g or above needle for IV use.

2) Failure to properly flush after administration of an IO will result in poor or occluded flow.

3) Caution in placement of External Jugular (EJ) due to increased improper placement.

Vascular Access



III. ADULT PATIENT CARE PROTOCOLS

33. *Ventilator Management*

VENTILATOR MANAGMENT

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 O_2 tubing to machine.
- If patient is a transfer and already on vent, maintain ventilator settings from medical treatment facility.
- **If patient "newly" on ventilator, initial settings should include:**
    - **Mode: AC, SIMV, or ASV (if using Hamilton T1)**
    - **Rate: 10-16bpm (or adequate rate for pediatric patient)** (typical adult start rate is 12, then adjust PRN)
    - **FiO_2: 100 percent**
    - **I:E ratio: 1:2 – 1:4**
    - **Tidal Volume: 6-8mL/kg (of ideal body weight)**
    - **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 O_2 tank not empty. Immediately disconnect ventilator and ventilate patient with BVM and 100% O_2. If this resolves problem or vent failed, continue to bag patient. Then titrate FiO_2 down as much as possible while keeping O_2 sat >93% (Goal FiO_2 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 Management

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 O_2 (MAX FiO_2 = 62%)

SAVEe II
Varied tidal volume based on patient height
Accepts supplemental O_2 (FiO_2 21 – 100%)

AutoVent 3000
CMV
Adult / Child
Tidal volume
Inspiratory time
BPM

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 V_t delivered. Peak airway pressure is variable and increases as needed to deliver prescribed V_t.

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

IBW calculation:
Men: [(height in inches – 60) x 2.2] + 50= Kg IBW
Women: [(height in inches – 60) x 2.2] + 45= Kg IBW

Ventilator Management

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

Inspiratory (I) and Expiratory (E) time and I:E ratio: The speed at which the V_t is delivered. Setting a shorter inspiratory time (I) results in a faster inspiratory flow rate. Average adult I time is 0.7 to 1 second. I:E ratio is usually 1:2 to 1:4

Positive end-expiratory pressure (PEEP): The amount of positive pressure that is maintained at end-expiration. It is expressed in centimeters of water. The purpose of PEEP is to increase end-expiratory lung volume and reduce air-space closure at end-expiration. Normal Physiologic PEEP is 5cm/H_2O.

Peak flow rate or peak inspiratory flow: The highest flow, or speed, that is set to deliver the V_t during inspiration, usually measured in liters per minute. When the flow rate is set higher, the speed of gas delivery is faster and inspiratory time is shorter.

Peak Airway Pressure (P_{AW}): Represents the total pressure that is required to deliver the V_t and depends upon various airway resistance, lung compliance, and chest wall factors. It is expressed in centimeters of water (cm H_2O).

Sensitivity or trigger sensitivity: Effort, or negative pressure, required by the patient to trigger a machine breath, commonly set so that minimal effort (-1 to -2 cm H_2O) is required to trigger a breath.

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 SPO_2 and $ETCO_2$ 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 cmH_2O.

6. Respiratory rate (RR) should be set to administer a minute ventilation (V_E) of 5 –10 L/min. Maintain $ETCO_2$ between 30-40 mm/Hg. [Current $ETCO_2$ × Current RR ÷ desired $ETCO_2$ = new respiratory rate]

7. PEEP 2-10 cm H_2O

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

9. FiO_2: Initiate at 100% and titrate FiO_2 to maintain SpO_2 >94%. Wean patient to the lowest level of FiO_2 and PEEP while maintaining SpO_2 >94%. Goal is FiO_2 50-60 and SpO_2 >94%.

Troubleshooting: Airway compromise or lost airway in-flight

Remove patient from circuit and perform bag-valve ventilation with 100% O_2 while troubleshooting (check to ensure patient can fully exhale first in case there was air trapping).

- **DOPE**: Displaced ETT / Obstructed ETT / Pneumothorax / Equipment failure

Ventilator Management

- If at any time patient begins to desaturate or develop respiratory problems, immediately disconnect ventilator and ventilate patient with BVM (with PEEP valve if available) and 100% O_2 while correcting issues utilizing the D.O.P.E. algorithm:
    - Displacement: ETT in place, patient not extubated/ tube did not move during transfer. If advanced – pull back to original length and attempt to bag; if tube has pulled farther out of trachea, DO NOT ATTEMPT TO ADVANCE IT without placement of bougie to verify tracheal placement. When advancing bougie, feel for tracheal rings or carina stop. If in doubt, pull tube and attempt BVM. If this fixes problem, continue to bag patient. Upon stabilization, consider alternative advanced airways (extraglotic airway or cric).

      **If ETT moves freely, access for ETT bulb rupture.
    - Obstructions: Assess for secretions in ETT. Suction if indicated.
    - Pressure: Ensure that a tension pneumothorax / hemothorax has not developed (if chest tube in place, ensure it is functioning/ not kinked or clamped). If tension pneumo/hemothorax suspected, perform immediate needle thoracostomy. Assess the need for escarotomy if circumferential burn. Consider additional paralysis and sedation if patient does not tolerate ventilation.
    - Equipment: Ensure that vent did not fail; O_2 tank not empty. If ventilator is operational, trace all tubes to the patient connection (airway tube, transducer line, exhalation line) ensuring patency and connections.

- **Airway**: Confirm ETT is in appropriate position: look / feel for symmetric chest wall rise and verify tube position Check $ETCO_2$
- Suction ETT if suspected secretion obstruction
- **Breathing**: Look and feel for chest excursion, check SPO_2, 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, PCO_2 is affected by respiratory rate and tidal volume (ventilation), while PO_2 is affected by PEEP and FiO_2 (oxygenation).

10. **High pressure alarms / Peak airway pressure alarms** (Peak pressure >35 cm H_2O): 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.

III. ADULT PATIENT CARE PROTOCOLS

34. *Determination of Death*

1. GENERAL PROVISIONS:

A. Purpose: The purpose of this policy is to assist SMTs in the determination of death in the field (i.e. pre-hospital setting). This policy is intended to provide SMTs with parameters to be used when determining whether or not to withhold resuscitative efforts and to provide guidelines for the Flight Surgeon for discontinuing resuscitative efforts.

B. Principles:

1) Resuscitative efforts are of no benefit to patients whose physical condition precludes any possibility of successful resuscitation.

2) Shall determine death based on specific criteria set forth in this policy.

3) Cold water drowning, hypothermia and barbiturate ingestion all prolong brain life and therefore treatment and transport should be considered on these patients.

4) The Unit's Flight Surgeon recognizes that SAR Medical Technicians have the discretion to initiate resuscitation in cases where the patient is obviously dead but a concern for unit morale exists. However, the SMT may decide to cease CPR once en route and or out of sight of concerned unit. Note: Given this situation, the SMT may perform CPR so long as:

a) The patient is not decapitated
b) No obvious decomposition (i.e. rigor) is present
c) Doing so does not put the provider and aircrew in danger

2. DEFINITIONS:

A. Obvious Death Criteria: A patient may be determined obviously dead by SAR Medical Technicians if, IN ADDITION to the absence of respiration, cardiac activity, and neurological reflexes, one or more of the following physical or circumstantial conditions exists:

1) Decapitation
2) Massive crush injury to the head, neck, or trunk
3) Penetrating or blunt injury with evisceration of the heart, lung or brain
4) Decomposition
5) Incineration
6) Rigor Mortis
7) Post-Mortem Lividity
8) Absence of vital signs (breathing, clear pulse, organized cardiac activity on a monitor)
9) Pupils fixed and dilated; absence of corneal reflex

B. Traumatic Cardiac Arrest: No pulse, no spontaneous respirations, no response to aggressive stimulation and pupils are fixed.

Determination of Death Cont'd.

A. Assessment: The Patient Assessment shall, at minimum, include the following items which must be documented on the patient's Patient Care Record (PCR):

1) Assure the patient has a patent airway;
2) Look, listen and feel for respirations; and
3) Check for a pulse for a minimum of 60 seconds.
4) Place patient on cardiac monitor (minimum of 3 leads)

B. Procedure:

1) Perform a Primary Assessment:

a. If patient meets obvious death criteria, do not proceed with resuscitation.
b. If a patient has been confirmed pulseless and apneic for at least 10 minutes (CPR having *not* been performed in that 10 minutes), do not proceed with resuscitation.

2) When not to initiate CPR:

a. Primary assessment reveals a pulseless, non-breathing patient who has signs of prolonged lifelessness in accordance with obvious death criteria.
b. A patient with an approved "Do-Not-Resuscitate" (DNR) document in accordance with Department policy.

C. Termination of CPR by SAR Medical Technicians:

1) Providers may discontinue resuscitative efforts as outlined below:

a. Any case in which information becomes available that would have prevented initiation of CPR had that information been available before CPR was initiated, CPR should be terminated.
b. If patient does not meet above criteria, initiate CPR. After 30 minutes of failure to respond to appropriate advanced life support treatment, defined as:

1) Establishment of airway
2) Sustained ventricular fibrillation or ventricular tachycardia with no pulse, despite attempts to defibrillate
3) Adequate medication therapy consistent with the patient's condition and rhythm
4) Successful thoracic needle decompression for trauma victims if indicated

c. If the treatment of one deteriorating patient would apparently lead to the further deterioration or loss of life of the other patient

2) Disposition of the decedent: If a determination of death has occurred and the decedent has not been moved from the original place of death:

a. The decedent shall remain at scene and not be transported:
b. Any treatment items, such as endotracheal tubes, intravenous catheters, ECG or defibrillation electrodes, shall be left in place;
c. Resuscitation equipment, such as bag-valve-mask devices ECG monitoring equipment, etc., may be removed from the deceased.

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IV. ***ADULT CARDIAC CARE PROTOCOLS***

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IV. ADULT CARDIAC CARE PROTOCOLS

1. ***Adult Cardiac Arrest***

A. Objectives

1) Early recognition and appropriate intervention of pulseless / apneic adult patients.

B. General Information

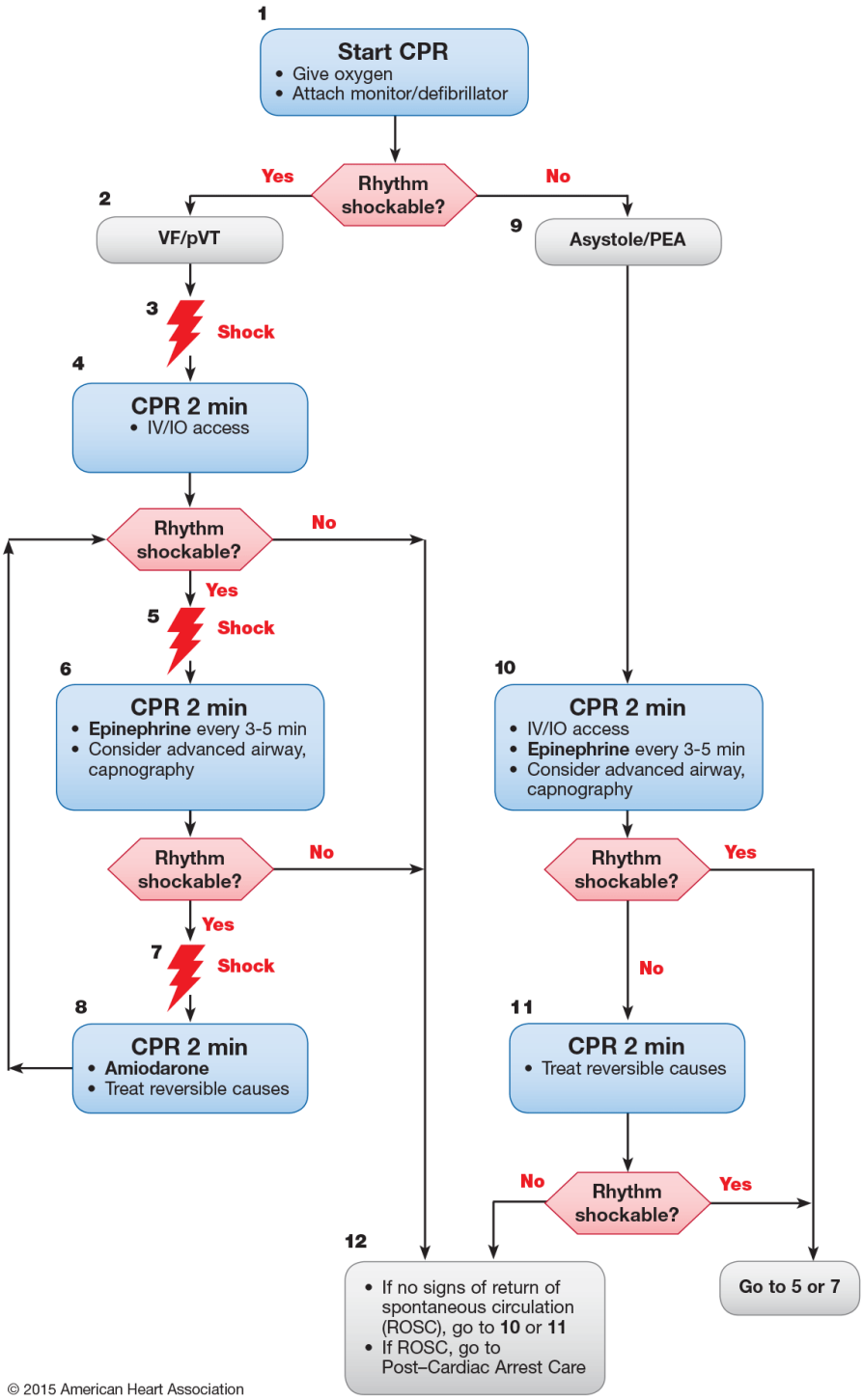
- Cardiopulmonary Resuscitation (CPR)
  a) CPR shall be given IAW 2015 American Heart Association Basic Life Support Guidelines
  b) Push hard and fast (at least 2 inches and at a rate of 100-120/Min)
  c) Ensure full chest recoil
  d) Minimize interruptions in compressions
  e) One cycle of CPR: 30 compressions then 2 breaths; 5 cycles-2min (If no Advanced Airway)
  f) Rotate compressors every 2 min if possible
  g) Check Rhythm every 2 min
  h) After advanced airway is placed, rescuers no longer deliver "cycles" of CPR
     1) Give continuous chest compressions without pauses for breaths
     2) Give 10 breaths/min
- Monitor / Defibrillator Use
  a) Follow appropriate protocol algorithm based on your rhythm analysis.
  b) Contraindications to defibrillation
     1) Rigor / Liver Mortis
     2) No Code / DNR situations
  c) If Patient successfully regains a pulse, maintain airway and ventilations as necessary and continue to monitor a pulse.

*If Patient becomes pulseless during transport, start CPR, and analyze rhythm.

C. Warnings / Alerts

- CPR may still be required in the presence of an organized cardiac rhythm.
- It is the responsibility of the provider delivering the shock to ensure that no one is touching the patient prior to shock delivery.
- Ensure that the patient is dried off and not laying in water prior to defibrillation.
- Ensure that transdermal medications are taken off and wiped clean prior to defibrillation.

Adult Cardiac Arrest Algorithm—2015 Update



CPR Quality

- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If P_{ETCO_2} <10 mm Hg, attempt to improve CPR quality.
- Intra-arterial pressure
  - If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve CPR quality.

Shock Energy for Defibrillation

- **Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic:** 360 J

Drug Therapy

- **Epinephrine IV/IO dose:** 1 mg every 3-5 minutes
- **Amiodarone IV/IO dose:** First dose: 300 mg bolus. Second dose: 150 mg.

Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in P_{ETCO_2} (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

2. ***Adult Asystole and Pulseless Electrical Activity***

A) Objectives:

1) Early recognition and appropriate intervention of pulseless / apneic adult patients.
2) Early appropriated recognition of lethal rhythms.

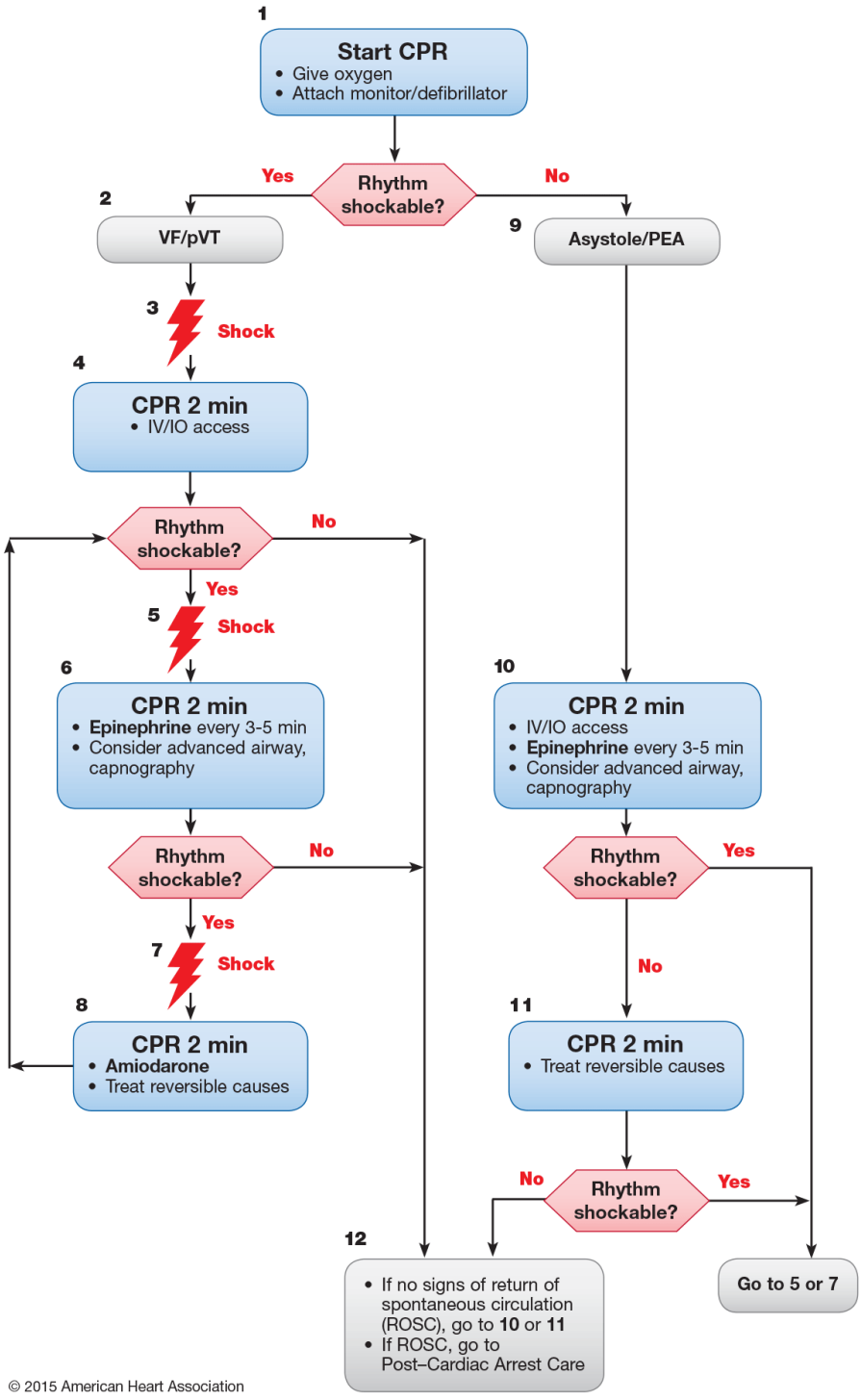
B) General Information:

- CPR shall be given IAW 2015 American Heart Association Basic Life Support Guidelines.
- Endotracheal administration of medications should be used ONLY when IV/IO access is not available.
- Search for and treat possible contributing factors using appropriate protocol for:
  - a) Hypovolemia
  - b) Hypoxia
  - c) Hypokalemia / Hyperkalemia
  - d) Hypoglycemia
  - e) Hypothermia / Hyperthermia
  - f) Hydrogen ion- (Acidosis)
  - g) Tension Pneumothorax
  - h) Toxins
  - i) Trauma
  - j) Tamponade Cardiac
  - k) Thrombosis (coronary or pulmonary)
- For cardiac arrest in renal patients administer Calcium Chloride 1 gm IV/IO push followed by 40 ml flush, Sodium Bicarbonate 1 Meq/kg and repeat in 10.

C) Warnings / Alerts

- CPR may still be required in the presence of an organized cardiac rhythm.

Adult Cardiac Arrest Algorithm—2015 Update



CPR Quality

- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If P_{ETCO_2} <10 mm Hg, attempt to improve CPR quality.
- Intra-arterial pressure
  - If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve CPR quality.

Shock Energy for Defibrillation

- **Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic:** 360 J

Drug Therapy

- **Epinephrine IV/IO dose:** 1 mg every 3-5 minutes
- **Amiodarone IV/IO dose:** First dose: 300 mg bolus. Second dose: 150 mg.

Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in P_{ETCO_2} (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

3. ***Adult Bradycardia***

A) Objectives:

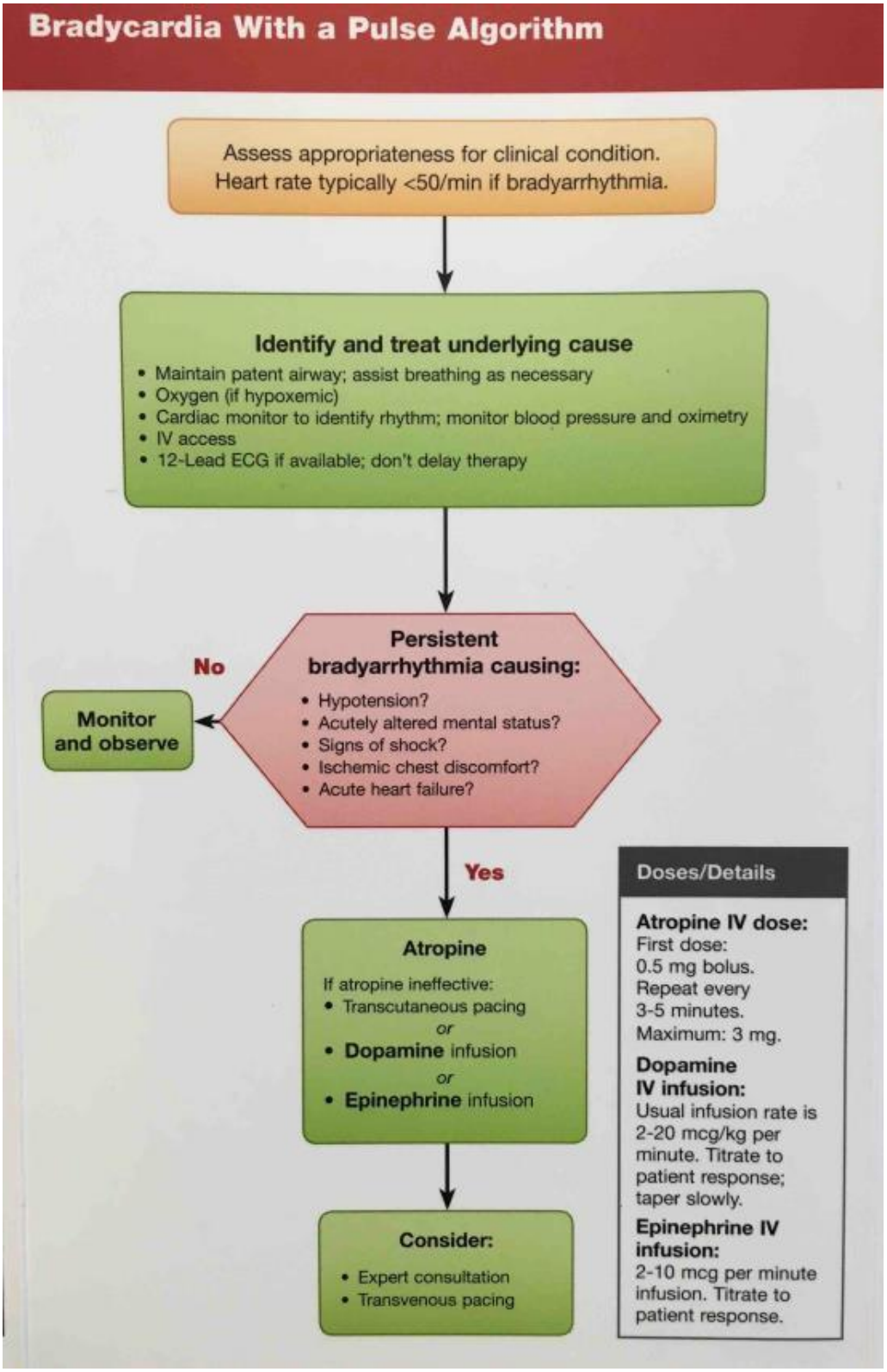
1) Early appropriate recognition and management of bradycardic rhythms.
2) Recognition of poor perfusion attributed to a bradycardic rhythm.

B) General Information:

- Signs and symptoms of poor perfusion include:
  a) New onset of altered mental status
  b) Ongoing chest pain
  c) Hypotension Systolic B/P less than 90. with associated signs and symptoms.
- If patient is stable, Atropine is first line medication.
- External Pacing
  a) Consider pain control and/or sedation
  b) Do not delay pacing for administration of medication
- Dopamine Drip
  a) Premixed Drip is preferred
  i) If not available then add 400 mg of Dopamine to 250 ml NS for concentration of 1600 mcg/ml
  b) Dose 2-10 mcg/kg/min
- Epinephrine Drip
  a) Add 0.4 mg of Epinephrine 1:1000 to 100 ml NS for a concentration of 4mcg/ml
  i) Dose 2-10 mcg/min
  b) Epinephrine Push Dose 1/100,000
  (i) Draw 1 ml of Epi 1/10,000 into 9 mL NS 10 mcg/mL
  Loading dose: 20 mcg/2mL
  Continuous Dosing: 10mcg/1mL/min
  To maintain SBP of >100 mmHg

C) Warnings/Alerts

- Patient may deteriorate due to unnecessary delay in pacing.
- Failure to recognize electrical and mechanical capture may lead to patient deterioration.
- Assessment of a carotid pulse may be inaccurate due to muscle jerking which may mimic a carotid pulse.
- Patients that are hypothermic should not be paced.
- Consider analgesia or sedation for pacing.


Bradycardia With a Pulse Algorithm
Assess appropriateness for clinical condition.
Heart rate typically <50/min if bradyarrhythmia.
Identify and treat underlying cause
• Maintain patent airway; assist breathing as necessary
• Oxygen (if hypoxemic)
• Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
• IV access
• 12-Lead ECG if available; don't delay therapy
Persistent bradyarrhythmia causing:
• Hypotension?
• Acutely altered mental status?
• Signs of shock?
• Ischemic chest discomfort?
• Acute heart failure?
No
Monitor and observe
Yes
Atropine
If atropine ineffective:
• Transcutaneous pacing
or
• Dopamine infusion
or
• Epinephrine infusion
Consider:
• Expert consultation
• Transvenous pacing
Doses/Details
Atropine IV dose:
First dose:
0.5 mg bolus.
Repeat every
3-5 minutes.
Maximum: 3 mg.
Dopamine IV infusion:
Usual infusion rate is 2-20 mcg/kg per minute. Titrate to patient response; taper slowly.
Epinephrine IV infusion:
2-10 mcg per minute infusion. Titrate to patient response.

IV. ADULT CARDIAC CARE PROTOCOLS

4 Cont. ***Adult Tachycardia- Narrow***

A) Objectives:

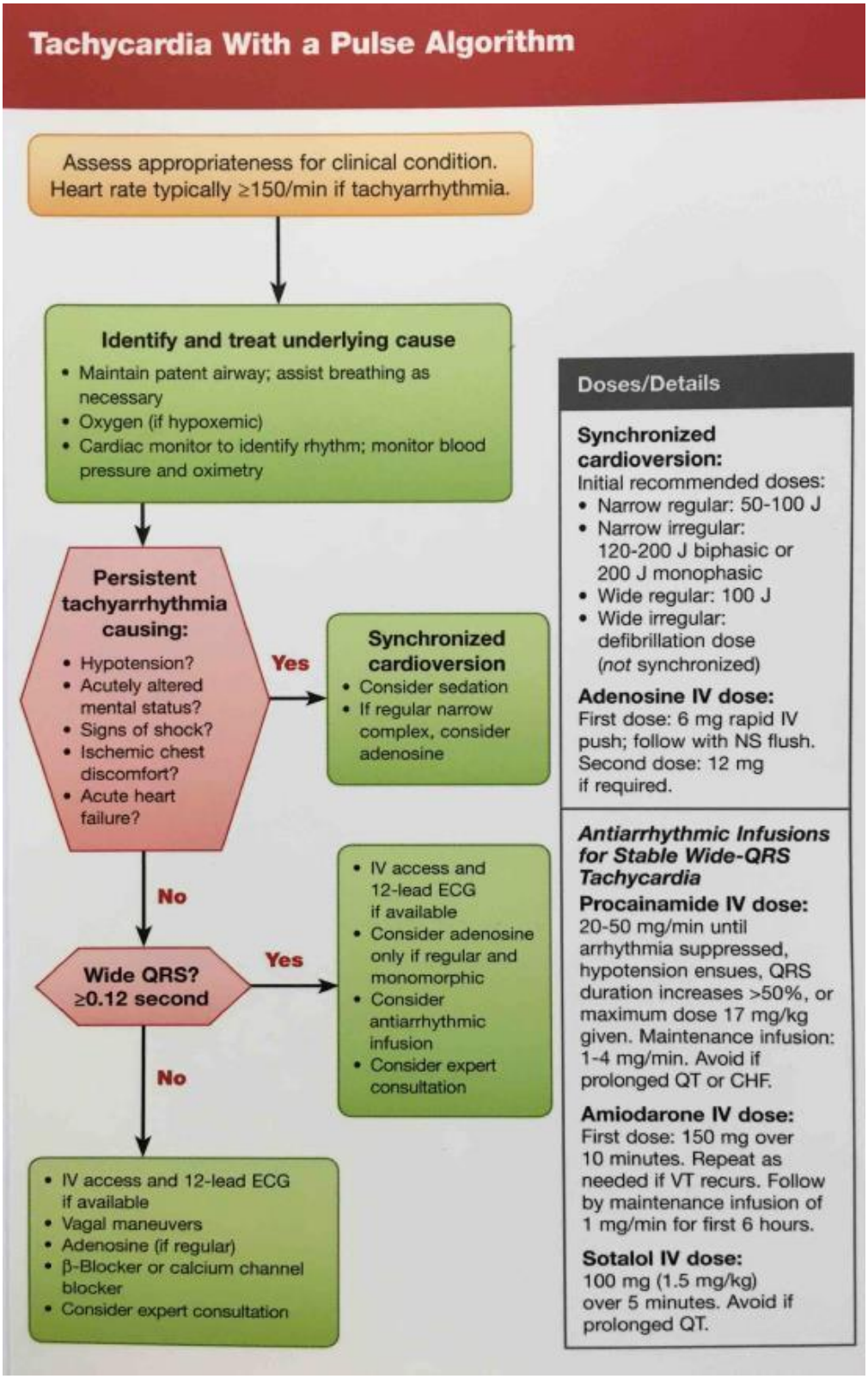
1) Early appropriate recognition and management of narrow complex tachycardia rhythms.
2) Recognition of poor perfusion attributed to a narrow complex tachycardia rhythm.

B) General Information:

- Signs and symptoms of a hemodynamically unstable patient include:
  a) Altered mental status
  b) Ongoing chest discomfort
  c) Shortness of breath
  d) Hypotension
  e) Shock
- Heart rate of 150/minute is one factor to distinguish SVT from sinus tach. Younger adult patients may experience sinus tach at rates greater than 150/minute and older patients may have SVT at rates lower than 150/minute. Other considerations should include presence/absence of P waves, beat to beat variability and patient history; if unsure of treatment contact medical control.
- If the patient has cocaine-induced SVT, administer Valium 5 mg IV/IO.

C) Warnings/Alerts

- Avoid low energy unsynchronized defibrillations. Low energy unsynchronized defibrillations are likely to induce ventricular fibrillation.
- If unable to obtain synchronization, deliver unsynchronized shock at defibrillation energy (manufacturer recommendations) not to delay cardioversion for administration of sedation to the unstable patient.
- It is the responsibility of the provider delivering the shock to ensure that no one is touching the patient prior to shock delivery.
- The following conditions need to be addressed prior to cardioversion:
  a) Patients in standing water
  b) Patients with transdermal medications
- Adenosine is contra-indicated in patients with a history of WPW.


Tachycardia With a Pulse Algorithm
Assess appropriateness for clinical condition. Heart rate typically ≥150/min if tachyarrhythmia.
Identify and treat underlying cause
• Maintain patent airway; assist breathing as necessary
• Oxygen (if hypoxemic)
• Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
Persistent tachyarrhythmia causing:
• Hypotension?
• Acutely altered mental status?
• Signs of shock?
• Ischemic chest discomfort?
• Acute heart failure?
Yes
Synchronized cardioversion
• Consider sedation
• If regular narrow complex, consider adenosine
No
Wide QRS? ≥0.12 second
Yes
• IV access and 12-lead ECG if available
• Consider adenosine only if regular and monomorphic
• Consider antiarrhythmic infusion
• Consider expert consultation
No
• IV access and 12-lead ECG if available
• Vagal maneuvers
• Adenosine (if regular)
• β-Blocker or calcium channel blocker
• Consider expert consultation
Doses/Details
Synchronized cardioversion:
Initial recommended doses:
• Narrow regular: 50-100 J
• Narrow irregular: 120-200 J biphasic or 200 J monophasic
• Wide regular: 100 J
• Wide irregular: defibrillation dose (not synchronized)
Adenosine IV dose:
First dose: 6 mg rapid IV push; follow with NS flush. Second dose: 12 mg if required.
Antiarrhythmic Infusions for Stable Wide-QRS Tachycardia
Procainamide IV dose:
20-50 mg/min until arrhythmia suppressed, hypotension ensues, QRS duration increases >50%, or maximum dose 17 mg/kg given. Maintenance infusion: 1-4 mg/min. Avoid if prolonged QT or CHF.
Amiodarone IV dose:
First dose: 150 mg over 10 minutes. Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.
Sotalol IV dose:
100 mg (1.5 mg/kg) over 5 minutes. Avoid if prolonged QT.

IV. ADULT CARDIAC CARE PROTOCOLS

4 Cont. ***Adult Tachycardia - Wide***

A) Objectives

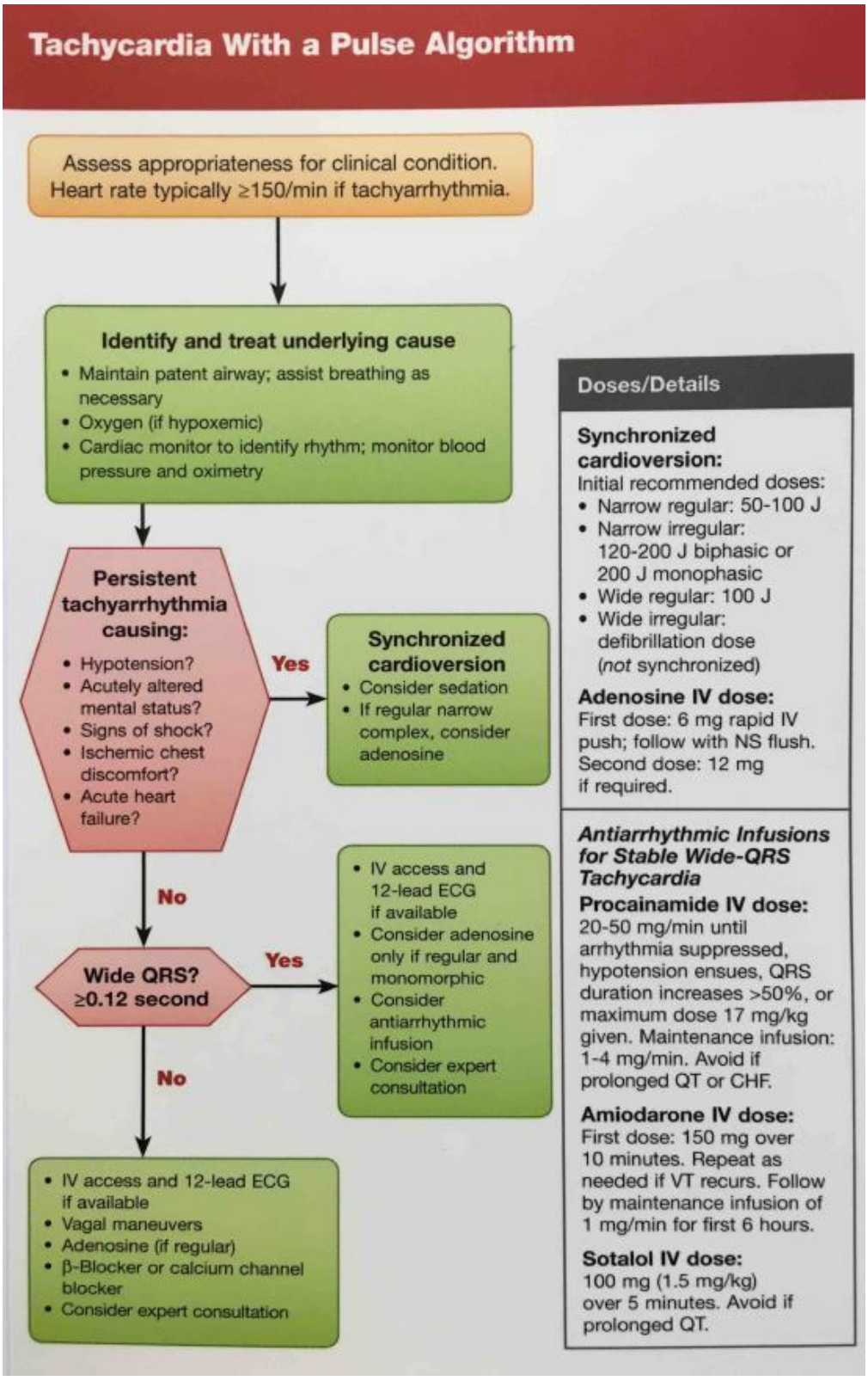
1) Early appropriate recognition and management of tachycardia rhythms.
2) Recognition of poor perfusion attributed to a tachycardia rhythm Adult Tachycardia – Wide Complex.

B) General Information

- Signs and Symptoms of a hemodynamically unstable patient include:
  a) Altered mental status
  b) Ongoing chest discomfort
  c) Shortness of breath
  d) Hypotension
  e) Shock
- Although not common, V-Tach can occur at rates less than 150; if unsure of treatment contact medical control

C) Warnings/Alerts

- Polymorphic VT can deteriorate quickly to VF – defibrillate ASAP.
- Avoid low energy unsynchronized defibrillations. Low energy unsynchronized defibrillations are likely to induce ventricular fibrillation.
- If unable to obtain synchronization, deliver unsynchronized shock at defibrillation energy (manufacturer recommendations).
- Do not delay cardioversion for administration of sedation to the unstable patient.
- It is the responsibility of the provider delivering the shock to ensure that no one. Is touching the patient prior to shock delivery
- The following conditions need to be addressed prior to cardioversion
  a) Patients in standing water
  b) Patients with transdermal medications
- Other conditions may mimic wide complex tachycardia
  a) Internal pacemakers
  b) Aberrancy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Persistent tachyarrhythmia causing:
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Synchronized cardioversion
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Wide QRS? ≥0.12 second
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• IV access and 12-lead ECG if available
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Synchronized cardioversion:
Initial recommended doses:
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Amiodarone IV dose:
First dose: 150 mg over 10 minutes. Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.
Sotalol IV dose:
100 mg (1.5 mg/kg) over 5 minutes. Avoid if prolonged QT.

IV. ADULT CARDIAC CARE PROTOCOLS

5. ***Return of Spontaneous Circulation (ROSC)***

A) Objectives

1) To appropriately treat patients who have return of spontaneous circulation.
2) To ensure adequate perfusion.

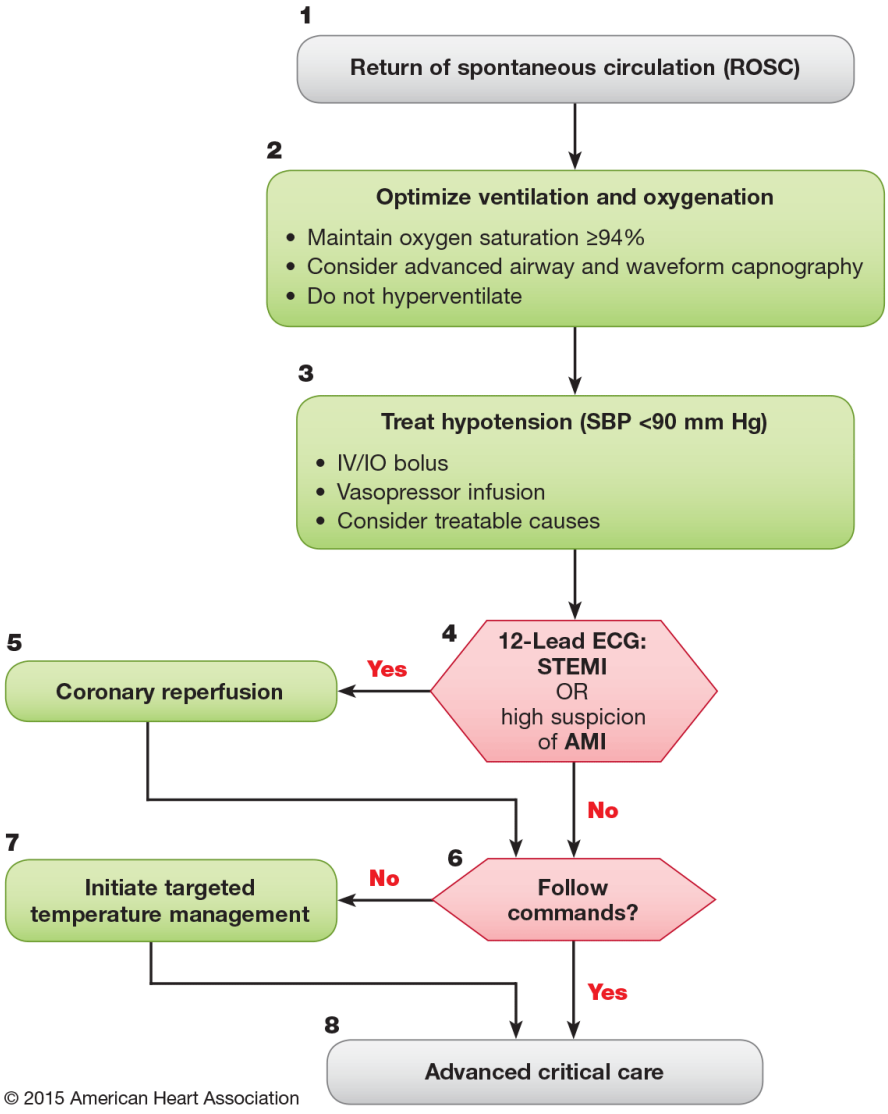
B) General Information

- Amiodarone:
  a) 150 mg in 100 ml over 10 minutes
  b) Do not use in the same IV line with furosemide, heparin or sodium bicarbonate
- Dopamine:
  a) Starting dose 2 mcg/kg/min
  b) Max dose of 20 mcg/kg/min
  c) Titrate to systolic blood pressure of 90-100 mm/Hg
  d) Mix 400 mg in 250 ml NS for a concentration of 1600 mcg/ml; see reference chart for drip rate

C) Warnings/ Alerts

- Amiodarone is contraindicated in the following conditions:
  a) Bradycardia
  b) Heart block
  c) Hypotension
  d) Pulmonary edema
  e) Cardiogenic shock

Adult Immediate Post–Cardiac Arrest Care Algorithm—2015 Update



Doses/Details

Ventilation/oxygenation: Avoid excessive ventilation. Start at 10 breaths/min and titrate to target P_{ETCO_2} of 35-40 mm Hg. When feasible, titrate F_{IO_2} to minimum necessary to achieve Spo_2 ≥94%.

IV bolus: Approximately 1-2 L normal saline or lactated Ringer's

Epinephrine IV infusion: 0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

Dopamine IV infusion: 5-10 mcg/kg per minute

Norepinephrine IV infusion: 0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

6. ***Termination of resuscitation***

A) Objectives

1) To provide criteria for field terminating resuscitation.

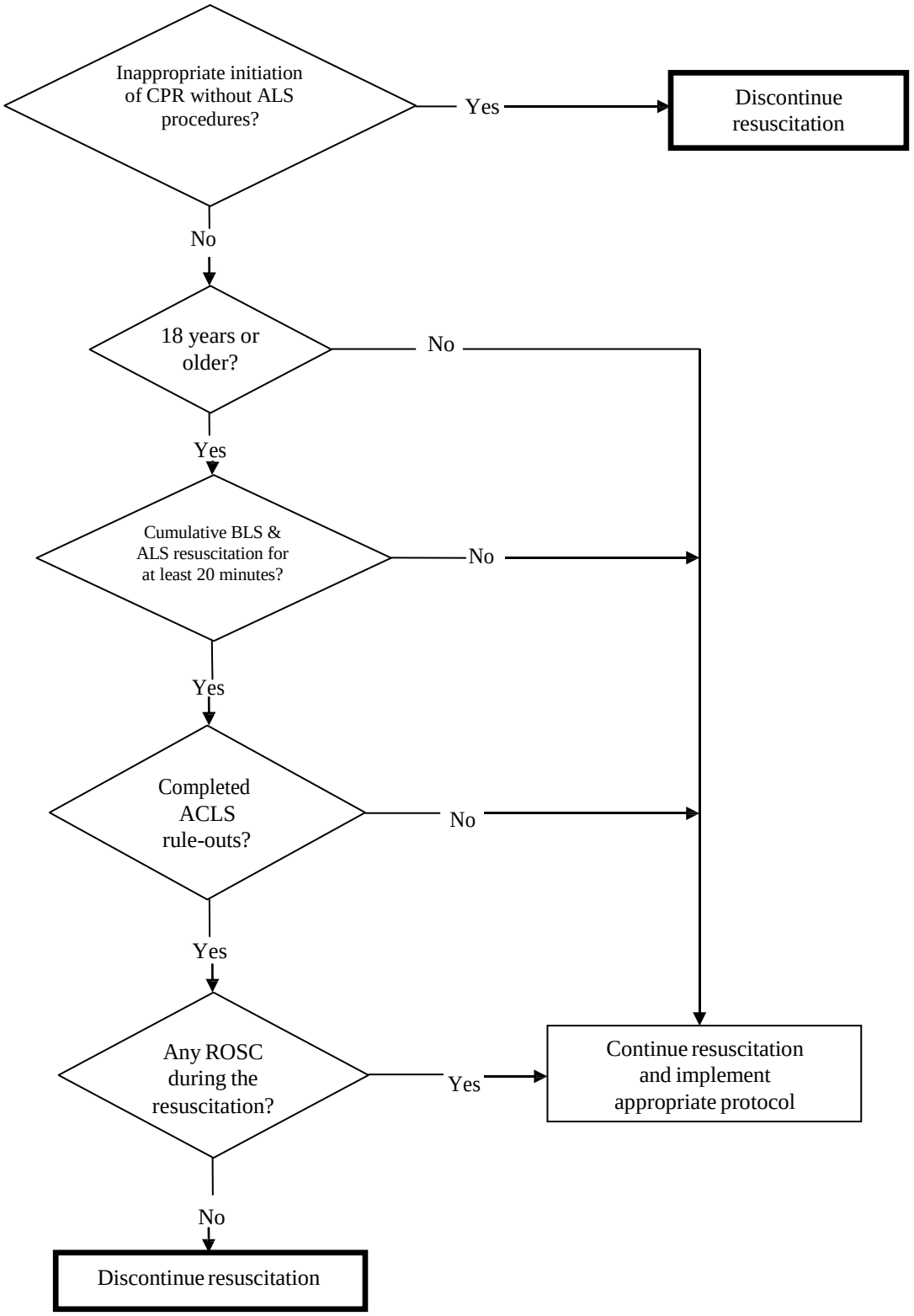
B) General Information

- Contraindications to using the protocol include patients who are exhibiting neurological activity, patients under 18 years old, or patients with suspected hypothermia.
- Inappropriate initiation of CPR includes patients with dependent lividity, rigor mortis, injuries incompatible with life or a valid DNR.
- Resuscitation must continue while you are evaluating the patient.
- Patients in cardiac arrest from environmental causes may warrant resuscitation efforts greater than 20 minutes (ie hypothermia, submersion injuries etc.).
- Once resuscitation has been discontinued
  a) Distribute bereavement booklet to family members, if available
  b) Leave all expendable ALS supplies in place

C) Warnings / Alerts

- This protocol is not to be used during transport (transport is defined as moving the patient into the aircraft)
- Recent studies have shown that resuscitation outcomes for witnessed arrest have had ROSC at times greater than 20 minutes while maintaining a refractory Ventricular Fibrillation rhythm in these patients. Sound judgment and all aspects of the patient situation should be held into consideration prior to any termination of efforts in these patients.

Termination of resuscitation



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3. JUMP START Triage 134
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8. Pediatric Tachycardia 140

V. PEDIATRIC GUIDELINES

1. General information:

Pediatric and Neonatal patients are not typically in the SAR Medical Technicians Scope of Practice, but have the potential to become patients under our care. The following charts are tools to help the SAR Medical Technician in treatment of Pediatric and Neonatal patients.

References to ALS EMS Field Guide (AHA2015), AHA ACLS/PALS Handbook, or BRASLOW Child Reference Tape shall be done anytime treatment is being conducted on a Pediatric or Neonatal patient. Next level of care shall be notified while transporting Pediatric and Neonatal patients.

2. Important reminders for providers treating Pediatric and Neonatal patients:

- Up until the age of 8, a child's head is proportionally large and contains 25% of total body weight.
- A Child's Airway is narrower and less stable at all levels than those of adults.
- Small amounts of blood loss in children can cause shock.
- Children can compensate in shock for long periods of time, during this time it is vital to perform lifesaving and shock treatment. When children start to decompensate in shock it tends to be irreversible. Aggressive stabilization of Pediatric and Neonate patients is key to managing these patients.

3. Clinical Reference charts for Pediatric(s) / Neonate(s):

Age	Preterm	Term	6 Months	1YR	3YR	6YR	8YR	10YR	11YR	12YR	14YR
Weight lbs.	3	7.5	15	22	33	44	55	66	77	88	99
Weight kg	1.5	3.5	7	10	15	20	15	30	35	40	45
Length in.	16	21	26	31	39	46	50	54	57	60	64
Length cm	41	53	66	79	99	117	127	137	145	152	163
Heart Rate	140	125	120	120	110	100	90	90	85	85	80
Respirations	40-60	40-60	24-36	22-30	20-26	20-24	18-22	18-22	16-22	16-22	14-22
Systolic B/P	50-60	60-70	60-120	65-125	100	100	105	110	110	115	115
ET Tube (mm)	2.5,3.0	3.5	3.5	4	4.5	5.5	6	6.5	6.5	7	7
Suction Cath	5-6 Fr	8 Fr	8 Fr	8 Fr	8 Fr	10 fr	10 Fr	10 fr	10 Fr	10 Fr	10 Fr
Defibrillation:											
2 J/kg (Initial)	3J	7J	14J	20J	30J	40J	50J	60J	70J	80J	90J
4 J/kg (Repeat)	6J	14J	28J	40J	60J	80J	100J	120J	140J	160J	180J
8 J/kg (Repeat)	12J	28J	56J	80J	120J	160J	200J	240J	280J	320J	360J
10 J/kg (Repeat)	15J	35J	70J	100J	150J	200J	250J	300J	350J	360J	360J
Cardioversion:											
0.5-2J/kg	1-3J	2-7J	4-14J	5-20J	8-30J	10-40J	13-50J	15-60J	18-70J	20-80J	23-90J
Fluid Challenge:											
20ml/kg IV/IO	15ml	35ml	140ml	200ml	300ml	400ml	500ml	600ml	700ml	800ml	900ml
Neonates: 10ml/kg	10ml/kg	10ml/kg									

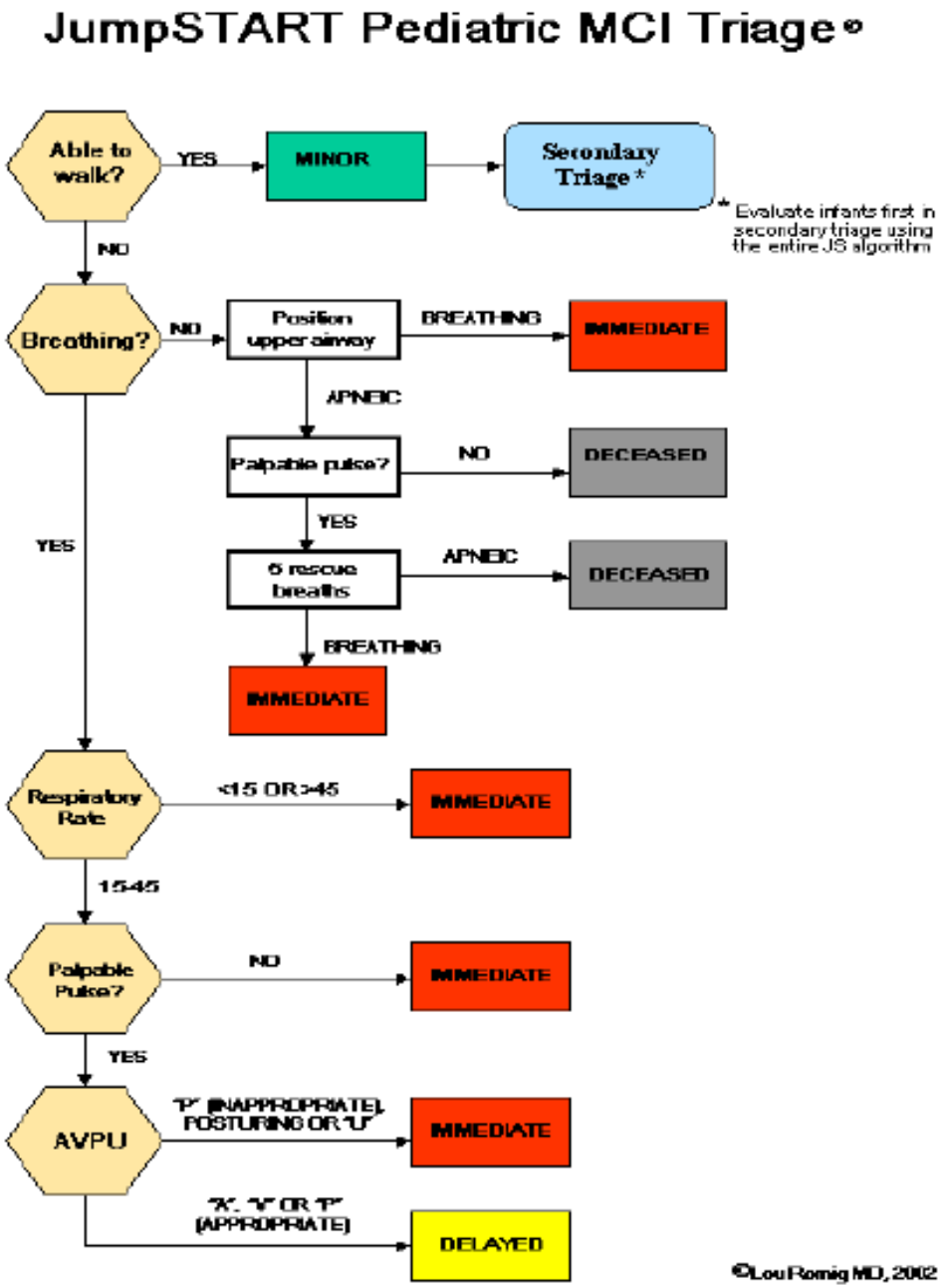
V. PEDIATRIC GUIDELINES

2. Clinical Reference charts for Pediatric(s) / Neonate(s):

Age	Preterm	Term	6 Months	1YR	3YR	6YR	8YR	10YR	11YR	12YR	14YR
Weight kg	1.5	3.5	7	10	15	20	15	30	35	40	45
Amiodarone (50mg/ml) 5mg/kg IV/IO	0.15ml	0.35ml	0.7ml	1ml	1.5ml	2ml	2.5ml	3ml	3.5ml	4ml	4.5ml
Atropine (0.1mg/ml) 0.02 mh/kg IV/IO	1ml	1ml	1.4ml	2ml	3ml	4ml	5ml	6ml	7ml	8ml	9ml
Dextrose (D50%w) 0.5gm/kg IV/IO {use D25%W for infant}	3ml D25%	7ml D25%	14ml D25%	20ml D25%	15ml	20ml	25ml	30ml	35ml	40ml	45ml
Diazepam (5mg/ml) 0.1-0.3 mg/kg IV/IO	0.03-0.09ml	0.07-0.21ml	0.14-0.42ml	0.2-0.6ml	0.3-0.9ml	0.4-1.2ml	0.5-1.5ml	0.6-1.8ml	0.7-2.1ml	0.8-2.4ml	0.9-2.7ml
EPI 1:10,000 (o.1mg/ml) 0.01 mg/kg IV/IO	0.15ml	0.35ml	0.7ml	1ml	1.5ml	2ml	2.5ml	3ml	3.5ml	4ml	4.5ml
ET EPI 1:1,000 (1mg/ml) 0.1 mg/kg ET	0.15ml	0.35ml	0.7ml	1ml	1.5ml	2ml	2.5ml	3ml	3.5ml	4ml	4.5ml
Etomidate (2mg/ml) 0.3mg/kg IV/IO	0.2ml	0.5ml	1ml	1.5ml	2.3ml	3ml	3.8ml	4.5ml	5.3ml	6ml	6.8ml
Morphine (1mg/ml) 0.1mg/kg IV/IO/IM	0.15ml	0.35ml	0.7ml	1ml	1.5ml	2ml	2.5ml	3ml	3.5ml	4ml	4.5ml
Naloxone (0.4 mg/ml) 0.1 mg/kg IV/IO/IM/SQ	0.4ml	0.9ml	1.8ml	2.5ml	3.8ml	5ml	5ml	5ml	5ml	5ml	5ml
Succinylcholine (20mg/ml) 1mg/kg IV/IO {infant: 2mg/kg}	0.15ml 2mk/kg	0.35ml 2mg/kg	0.7ml 2mg/kg	1ml 2mg/kg	0.75ml	1ml	1.25ml	1.5ml	1.75ml	2ml	2.3ml

V. PEDIATRIC GUIDELINES

3. Jump START Triage



JumpStart Triage

Indications: Trauma patients who meet any of the following criteria shall be transported to the **closest appropriate** trauma center within a 30-minute ground transport time. Trauma patients who are not within 30 minutes ground transport time of a trauma center should be transported to the closest hospital if they cannot be delivered to an appropriate facility more rapidly by air ambulance.

Physiologic Criteria

- Glascow Coma Scale less than 14, or
- Systolic blood pressure of less than 90 mm/Hg, or
- Respiratory rate of less than 10 or greater than 29 breaths per minute (less than 20 breaths per minute in infants less than 1 year old)

Anatomic Criteria

- Penetrating injuries to head, neck, torso and extremities proximal to elbow or knee
- Flail Chest
- 2 or more proximal long bone fracures
- Crushed, degloved or mangled extremity
- Amputation proximal to wrist or ankle
- Pelvic fractures
- Open or depressed skull fractures
- Paralysis

Mechanism of Injury

- **Falls**
  - Adults – greater than 20 feet
  - Children less than 15 years old – greater than 10 feet, or 2-3 times the child's height
- **High-risk auto crash**
  - Intrusion- more than 12 inches to the occupant site or more than 18 inches to any site
  - Ejection (partial or complete) from automobile
  - Death in the same passenger compartment
  - Vehicle telemetry data consistent with high risk of injury
- **Auto versus pedestrian / bicyclists**- thrown, run over or with significant (greater than 20 mph) impact
- **Motorcycle crash** at speed greater than 20 mph
- **Special Considerations**
- **Burns** (with or without other trauma) – absent other trauma, burns that meet Burn Center criteria should be transported to a burn center
- **Pregnancy**- Injured women who are more than 20 weeks pregnant should be considered for transport to a trauma center or a hospital with obstetrical resources
- **Age** – greater than 55 years of age
- **Anticoagulation and Bleeding Disorders** – EMS should contact medical control and consider transport to trauma center
- **Time- Sensitive Extremity Injury** – open fracture(s) or fracture(s) with neurovascular compromise
- **EMS Provider Judgment** – EMS provides, based on experience and expertise, may always exercise clinical judgment regarding atypical patient presentations

V. PEDIATRIC GUIDELINES

4. APGAR / Glasgow Coma Scale

APGAR / Glasgow Coma Scale Score / Pain Rating Scale

APGAR

Sign	0	1	2
Appearance (skin color)	Blue, pale	Body pink, blue extremities	Completely pink
Pulse rate (heart rate)	Absent	<100 beats/minute	>100 beats/minute
Grimace (irritability)	No response	Grimace	Cough, sneeze, cry
Activity (muscle tone)	Limp	Some flexion	Active motion
Respirations (effort)	Absent	Slow, irregular	Good, crying

Pediatric Glasgow Coma Scale (GCS) Score

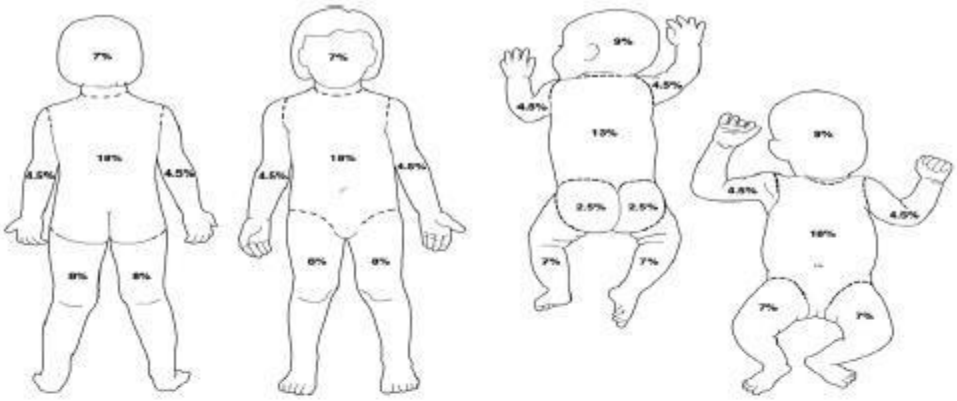
Eye	Verbal	Motor
4 – Spontaneous eye opening 3 – Eye opening on command 2 – Eye opening to painful stimulus 1 – No eye opening *If eye(s) cannot be opened due to severe swelling, the patient should receive the score based on what he/she would be able to do	*>5 Years of Age* 5 – Oriented and converses 4 – Disoriented and converses 3 – Inappropriate words 2 – Incomprehensible sounds 1 – Makes no verbal response *2-5 Years of Age* 5 – Appropriate words and phrases 4 – Inappropriate words 3 – Cries/screams 2 – Grunts 1 – Makes no verbal response *Birth to 2 Years of Age* 5 – Cries appropriately, smiles, coos 4 – Cries 3 – Inappropriate crying/screaming 2 – Grunts 1 – Makes no verbal response *See note about intubation	6 – Follows command 5 – Localizes painful stimuli 4 – Withdrawal to pain 3 – Responds with abnormal flexion to painful stimuli (decorticate) 2 – Responds with abnormal extension to painful stimuli (decerebrate) 1 – Gives no motor response
• If patient intubated, GCS score contains only eye and motor scales and a "T" is added to note the inability to assess verbal response (e.g., "8T")		

Pediatric Pain Rating Scale

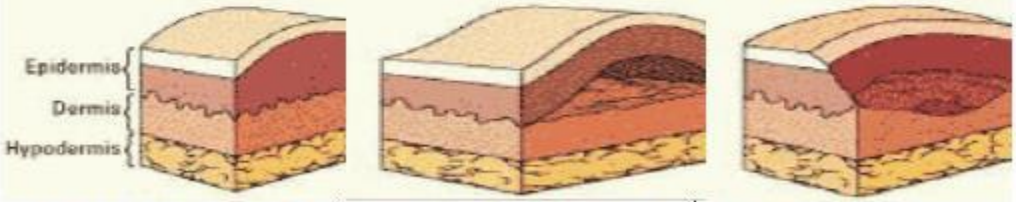
Explain to the child that each face is for a person who feels happy because there is no pain (hurt) or sad because there is some or a lot of pain. Face 0 is very happy because there is no hurt. Face 2 hurts just a little bit. Face 4 hurts a little more. Face 6 hurts even more. Face 8 hurts a whole lot, but Face 10 hurts as much as you can imagine, although you do not have to be crying to feel this bad. Ask child to choose the face that best describes the child's own pain. Record the number under chosen face on patient care report.

V. PEDIATRIC GUIDELINES

5. Neonate / Pediatric Burn Reference



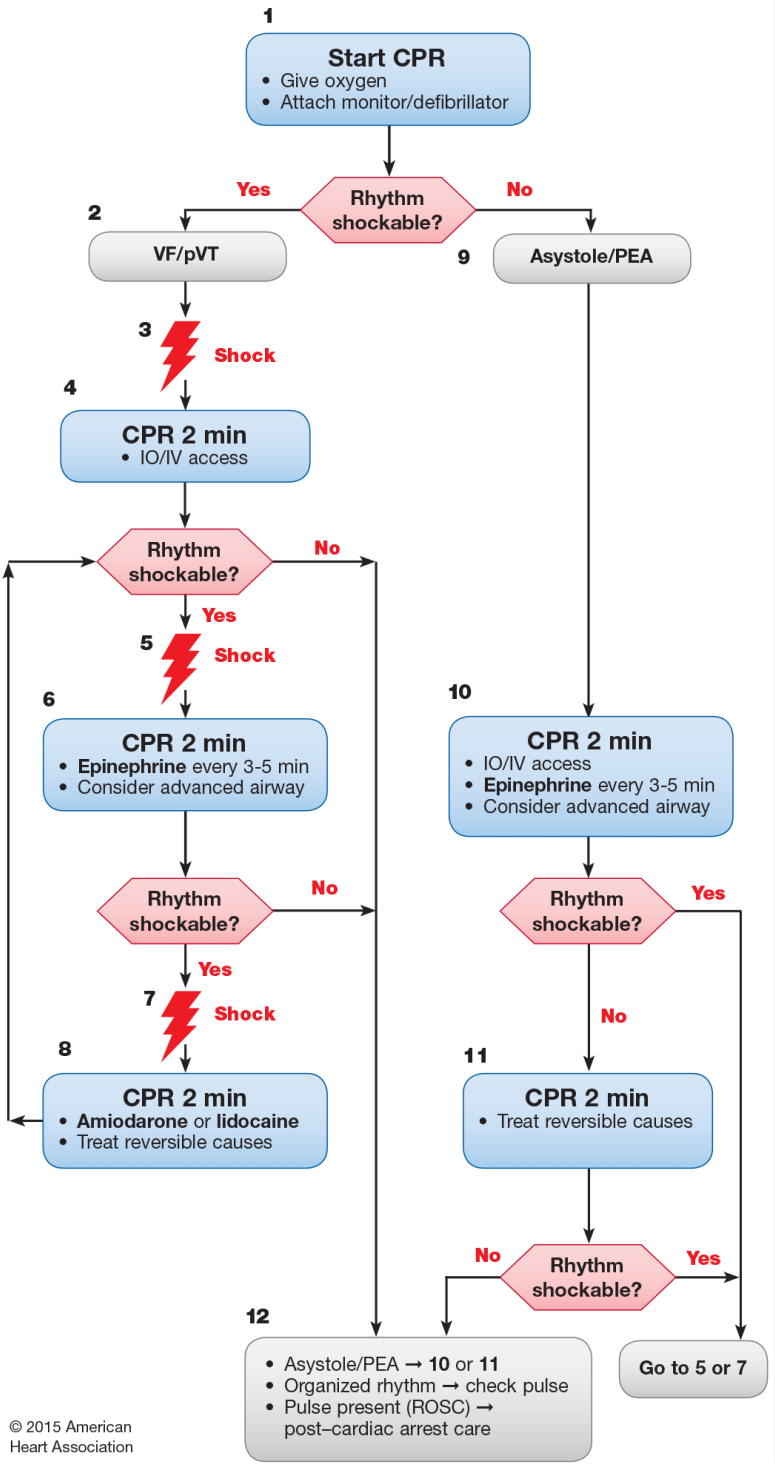
Palm Method:
The palm method is a tool whereby the size of the patients palm is used as an indicator for specific percentage of TBSA.
The surface area of a patients palm equals approximately 1% of TBSA.
This method is particularly useful where the burn has an irregular shape or has a scattered distribution.

Superficial (First-Degree)	Partial Thickness (Second-Degree)	Full Thickness (Third-Degree)
		
Damage to the outer layer of skin {epidermis}, causing pain, redness and swelling.	Damage to both outer skin and underlying tissue layers {epidermis and dermis} causing pain, redness, swelling and blistering.	Damage extends deeper into tissues {epidermis, dermis and hypodermis} causing extensive tissue destruction. The skin may feel numb.

V. PEDIATRIC GUIDELINES

6. Pediatric Cardiac Arrest

Pediatric Cardiac Arrest Algorithm—2015 Update



CPR Quality

- Push hard (≥⅓ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 15:2 compression-ventilation ratio.

Shock Energy for Defibrillation

First shock 2 J/kg, second shock 4 J/kg, subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose

Drug Therapy

- **Epinephrine IO/IV dose:** 0.01 mg/kg (0.1 mL/kg of 1:10 000 concentration). Repeat every 3-5 minutes.
  If no IO/IV access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of 1:1000 concentration).
- **Amiodarone IO/IV dose:** 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.
- **Lidocaine IO/IV dose:** Initial: 1 mg/kg loading dose. Maintenance: 20-50 mcg/kg per minute infusion (repeat bolus dose if infusion initiated >15 minutes after initial bolus therapy).

Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Spontaneous arterial pressure waves with intra-arterial monitoring

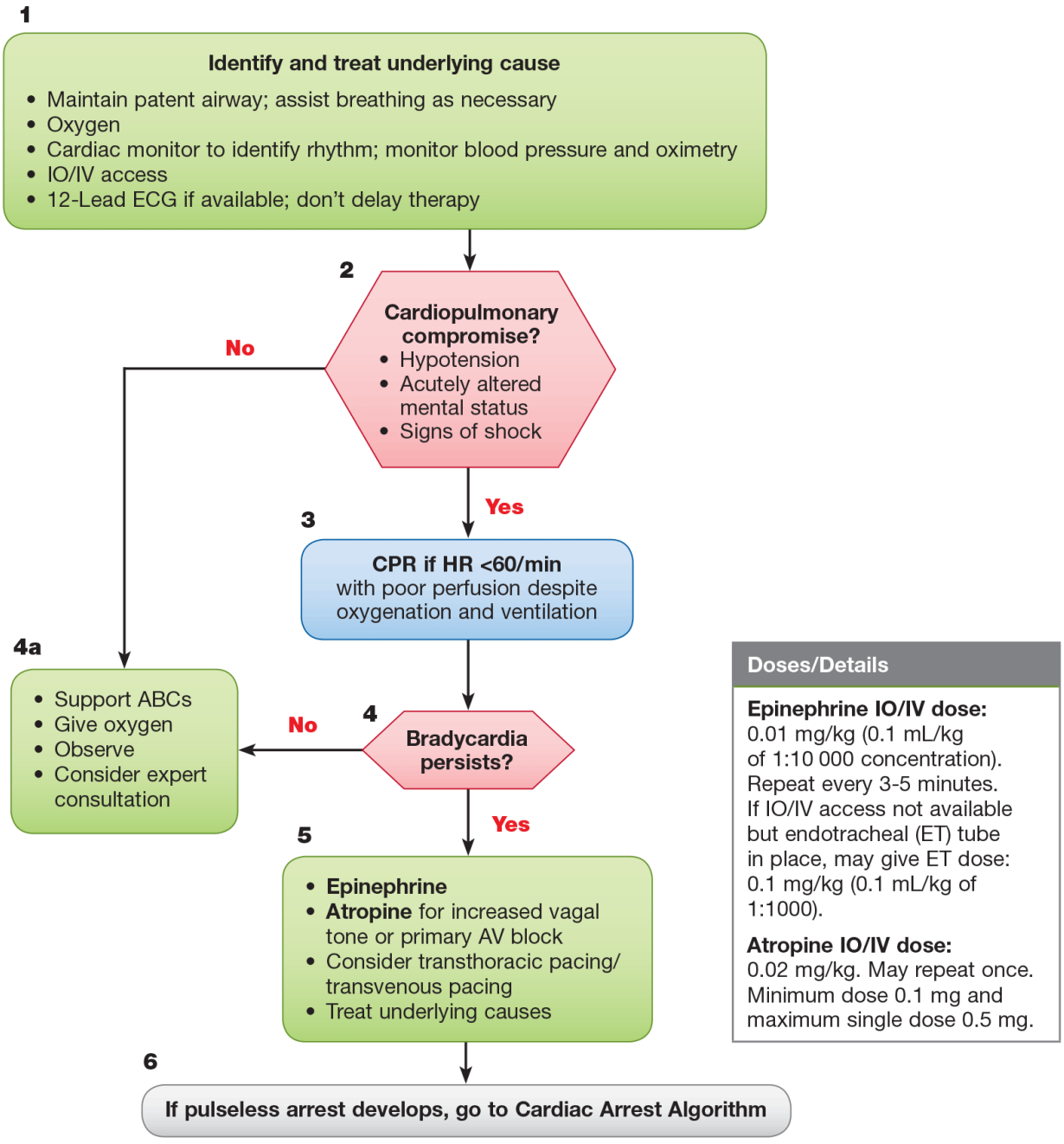
Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypoglycemia
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

V. PEDIATRIC GUIDELINES

7. Pediatric Bradycardia

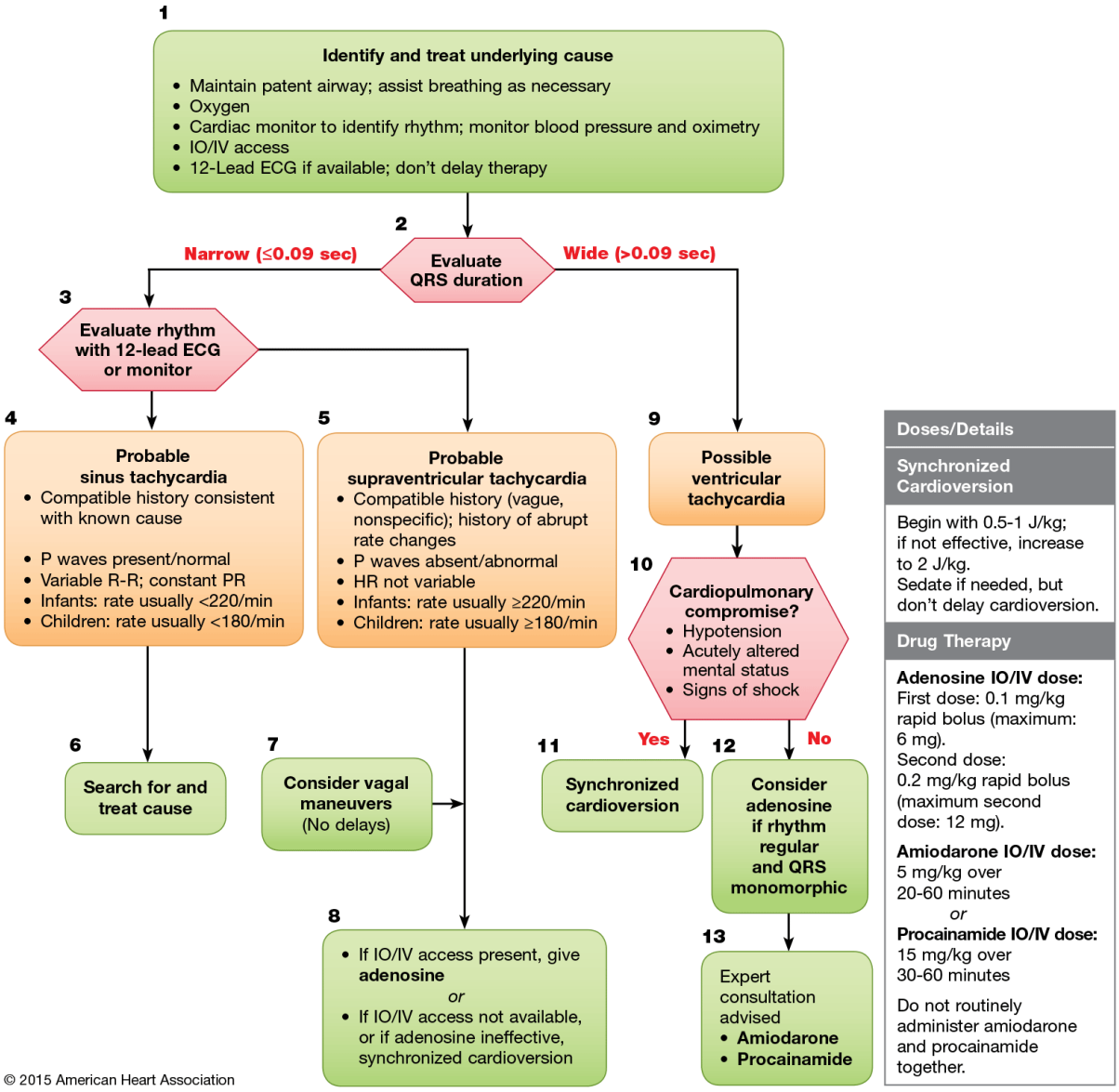
Pediatric Bradycardia With a Pulse and Poor Perfusion Algorithm



V. PEDIATRIC GUIDELINES

8. Pediatric Tachycardia

Pediatric Tachycardia With a Pulse and Poor Perfusion Algorithm



VI. ***TACTICAL COMBAT CASUALTY CARE (TCCC)***

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3. Tactical Field Care Algorithms 148
4. Tactical Evacuation Care Algorithms 159
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7. Triage Categories 178
8. 9 – Line / MIST Report 179

VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

1. Abbreviated TCCC Guidelines

Basic Management Plan for Care Under Fire

Return Fire and take cover

Direct or expect casualty to remain engaged as a combatant if appropriate

Direct casualty to move to cover and apply self-aid if able.

Try to keep the casualty from sustaining additional wounds.

Stop life-threatening external hemorrhage if tactically feasible:
- Direct casualty to control hemorrhage by self-aid if able.

Use a CoTCCC-recommended limb tourniquet for extremity hemorrhage
- Move the casualty to cover

Airway management is generally best deferred until the Tactical Field Care phase.

Basic Management Plan for Tactical Field Care

Establish Security Perimeter IAW Tactical SOPs. Maintain situational awareness.

Triage Casualties as required. Altered mental status is criteria to have weapons cleared/secured, communications gear secured and sensitive items redistributed.

Massive Hemorrhage

Assess for unrecognized hemorrhage and control all life-threatening bleeding.

Use one or more CoTCCC-recommended limb tourniquets if necessary.

Use a CoTCCC approved hemostatic dressing for compressible hemorrhage not amenable to limb tourniquet use.

Immediately apply a CoTCCC-recommended junctional tourniquet if the bleeding site is amenable to use of a junctional tourniquet.

Airway Management

Unconscious casualty without airway obstruction:
- -Chin lift or jaw thrust maneuver
- -Nasopharyngeal airway
- -Place the casualty in the recovery position

Casualty with airway obstruction or impending airway obstruction:
- -Allow a conscious casualty to assume any position that best protects the airway, to include sitting up
- -Chin lift or jaw thrust maneuver
- -Nasopharyngeal airway
- -Place an unconscious casualty in the recovery position

If the previous measures are unsuccessful perform a surgical cricothyroidotomy using one of the following:
- -CricKey technique
- -Bougie-aided open surgical technique
- -Standard open surgical technique

*Use lidocaine if the casualty is conscious

Basic Management Plan for Tactical Field Care continued

Respiration/Breathing

In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax:

-Decompress the chest on the side of the injury at the primary or alternate site.

All open and/or sucking chest wounds should be treated by:

-Applying a vented chest seal (preferred)

-Applying a non-vented chest seal

-Burp the wound if indicated for breathing difficulty

Initiate pulsoximetry monitoring.

Monitor for tension pneumothorax.

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

Circulation - Bleeding

Apply a pelvic binder for suspected pelvic fracture and/or severe blunt force or blast injury.

Reassess prior tourniquet application:

-Expose the wound and determine if a tourniquet is needed; if bleeding is not controlled then tighten tourniquet if possible.

-If the first tourniquet does not control bleeding after tightening, then add a second tourniquet side-by-side with the first.

Convert Limb tourniquets and junctional tourniquets if the following three criteria are met:

-The casualty is not in shock.

-It is possible to monitor the wound closely for bleeding.

-The tourniquet is not being used to control bleeding from an amputation.

Convert tourniquets in less than 2 hours if bleeding can be controlled with other means.

Expose and use an indelible marker to clearly mark all tourniquet sites with the time of tourniquet application, reapplication, conversion, or removal.

Circulation - IV/IO Access

Start an 18-gauge IV or Saline Lock if indicated.

If IV access is not obtainable, use an intraosseous (IO) needle.

Circulation - TXA

If a casualty is anticipated to need a blood transfusion, then administer 1 gram of tranexamic acid (TXA) in 100ml of NS or LR over 10min ASAP but NOT beyond 3 hours post injury.

Circulation - Fluid Resuscitation

Assess for hemorrhagic shock:

-If not in shock PO fluids are permissible if casualty is conscious and can swallow.

-If in shock resuscitate with:

Whole blood (preferred) or
Plasma, RBCs and platelets (1:1:1) or
Plasma and RBCs (1:1) or
Plasma or if blood products not available,
Hextend or Lactated Ringers or Plasma-Lyte-A

Resuscitate with above fluids until a palpable radial pulse, improved mental status or systolic BP of 80-90 mmHg is present. Discontinue fluids when one or more end points are achieved.

Reassess casualty frequently to check for recurrence of shock. If shock recurs, verify all hemorrhage is under control and repeat fluid resuscitation as above.

Basic Management Plan for Tactical Field Care continued

Hypothermia Prevention

Minimize casualty environmental exposure and promote heat retention.
Keep personal protective gear on if feasible. Replace wet clothing if possible. Get casualty onto insulated surface ASAP.
Use a hypothermia prevention kit with active rewarming.
If none above is available, then use dry blankets, poncho liners, or sleeping bags and keep the casualty warm and dry.
Warm IV fluids are preferred.

Penetrating Eye Trauma - If penetrating eye injury is noted or suspected:

Perform a rapid field test of visual acuity and document findings.
Cover eye with a rigid eye shield (not a pressure patch).
Administer Combat Wound Medication Pack if possible and/or administer IV/IM antibiotics per below.

Monitoring – Initiate advanced electronic monitoring of vital signs if available.

Analgesia/Pain Management

Analgesia on the battlefield should generally be achieved by one of three options:
Mild to Moderate Pain and/or Casualty can swallow and is still able to fight:
-Administer TCCC Combat Wound Medication Pack (CWMP)
Moderate to Severe Pain and casualty IS NOT in Shock
-Oral Transmucosal Fentanyl Citrate (OTFC) 800mcg
Moderate to Severe Pain and casualty is in hemorrhagic shock or respiratory distress
-Administer Ketamine 50mg IM or IN repeating q30min prn
OR
-Administer Ketamine 20mg Slow IV or IO repeating q20min prn

*Endpoint control of pain or development of nystagmus.
*Consider Ondansetron 4mg ODT/IV/IO/IM q8hours prn for nausea and vomiting.

Antibiotics

If able to take PO, then administer Moxifloxacin 400mg PO qDaily from CWPP.
If unable to take PO, administer Ertapenem 1 gram IV/IM qDaily.

Wounds

Inspect and dress known wounds.
Check for Additional Wounds.

Burns

Facial burns should be aggressively monitored for airway status and potential inhalation injury.
Estimate total body surface area (TBSA) burned to nearest 10%.
Cover burned areas with dry, sterile dressings. For burns >20% TBSA, consider placing casualty immediately in HPMK or other hypothermia prevention means.
Fluid Resuscitation (USAISR Rule of Ten):
-If burns >20% TBSA, initiate IV/IO fluids ASAP with Lactated Ringers, NS, or Hextend. If Hextend, then no more than 1000ml followed by LR or NS as needed.
-Initial IV/IO fluid rate = %TBSA X 10ml/per hour for adults 40-80 kg (+100ml/hr for every 10kg above 80kg).
-If hemorrhagic shock is present then resuscitate IAW fluid resuscitation in Circulation section.
All TCCC interventions may be performed on or through burned skin.

Basic Management Plan for Tactical Field Care continued

Splinting - Splint Fractures and Recheck Pulses.

Communication

- Communicate with the casualty if possible. Encourage, reassure, and explain care.
- Communicate with tactical leadership ASAP and throughout treatment. Provide casualty status and evac requirements.
- Communicate with the evacuation system to arrange TACEVAC.
- Communicate with medical personnel on evacuation assets and relay mechanism of injury, injuries sustained, signs/symptoms and treatments rendered.

Documentation

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

Cardiopulmonary resuscitation (CPR)

- Battlefield blast or penetrating trauma casualties with no pulse, no ventilations, and no other signs of life should not be resuscitated.
- Casualties with torso trauma or polytrauma with no pulse or respirations should have bilateral needle decompression performed to confirm/deny tension pneumothorax prior to discontinuing care.

Prepare for Evacuation

- Complete and secure TCCC Card (DD1380) to casualty.
- Secure all loose ends of bandages and wraps.
- Secure hypothermia prevention wraps/blankets/straps.
- Secure litter straps and consider additional padding for long evacuations.
- Provide instructions to ambulatory patients as needed.
- Stage Casualties for evacuation.
- Maintain security at evacuation site.

Basic Management Plan for Tactical Evacuation Care (TACEVAC)

In addition to the principles of Tactical Field Care consider the following for Tactical Evacuation Care:

Transition of Care

Tactical force should establish evacuation point security and stage casualties for evacuation.
Tactical force personnel/medic should communicate patient status to TACEVAC personnel to include stable/unstable, injuries identified, and treatments rendered.
TACEVAC personnel stage casualties on evac platform as required.
Secure casualties on evac platform IAW unit policies, platform configurations, and safety requirements.
TACEVAC medical personnel reassess casualties and re-evaluate all injuries and interventions.

Airway Management- Consider the following for casualty with airway obstruction or impending airway obstruction:

-Supraglottic airway, or
-Endotracheal intubation

Breathing

Consider chest tube insertion if no improvement and/or long transport is anticipated.
Administer oxygen when possible for the following types of casualties:

-Low oxygen saturation by pulse oximetry
-Injuries associated with impaired oxygenation
-Unconscious casualty
-Casualty with TBI (maintain oxygen saturation > 90%)
-Casualty in shock
-Casualty at altitude

Traumatic Brain Injury-Casualties with moderate/severe TBI should be monitored for:

-Decreases in level of consciousness
-Pupillary dilation
-SBP should be >90 mmHg
-O2 sat > 90
-Hypothermia
-PCO2 (If capnography is available, maintain between 35-40 mmHg)
-Penetrating head trauma (if present, administer antibiotics)
-Assume a spinal (neck) injury until cleared

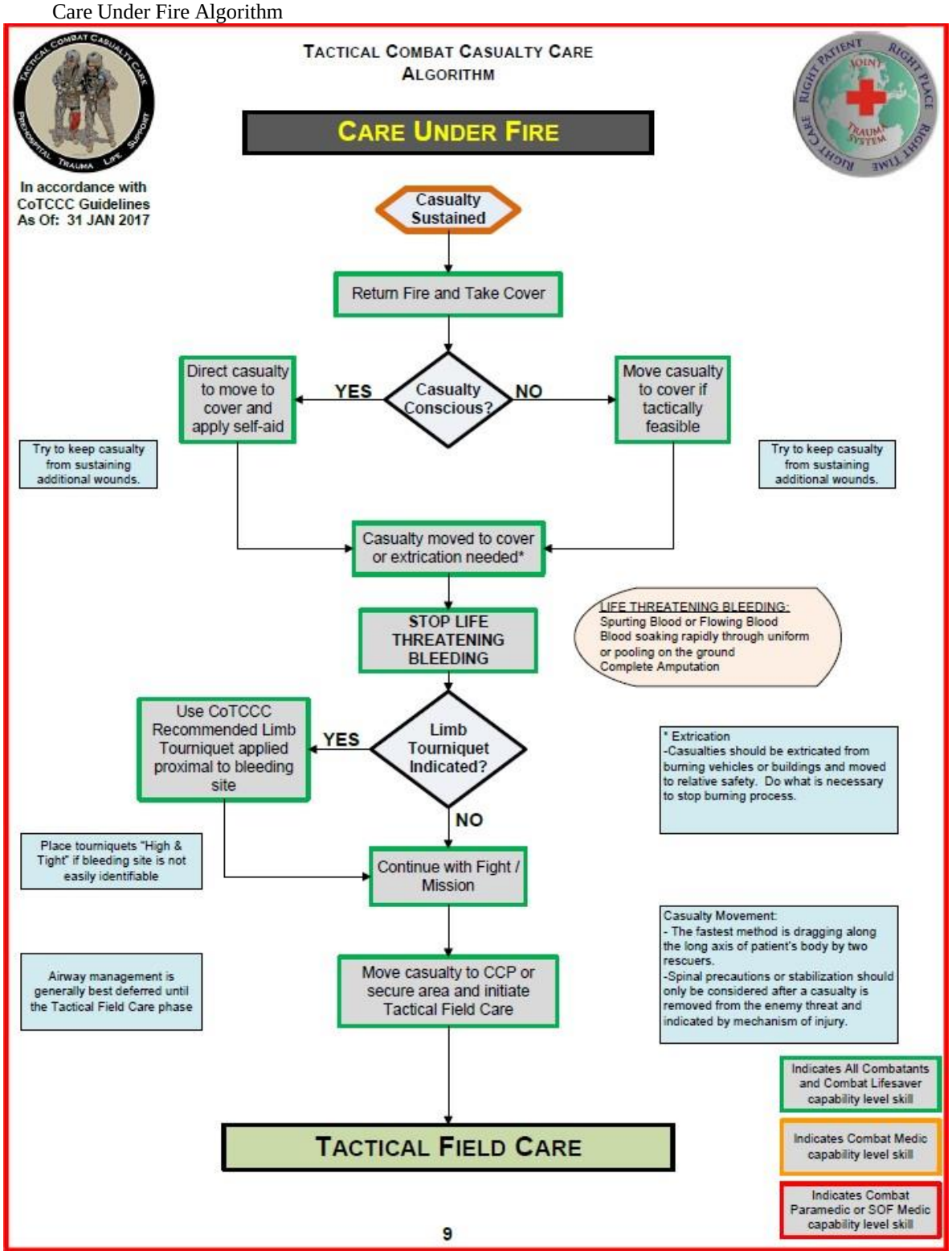
If impending herniation is suspected take the following actions:

-Administer 250 cc of 3 or 5% hypertonic saline bolus
-Elevate the casualty's head 30 degrees
-Hyperventilate the casualty

Communication

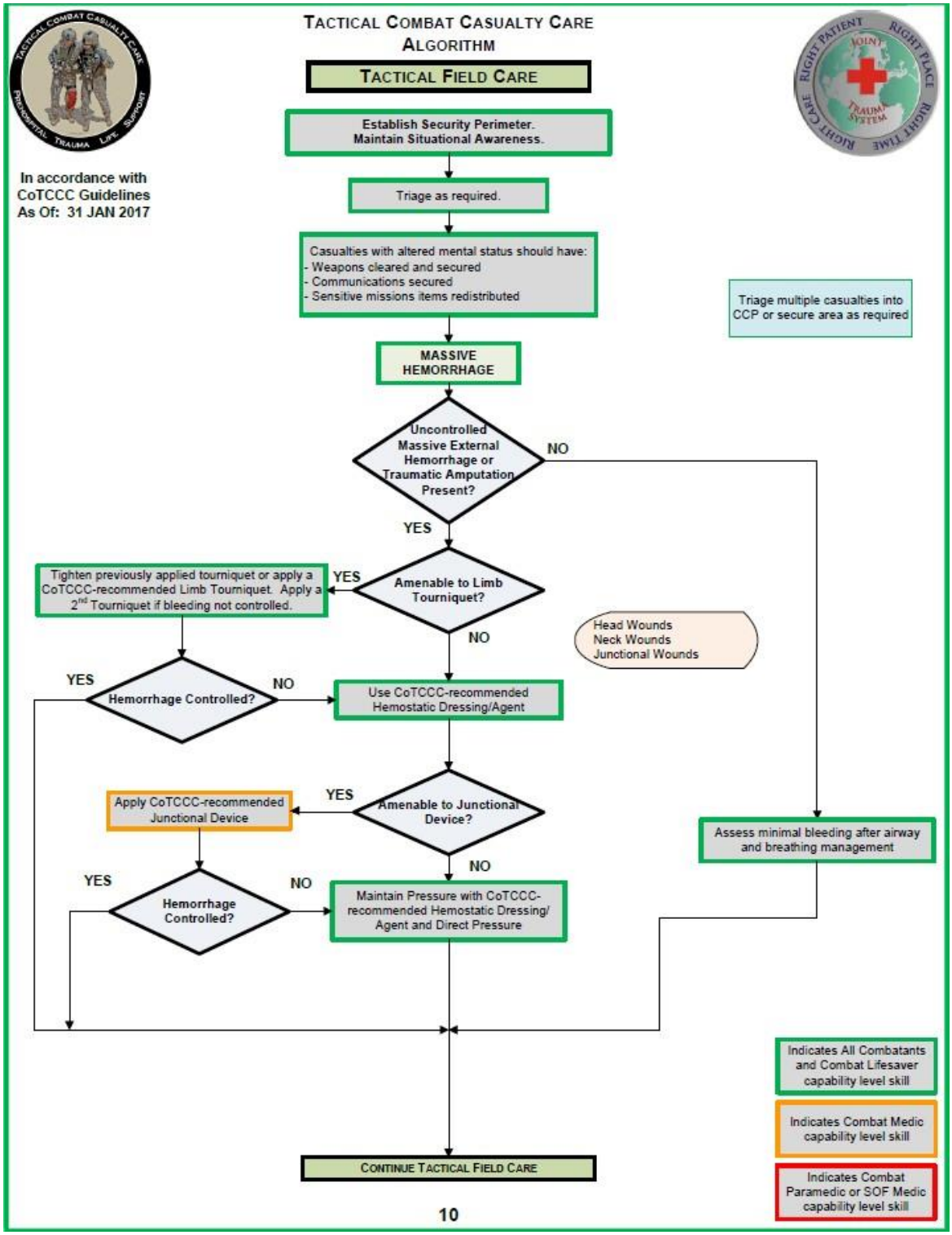
Communicate with the casualty if possible. Encourage, reassure, and explain care
Communicate with next level of care and relay mechanism of injury, injuries sustained, signs/symptoms, and treatments rendered.

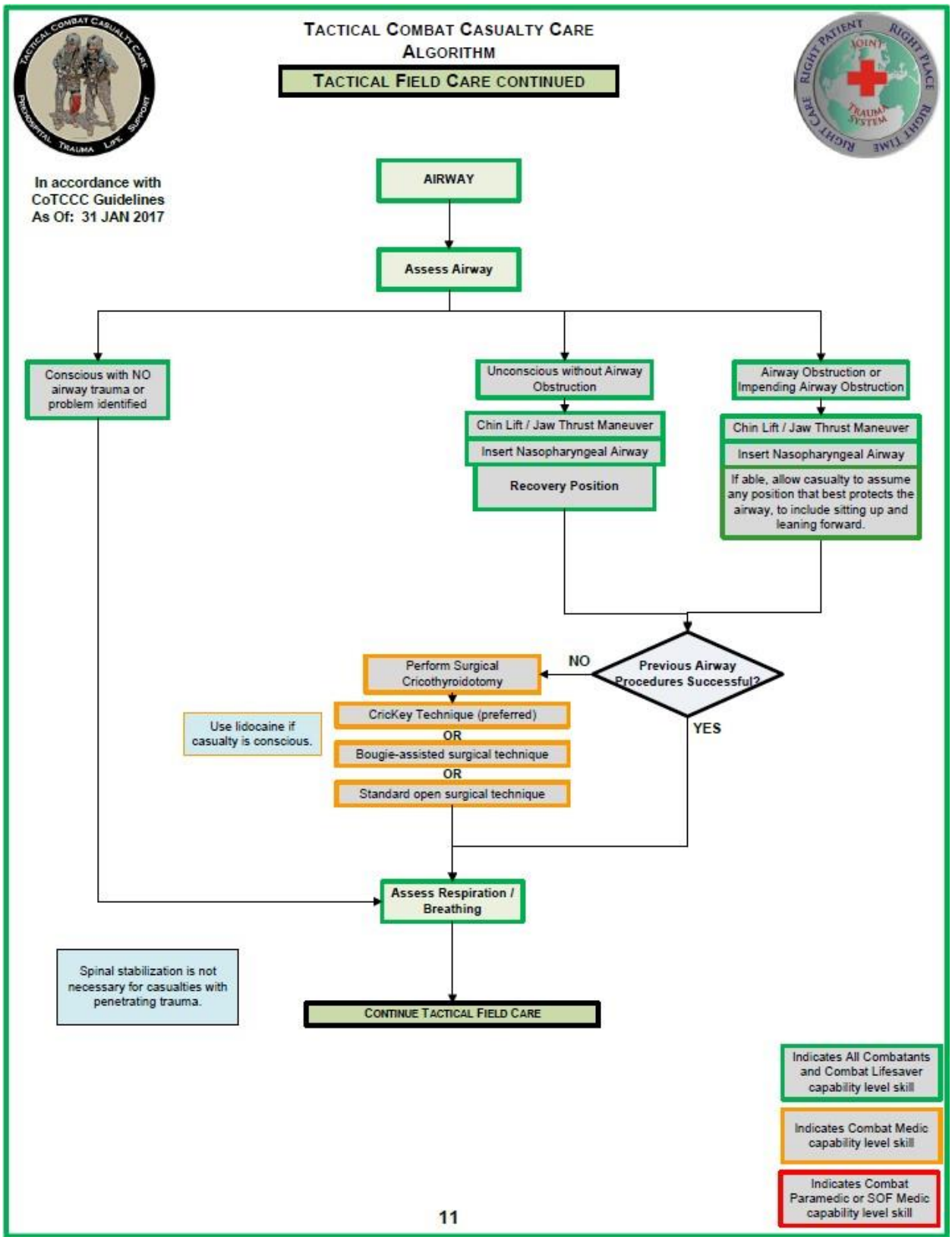
2. Care Under Fire Algorithm



VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

3. Tactical Field Care Algorithm




TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL FIELD CARE CONTINUED
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
AIRWAY
Assess Airway
Conscious with NO airway trauma or problem identified
Unconscious without Airway Obstruction
Chin Lift / Jaw Thrust Maneuver
Insert Nasopharyngeal Airway
Recovery Position
Airway Obstruction or Impending Airway Obstruction
Chin Lift / Jaw Thrust Maneuver
Insert Nasopharyngeal Airway
If able, allow casualty to assume any position that best protects the airway, to include sitting up and leaning forward.
Previous Airway Procedures Successful?
NO
YES
Perform Surgical Cricothyroidotomy
CricKey Technique (preferred)
OR
Bougie-assisted surgical technique
OR
Standard open surgical technique
Use lidocaine if casualty is conscious.
Assess Respiration / Breathing
Spinal stabilization is not necessary for casualties with penetrating trauma.
CONTINUE TACTICAL FIELD CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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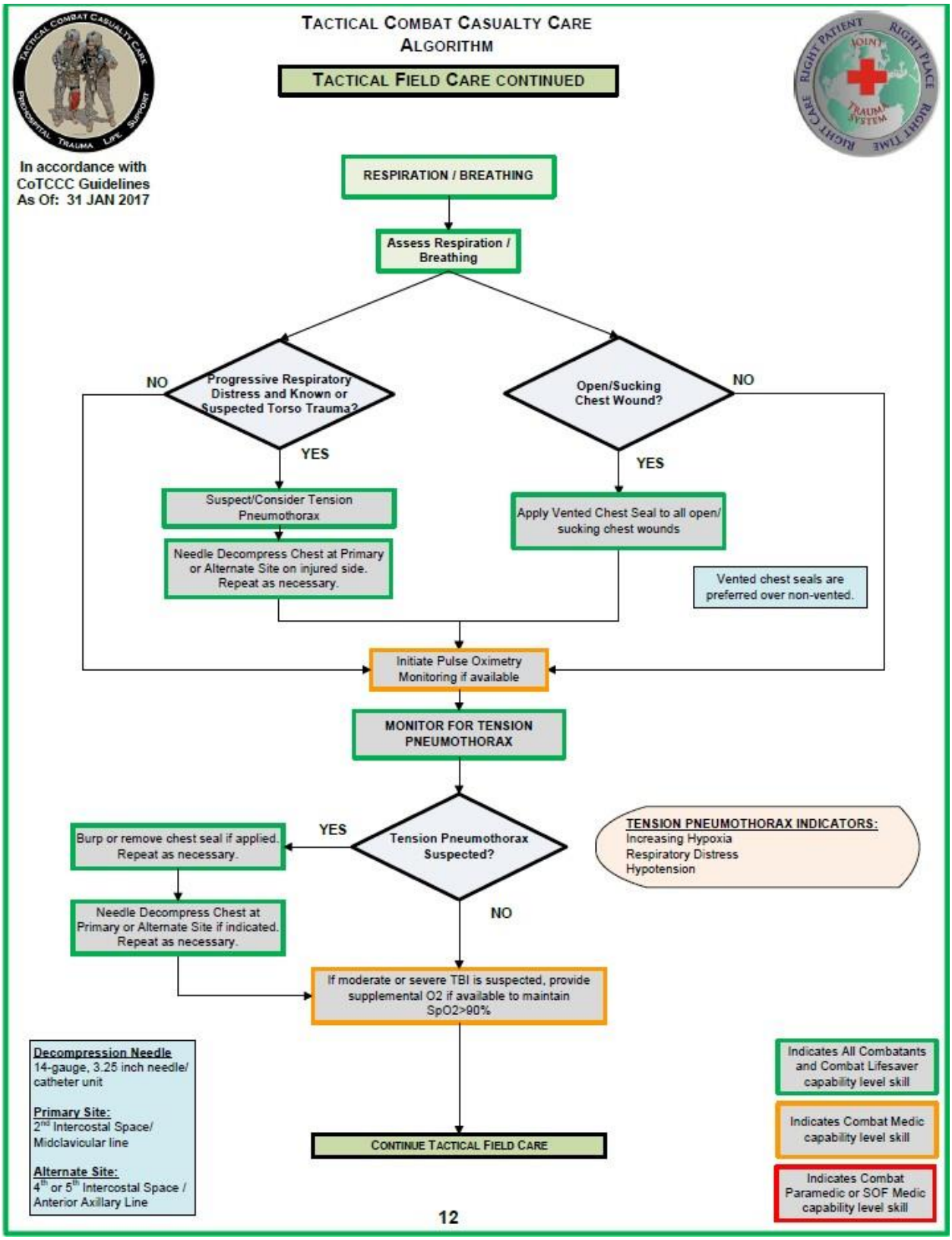
TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL FIELD CARE CONTINUED
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
RESPIRATION / BREATHING
Assess Respiration / Breathing
Progressive Respiratory Distress and Known or Suspected Torso Trauma?
NO
YES
Suspect/Consider Tension Pneumothorax
Needle Decompress Chest at Primary or Alternate Site on injured side. Repeat as necessary.
Open/Sucking Chest Wound?
NO
YES
Apply Vented Chest Seal to all open/ sucking chest wounds
Vented chest seals are preferred over non-vented.
Initiate Pulse Oximetry Monitoring if available
MONITOR FOR TENSION PNEUMOTHORAX
Tension Pneumothorax Suspected?
YES
Burp or remove chest seal if applied. Repeat as necessary.
Needle Decompress Chest at Primary or Alternate Site if indicated. Repeat as necessary.
NO
TENSION PNEUMOTHORAX INDICATORS:
Increasing Hypoxia
Respiratory Distress
Hypotension
If moderate or severe TBI is suspected, provide supplemental O2 if available to maintain SpO2>90%
CONTINUE TACTICAL FIELD CARE
Decompression Needle
14-gauge, 3.25 inch needle/ catheter unit
Primary Site:
2nd Intercostal Space/ Midclavicular line
Alternate Site:
4th or 5th Intercostal Space / Anterior Axillary Line
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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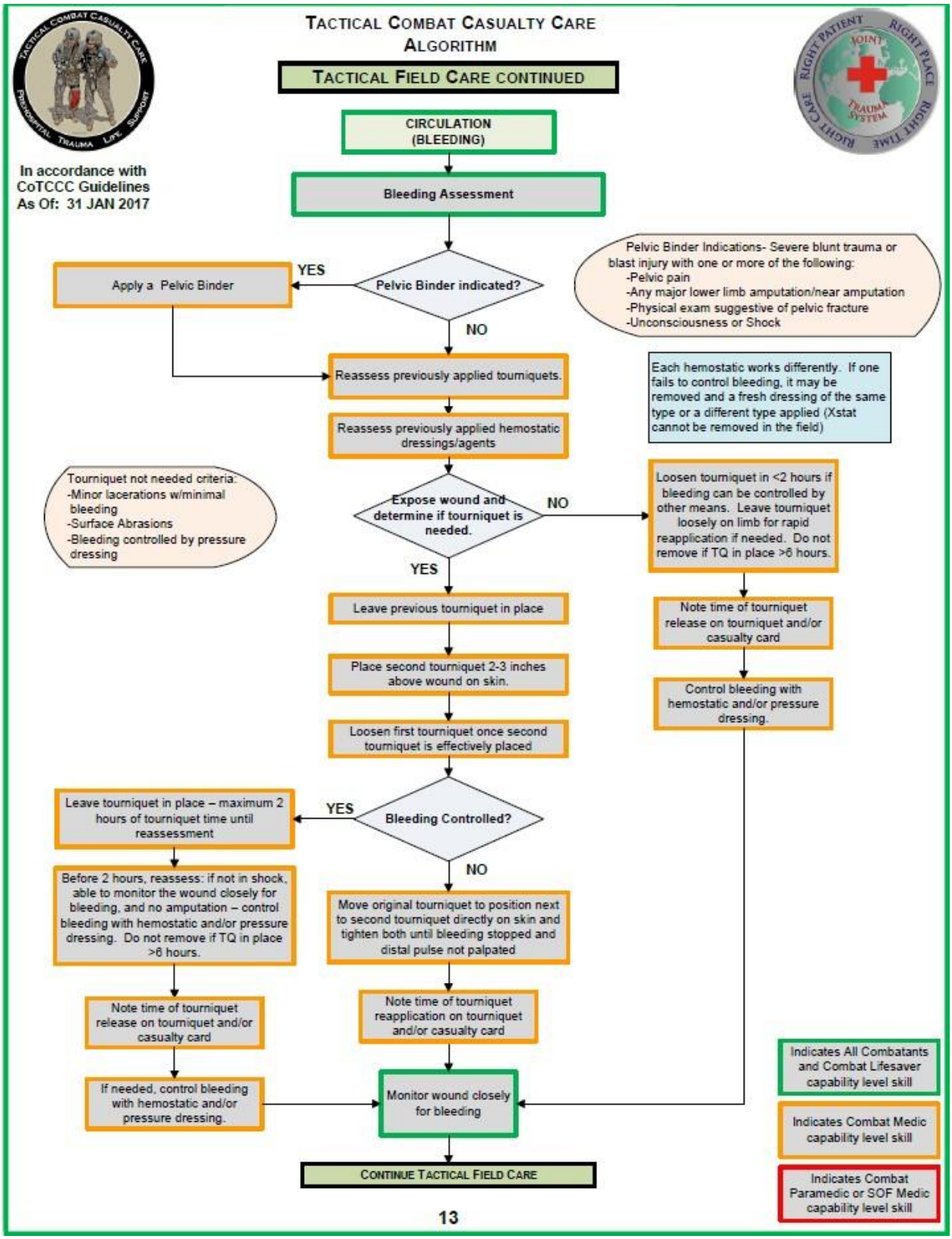
TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL FIELD CARE CONTINUED
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
CIRCULATION (BLEEDING)
Bleeding Assessment
Pelvic Binder indicated?
YES
Apply a Pelvic Binder
NO
Pelvic Binder Indications- Severe blunt trauma or blast injury with one or more of the following:
-Pelvic pain
-Any major lower limb amputation/near amputation
-Physical exam suggestive of pelvic fracture
-Unconsciousness or Shock
Reassess previously applied tourniquets.
Reassess previously applied hemostatic dressings/agents
Each hemostatic works differently. If one fails to control bleeding, it may be removed and a fresh dressing of the same type or a different type applied (Xstat cannot be removed in the field)
Tourniquet not needed criteria:
-Minor lacerations w/minimal bleeding
-Surface Abrasions
-Bleeding controlled by pressure dressing
Expose wound and determine if tourniquet is needed.
NO
YES
Loosen tourniquet in <2 hours if bleeding can be controlled by other means. Leave tourniquet loosely on limb for rapid reapplication if needed. Do not remove if TQ in place >6 hours.
Note time of tourniquet release on tourniquet and/or casualty card
Control bleeding with hemostatic and/or pressure dressing.
Leave previous tourniquet in place
Place second tourniquet 2-3 inches above wound on skin.
Loosen first tourniquet once second tourniquet is effectively placed
Bleeding Controlled?
YES
Leave tourniquet in place – maximum 2 hours of tourniquet time until reassessment
NO
Before 2 hours, reassess: if not in shock, able to monitor the wound closely for bleeding, and no amputation – control bleeding with hemostatic and/or pressure dressing. Do not remove if TQ in place >6 hours.
Move original tourniquet to position next to second tourniquet directly on skin and tighten both until bleeding stopped and distal pulse not palpated
Note time of tourniquet release on tourniquet and/or casualty card
Note time of tourniquet reapplication on tourniquet and/or casualty card
If needed, control bleeding with hemostatic and/or pressure dressing.
Monitor wound closely for bleeding
CONTINUE TACTICAL FIELD CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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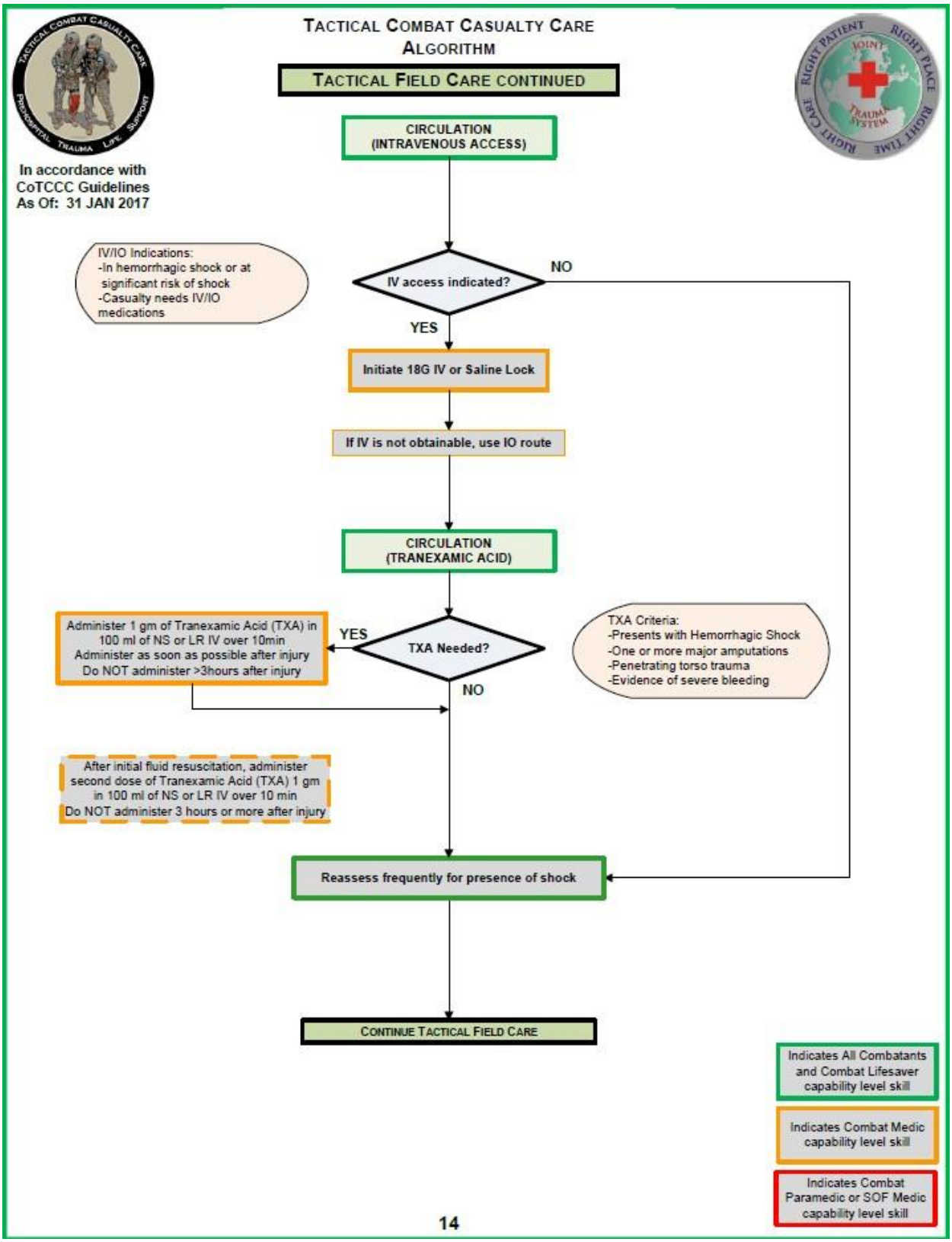
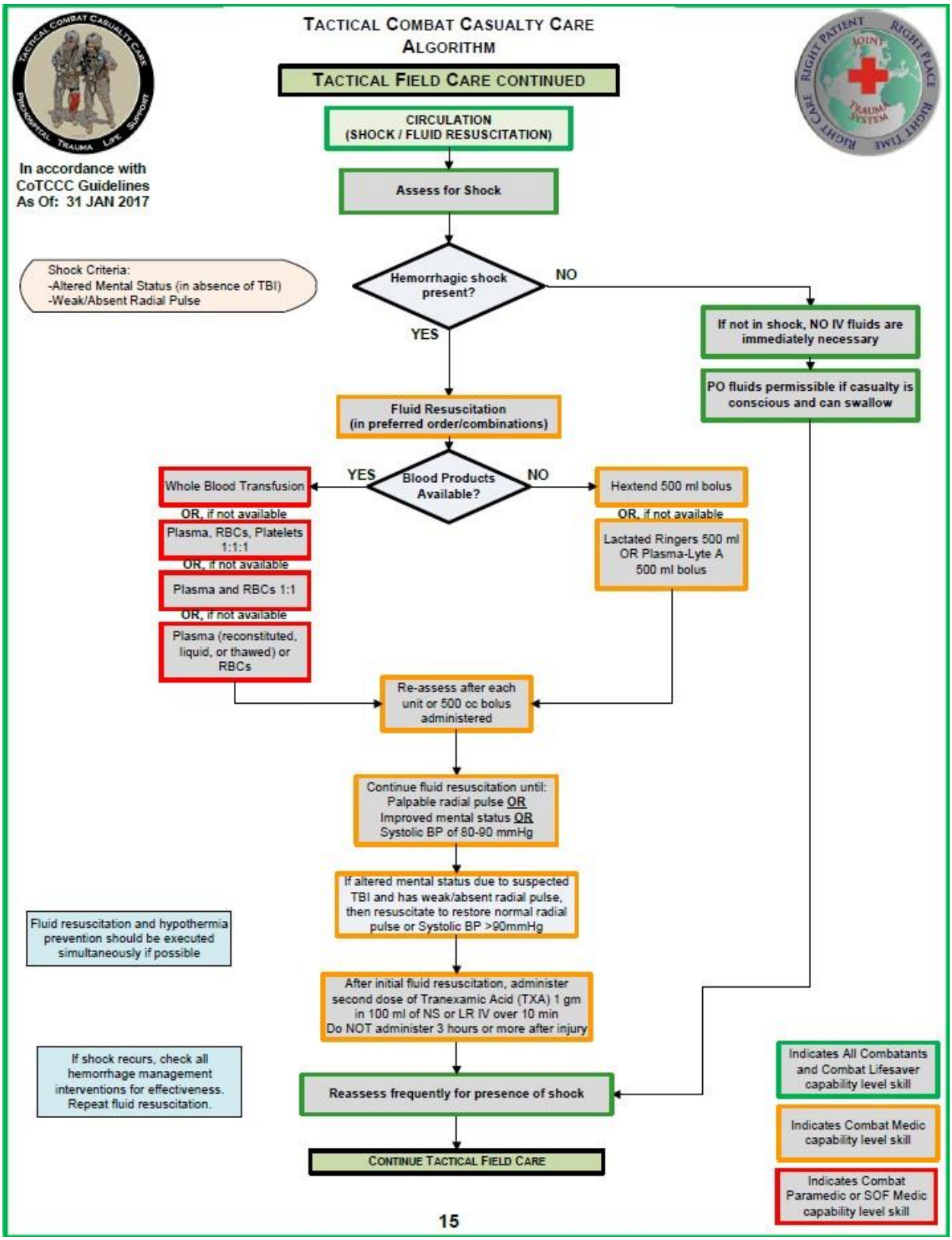

TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL FIELD CARE CONTINUED
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
CIRCULATION (INTRAVENOUS ACCESS)
IV/IO Indications:
-In hemorrhagic shock or at significant risk of shock
-Casualty needs IV/IO medications
IV access indicated?
NO
YES
Initiate 18G IV or Saline Lock
If IV is not obtainable, use IO route
CIRCULATION (TRANEXAMIC ACID)
Administer 1 gm of Tranexamic Acid (TXA) in 100 ml of NS or LR IV over 10min
Administer as soon as possible after injury
Do NOT administer >3hours after injury
YES
TXA Needed?
NO
TXA Criteria:
-Presents with Hemorrhagic Shock
-One or more major amputations
-Penetrating torso trauma
-Evidence of severe bleeding
After initial fluid resuscitation, administer second dose of Tranexamic Acid (TXA) 1 gm in 100 ml of NS or LR IV over 10 min
Do NOT administer 3 hours or more after injury
Reassess frequently for presence of shock
CONTINUE TACTICAL FIELD CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
14


TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL FIELD CARE CONTINUED
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
CIRCULATION (SHOCK / FLUID RESUSCITATION)
Assess for Shock
Shock Criteria:
-Altered Mental Status (in absence of TBI)
-Weak/Absent Radial Pulse
Hemorrhagic shock present?
NO
YES
If not in shock, NO IV fluids are immediately necessary
PO fluids permissible if casualty is conscious and can swallow
Fluid Resuscitation (in preferred order/combinations)
Blood Products Available?
YES
NO
Whole Blood Transfusion
OR, if not available
Plasma, RBCs, Platelets 1:1:1
OR, if not available
Plasma and RBCs 1:1
OR, if not available
Plasma (reconstituted, liquid, or thawed) or RBCs
Hextend 500 ml bolus
OR, if not available
Lactated Ringers 500 ml OR Plasma-Lyte A 500 ml bolus
Re-assess after each unit or 500 cc bolus administered
Continue fluid resuscitation until: Palpable radial pulse OR Improved mental status OR Systolic BP of 80-90 mmHg
If altered mental status due to suspected TBI and has weak/absent radial pulse, then resuscitate to restore normal radial pulse or Systolic BP >90mmHg
Fluid resuscitation and hypothermia prevention should be executed simultaneously if possible
After initial fluid resuscitation, administer second dose of Tranexamic Acid (TXA) 1 gm in 100 ml of NS or LR IV over 10 min Do NOT administer 3 hours or more after injury
If shock recurs, check all hemorrhage management interventions for effectiveness. Repeat fluid resuscitation.
Reassess frequently for presence of shock
CONTINUE TACTICAL FIELD CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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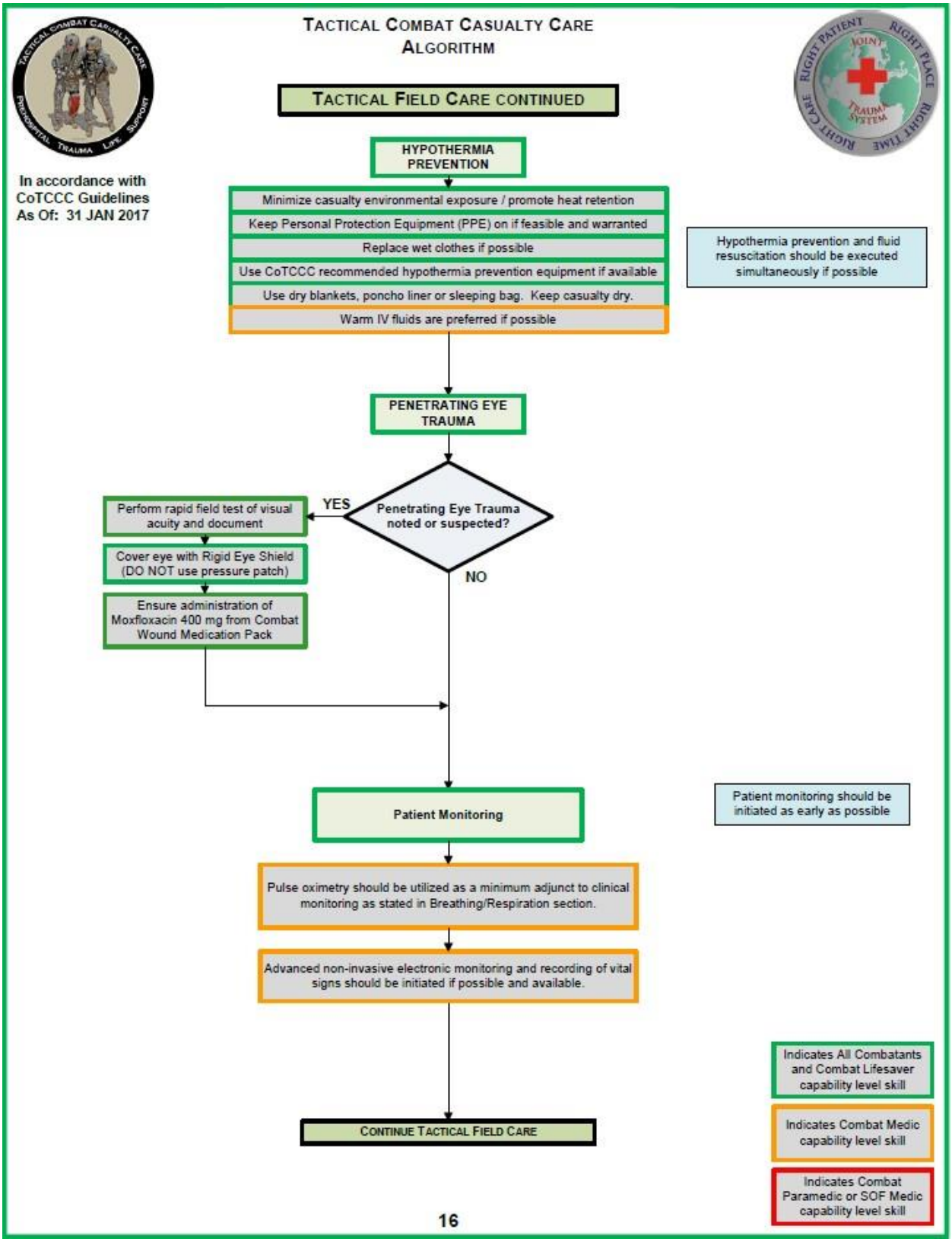
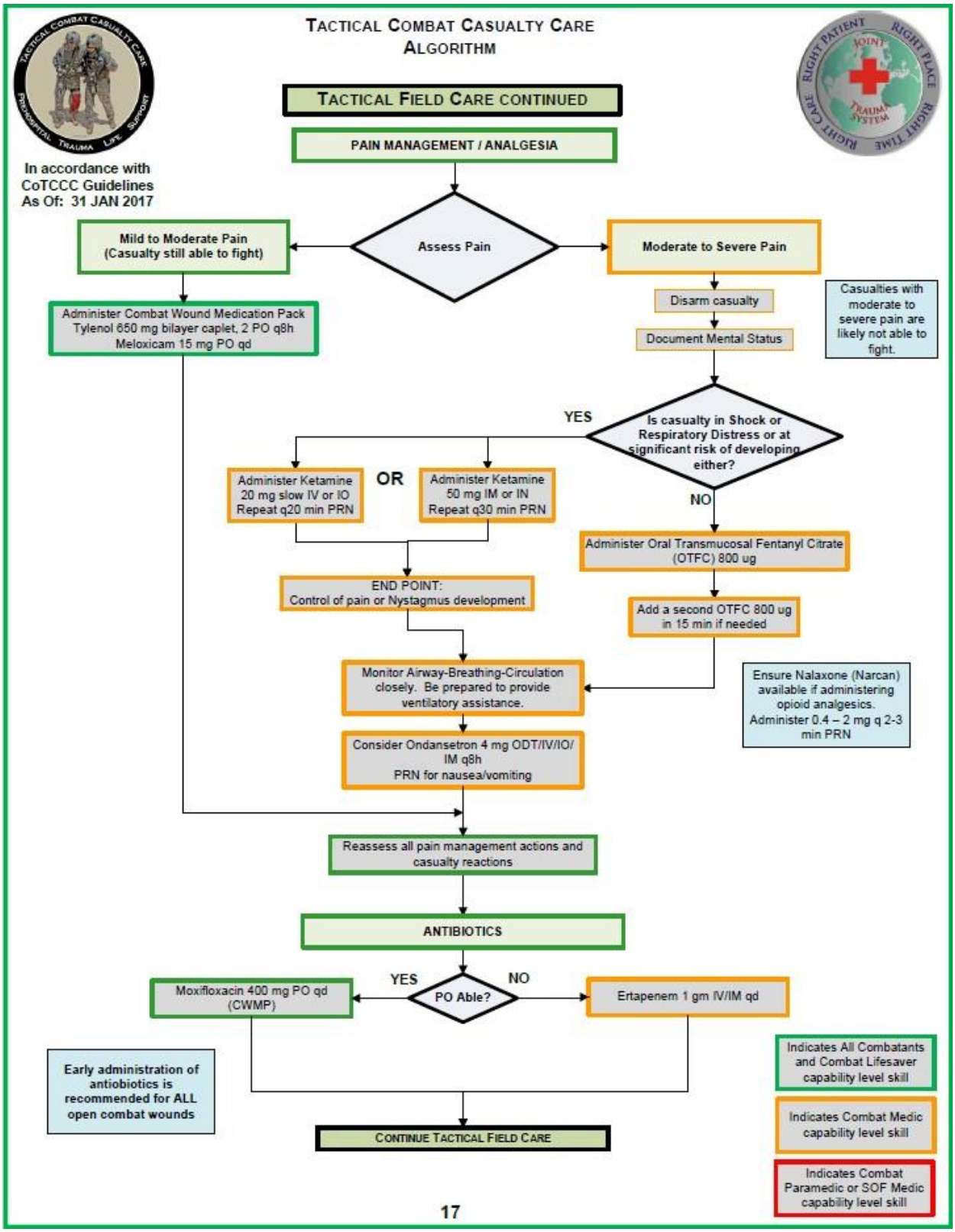
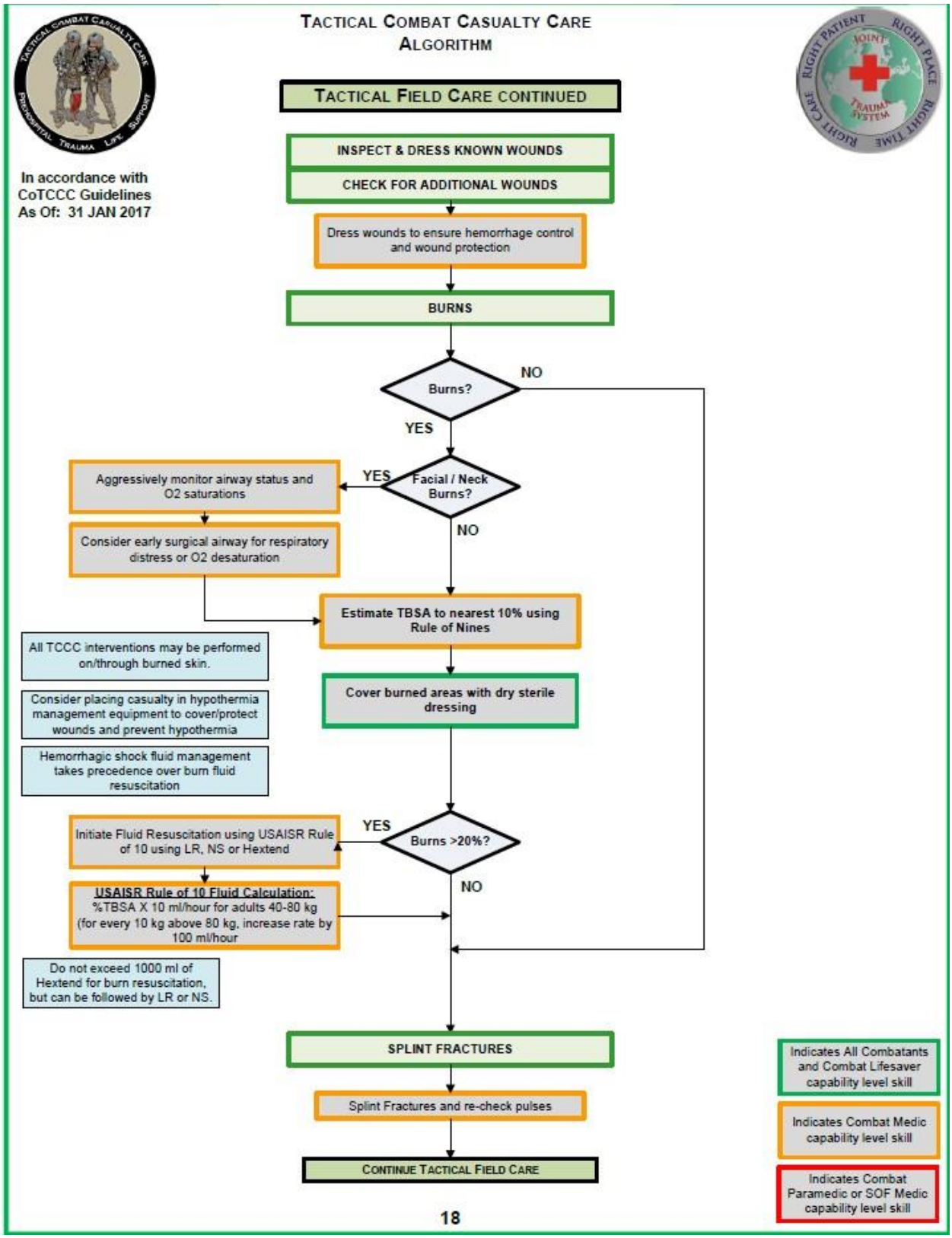

TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL FIELD CARE CONTINUED
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
HYPOTHERMIA PREVENTION
Minimize casualty environmental exposure / promote heat retention
Keep Personal Protection Equipment (PPE) on if feasible and warranted
Replace wet clothes if possible
Use CoTCCC recommended hypothermia prevention equipment if available
Use dry blankets, poncho liner or sleeping bag. Keep casualty dry.
Warm IV fluids are preferred if possible
Hypothermia prevention and fluid resuscitation should be executed simultaneously if possible
PENETRATING EYE TRAUMA
Penetrating Eye Trauma noted or suspected?
YES
Perform rapid field test of visual acuity and document
Cover eye with Rigid Eye Shield (DO NOT use pressure patch)
Ensure administration of Moxfloxacin 400 mg from Combat Wound Medication Pack
NO
Patient Monitoring
Patient monitoring should be initiated as early as possible
Pulse oximetry should be utilized as a minimum adjunct to clinical monitoring as stated in Breathing/Respiration section.
Advanced non-invasive electronic monitoring and recording of vital signs should be initiated if possible and available.
CONTINUE TACTICAL FIELD CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
16


TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL FIELD CARE CONTINUED
PAIN MANAGEMENT / ANALGESIA
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
Assess Pain
Mild to Moderate Pain (Casualty still able to fight)
Moderate to Severe Pain
Administer Combat Wound Medication Pack Tylenol 650 mg bilayer caplet, 2 PO q8h Meloxicam 15 mg PO qd
Disarm casualty
Document Mental Status
Casualties with moderate to severe pain are likely not able to fight.
YES
Is casualty in Shock or Respiratory Distress or at significant risk of developing either?
NO
Administer Ketamine 20 mg slow IV or IO Repeat q20 min PRN
OR
Administer Ketamine 50 mg IM or IN Repeat q30 min PRN
Administer Oral Transmucosal Fentanyl Citrate (OTFC) 800 ug
END POINT: Control of pain or Nystagmus development
Add a second OTFC 800 ug in 15 min if needed
Monitor Airway-Breathing-Circulation closely. Be prepared to provide ventilatory assistance.
Ensure Nalaxone (Narcan) available if administering opioid analgesics. Administer 0.4 – 2 mg q 2-3 min PRN
Consider Ondansetron 4 mg ODT/IV/IO/ IM q8h PRN for nausea/vomiting
Reassess all pain management actions and casualty reactions
ANTIBIOTICS
YES
PO Able?
NO
Moxifloxacin 400 mg PO qd (CWMP)
Ertapenem 1 gm IV/IM qd
Early administration of antiobiotics is recommended for ALL open combat wounds
CONTINUE TACTICAL FIELD CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
17


TACTICAL COMBAT CASUALTY CARE ALGORITHM
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
TACTICAL FIELD CARE CONTINUED
INSPECT & DRESS KNOWN WOUNDS
CHECK FOR ADDITIONAL WOUNDS
Dress wounds to ensure hemorrhage control and wound protection
BURNS
Burns?
NO
YES
Facial / Neck Burns?
YES
Aggressively monitor airway status and O2 saturations
Consider early surgical airway for respiratory distress or O2 desaturation
NO
Estimate TBSA to nearest 10% using Rule of Nines
All TCCC interventions may be performed on/through burned skin.
Consider placing casualty in hypothermia management equipment to cover/protect wounds and prevent hypothermia
Hemorrhagic shock fluid management takes precedence over burn fluid resuscitation
Cover burned areas with dry sterile dressing
Burns >20%?
YES
Initiate Fluid Resuscitation using USAISR Rule of 10 using LR, NS or Hextend
NO
USAISR Rule of 10 Fluid Calculation:
%TBSA X 10 ml/hour for adults 40-80 kg
(for every 10 kg above 80 kg, increase rate by 100 ml/hour
Do not exceed 1000 ml of Hextend for burn resuscitation, but can be followed by LR or NS.
SPLINT FRACTURES
Splint Fractures and re-check pulses
CONTINUE TACTICAL FIELD CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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TACTICAL COMBAT CASUALTY CARE ALGORITHM

TACTICAL FIELD CARE CONTINUED

In accordance with CoTCCC Guidelines As Of: 31 JAN 2017

COMMUNICATION

Communicate with casualty, tactical leadership, and medical providers in evacuation chain

- **Communicate with Casualty**
  - Encourage, reassure, explain care if possible
- **Communicate with Tactical Leadership**
  - Provide casualty status and evacuation requirements to assist in evac coordination
  - Communicate with evacuation system (PECC) to arrange TACEVAC
- **Communicate with Evacuation Chain**
  - Communicate with medical providers on evac asset if possible.
  - Relay mechanism of injury, injuries sustained, signs/ symptoms, and treatments rendered.

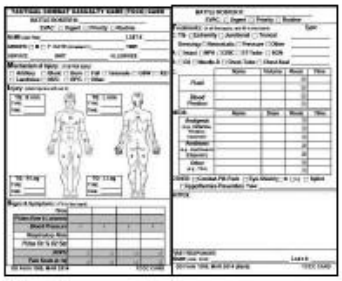
Cardiopulmonary Resuscitation (CPR) Considerations

Battlefield blast or penetrating trauma casualties with NO pulse, NO ventilations, and NO other signs of life should not be resuscitated.

However, casualties with torso or polytrauma with no pulse or respirations should have bilateral needle decompression performed to confirm/ deny tension pneumothorax prior to discontinuing care.

DOCUMENTATION

Document clinical assessments, treatments rendered, and changes on DD1380 TCCC Card and forward with casualty to next level of care.



CONTINUE TACTICAL FIELD CARE

Indicates All Combatants and Combat Lifesaver capability level skill

Indicates Combat Medic capability level skill

Indicates Combat Paramedic or SOF Medic capability level skill

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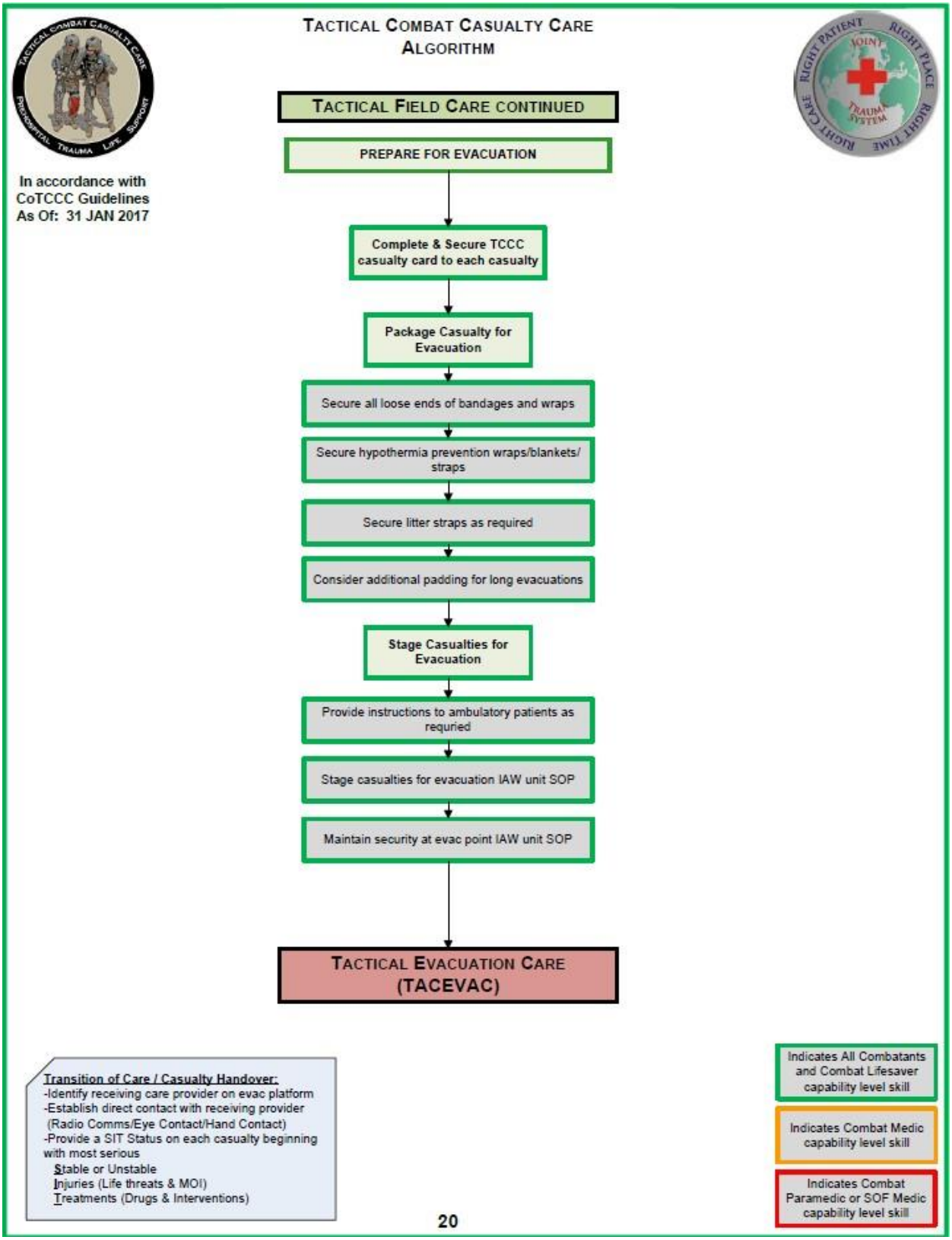
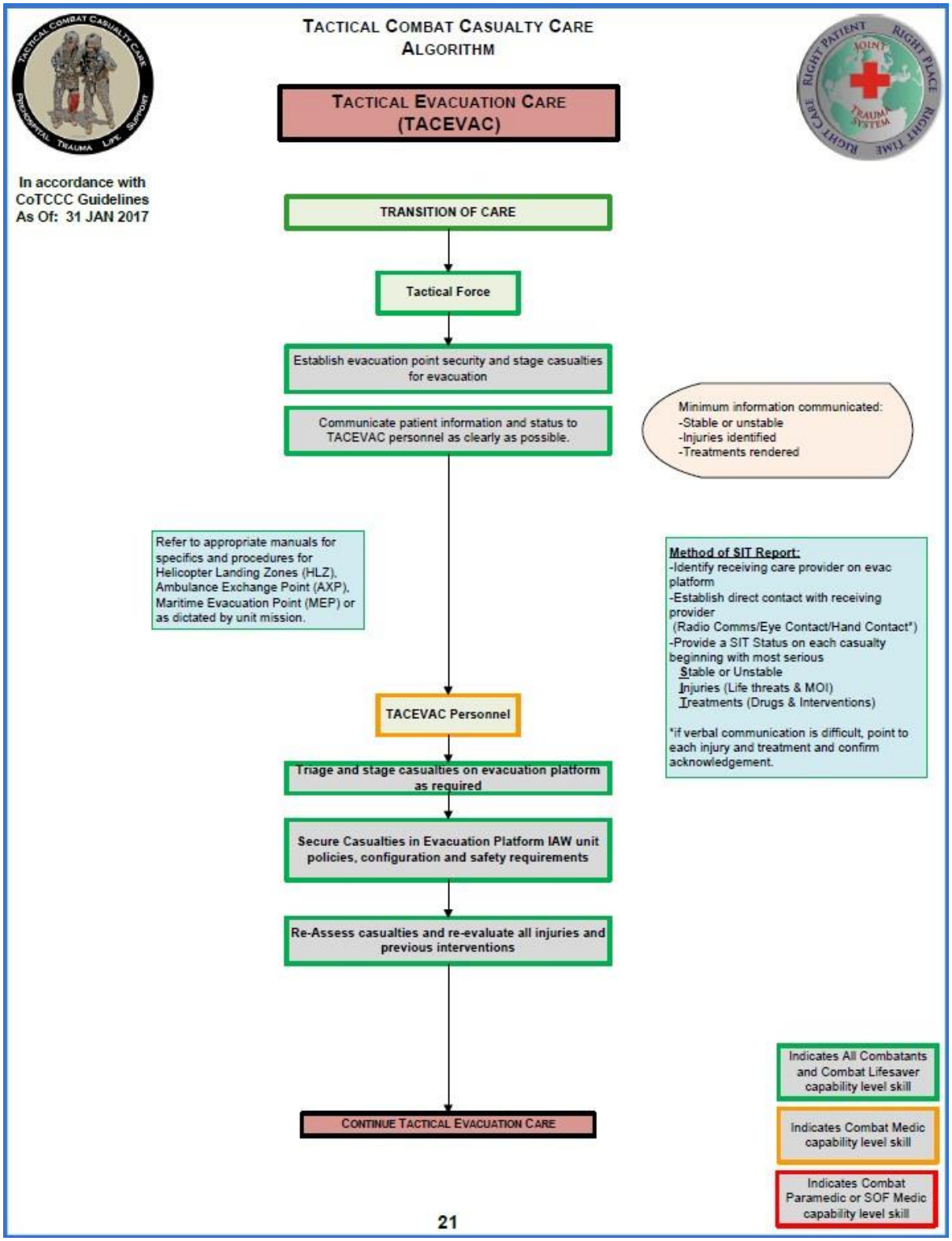
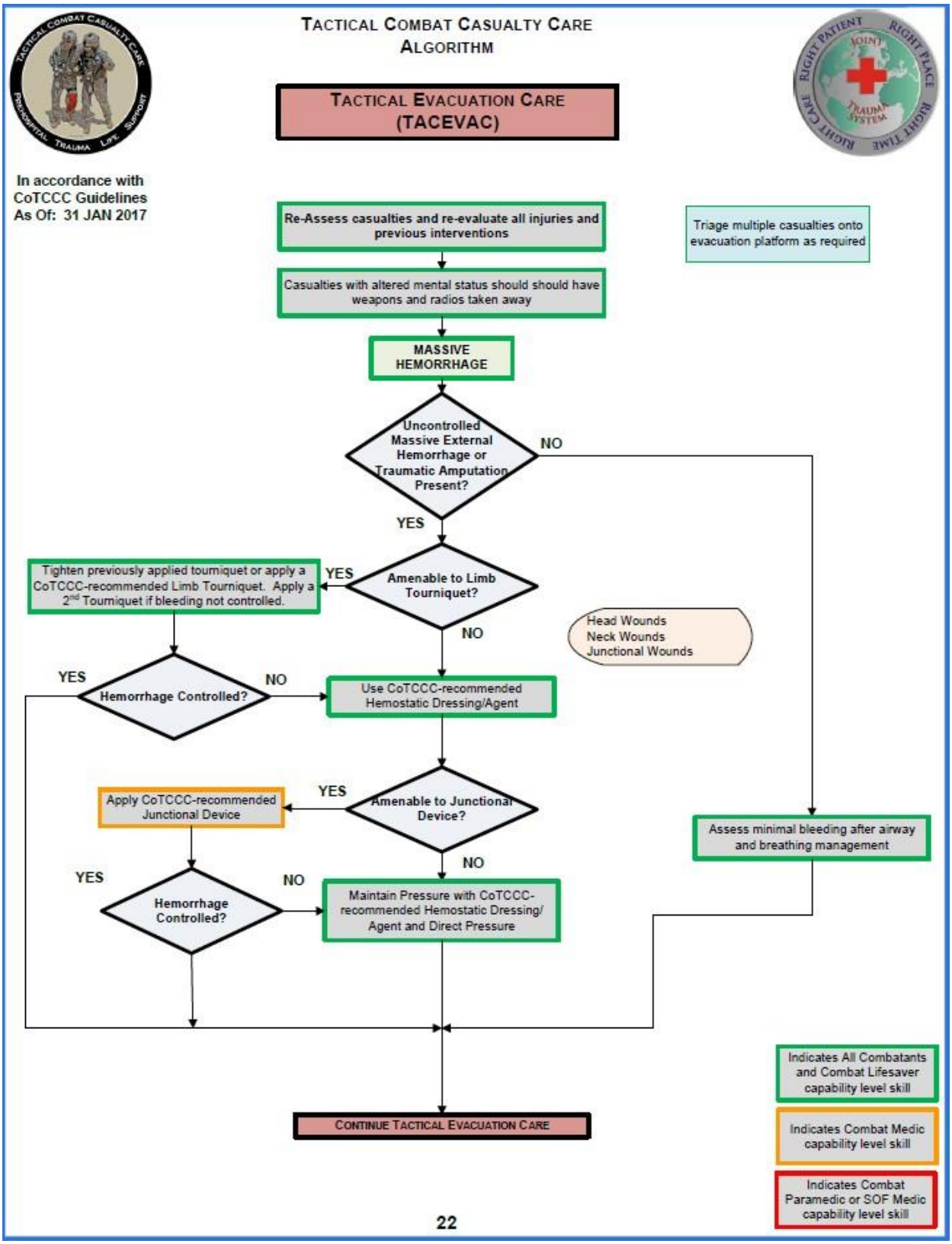

TACTICAL COMBAT CASUALTY CARE ALGORITHM
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
TACTICAL FIELD CARE CONTINUED
PREPARE FOR EVACUATION
Complete & Secure TCCC casualty card to each casualty
Package Casualty for Evacuation
Secure all loose ends of bandages and wraps
Secure hypothermia prevention wraps/blankets/ straps
Secure litter straps as required
Consider additional padding for long evacuations
Stage Casualties for Evacuation
Provide instructions to ambulatory patients as requried
Stage casualties for evacuation IAW unit SOP
Maintain security at evac point IAW unit SOP
TACTICAL EVACUATION CARE (TACEVAC)
Transition of Care / Casualty Handover:
-Identify receiving care provider on evac platform
-Establish direct contact with receiving provider (Radio Comms/Eye Contact/Hand Contact)
-Provide a SIT Status on each casualty beginning with most serious
Stable or Unstable
Injuries (Life threats & MOI)
Treatments (Drugs & Interventions)
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
20

VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

4. Tactical Evacuation Care Algorithm




TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
Re-Assess casualties and re-evaluate all injuries and previous interventions
Triage multiple casualties onto evacuation platform as required
Casualties with altered mental status should should have weapons and radios taken away
MASSIVE HEMORRHAGE
Uncontrolled Massive External Hemorrhage or Traumatic Amputation Present?
NO
YES
Amenable to Limb Tourniquet?
YES
Tighten previously applied tourniquet or apply a CoTCCC-recommended Limb Tourniquet. Apply a 2nd Tourniquet if bleeding not controlled.
NO
Head Wounds
Neck Wounds
Junctional Wounds
YES
Hemorrhage Controlled?
NO
Use CoTCCC-recommended Hemostatic Dressing/Agent
Amenable to Junctional Device?
YES
Apply CoTCCC-recommended Junctional Device
NO
Assess minimal bleeding after airway and breathing management
YES
Hemorrhage Controlled?
NO
Maintain Pressure with CoTCCC-recommended Hemostatic Dressing/ Agent and Direct Pressure
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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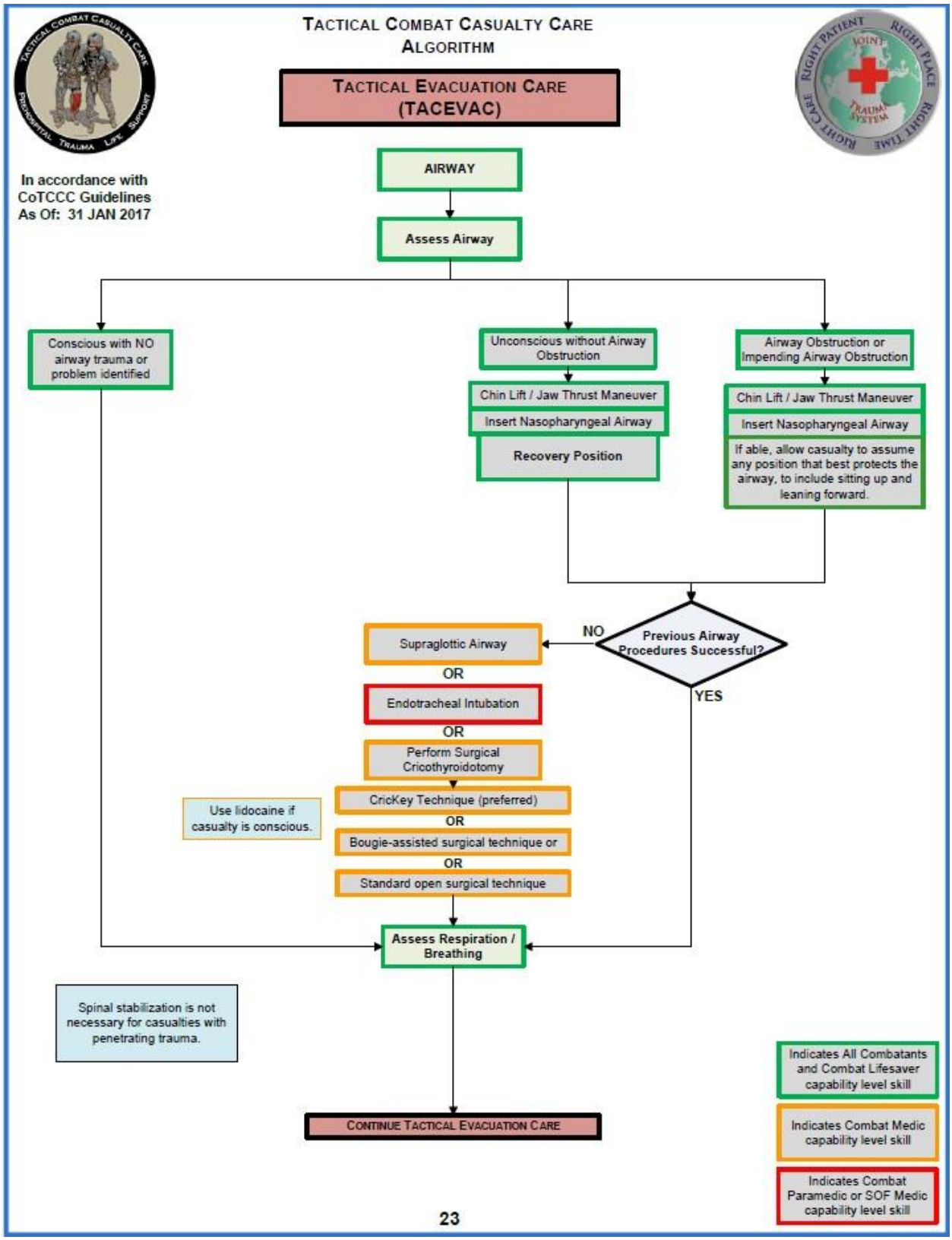
TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
AIRWAY
Assess Airway
Conscious with NO airway trauma or problem identified
Unconscious without Airway Obstruction
Chin Lift / Jaw Thrust Maneuver
Insert Nasopharyngeal Airway
Recovery Position
Airway Obstruction or Impending Airway Obstruction
Chin Lift / Jaw Thrust Maneuver
Insert Nasopharyngeal Airway
If able, allow casualty to assume any position that best protects the airway, to include sitting up and leaning forward.
Previous Airway Procedures Successful?
NO
YES
Supraglottic Airway
OR
Endotracheal Intubation
OR
Perform Surgical Cricothyroidotomy
CricKey Technique (preferred)
OR
Bougie-assisted surgical technique or
OR
Standard open surgical technique
Use lidocaine if casualty is conscious.
Assess Respiration / Breathing
Spinal stabilization is not necessary for casualties with penetrating trauma.
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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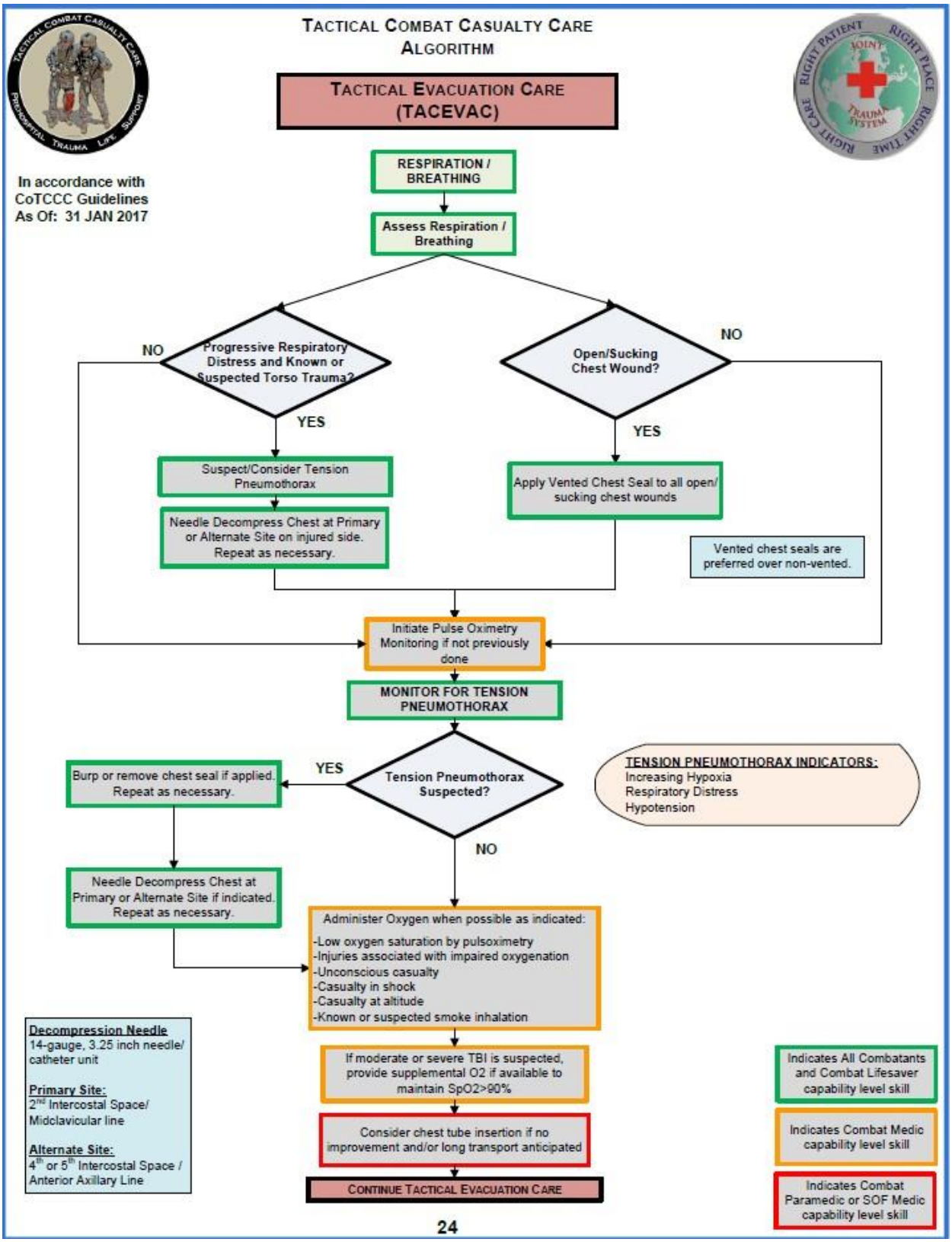
TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
RESPIRATION / BREATHING
Assess Respiration / Breathing
Progressive Respiratory Distress and Known or Suspected Torso Trauma?
NO
YES
Suspect/Consider Tension Pneumothorax
Needle Decompress Chest at Primary or Alternate Site on injured side. Repeat as necessary.
Open/Sucking Chest Wound?
NO
YES
Apply Vented Chest Seal to all open/ sucking chest wounds
Vented chest seals are preferred over non-vented.
Initiate Pulse Oximetry Monitoring if not previously done
MONITOR FOR TENSION PNEUMOTHORAX
Tension Pneumothorax Suspected?
YES
Burp or remove chest seal if applied. Repeat as necessary.
Needle Decompress Chest at Primary or Alternate Site if indicated. Repeat as necessary.
NO
TENSION PNEUMOTHORAX INDICATORS:
Increasing Hypoxia
Respiratory Distress
Hypotension
Administer Oxygen when possible as indicated:
-Low oxygen saturation by pulsoximetry
-Injuries associated with impaired oxygenation
-Unconscious casualty
-Casualty in shock
-Casualty at altitude
-Known or suspected smoke inhalation
If moderate or severe TBI is suspected, provide supplemental O2 if available to maintain SpO2>90%
Consider chest tube insertion if no improvement and/or long transport anticipated
CONTINUE TACTICAL EVACUATION CARE
Decompression Needle
14-gauge, 3.25 inch needle/ catheter unit
Primary Site:
2nd Intercostal Space/ Midclavicular line
Alternate Site:
4th or 5th Intercostal Space / Anterior Axillary Line
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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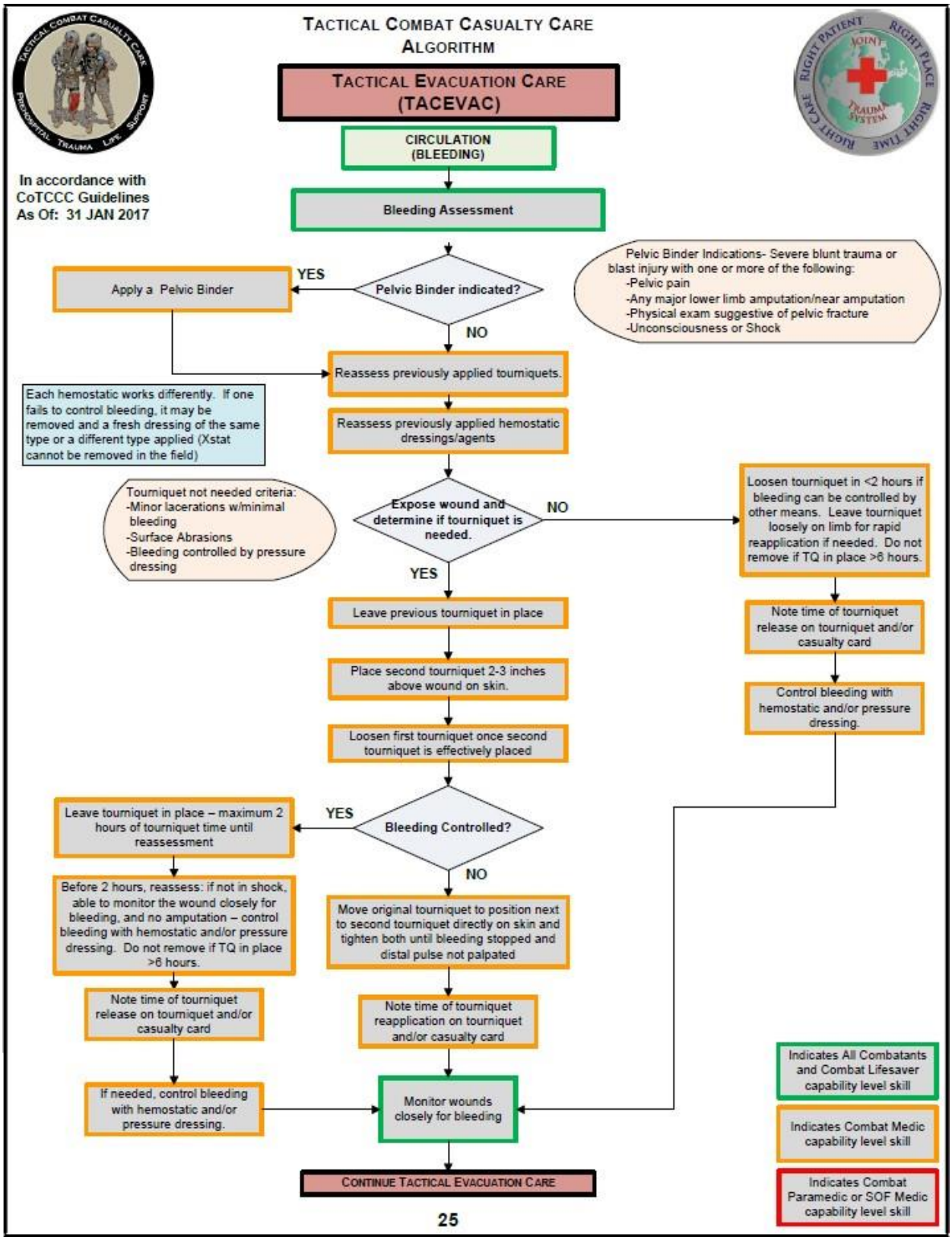
TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
CIRCULATION (BLEEDING)
Bleeding Assessment
Pelvic Binder indicated?
YES
Apply a Pelvic Binder
NO
Pelvic Binder Indications- Severe blunt trauma or blast injury with one or more of the following:
-Pelvic pain
-Any major lower limb amputation/near amputation
-Physical exam suggestive of pelvic fracture
-Unconsciousness or Shock
Reassess previously applied tourniquets.
Each hemostatic works differently. If one fails to control bleeding, it may be removed and a fresh dressing of the same type or a different type applied (Xstat cannot be removed in the field)
Reassess previously applied hemostatic dressings/agents
Tourniquet not needed criteria:
-Minor lacerations w/minimal bleeding
-Surface Abrasions
-Bleeding controlled by pressure dressing
Expose wound and determine if tourniquet is needed.
NO
Loosen tourniquet in <2 hours if bleeding can be controlled by other means. Leave tourniquet loosely on limb for rapid reapplication if needed. Do not remove if TQ in place >6 hours.
YES
Leave previous tourniquet in place
Note time of tourniquet release on tourniquet and/or casualty card
Place second tourniquet 2-3 inches above wound on skin.
Control bleeding with hemostatic and/or pressure dressing.
Loosen first tourniquet once second tourniquet is effectively placed
Leave tourniquet in place – maximum 2 hours of tourniquet time until reassessment
YES
Bleeding Controlled?
NO
Before 2 hours, reassess: if not in shock, able to monitor the wound closely for bleeding, and no amputation – control bleeding with hemostatic and/or pressure dressing. Do not remove if TQ in place >6 hours.
Move original tourniquet to position next to second tourniquet directly on skin and tighten both until bleeding stopped and distal pulse not palpated
Note time of tourniquet release on tourniquet and/or casualty card
Note time of tourniquet reapplication on tourniquet and/or casualty card
If needed, control bleeding with hemostatic and/or pressure dressing.
Monitor wounds closely for bleeding
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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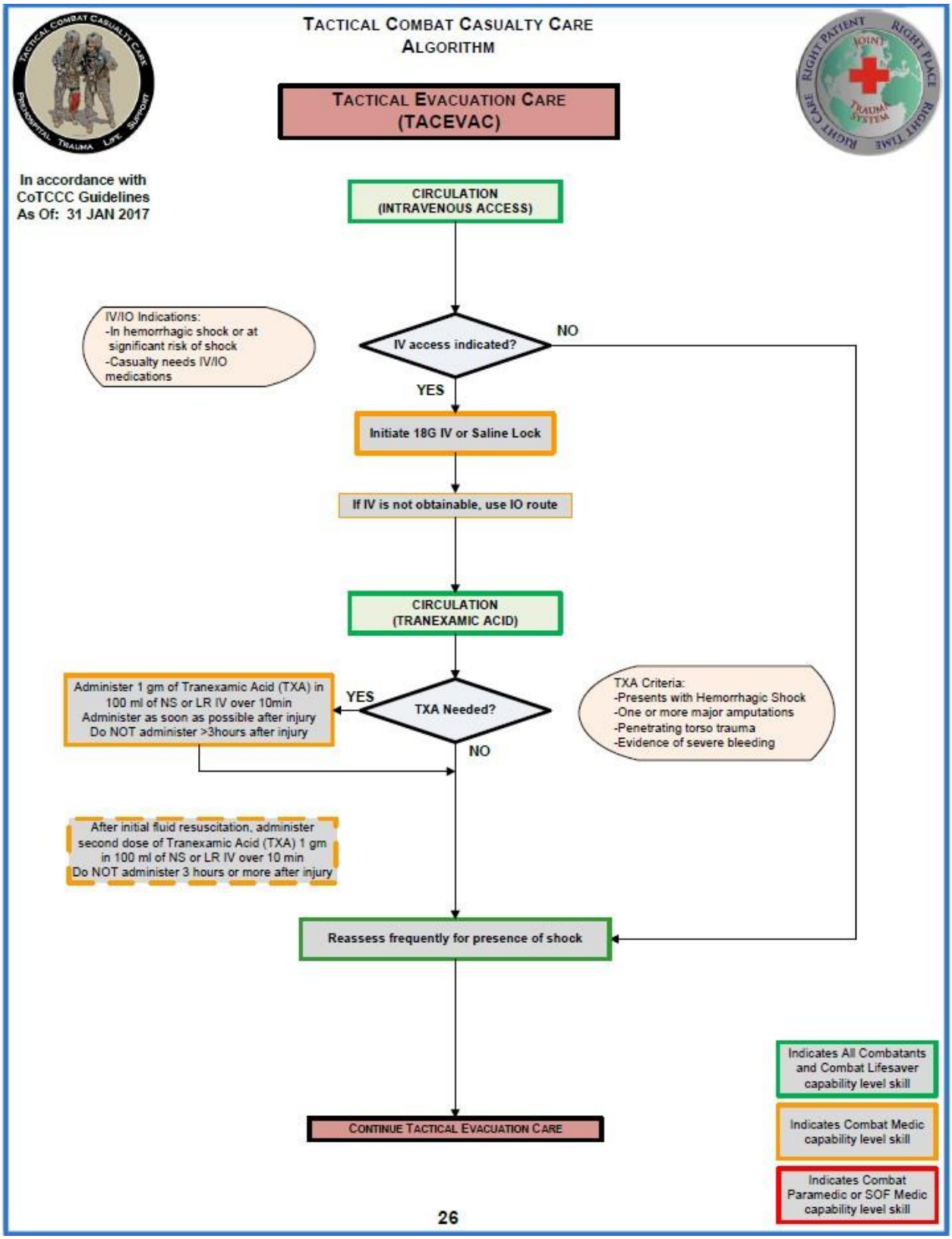
TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
CIRCULATION (INTRAVENOUS ACCESS)
IV/IO Indications:
-In hemorrhagic shock or at significant risk of shock
-Casualty needs IV/IO medications
IV access indicated?
NO
YES
Initiate 18G IV or Saline Lock
If IV is not obtainable, use IO route
CIRCULATION (TRANEXAMIC ACID)
Administer 1 gm of Tranexamic Acid (TXA) in 100 ml of NS or LR IV over 10min
Administer as soon as possible after injury
Do NOT administer >3hours after injury
YES
TXA Needed?
NO
TXA Criteria:
-Presents with Hemorrhagic Shock
-One or more major amputations
-Penetrating torso trauma
-Evidence of severe bleeding
After initial fluid resuscitation, administer second dose of Tranexamic Acid (TXA) 1 gm in 100 ml of NS or LR IV over 10 min
Do NOT administer 3 hours or more after injury
Reassess frequently for presence of shock
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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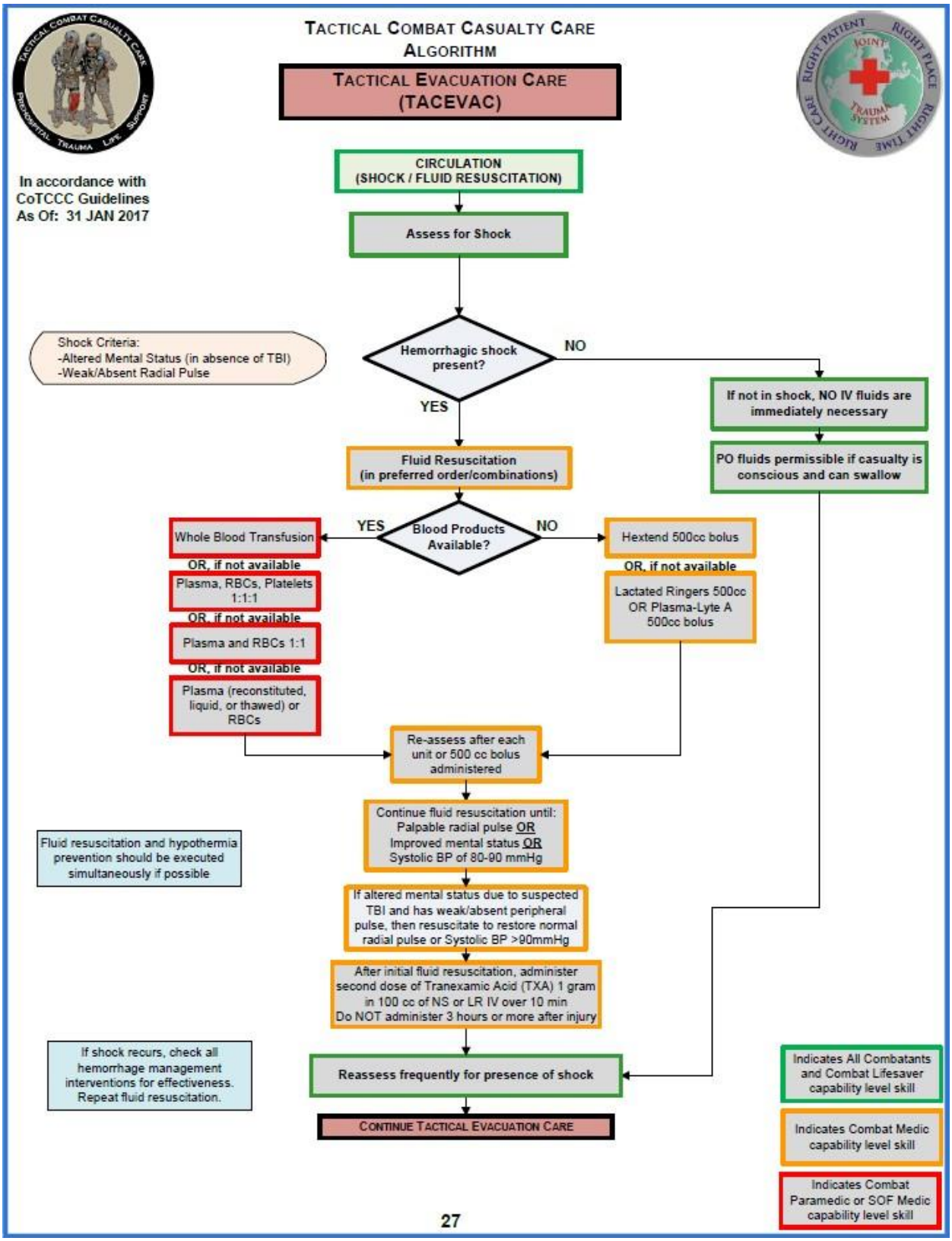
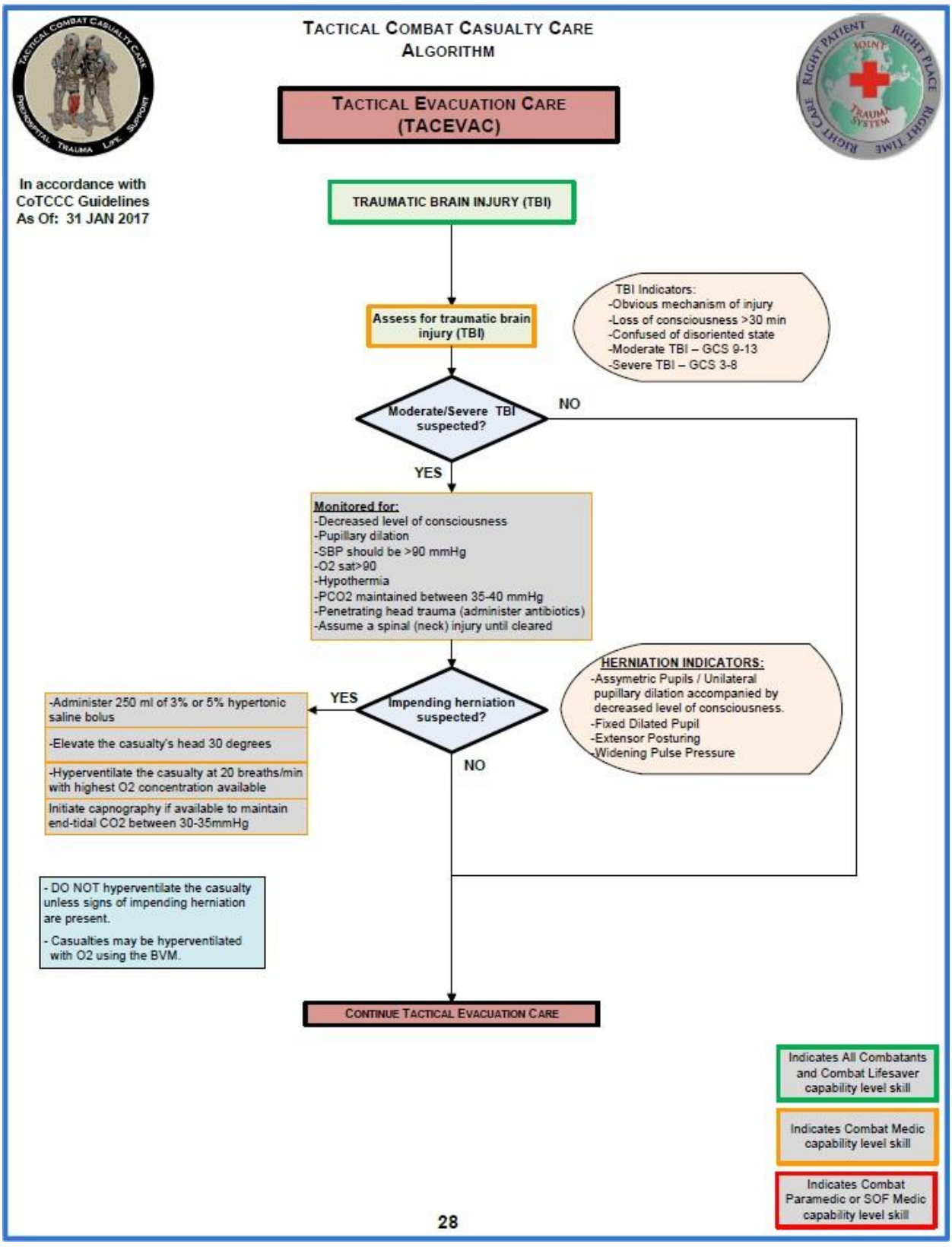
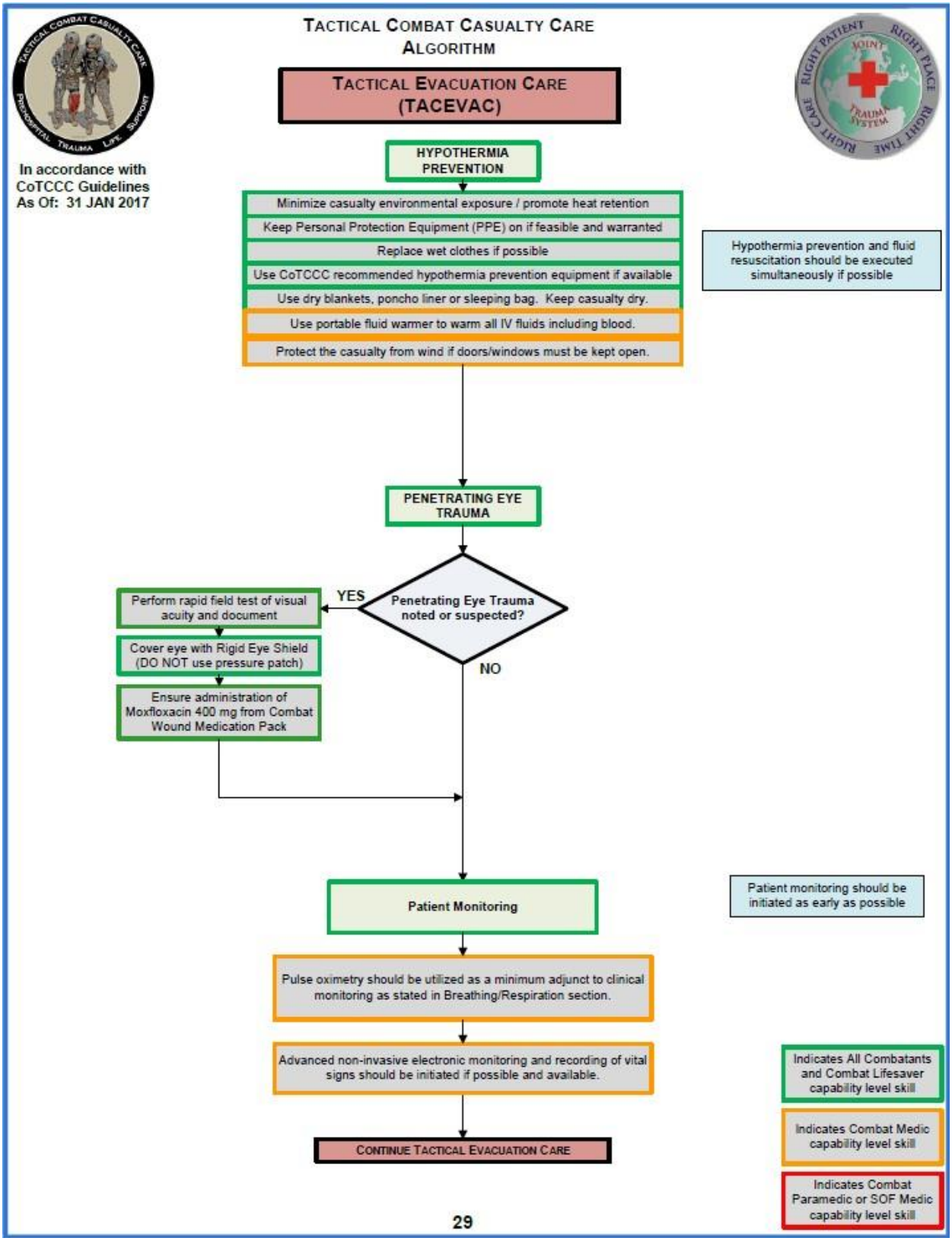
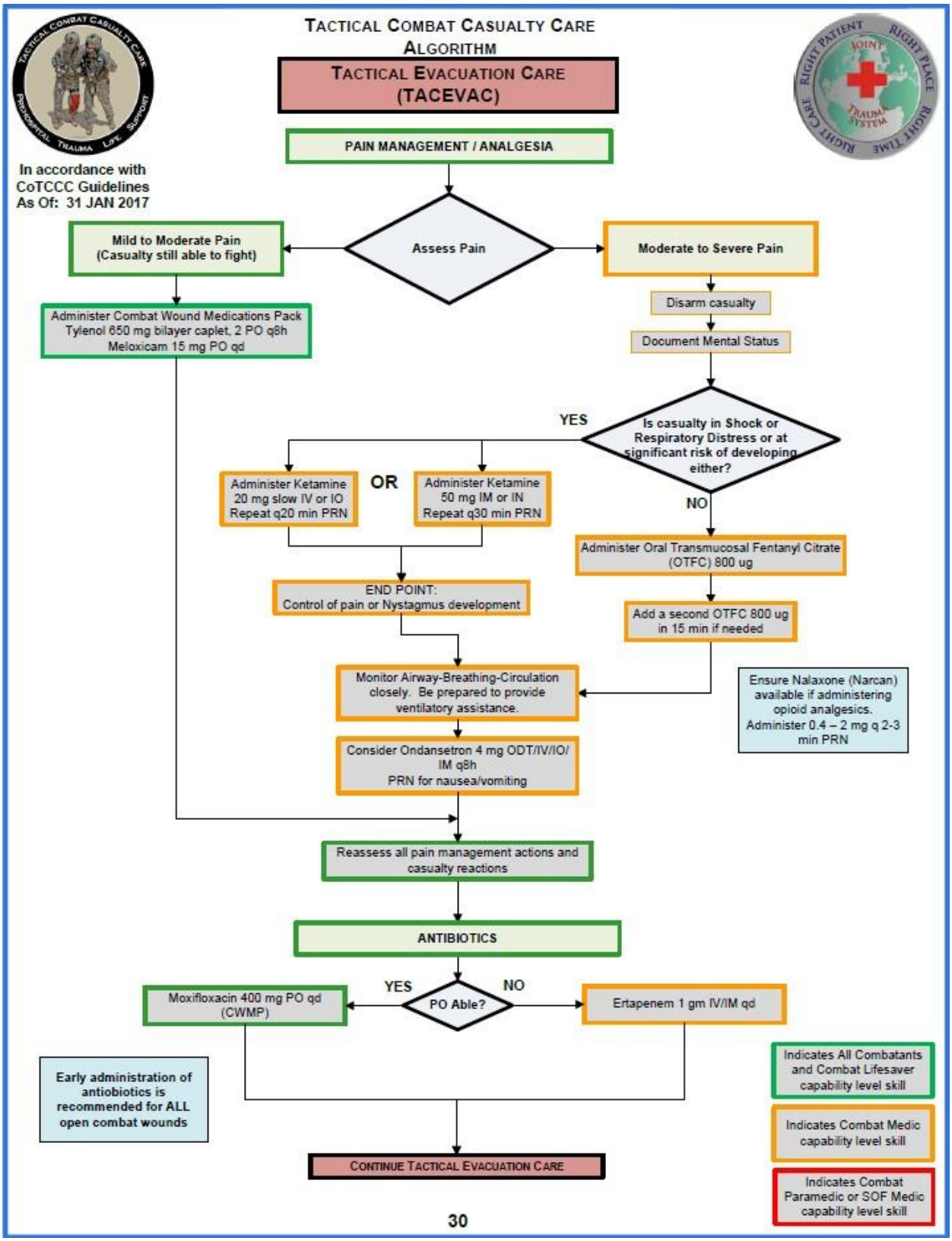
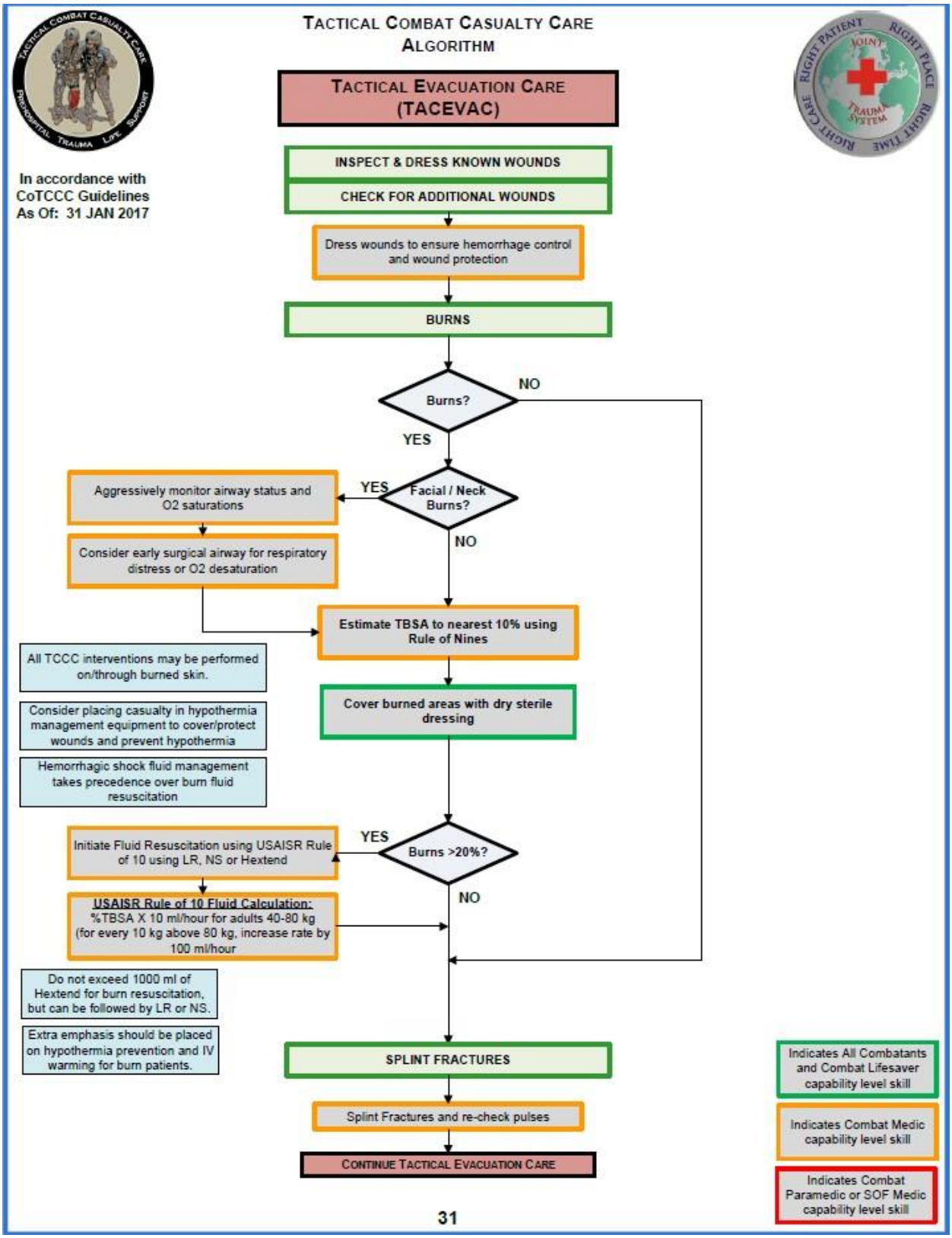

TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
CIRCULATION (SHOCK / FLUID RESUSCITATION)
Assess for Shock
Shock Criteria:
-Altered Mental Status (in absence of TBI)
-Weak/Absent Radial Pulse
Hemorrhagic shock present?
NO
YES
If not in shock, NO IV fluids are immediately necessary
PO fluids permissible if casualty is conscious and can swallow
Fluid Resuscitation (in preferred order/combinations)
Blood Products Available?
YES
NO
Whole Blood Transfusion
OR, if not available
Plasma, RBCs, Platelets 1:1:1
OR, if not available
Plasma and RBCs 1:1
OR, if not available
Plasma (reconstituted, liquid, or thawed) or RBCs
Hextend 500cc bolus
OR, if not available
Lactated Ringers 500cc OR Plasma-Lyte A 500cc bolus
Re-assess after each unit or 500 cc bolus administered
Continue fluid resuscitation until: Palpable radial pulse OR Improved mental status OR Systolic BP of 80-90 mmHg
Fluid resuscitation and hypothermia prevention should be executed simultaneously if possible
If altered mental status due to suspected TBI and has weak/absent peripheral pulse, then resuscitate to restore normal radial pulse or Systolic BP >90mmHg
After initial fluid resuscitation, administer second dose of Tranexamic Acid (TXA) 1 gram in 100 cc of NS or LR IV over 10 min Do NOT administer 3 hours or more after injury
If shock recurs, check all hemorrhage management interventions for effectiveness. Repeat fluid resuscitation.
Reassess frequently for presence of shock
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
27


TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
TRAUMATIC BRAIN INJURY (TBI)
Assess for traumatic brain injury (TBI)
TBI Indicators:
-Obvious mechanism of injury
-Loss of consciousness >30 min
-Confused of disoriented state
-Moderate TBI – GCS 9-13
-Severe TBI – GCS 3-8
Moderate/Severe TBI suspected?
NO
YES
Monitored for:
-Decreased level of consciousness
-Pupillary dilation
-SBP should be >90 mmHg
-O2 sat>90
-Hypothermia
-PCO2 maintained between 35-40 mmHg
-Penetrating head trauma (administer antibiotics)
-Assume a spinal (neck) injury until cleared
Impending herniation suspected?
YES
NO
HERNIATION INDICATORS:
-Assymetric Pupils / Unilateral pupillary dilation accompanied by decreased level of consciousness.
-Fixed Dilated Pupil
-Extensor Posturing
-Widening Pulse Pressure
-Administer 250 ml of 3% or 5% hypertonic saline bolus
-Elevate the casualty's head 30 degrees
-Hyperventilate the casualty at 20 breaths/min with highest O2 concentration available
Initiate capnography if available to maintain end-tidal CO2 between 30-35mmHg
- DO NOT hyperventilate the casualty unless signs of impending herniation are present.
- Casualties may be hyperventilated with O2 using the BVM.
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
28


TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
HYPOTHERMIA PREVENTION
Minimize casualty environmental exposure / promote heat retention
Keep Personal Protection Equipment (PPE) on if feasible and warranted
Replace wet clothes if possible
Use CoTCCC recommended hypothermia prevention equipment if available
Use dry blankets, poncho liner or sleeping bag. Keep casualty dry.
Use portable fluid warmer to warm all IV fluids including blood.
Protect the casualty from wind if doors/windows must be kept open.
Hypothermia prevention and fluid resuscitation should be executed simultaneously if possible
PENETRATING EYE TRAUMA
Penetrating Eye Trauma noted or suspected?
YES
Perform rapid field test of visual acuity and document
Cover eye with Rigid Eye Shield (DO NOT use pressure patch)
Ensure administration of Moxfloxacin 400 mg from Combat Wound Medication Pack
NO
Patient Monitoring
Patient monitoring should be initiated as early as possible
Pulse oximetry should be utilized as a minimum adjunct to clinical monitoring as stated in Breathing/Respiration section.
Advanced non-invasive electronic monitoring and recording of vital signs should be initiated if possible and available.
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
29


TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
PAIN MANAGEMENT / ANALGESIA
Assess Pain
Mild to Moderate Pain (Casualty still able to fight)
Moderate to Severe Pain
Administer Combat Wound Medications Pack Tylenol 650 mg bilayer caplet, 2 PO q8h Meloxicam 15 mg PO qd
Disarm casualty
Document Mental Status
YES
Is casualty in Shock or Respiratory Distress or at significant risk of developing either?
NO
Administer Ketamine 20 mg slow IV or IO Repeat q20 min PRN
OR
Administer Ketamine 50 mg IM or IN Repeat q30 min PRN
Administer Oral Transmucosal Fentanyl Citrate (OTFC) 800 ug
END POINT: Control of pain or Nystagmus development
Add a second OTFC 800 ug in 15 min if needed
Monitor Airway-Breathing-Circulation closely. Be prepared to provide ventilatory assistance.
Ensure Nalaxone (Narcan) available if administering opioid analgesics. Administer 0.4 – 2 mg q 2-3 min PRN
Consider Ondansetron 4 mg ODT/IV/IO/ IM q8h PRN for nausea/vomiting
Reassess all pain management actions and casualty reactions
ANTIBIOTICS
YES
PO Able?
NO
Moxifloxacin 400 mg PO qd (CWMP)
Ertapenem 1 gm IV/IM qd
Early administration of antiobiotics is recommended for ALL open combat wounds
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
30


TACTICAL COMBAT CASUALTY CARE ALGORITHM
TACTICAL EVACUATION CARE (TACEVAC)
In accordance with CoTCCC Guidelines As Of: 31 JAN 2017
INSPECT & DRESS KNOWN WOUNDS
CHECK FOR ADDITIONAL WOUNDS
Dress wounds to ensure hemorrhage control and wound protection
BURNS
Burns?
NO
YES
Facial / Neck Burns?
YES
Aggressively monitor airway status and O2 saturations
Consider early surgical airway for respiratory distress or O2 desaturation
NO
Estimate TBSA to nearest 10% using Rule of Nines
All TCCC interventions may be performed on/through burned skin.
Consider placing casualty in hypothermia management equipment to cover/protect wounds and prevent hypothermia
Hemorrhagic shock fluid management takes precedence over burn fluid resuscitation
Cover burned areas with dry sterile dressing
Burns >20%?
YES
Initiate Fluid Resuscitation using USAISR Rule of 10 using LR, NS or Hextend
NO
USAISR Rule of 10 Fluid Calculation:
%TBSA X 10 ml/hour for adults 40-80 kg
(for every 10 kg above 80 kg, increase rate by 100 ml/hour
Do not exceed 1000 ml of Hextend for burn resuscitation, but can be followed by LR or NS.
Extra emphasis should be placed on hypothermia prevention and IV warming for burn patients.
SPLINT FRACTURES
Splint Fractures and re-check pulses
CONTINUE TACTICAL EVACUATION CARE
Indicates All Combatants and Combat Lifesaver capability level skill
Indicates Combat Medic capability level skill
Indicates Combat Paramedic or SOF Medic capability level skill
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TACTICAL COMBAT CASUALTY CARE ALGORITHM

In accordance with CoTCCC Guidelines As Of: 31 JAN 2017

TACTICAL EVACUATION CARE (TACEVAC)

COMMUNICATION

Communicate with casualty and medical providers in evacuation chain

- **Communicate with Casualty**
  - Encourage, reassure, explain care if possible
- **Communicate with Receiving Medical Facility**
  - Communicate with medical providers on evac asset if possible.
  - Relay mechanism of injury, injuries sustained, signs/ symptoms, and treatments rendered.

Cardiopulmonary Resuscitation (CPR) Considerations

CPR may be attempted in TACEVAC if casualty does not have obviously fatal wounds and quickly arriving at a surgical capability. CPR should not be attempted if compromising the mission or denying lifesaving treatment to other casualties.

Casualties with torso or polytrauma with no pulse or respirations should have bilateral needle decompression performed to confirm/deny tension pneumothorax prior to discontinuing care.

DOCUMENTATION

Document clinical assessments, treatments rendered, and changes on DD1380 TCCC Card and forward with casualty to next level of care.

NEXT LEVEL CARE

Indicates All Combatants and Combat Lifesaver capability level skill

Indicates Combat Medic capability level skill

Indicates Combat Paramedic or SOF Medic capability level skill

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VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

5. Blood/Fresh Frozen Plasma(FFP) Administration and Protocol

INDICATIONS: If the patient is in shock, especially in the presence of known or suspected non-compressible hemorrhage, then resuscitate with 2 units of plasma followed by PRBCs in a 1:1 ratio. If blood components are not available AND you are trained and comfortable with the procedure, collect and transfuse fresh whole blood. Resuscitate and attempt to maintain a palpable radial pulse or clinical improvement. If BP monitoring is available, maintain target systolic BP of 80-90mmHg (at least 90mmHg in the presence of TBI).

OVERVIEW:

1. Whole blood (WB) is blood that has not been modified except for the addition of an anticoagulant. WB provides the equivalent of Fresh Frozen Plasma (FFP), RBCs and Platelets (PLTSs) in a 1:1:1 ratio. FWB will have a shelf-life of 24 hours and should be transfused immediately or stored at 33-43 degrees F (1-6 degrees C) within 8 hours after collection, unless otherwise directed by medical staff due to insufficient or no red blood cell (RBC) or plasma product inventory. It should be tested with rapid test kits to decrease the risk of infectious disease transmission. Identify a blood donor who is ABO identical with the intended recipient.
2. WB is sometimes referred to fresh whole blood (FWB) if it has been recently collected. However, there is no time standard as to when it is no longer considered to be fresh. It is also referred to as warm fresh whole blood (WFWB) when it is still warm following collection. WB is separated into different components.

*** Any separated component, including RBCs or Packed RBCs (PRBCs), is considered a blood component and therefore **CANNOT** be correctly referred to as blood. Blood refers to WFWB, FWB, and WB.

3. The following are in use depending on theater of operations:
   a. Fresh frozen plasma (FFP)
   b. Packed red blood cells (PRBCs)
   c. Warm fresh whole blood (WFWB)
   d. Fresh whole blood (FWB)
   e. Whole blood (WB)
4. Prior to initiation of transfusion, the following will be checked:
   a. Vital signs (T, P, R, BP). Measure, evaluate and record baseline vital signs. Every effort should be made to monitor temperature as **an increase in temperature may be the first indicator of a transfusion reaction**.
   b. Casualty blood type should be confirmed.
      i. In an emergency, establish ABO/Rh of recipients and donors via local testing or previous testing.
      ii. EldonCard® tests should ONLY be used to confirm previous results obtained using the ABO/Rh test tube method.

Identification tags for ABO/Rh verification should be utilized as a last resort only. Accurate identification and verification of the donor's blood and the intended recipient may be the single most important step in ensuring transfusion safety.

   c. Active warming loss prevention should be used to prevent casualty hypothermia.

Transfusions

1. Ideally blood products should be warmed to approximately 98.6 °F (37 °C) prior to transfusion. Do not exceed 102 °F (39 °C). This may cause an inflammatory reaction and lyse some of the red cells.

Do not use warmers directly against the fluid bag because of the risk of hemolysis or damage to the blood or blood product. Blood or blood components should not be warmed in a microwave, unless it is specifically designed for that purpose.

2. Blood/blood components may be infused using a pressure infuser that encases the entire blood collection bag. Do not use a BP cuff for infusion as they deliver uneven pressure. Do not exceed 300mmHg with the pressure infusion device.

3. The largest bore IV catheter should be used. An IO device may be used. Ensure that a strong flush is done and good flow is obtained prior to using an IO infusion.

4. When performing any administration of blood or blood components the patient should be continuously monitored for signs and symptoms of an immunologic blood transfusion reaction. The first 10-15 minutes of any transfusion are the most critical.
   - **a. Anaphylactic Reaction**
     - i. Shock
     - ii. Hypotension
     - iii. Angioedema (red, swollen face)
     - iv. Respiratory distress
   - **b. Acute Hemolytic Transfusion Reaction**
     - i. Acute Hemolytic Reaction usually has onset within 1 hour
     - ii. Evidence of disseminated intravascular coagulopathy (DIC) – oozing from blood draw, IV sites.
     - iii. Flushing, especially in the face
     - iv. Fever and increase in core temp of more than 2 degrees F (1 degree C)
     - v. Shaking, chills (rigor)
     - vi. Flank pain or the acute onset of pain in the chest (retrosternal), abdomen and thighs
     - vii. Wheezing, dyspnea
     - viii. Anxiety, feeling of impending doom
     - ix. Nausea and vomiting
     - x. Hypotension
     - xi. Pain, inflammation, and/or warmth at the infusion site
     - xii. Red or Brown Urine (hemoglobinuria)-The onset of red urine during or shortly after a blood transfusion may represent hematuria (indicating bleeding in the lower urinary tract (tube #1 below) or hemoglobinuria (indicating an acute hemolytic reaction, tube #2 below). If freshly collected urine from a patient with hematuria is centrifuged, red blood cells settle at the bottom of the tube, leaving clear yellow urine supernatant (see tube #3 below). If the red color is due to hemoglobinuria, the urine sample remains red after centrifugation (see tube #4 below).

c. **Febrile Non Hemolytic Reactions**
   i. Fever not as severe as with an acute hemolytic reaction
   ii. Chills
   iii. Dyspnea
d. **Urticarial Reactions** - Urticaria
e. **Other transfusion related signs and symptoms**
   i. Flushing (especially in the face), urticaria, or edema
   ii. Increased pulse or respiratory rate
   iii. Nausea, vomiting or diarrhea
   iv. Pain and/or edema at the infusion site
   v. Headache
   vi. Feeling of impending doom
f. **Citrate Toxicity**
   i. Mild
      (a) Perioral and periorbital paresthesia
      (b) Metallic taste in the mouth
      (c) "Tingling" sensation around the mouth or in the extremities
   ii. Severe
      (a) Carpopedal spasms
      (b) Twitching
      (c) Chills
      (d) Stomach cramps
      (e) Pressure in the chest
      (f) Hypotension and possible cardiac arrhythmia
      (g) Nausea and/or vomiting
      (h) Tetany
      (i) Laryngeal spasm
      (j) Seizures
      (k) Bradycardia
   iii. Treatment
      (a) **Mild Toxicity** - Slow or stop transfusion until symptoms subside. Ensure proper mixture and concentration of citrate
      (b) **Severe Toxicity** - 10ml of a 10% solution of Calcium Gluconate SLOW IV push.

Do not rapidly infuse Calcium nor give more than one dose without the ability to monitor electrolytes. This may lead to cardiac arrhythmias.

5. Treatment of Immunologic Blood Transfusions Reactions. The first step in treating ALL transfusion related issues is to **STOP** the transfusion and save all of the blood products and equipment used for administration and typing for follow-up testing.

a. **Anaphylactic Reactions**
   i. Epinephrine 0.5ml of 1:1000 IM
   ii. Airway maintenance and oxygenation
   iii. Resuscitate hypotensive patients with IV fluids
   iv. Diphenhydramine, Dexamethasone, Zantac
b. **Acute Hemolytic Transfusion Reaction (AHTR)**
   i. Immediately STOP the transfusion
   ii. Initial Treatment

(a) Secure and maintain airway
(b) Begin an IV infusion of crystalloid.
NOTE: DO NOT run any fluid through the line that was carrying blood.
(c) The goal of fluid resuscitation is to maintain a urine output of 100-200ml/hr until the urine is clear of hemolyzed RBCs.
(d) Administer mannitol 20% (Osmitrol®) 20gm IV over 5 minutes using a blood administration filter to prevent infusion of mannitol crystals. If diuresis does not occur, repeat the 20gm dose once. The patient should receive a Foley catheter to monitor urine output.
(e) If mannitol 20% (Osmitrol®) is unavailable or does not produce diuresis, administer furosemide (Lasix®) 40-80mg initially and titrate later doses to maintain urine output of 100-200cc/hr.
(f) However, if urine output is not obtained within 2-3 hours of administration of fluid, consider the development of Acute Renal Failure and discontinue further fluids.
(g) Consider using acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV (every 6 hours to treat discomfort associated with fevers. (Avoid the use of aspirin or other NSAIDS).
(h) Administer 25-50mg of diphenhydramine (Benadryl®) IM, or IV to treat associated histamine release from AHTR & help manage the chills/rigor.

NOTE: Antihistamine (IV administration) must never be mixed with blood or blood products in the same transfusion lines.

iii. **SAVE** remaining donor blood and any typing information available & evacuate w/ patient. This will allow for ABO/further diagnostic testing at the MTF.

c. Febrile Non Hemolytic Reactions

i. Treat with antipyretics. Acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV (avoid the use of aspirin and other NSAIDS).
ii. If symptoms abate and there is no evidence of an acute hemolytic reaction consider restarting the transfusion.
iii. Pretreatment with antipyretics and antihistamines is recommended in this protocol and commonly done although there is no evidence that is decreases the incidence of fever and urticaria associated with transfusions.

d. Urticarial Reactions

i. Treat with 25-50mg diphenhydramine (Benadryl ®) IM or PO.
ii. If symptoms abate and there is no evidence of an acute hemolytic reaction consider restarting the transfusion.

Administer Fresh Frozen Plasma (FFP)

1. Keep FFP frozen at -0.4 degrees F (-18 degrees C) or below.

2. Do not rough handle FFP before thawing because the bags can be easily cracked, broken, or damaged.

3. FFP should be thawed in a water bath with the FFP bag wrapped in a plastic overwrap bag to protect the ports from contamination and to lessen the risk of contaminating the water bath if the FFP bag is broken or cracked (See Enclosure #2: Suggested Packing List). Thaw FFP at 98.6 degrees F (37 degrees C) or by using a method and/or equipment that is intended (validated) for such use. Do not exceed 107 degrees F (42 degrees C).

4. Turn the plasma during the thawing process and ensure that all fibrin clots are dissolved.

5. The plasma should be administered as rapidly as possible after thawing. Keep plasma refrigerated at 33-43 degrees F (1-6 degrees C) prior to administration.

6. Thawed plasma can be stored for 3 days at 33-43 degrees F (1-6 degrees C) and then should be returned to the MTF for use. If thawed plasma cannot be returned to and MTF for use then it should be discarded after storage at 33-43 degrees F (1-6 degrees C) for 5 days. Thawed plasma can only be kept for 30 minutes at room temperature (68-75 degrees F [20-24 degrees C]).

7. **AB is the universal donor for plasma.**

8. FFP is normally supplied as type AB or A.

9. Rh factor is not a concern when administering FFP.

10. Ensure compatibility of recipient.

11. Administer 2 units of FFP and then begin administering PRBCs in a 1:1 ratio if available. You may bolus or pressure infuse FFP immediately.

VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

6. DD1380 TCCC Card

TACTICAL COMBAT CASUALTY CARE (TCCC) CARD

BATTLE ROSTER #: _____

EVAC: ☐ Urgent ☐ Priority ☐ Routine

NAME (Last, First): _____ LAST 4: _____

GENDER: ☐ M ☐ F DATE (DD-MMM-YY): _____ TIME: _____

SERVICE: _____ UNIT: _____ ALLERGIES: _____

Mechanism of Injury: (X all that apply)

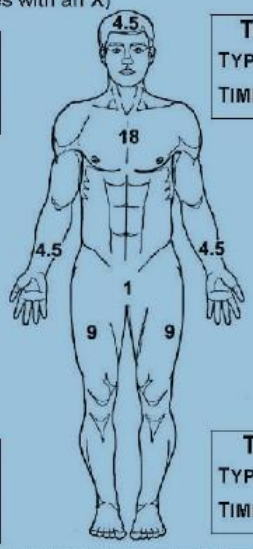
☐ Artillery ☐ Blunt ☐ Burn ☐ Fall ☐ Grenade ☐ GSW ☐ IED

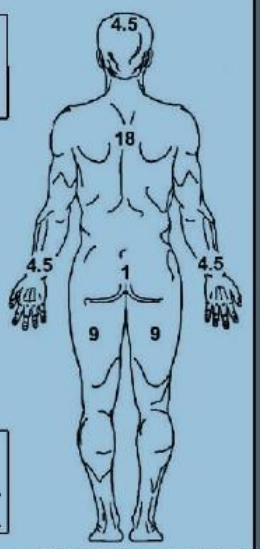
☐ Landmine ☐ MVC ☐ RPG ☐ Other: _____

Injury: (Mark injuries with an X)

TQ: R Arm
TYPE: _____
TIME: _____

TQ: L Arm
TYPE: _____
TIME: _____





TQ: R Leg
TYPE: _____
TIME: _____

TQ: L Leg
TYPE: _____
TIME: _____

Signs & Symptoms: (Fill in the blank)

Time				
Pulse (Rate & Location)				
Blood Pressure	/	/	/	/
Respiratory Rate				
Pulse Ox % O2 Sat				
AVPU				
Pain Scale (0-10)				

DD Form 1380, JUN 2014 TCCC CARD

VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

7. DD1380 TCCC Card

BATTLE ROSTER #: _____

EVAC: ☐ Urgent ☐ Priority ☐ Routine

Treatments: (X all that apply, and fill in the blank) — *Type*

C: TQ- ☐ Extremity ☐ Junctional ☐ Truncal _____

Dressing- ☐ Hemostatic ☐ Pressure ☐ Other _____

A: ☐ Intact ☐ NPA ☐ CRIC ☐ ET-Tube ☐ SGA _____

B: ☐ O2 ☐ Needle-D ☐ Chest-Tube ☐ Chest-Seal _____

C:	Name	Volume	Route	Time
Fluid				
Blood Product				

MEDS:	Name	Dose	Route	Time
Analgesic (e.g., Ketamine, Fentanyl, Morphine)				
Antibiotic (e.g., Moxifloxacin, Ertapenem)				
Other (e.g., TXA)				

OTHER: ☐ Combat-Pill-Pack ☐ Eye-Shield (☐ R ☐ L) ☐ Splint

☐ Hypothermia-Prevention Type: _____

NOTES:

FIRST RESPONDER

NAME (Last, First): _____ **LAST 4:** _____

DD Form 1380, JUN 2014 (Back) **TCCC CARD**

VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

8. Triage Categories

IMMEDIATE
This category includes those casualties who require an immediate LSI and/or surgery. Put simply, if medical attention is not provided they will die. **The key to successful triage is to locate these individuals as quickly as possible. Casualties do not remain in this category for an extended period of time. They are either found, triaged and treated, or they die!** Hemodynamically unstable casualties with airway obstruction, chest or abdominal injuries, massive external bleeding, or shock deserve this classification.
DELAYED
This category includes those wounded who are likely to need surgery, but whose general condition permits delay in surgical treatment without unduly endangering the life, limb, or eyesight of the casualty. Sustaining treatment will be required (e.g., oral or IV fluids, splinting, administration of antibiotics and pain control), but can possibly wait. Examples of casualties in this category include those with no evidence of shock who have; large soft tissue wounds, fractures of major bones, intra-abdominal and/or thoracic wounds, and burns to less than 20% of total body surface area (TBSA).
MINIMAL
Casualties in this category are often referred as the "walking wounded." Although these patients may appear to be in bad shape at first, it is their physiologic state that tells the true story. These casualties have minor injuries (e.g., small burns, lacerations, abrasions, or small fractures) that can usually be treated with self- or buddy-aid. These casualties should be utilized for mission requirements (e.g., scene security), to help treat and/or transport the more seriously wounded, or put back into the fight.
EXPECTANT
Casualties in this category have wounds that are so extensive, that even if they were the sole casualty and had the benefit of optimal medical resources, their survival would be highly unlikely. Even so, expectant casualties should not be neglected. They should receive comfort measures and pain medication if possible, and they deserve re-triage as appropriate. Examples of expectant casualties are the unresponsive with injuries such as penetrating head trauma with obvious massive damage to the brain.

EVACUATION PRECEDENCE

URGENT / CATEGORY A (WITHIN 2 HOURS) *	PRIORITY / CATEGORY B (WITHIN 4 HOURS)	ROUTINE / CATEGORY C (WITHIN 24 HOURS)
• Significant injuries from a dismounted IED attack • Gunshot wound or penetrating shrapnel to chest, abdomen, or pelvis • Any casualty with ongoing airway difficulty • Any casualty with ongoing respiratory difficulty • Unconscious casualty • Casualty with known or suspected spinal injury • Casualty in shock • Casualty with bleeding that is difficult to control • Moderate/Severe TBI • Burns greater than 20% Total Body Surface Area	• Isolated, open extremity fracture with bleeding controlled • Any casualty with a tourniquet in place • Penetrating or other serious eye injury • Significant soft-tissue injury without major bleeding • Extremity injury with absent distal pulses • Burns over 10-20% of Total Body Surface Area	• Concussion (mild traumatic brain injury) • Gunshot wound to extremity - bleeding controlled without tourniquet • Minor soft-tissue shrapnel injury • Closed fracture with intact distal pulses • Burns over < 10% Total Body Surface Area

* Note that by Secretary of Defense directive, all casualties categorized as CAT A in the Afghanistan theater of operations should be able to be evacuated to an MTF with a surgical capability within 60 minutes from the time that the evacuation mission is approved.

VI. TACTICAL COMBAT CASUALTY CARE (TCCC)

9. 9 – Line / MIST Report

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

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

VII. CANINE PROTOCOL(Military & DOD working Dogs)

K-9 Trauma Management Protocol

SIGNS AND SYMPTOMS for Shock:
1. Pale color in gums, capillary refill time greater than 2 seconds
2. Dry lips and gums, dehydration
3. Excessive drooling in some poisoning cases
4. Weak femoral pulse
5. Rapid heart rate of 150-200 beats per minute
6. Cool extremities
7. Hyperventilation, rapid breathing generally over 25 breaths per minute (panting may or may not be normal)
8. Confusion, restless, anxiousness
9. General weakness

Advanced stages of shock:
1. Continued depression and weakness to the point of not being able to move or becoming unresponsive or unconscious
2. Dilated pupils
3. Capillary refill time greater than 4 seconds
4. White mucous membranes
5. Rectal temperature below 98° F.

MANAGEMENT:

1. **MARCHE** Protocol
2. **Muzzle, M**assive hemorrhage: Control bleeding per TCCC standards, Morphine
   A. Muzzle
   B. Massive hemorrhage: Control bleeding with direct pressure and pressure dressings. Tourniquets are not as effective in dogs due to anatomical differences. All hemostatic agents used in humans are safe for use in dogs.
   C. Morphine: 10-30mg IM. May cause vomiting and respiratory depression. Use Naloxone (0.02mg/kg) for reversal if necessary.
3. **A**irway
   A. An injured dog or an animal in shock may not recognize you. The dog may bite you out of pain or fear. If the dog is having trouble breathing or panting heavily, **DO NOT** apply a muzzle. If a

muzzle is placed on the dog it must be monitored at all times and removed at the first sign of overheating or vomiting because they can easily aspirate. Get help if possible from someone who can help hold the dog, so you can do an examination and/or treat the dog.

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

B. Intubation or tracheostomy if necessary to assure airway

1) Do not attempt to intubate a conscious animal, personnel must have prior training. ET tube size can range from 7-10.

C. If intubation is not possible, then attempt tracheostomy.

D. After achieving a patent airway, one must determine whether the animal is breathing, and whether this breathing is effective.

E. **AIRWAY CONSIDERATIONS:**

1) Size 7mm to 10mm cuffed endotracheal tube, secure with gauze or IV tubing. Tie over nose.
2) Flow by oxygen – secure airline to muzzle.
3) Field expedient O_2 masks.
4) Nasal trumpets are ineffective in canines

4. **R**espirations

A. Look, Listen, and Feel

B. If not breathing, ventilate the animal by closing the mouth, and performing mouth-to-nose ventilations. If patient is intubated or has tracheostomy, ventilate the animal using an Ambu-bag.

C. Ventilate at 20 breaths per minute.

D. If available, use supplemental oxygen

E. Needle thoracentesis: Place the dog in the lateral recumbency, go midway between sternum and spine between the 7th and 9th ribs. Use a 14G 3.25in needle. Perform needle decompression on both sides.

5. **C**irculation

A. Be sure that there are no major (pooling/spurting blood) points of bleeding. Control as necessary.

B. Hemorrhagic Shock Fluid Resuscitation (Administration Routes):

1) Primary route is IV
2) Secondary route is IO (Tibia or Humerus) on a sedate or unconscious dog only.

C. Incorporate crystalloids and colloids as needed

1) Bolus of crystalloid, 10-20ml/kg, reassess and repeat a maximum of 2 times
2) Bolus of colloid, 5-10ml/kg given once over 20-30 minutes.

D. The targeted endpoint for resuscitation should be to achieve and maintain permissive hypotension.

E. Blood transfusion (dog-to-dog), if available.

1) For the first transfusion in a trauma/field situation it is generally safe to give any type of blood without typing or cross-matching.
2) Collect no more than 20% blood volume (collect 1 unit/450ml from typical size working dog). Perform a sterile prep and use the jugular vein for collection.
3) In a trauma/field situation you will usually administer the whole unit. Human blood transfusion guidelines apply for rate and monitoring requirements.

6. **H**ypothermia: Prevent loss of body heat. Dry the fur. Use a hypothermia blanket. Watch for overheating.

7. Evacuation and Everything Else

A. TXA – Administer 10-15ml/kg IM or slowly IV

B. Analgesia

1) Morphine: Administer 0.5-1mg/kg IM or IV, may cause vomiting

2) Hydromorphone/Dilaudid: Administer 0.1-0.2mg/kg IM or IV, may cause vomiting
3) Fentanyl: Administer 3-4mcg/kg IV; Can also use a fentanyl lollipop inserted in the rectum secured with tape to the tail base
4) Naloxone: Opiod reversal , administer at 0.02-0.04mg/kg IV, IM, or SQ

C. Antibiotic Therapy for Penetrating Wounds
1) Ceftriaxone (Rocephin) 1gm IV / IM daily
2) **E**rtapenem (Invanz) 500mg IV / IM two times a day

Monitoring:

K-9 EVALUATION AND TREATMENT PROTOCOL

VITAL SIGNS OF CANINES:

Parameter	Value	Parameter	Value
Pulse	60-120 bpm	HCT/PCV	37-55%
Respiration	8-24 bpm	SPO2	95-100%
Temp	100-102.5 F	ET CO2	35-45 mm Hg
CRT	<2 sec	Total Protein	5-7.5g/dl

1. Temperature:
   A. Normal Rectal Temp is 100-102.5° F.
   B. Temperature after exercise: 103-106° F. Temperature should return to normal within 15 minutes after completion.
2. Pulse
   A. Normal pulse rate will vary from 60-120bpm. Can beat up to 150 with exercise.
   B. The pulse rate and respiratory rate will vary from dog to dog, and will also vary if the dog is at rest or working.
   C. The femoral artery is located on the inside of a dog's rear thighs. Take your hand as if you were passing someone a plate, grab the dog on the front of their thigh with your fingers inside the thigh, and palpate the artery.
3. Normal respiratory rate for an adult dog will vary between 8-24 respirations per minute
4. Capillary refill time: less than 2 seconds.
5. Mucous membrane color: generally pink.

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

MONITORING:

1. Pulse Ox – Placed on tongue, ear, or other non-pigmented highly vascular area such as the lip, vulva, or prepuce.
2. EKG – Alligator clips behind each elbow and above left knee. If you do not have alligator clips place the buttons or leads behind the largest pad on the foot. Sticky pads can also be placed on the largest pad on the foot of the left and right forelimbs and the left hindlimb.
3. Animals do not have palpable carotid pulses. You can obtain a femoral pulse in the inguinal crease.
4. End Tidal CO2 – Measure the same way you do in human patients. Normal value 35-45mm Hg.

Femoral Pulse Location:

IV/IM Sites

IM and SQ INJECTION SITES:

IM Injections

1. Gluteal Site: palpate muscle belly between fingers. Insert needle into muscle; pull back on plunger to ensure no blood is present. Inject if no blood and reposition needle if blood is present.

2. Epaxial Site: Place hand on back with middle finger located on spine and thumb just in front of the pelvis. Muscle belly will be where your index finger naturally falls.

Subcutaneous Injections

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

IV SITES:

Usually the easiest/best vein to use for a K-9 IV is the one found on their forelegs. The cephalic vein is located on the middle of the foreleg. This is the most commonly used vein for fluid administration and IV delivery of drugs.

If the person occluding the vein for you rolls it laterally, this will place the vein directly on top of the dog's leg, easing access.

Maintain a firm hold on the dogs leg as you place the catheter, as they will pull away from you while placing the catheter.

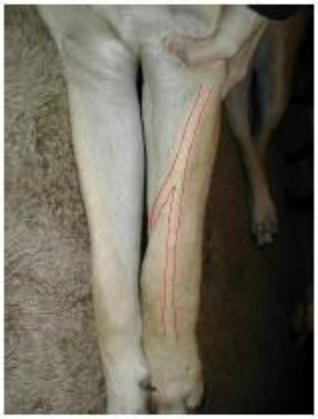
Start distally on the vein. If you blow the vein, move more proximally and attempt the IV.

An 18 gauge 1 ½" catheter can be used in both the cephalic and the saphenous veins.

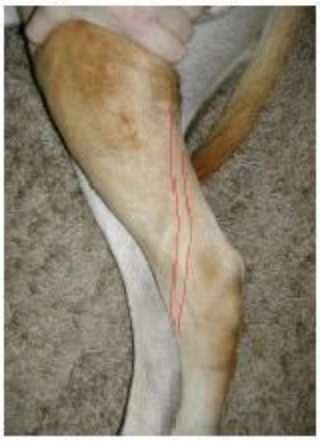
In the hind leg, the lateral saphenous vein is used. This vein is harder to maintain and secure.

In both procedures use plenty of tape to secure the IV line. Your patient will try to pull it out. If they are ambulatory, movement will often dislodge the IV. IVs in conscious dogs must be monitored.

Cephalic Vein



Saphenous Vein



Hydration Status

HYDRATION STATUS:

1. Normal Hydration: Pick up skin and release. It should return to the original position within 1 second.
   A. Capillary Refill Time (CRT) is measured by pressing on the gums over the canine tooth. Using one finger, press down firmly until the gums turn white under your finger and release. Anything over two seconds is considered too long. Also, note the normal color of your dog's gums and mouth. Dog's gum color may vary from black, pink, brown or any combination of those colors.
2. Dehydration:
   A. 6-8% dehydration – loss of skin elasticity, tacky gums, mildly prolonged CRT
   B. 10-12% dehydration – tented skin, dry gums, prolonged CRT, sunken eyes, increased HR, rapid/weak pulses. Consider a 10-12% dehydration an emergency.
3. Dehydration Fluid Replacement
   A. Estimate dehydration
      1) 5% give 1000ml bolus IV
      2) 10% give 1500ml bolus IV
   B. Fluid choice is normal saline or Lactated Ringer's Solution. Oral fluid consumption is the best way to rehydrate a dog.

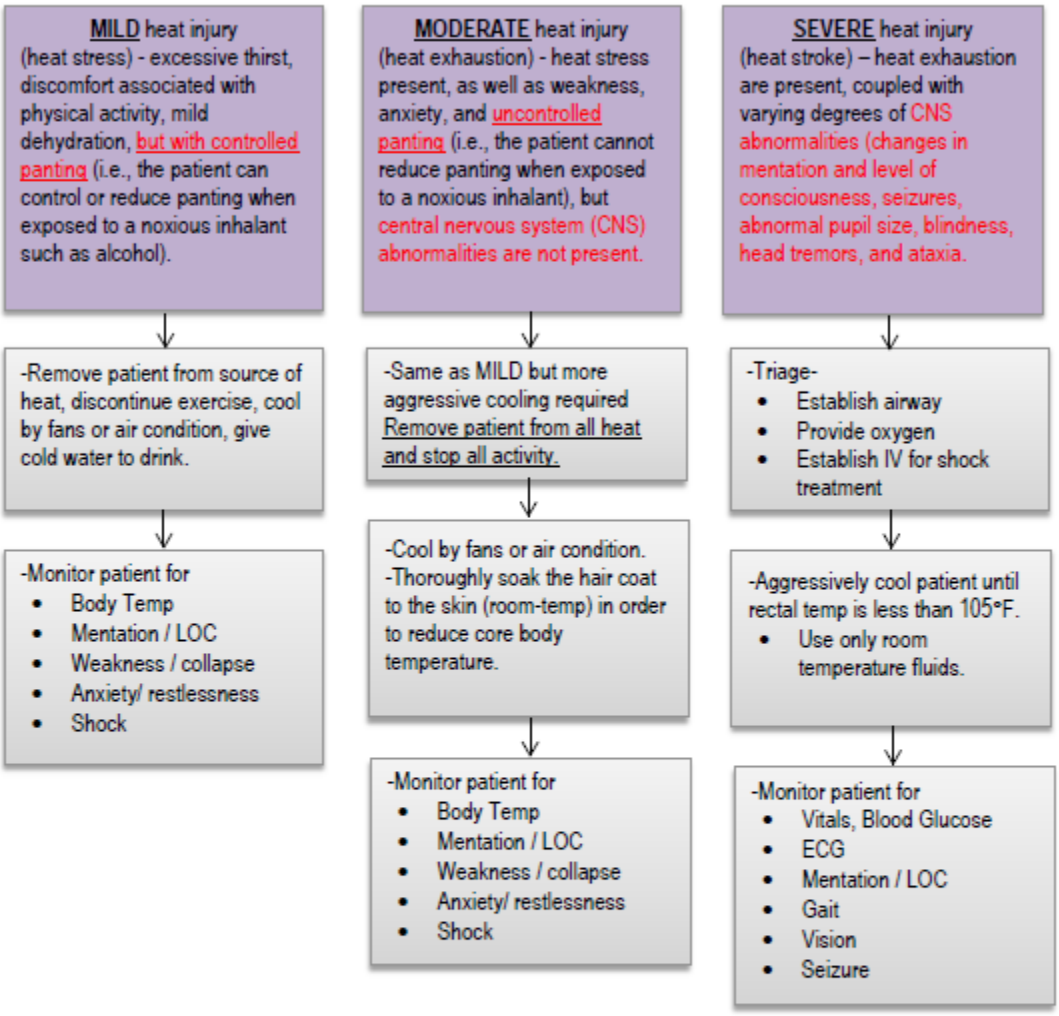
RESTRAINT (SOF medical personnel should work with handler to learn muzzling techniques):

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

      2) The leash is wrapped around the snout and held tightly.

3. Chemical restraint if needed to protect handler and medic
   A. Dexdomitor (if not traumatic injury) reversed with Antisedan. Dexdomitor after onset gives 20-30 minutes of good sedation when administered with labeled dose.
   B. For mild sedation, a combination of Midazolam (0.3mg/kg) plus Ketamine (5mg/kg) can be administered IM or IV.
   C. For deep sedation, a combination of Morphine (1mg/kg) plus Midazolam (0.3mg/kg) plus Ketamine (5mg/kg) can be administered IM.
      1) Dilaudid/Hydromorphone (0.1mg/kg) may be used in place of Morphine.

MWD Heat Injury Treatment



Clinical Pearls:

- **PANTING** is the only significant cooling mechanism for dogs.
- **NO** specific body temperature defines heat stroke in MWD's. Normal rectal temperature is 99.0° 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.

MWD CPR Management

Cardiopulmonary Arrest Confirmed

BEGIN BASIC LIFE SUPPORT- SUSTAIN CPR for 2-3 minute cycles

- **Circulation**- Chest compressions, FAST and HARD, 100 compressions per minute
- **Airway**- Clear airway and intubate; perform tracheostomy if obstructed airway
- **Breathing**- Manually ventilate with 100% O_2 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
    or
    Vasopressin **0.8 U/kg** IV/IO **once**
    and
  - Lidocaine **2 mg/kg** IV/IO
    or
  - 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 CACLUATION (Quick Reference)

Caution: you must first validate the drug concentrations on the bottle is the same as on this quick reference chart.					Weight (Pounds)	50	60	70	80	90	100
					Weight (Kg)	22.7	27.3	32	36.3	41	45.5
DRUG/ACTION	[CONC]		DOSE		ROUTE	ml	ml	ml	ml	ml	ml
Vasopressin	20	units/ml	0.80	U/kg	IV / IO	0.91	1.09	1.28	1.45	1.64	1.82
Epinephrine (1:1,000)	1	mg/ml	0.01	mg/kg	IV / IO	0.23	0.27	0.32	0.36	0.41	0.46
Epinephrine (1:10,000)	0.1	mg/ml	0.01	mg/kg	IV / IO	2.27	2.73	3.20	3.63	4.10	4.55
Atropine	0.4	mg/ml	0.04	mg/kg	IV / IO	2.27	2.73	3.20	3.63	4.10	4.55
Lidocane (1%)	10	mg/ml	2.00	mg/kg	IV / IO	4.54	5.46	6.40	7.26	8.20	0.91
Amiodarone	50	mg/ml	5.00	mg/kg	IV / IO	2.27	2.73	3.20	3.63	4.10	4.55
Magnesium Sulfate (0.5 g/ml)	500	mg/ml	30.00	mg/kg	IV	1.36	1.64	1.92	2.18	2.46	2.73
Sodium Bicarbonate (8.4%)	1	mEq/ml	1.00	mEq/kg	IV	22.70	27.30	32.00	3.63	41.00	45.50
Defibrillate	2-5	J/kg	2.00	J/kg	External	45.40	54.60	64.00	72.60	82.00	91.00

Drug	Dose	Dose per 25kg K9
K9 - ALS DRUGS		
Epinephrine	0.01 mg/kg (1:1000) IV/IO, IM, IT q 3-5 min	0.25 mg
Atropine	0.04 mg/kg IV/IO, IM, IT q 3-5 min	1 mg
Lidocaine	2 mg/kg IV/IO, IT (slow IV/IO push over 1-2 min)	50 mg
NAVEL (naloxone, atropine, vasopressin, epinephrine, lidocaine) may be given via ETT (Intratracheal or IT) For IT administration increase IV dose 2–3× and dilute with 0.9 % saline or sterile water		
K9 - ANESTHETICS / CHEMICAL RESTRAINT		
Ketamine	2 - 4 mg/kg IV or 5 – 8 mg/kg IM *(with benzodiazepine)*	50 - 100 mg IV / IO 125 – 400 mg IM
Etomidate	1 mg/kg *(Administer a benzodiazepine prior to Etomidate)*	25 mg
Diazepam*(Valium®)	0.2 - 0.4 mg/kg IV/IO/IM or per rectum	5 - 10 mg
Midazolam* (Versed®)	0.2 - 0.5 mg/kg IV/IO/IM	5 - 10 mg
Lorazepam* (Ativan®)	0.2 mg/kg IV/IO/IM or intranasal once	5 mg
**(NOTE: Do not use Benzodiazepines alone for restraint, may cause paradoxical excitement)*		
K9 - OPIOIDS / ANALGESICS		
Fentanyl	Bolus or Loading Dose: 2-5 mcg/kg IV/IO/IM q 30 min Infusion: 3 – 6 mcg/kg/h	50 - 125 mcg 75 - 150 mcg/h
Hydromorpone (Dilaudid)	Bolus or Loading Dose: 0.1 mg/kg IV/IO/ IM q 2 - 4 h Infusion: 0.01 – 0.05 mg/kg/h	2.5 mg 0.25 - 1.25 mg/h
Morphine	Bolus or Loading Dose: 0.2–0.5 mg/kg IV/IO/IM q 1-4h ***Administer IV/IO Slowly over 3 - 5 min***	5 - 10 mg
	Infusion: 0.1 – 0.3mg/kg/h *(2.5 - 7.5 mg / h)*	2.5- 7.5 mg/h
*NOTE: **a)** Oral opiates tend not to be effective in K9's; **b)** Always start low and titrate to effect; **c)** monitor for respiratory depression and hypotension; **d)** have naloxone on hand for opiate reversal if needed; **e)** consider administering an antiemetic prior to the opiate		
DRUG REVERSALS		
Flumazenil (Romazicon®)	0.02mg/kg IV/IO; repeat every 30 - 60 min as needed	0.5 mg
Nalaxone (Narcan®)	0.04 -0.1 mg/kg IV/IO/IM/IT; repeat as necessary	1.0 - 2.5 mg

Drug	Dose	Dose per 25kg K9
GASTROPROTECTANTS (Antacids)		
Famotidine (Pepcid®)	0. 5 - 1.0 mg/kg IV or PO, q 12 h	10 -25 mg
Ranitidine (Zantac®)	2mg/kg IM or slow IV/IO q8-12h	50 mg
ANTI-EMETICS (Antinausea)		
Ondansetron (Zofran®)	0.2 - 0.5 mg/kg PO or IV (slowly IV over 2-15 minutes) q 8 h	5 - 10 mg
Promethazine (Phenergan®)	0.2 – 0.5 mg/kg PO q 6-8 h **low oral bioavailability in K9s*	5 - 10 mg
MISCELLANEOUS		
Albuterol	*Oral:* 0.02 – 0.05 mg/kg PO q8-12h	0.5 - 1.25 mg
	Inhaler: 2-4 puffs q 20 min until resolution of clinical signs	**Requires spacing chamber /mask*
Cetirizine	1 mg/kg PO q12-24 h	10 – 20 mg
EPI-PEN®	0.15 (pediatric) or 0.3 mg (adult) unit dose	0.15 - 0.3 mg IM
Dextrose 50% (glucose)	1 ml/kg (0.5 gm/kg) IV slowly *(dilute 1:2 with saline to make 25% solution)*	25 mL (25 gm)
Diphenhydramine (Benadryl®)	2 - 4 mg/kg q 8 - 12 hour IM or PO	50 - 100 mg
Lidocaine 1% without Epi	1 mg/kg injected for local anesthesia	25 mg (2.5 mL)
Mannitol 25% (250 mg/mL)	0.5 - 1.4 g/kg IV/IO over 20 - 30 min	12.5 - 35 g
Sodium Bicarbonate	1 mEq/kg, once, diluted IV, (for CPA > 10 min + pH< 7)	25 mEq
Tetracaine 0.5% (*Proparacaine*)	1 -2 gtts / eye	1 -2 gtts / eye
Tranexamic Acid	10 mg/kg IV, slow infusion	25 mg
*AVOID **NON-STEROIDAL ANTI-INFLAMMATORY** medications (e.g. aspirin, ibuprofen, naproxen, ketorolac, etc.) in the trauma patients		
ANTIBIOTICS		
Ampicillin +/- sulbactrum	20 – 40 mg/kg IV /IM q6-8h	500 – 1000mg
Cephalexin (Rilexine®)	22 – 30 mg/kg **PO** q 12h (ORAL)	500 – 1000 mg
Cefazolin (Ancef)	20 – 22 mg/kg IV or IM (large muscle)	500 – 1000 mg
Cefotetan (Cefotan)	30 mg/kg IV or SC q8h (Do not give IM – painful)	750 – 1000 mg
Ceftriaxone (Rocephin®)	25 - 50 mg/kg **IV** q24 h or 50 mg/kg **IM** / SC q 12 – 24 h	1000 mg

K9 Daily Water Requirements =
132 x Body Weight(kg)$^{0.75}$ or 40 - 50 mL/kg/day

K9 TECC Shock Fluid Resuscitation Recommendations

- Avoid large-volume isotonic crystalloid resuscitation to prevent exacerbating resuscitative injury
- Reassess perfusion parameters after each fluid bolus
- Reassess the K9 casualty frequently to check for recurrence of shock
- If shock recurs, recheck all external hemorrhage control measures to ensure that they are still effective and repeat the fluid resuscitation as outlined above.

Heat Related Illness

- Move from hot area into shade or air-conditioned area
- As feasible, remove muzzles, harnesses, tactical gear, etc.
- Place on cool surface to promote conductive cooling
- Offer cool water and encourage drinking if K9 is alert and conscious
- Start **active external cooling**
  - If air-conditioning not available, blow a circulating fan over K9 (if available)
  - Place cold compresses or ice packs (wrapped in a towel) on the head and neck as well as in the armpits (axillae) and groin; **NOTE**: avoid placing ice packs on the limbs as this shunts hot blood back to the body core.
  - Immerse in cold water bath or Douse or spray body with cold water
- Place an IV / IO catheter and start IV / IO fluids to restore perfusion
- STOP active cooling when rectal temperatures reach 103.5 - 104°F.
  - Dry K9 off, place on dry surface, avoid direct application of air on you K9 from circulating fans or air-conditioning.
- **Monitor temperature** every ten minutes for at least the next few hours as body temperature may continue dropping to the subnormal range or rise excessively again

Options for Shock Resuscitation are in the Order of Preference

1. **K9-specific Fresh or Stored Whole Blood, 450 – 500 mL** (*1 unit*)
2. **K9-specific pRBC: FFP @ 10 mL/kg** of each *(Ex: 25kg K9 = 250 mL pRBC: 250 mL FFP)*
   DO NOT give human blood products to an injured K9
3. **Colloid only** *(*low-molecular weight 130/0.4 preferred*)*: **125 - 250 mL** (5 – 10 mL/kg)
   - *Repeated in **125 mL** aliquots to achieve palpable femoral pulse.*
   - *Not to exceed of a total volume of **500 mL***
4. **Hypertonic Saline (HTS) + Synthetic Colloid**
   - **75 mL** HTS : **75 mL** Colloid = **150 mL** total volume *(5 mL/kg HTS : 5 mL/kg Colloid)*
   - Limit **HTS** to no more than **TWO** aliquots
   - **NOTE**: Avoid using HTS in situations involving *uncontrolled hemorrhage* where definitive hemostasis cannot be achieved.
   - **With concurrent TBI**: restores perfusion and provides hyperosmotic therapy
5. **Isotonic crystalloid Only**: **500 mL** (20 mL/kg)
   - Repeated in 250 – 500 mL aliquots to achieve palpable femoral pulse.
   - Not to exceed of a total volume of 1000 mL
   - **Preferred** crystalloid is a balanced, buffered isotonic solutions
     - Lactated Ringers, Plasma-Lyte A, Normosol-R - **Avoid 0.9% NaCl**

Fluid Resuscitative Goals

Discontinue fluids when the following end-points have been achieved:

Non-Hemorrhagic or Controlled Hemorrhagic Shock
- Palpable femoral pulse & improved mentation MAP = > 65 mm Hg; **SBP 80 – 90 mm Hg**

Uncontrolled / Noncompressible Hemorrhagic Shock
- Consider *Hypotensive Resuscitation*
- Palpable femoral pulse & improved mentation AND/OR **MAP = 50 - 60 mm Hg; SBP ~80 mm Hg**
- *Maintained until **definitive hemostatic** control is achieved*

Hemorrhagic Shock with Neurological Trauma (*TBI*)
- K9 casualty with an altered mental status due to suspected TBI with a weak or absent peripheral pulse:
- Resuscitate to restore & maintain a palpable femoral pulse. If BP monitoring is available, maintain a target **SBP ≥ 90 mm Hg**

VIII. MEDICATION REFERENCES

1. Mosby Paramedic (VOL. 8/2015 AHA updates)
2. AHA ACLS provider manual
3. AHA PALS provider manual
4. TCCC Guidelines
5. Clinical Practice Guidelines (CPG's)
6. Advanced Tactical Paramedic (ATP) Guidelines 10th Edition
7. Tactical Medical Emergency Protocols (TMEPS) 10th Edition

XIII. MEDICATION REFERENCE

ACTIVATED CHARCOAL	
Class	Absorbent, Antidote
Indications	Oral poisoning and medication overdose.
Contraindications	GI obstruction, GI bleed or perforation, patients with an unprotected airway
Dose & Route	**1 to 12 years:** 25 to 50 grams **>12 years and adults**: 25 to 100 grams Given PO or via NG or OG tube. Agitate contained thoroughly and mix with water to make a slurry prior to administration.
Side Effects	May induce nausea, vomiting, constipation or diarrhea.

ADENOSINE	
Class	Antidysrhythmic
Indications	PSVT refractory to vagal maneuvers, including dysrhythmias associated with bypass tracts as WPW syndrome.
Contraindications	2° or 3° AVB's, Sick Sinus Syndrome, A-fib/flutter and VT usually not converted with Adenosine.
Dose & Route	**Adult:** 6mg rapid IV push followed by a 20cc flush. 2nd dose at 12mg may be administered in 1-2 minutes 3mg IV initially for patients taking carbamazepine or dipyridamole, heart transplant, or if adenosine is being administer through a central line. **Peds:** 0.1mg/kg rapid IV push (Max= 6mg), double the 2nd and 3rd doses (Max= 12mg).
Side Effects	Transient periods of new arrhythmia after cardioversion, chest pressure/discomfort, SOB, Nausea, chest pain, Diaphoresis, Flushing, HA, Palpitations, Paresthesia's, neck discomfort

ALBUTEROL	
Class	Sympathomimetic, Bronchodilator, Beta-2 selective
Indications	Asthma, bronchospasm, exercise-induced bronchospasm, hyperkalemia
Contraindications	Hypersensitivity. Symptomatic tachycardia dysrhythmias.
Dose & Route	**Bronchospasm**: 2.5 to 5mg diluted in 3ml of NS administered by nebulizer Q 20min x3 doses or 10 to 15mg/hour as continuous nebulization **Hyperkalemia**: 10 to 20mg nebulized over 10 minutes
Side Effects	Anxiety, tremor, chest pain, diaphoresis, dizziness, HA, nausea, palpitations, restlessness, tachycardia.

AMIODARONE	
Class	Antiarrhythmic Class III
Indications	Initial treatment and prophylaxis of recurring VF and hemodynamically unstable VT.
Contraindications	Cardiogenic shock, iodine hypersensitivity, bradycardia, 2° and 3° AVB
Dose & Route	VF/VT Cardiac arrest: **Adult**: 300mg IV/IO push, second dose of 150mg IV/IO push if needed **Peds:** 5mg/kg (Max 300mg) IV/IO push, may repeat twice (Max total dose=15mg/kg) Life-Threatening arrhythmias WITH pulse: **Adult:** 150mg IV over 10 min, may repeat if necessary **Peds:** 5 mg/kg IV (Max 300mg) over 20-60 min, may repeat twice up (Max total=15mg/kg) Maintenance Infusion after return of spontaneous resuscitation: 360mg over 6°, then 540mg over 18°
Side Effects	Bradycardia, flushing, HA, hypotension (rapid infusions), Vertigo, N/V, QT prolongation, epithelial keratopathy, pulmonary toxicity

ASPIRIN	
Class	Analgesic, anti-inflammatory, anti-pyretic, anti-platelet
Indications	Mild to moderate pain or fever. Chest pain (suspected angina or AMI) Prevention of AMI or reinfarction.
Contraindications	Children with flu-like symptoms, Hypersensitivity to NSAIDS.
Dose & Route	STEMI/NSTEMI: PO: (4) 81mg chewable tablets (324mg) Or adult 325mg non-enteric coated Rectal: 600mg suppository for those who can't take PO
Side Effects	Anaphylaxis, pulmonary edema, GI bleeding, Heartburn, coma, confusion, dizziness, tinnitus.

ATROPINE	
Class	Parasympatholytic (anticholinergic) agent
Indications	Symptomatic sinus bradycardias Organophosphate or nerve gas poisoning
Contraindications	There are no contraindications listed in the manufacturer's labeling
Dose & Route	*Bradycardia:* Adult: 0.5 mg IV/IO repeat Q 3-5min (Max total dose=3mg) Peds: 0.02mg/kg IV/IO Q 3-5 min (Minimum dose=0.1mg, Max SINGLE dose=0.5mg, Max TOTAL dose=1mg) *Organophosphate and nerve gas poisoning:* Adult: 1 to 6 mg IV/IM/ET Q3-5 minutes prn, double the dose if no response from previous dose. Peds: 0.05 to 0.1mg/kg IV/IM/ET Q 5-10 minutes prn, double the dose if no response from previous dose
Side Effects	Anticholinergic effects (dry mouth, blurred vision, photophobia, urinary retention, and constipation). Dizziness, Dysrhythmias, Flushing, HA, Hot, dry skin, Nausea/vomiting. Palpatations. Tachycardia. Paradoxical bradycardia if pushed too slowly or in dose <0.5mg in adults or <0.1mg in peds.

CALCIUM CHLORIDE 10%	
Class	Electrolyte
Indications	Acute hyperkalemia, acute hypocalcemia, calcium channel and beta blocker OD, abdominal spasms associated with spider bites and portugese man-o-war stings. Magnesium sulfate OD.
Contraindications	Known or suspected digoxin toxicity
Dose & Route	Cardiac arrest or cardiotoxicity d/t hyperkalemia, hypocalcemia, or hypermagnesemia Adult: 500 to 1000mg IV over 3-5minutes, may repeat prn Peds: 20mg/kg IV/IO Max= 2000mg/dose, may repeat prn Beta-blocker OD (Refractory to first line treatments) Adult: 10% solution: 20mg/kg over 5-10min, followed by 20 to 50mg/kg/hr Ca channel blocker OD: Adult: 10% solution: 1 to 2 grams over 5 min Q10-20min, then 20 to 50mg/kg/hr Peds: 10 to 20mg/kg over 10-15min (Max=2000mg/dose) Q10-15min prn, followed by 20-50 mg/kg/hr Hypovolemic shock: Infused via a 10% solution, 1 gram over 10 minutes.
Side Effects	ADE due to rapid IV injections: bradycardia, cardiac arrest, hypotension, syncope, feeling abnormal, tingling sensation, hot flash

DEXTROSE 50% / 25%	
Class	Carbohydrate, Hypertonic solution
Indications	Altered LOC, Coma of unknown origin, Hypoglycemia (usually FSBS <70). Seizures of unknown origin.
Contraindications	Increased intracranial pressure or hemorrhage. Known or suspected CVA in absence of hypoglycemia. Hypersensitivity to corn
Dose & Route	Adult: 10 to 25G slow IVP, repeat if necessary. Peds: 0.5-1.0g/kg slow IVP. If D25 not available, dilute D50 1:1 with sterile water or saline for 25% concentration May repeat of necessary.
Side Effects	Irritation, burning, and pain at the injection site.

DIAZEPAM (Valium)	
Class	Benzodiazepine
Indications	Acute alcohol. Acute anxiety state. Pre-medication prior to counter shock or TCP. Seizure activity. Skeletal muscle relaxation.
Contraindications	Coma (except seizures or rigidity.) Respiratory depression. Acute narrow-angle glaucoma. Untreated open-angle glaucoma.
Dose & Route	Seizures (adult and peds): IV: 0.15mg/kg over 2 minutes (Max=10mg/dose). May repeat Q 5min prn Anxiety: Adult: 2 to 10 mg IV/IM; may repeat in 3-4 hours prn
Side Effects	Confusion. Drowsiness. Hypotension. N/V. Psychomotor impairment. Reflex tachycardia. Respiratory depression or arrest.

DILTIAZEM (Cardizem)	
Class	Nondihydropyridine Calcium Channel Blocker
Indications	Atrial fibrillation, flutter, and tachycardia with rapid ventricular response rate. PSVT.
Contraindications	2nd or 3rd degree AVB. AMI. Cardiogenic shock. Hypersensitivity. Hypotension. Within a few hours of IV Beta blocker use. Sick sinus syndrome. Short PR syndrome. Ventricular tachycardia. WPW syndrome. Wide complex tachycardia of unknown origin.
Dose & Route	Adult: 0.25mg/kg IV over 2 min. Repeat in 15 minutes if needed at 0.35mg/kg. Peds: Same as adult, but rarely used.
Side Effects	1st degree AVB. Bradycardia. Chest pain. CHF. Diaphoresis. Dizziness. Dyspnea. Headache. Hypotension. Nausea/vomiting. Peripheral edema

DIPHENHYDRAMINE (Benadryl)	
Class	Antihistamine
Indications	Acute extrapyramidal reactions. Dystonic reactions to phenothiazines. Moderate to severe anaphylaxis after epinepherine. Allergic symptoms.
Contraindications	Hypersensitivity. Nursing mothers.
Dose & Route	Adult: 25-50mg IM/IV Peds: 1 to 2mg/kg IM/IV (Max 50mg/dose)
Side Effects	Bradycardia. Disturbed coordination. Drowsiness. Dry mouth and throat. Paradoxical excitement in children. Sedation. Tachycardia. Thickening of bronchial secretions.

DOPAMINE (Intropin)	
Class	Sympathomimetic (Inotrope)
Indications	Adjunct treatment of Hypotension in the absence of Hypovolemia. Second line for symptomatic bradycardia (after atropine)
Contraindications	Hypovolemic shock without fluid resuscitation. Patients with Pheochromocytoma. Tachydysrhythmias. Ventricular Fibrillation.
Dose & Route	Adult and Peds: (Concentrations of 1600mcg/ml or 800mcg/ml) 400mg in 250ml=1600mcg/ml, 400mg in 500ml=800mcg/ml 800mg in 500ml=1600mcg/ml, 800mg in 1000ml=800mcg/ml *Renal Dose*: 1-5mcg/kg/min *Cardiac Dose:* 5-10mcg/kg/min *Vasopressor dose:* >10mcg/kg/min
Side Effects	Dose related tachycardia's, Hypertension, Increased myocardial O_2 demands (may increase ischemia), Palpitations, Excessive vasoconstriction

ETOMIDATE	
Class	Nonbarbituate hypnotic, anesthetic
Indications	Premedication for tracheal intubation or cardioversion.
Contraindications	Hypersensitivity
Dose & Route	Adult and Peds: 0.2-0.6mg/kg IV/IO over 30 seconds (usually 0.3mg/kg)
Side Effects	Adrenal Suppression, Apnea, Hiccups, Hypo/Hyperventilation, Pain at injection site, Bradycardia, HTN, Involuntary muscle movements, Tachycardia, Dysrhythmias, Hypotension, N/V

EPINEPHRINE	
Class	Sympathomimetic
Indications	1:1000: Anaphylaxis. Severe allergic reactions. Bronchial asthma. Exacerbation of COPD. Used in adult and pediatric cardiac arrest after 1:10,000. 1:10000: Anaphylactic Shock, Cardiac Arrest, Profound symptomatic bradycardia
Contraindications	There are no contraindications
Dose & Route	1:1000: (1 mg in 1 ml vial; See EPI 1:10,000 for cardiac arrest dosing regimens) *Hypersensitive Reactions (Intramuscular is preferred over SQ)* Adult: 0.2-0.5mg IM/SQ Q 5-15min Peds: 0.01mg/kg up to 0.3mg IM/SQ Q 5-15min 1:10000: (1mg in 10ml syringe) *Cardiac Arrest:* Adult: 1MG IVP every 3-5 Minutes (ETT 2-2.5 x IV dose) Peds: 0.1mg/kg (1:10,000) initial dose IV (0.1mg/kg of 1:1,000 ETT) Subsequent doses 0.1mg/kg of 1:1,000 IV/ET/IO *Anaphylactic reaction or bronchoconstriction:* Adult: 0.1mg over 5 minutes Peds: 0.1mcg/kg/min IV infusion (Refractory to IM dose; Max=10mcg/min) *Infusions for cardiac arrest or symptomatic Bradycardia:* Adult: Mix 2mg in 250mls of NS/D5W (8mcg/ml) and Infuse at 0.1mcg/kg/min for desired response. Peds: Mix 2mg in 250mls of NS/D5W (8mcg/ml), begin at 0.1mcg/kg/min, titrate up to 1mcg/kg/min Epinephrine Push Dose: 1/100,000 Draw 1ml of Epi 1/10,000 into 9 mL of a NS saline flush: 10mcg/ml Loading dose: 20 mcg/2ml Continuous Dosing: 10mcg/1ml/min to maintain SBP of >90 mmHg
Side Effects	Anxiousness, Chest Pain, Headache, Nausea, Palpitations, Restlessness, Tachycardia, Tremors. Tachyarrhythmia. Injection site tissue necrosis.

FENTANYL (Sublimaze)	
Class	Narcotic Analgesic
Indications	Adjunct to aesthesia for procedures, Severe pain
Contraindications	Hypersensitivity
Dose & Route	Adult: 25-100 mcg IV over 1 min Q30-60 minutes (May also give IM) Peds: 1-2 mcg/kg IV over 1 min Q30-60 minutes (May also give IM)
Side Effects	Altered LOC, Abnormal dreams, Arrhythmias, Confusion, Dizziness, Headaches, Hypotension, N/V, Respiratory depression

FUROSEMIDE	
Class	Loop diuretic
Indications	Pulmonary edema associated with CHF, hepatic or renal disease.
Contraindications	Anuria. Hypersensitivity. Hypersensitivity to sulfonamides. Hypovolemia/Dehydration. Uncorrected states of electrolyte depletion
Dose & Route	Adult: 20 to 40mg IV, may repeat in 1-2hours as same dose or increase by 20mg/dose Peds: 1mg/kg IV, May repeat in 2 hours or increase by 1mg/kg/dose (max 6mg/kg/dose)
Side Effects	Dry Mouth, ECG changes with electrolyte imbalances, Hypercalcemia, Hyperuricemia, Hypochloremia, Hyponatremia, Hypokalemia, Hypotension, Transient deafness, Tinnitus

GLUCAGON	
Class	Pancreatic Hormone, insulin antagonist.
Indications	Hypoglycemia (if D50 unavailable). Unconscious, combative, seizuring patients that an IV cannot be started and glucose is needed. Beta Blocker and Calcium Channel Blocker Overdose.
Contraindications	Hypersensitivity; pheochromocytoma, insulinoma
Dose & Route	Hypoglycemia: Adult: 1mg reconstituted IM/IV/SQ Q 15 min prn Peds: <20kg = 0.5mg, >20kg = 1mg IM/IV/SQ Q 15min prn Beta Blocker and Calcium Channel Blocker Overdose Adult: 3 to 10 mg IV bolus followed by an infusion of 3-5 mg/hr Peds: 0.15mg/kg IV bolus followed by an infusion of 0.07mg/kg/hr (Max 5mg/hr)
Side Effects	Hypotension, N/V, Tachycardia, Uticaria

IPATROPIUM (Atrovent)	
Class	Anticholinergic, Bronchodilator
Indications	Persistent bronchospasm associated with asthma and COPD.
Contraindications	Hypersensitivity to ipatropium, atropine, alkaloid, soybean products, or peanuts.
Dose & Route	Adult: 500mcg (0.5mg) in nebulizer typically with a beta adrenergic (Albuterol) Pediatrics: N/A
Side Effects	Anxiety. Blurred vision. Coughing. Dry mouth. Headache. Nausea/vomiting. Palpatations. Tachycardia.

KETOROLAC (Toradol)	
Class	NSAID
Indications	Short-term management of moderate to severe pain
Contraindications	Hypersensitivities to aspirin/NSAIDS, Active peptic ulcer disease, History of GI bleeding, Angioedema, Asthma, Renal Failure
Dose & Route	Adult: 30-60mg IM or 15-30 MG IVP Peds: Not recommended
Side Effects	Anaphylaxis, Bleeding disorders, Edema, Headache, Nausea, Sedation.

KETAMINE	
Class	Analgesic
Indications	Moderate to Severe acute and chronic pain, adjunct to aesthesia for procedures, or RSI
Contraindications	<3 months old, known or suspected schizophrenia (even if stable on current meds)
Dose & Route	Pain: Adult: IM: 2-4 mg/kg (repeat dose every 30 minutes to 1 hour as necessary to control severe pain or casualty develops nystagmus/rhythmic eye movement back and forth) IN: 0.5 to 1mg/kg (using nasal atomizer device) Q10min with 0.25-0.5mg/kg prn IV: 0.3mg/kg infused over 5 minutes Sedation: Adult and Peds: IM: 4-5 mg/kg, may repeat Q5-10 minutes prn IV: 1-2mg/kg over 1 min, may repeat 0.5-1mg/kg Q5-15 minutes prn
Side Effects	Delirium, confusion, dreamlike state, hallucinations, vivid imagery, Bradycardia, sialorrhea, nausea/vomiting, tachycardia, nystagmus, hypertension, hypertonia

LIDOCAINE 2%	
Class	Antidyrshythmic, local anesthetic
Indications	Significant ventricular ectopy in the setting of myocardial ischemia or infarction. Ventricular fibrillation. Ventricular Tachycardia.
Contraindications	2nd or 3rd degree heart block in absence of artificial pacemaker. Adams-stokes syndrome. WPW syndrome. PVC's in conjunction with bradycardia. Allergy to corn
Dose & Route	*Cardiac Arrest* (V-fib, Pulseless V-Tach): Adult: 1-1.5mg/kg IV/IO, repeat Q 5-10 minutes with 0.5-0.75mg/kg to a max of 3mg/kg May give 2-3.75mg/kg ET diluted in 5-10 ml NS or SWFI *Peds:* 1mg/kg IV/IO follow with infusion of 20- 50mcg/kg, May give 2-3 mg/kg/dose ET flushed with 5ml NS and 5 assisted manual ventilations *Maintenance infusion after conversion of rhythm:* Adult: Mix 2 grams in 500ml (4mg/ml) and infuse at 2-4mg/min. Peds: Dilute 120mg in 100ml and infuse at 20-50mcg/kg/min (1-2.5mg/kg/Hour)
Side Effects	Bradycardia, Blurred Vision, Cardiovascular collapse, CNS depression with high doses. Confusion. Hypotension. Lightheadedness.

LORAZEPAM (Ativan)	
Class	Benzodiazepine
Indications	Acute anxiety episodes, Combative patients, Difficult intubations, Muscle relaxant, Status epilepticus, Pre-medication for cardioversion or TCP.
Contraindications	Hypersensitivity. Respiratory depression. Acute narrow-angle glaucoma
Dose & Route	Adult: 2-4mg IV/IM Q5-10min (Max=4mg/dose) Pediatrics: 0.1 mg/kg IV/IM Q5-10min (Max=4mg/dose)
Side Effects	Decreased LOC. Hypotension. Respiratory depression.

MAGNESIUM SULFATE 10%	
Class	Electrolyte, Anti-Convulsant
Indications	Hypomagnesium, Pre-term labor, Seizures of ecclampsia, Torsades de Points, Refractory ventricular fibrillation.
Contraindications	Heart Block. Hypersensitivity. Hypocalacemia. Myocardial damage. Shock. Severe persistent hypertension
Dose & Route	*Seizure activity associated with pregnancy/pre-term labor:* 4-6 grams IV infused over 20 min, followed by 1-2grams/hour (Max=40g/24 hours) *Torsade/Refreactory VF,VT:* Adult: 1-2 grams IV/IO in 10 ML NS or D5W bolus if pulseless and over 15 Minutes with a pulse. Peds: 25-50mg/kg/dose IV/IO bolus if pulseless or over 20 minutes with pulse (Max=2grams/dose)
Side Effects	Bradycardia. Circulatory collapse. CNS Depression. Depressed reflex. Diaphoresis. Diarrhea. Flushing. Hypotension. Hypothermia. Respiratory depression

METHYLPREDNISOLONE (Solu-medrol)	
Class	Glucocorticoid (synthetic steroid)
Indications	Acute spinal cord injury. Anaphylaxis. Bronchodilator-unresponsive. Asthma. Shock (controversial)
Contraindications	None In emergency. Use in caution in GI bleeding, diabetes, and severe infection.
Dose & Route	Adult: 40-125mg IVP except for spinal injury which is 30mg/kg IV over 15 minutes followed by 5.4mg/kg/hour infusion. Peds: Spinal cord injury: same dose as adult Asthma Exacerbation: <12 years old; 1-2 mg/kg/day, Max=60mg/day >12 years old; Same as adult
Side Effects	Alkalosis, GI bleeding. Headache, Hypertension. Hypokalemia. Prolonged wound healing. Sodium and water retention.

MIDAZOLAM (Versed)	
Class	Benzodiazepine sedative/hypnotic
Indications	Premedication for cardioversion, RSI, Acute anxiety, status epilepticus.
Contraindications	Hypersensitivity. Acute narrow angle glaucoma.
Dose & Route	Sedation/anxiolysis Adult: IV: 2.5-5mg over 2 minutes, Q2-3min prn IM: 0.08 mg/kg IN: 0.1mg/kg Peds: IV: <6 months: Not recommended 6months-5 years: 0.05-0.1mg/kg (Max total dose= 6mg) 6-12 years old: 0.05mg/kg (Max total dose=10mg) >12 years old: Refer to Adult dosing (Max total dose=10mg) IM: 0.1-0.5mg/kg, Max total dose=10mg IN: 0.2-0.5mg/kg, Max total dose=10mg Status Epilepticus Adult: IV: 0.2mg/kg IM: 10mg once or 0.2mg/kg (Max 10mg/dose) Peds: IV: 0.2mg/kg IM: 0.2mg/kg (Max=10mg/dose)
Side Effects	AMS. Amnesia. Blurred Vision. Bradycardia. Cough. Drowsiness. Fluctuations in respiratory arrest. Respiratory depression. Tachycardia.

MORPHINE	
Class	Opioid analgesic
Indications	Chest Pain associated with MI. Moderate to Severe acute and chronic pain. Pulmonary edema with or without pain.
Contraindications	GI obstruction. Hypersensitivity. Hypotension. Hypovolemia. Patient having taken MAO inhibitors in last 14 days. Severe respiratory depression.
Dose & Route	Adult: Start 2-10mg SIVP (2mg/min) titrate to effect. Peds: 0.1-0.2mg/kg/dose SIVP Max dose: <1 year old= 2mg/dose, 1-6 years=4mg/dose, 7-12 years=8mg/dose, >12 years=10mg/dose
Side Effects	Allergic reaction, Altered mental status, Bradycardia, Bronchospasm, Dry Mouth, Euphoria, Flushing, Hypotension, Palpitations, Respiratory depression, Syncope, Tachycardia.

NALOXONE (Narcan)	
Class	Opioid antagonist
Indications	Coma of unknown origin, Decreased LOC, Known or suspected opioid overdose.
Contraindications	Hypersensitivity
Dose & Route	Adult: 0.4-2mg IV (preferred), IM, SC, and ET (2-2.5 times IV dose). Q 2 minutes (Max=10mg total) Peds: 0.1mg/kg IV (preferred), IM, SC, ET, or IO. (Max=2mg/dose) Q2 minutes
Side Effects	Blurred Vision, Diaphoresis, Dysrhythmias, Hypertension, N/V, Tachycardia, Withdrawal symptoms.

NITROGLYCERINE	
Class	Vasodilator, Antianginal agent, Extravasation antidote
Indications	AMI, CHF with pulmonary edema, Hypertensive emergencies, Ischemic chest pain, Pulmonary Hypertension.
Contraindications	Children under 12. Head injury with/without hemorrhage. Hypersensitivity to nitrates. Hypotension. Concurrent use with PDE-5 inhibitors. Corn allergy
Dose & Route	Adult: 0.3 or 0.6mg tablet or spray SL every 5 minutes to a total of 3 doses. IV Infusion: Mix 100-200mcg/ml drip and infuse at a rate of 5-20mcg/min to start. Increase at 5-10mcg/min every 5 minutes until desired effect is achieved or hypotension occurs. (Max=400mcg/min) Peds: N/A
Side Effects	Diaphoresis, Dizziness, Headache, Hypotension, N/V, Reflex tachycardia, syncope.

ONDANSETRON (ZOFRAN)	
Class	Antiemetic
Indications	Nausea & Vomiting
Contraindications	Hypersensitivity to dolasetron, granisetron. May precipitate with bicarb.
Dose & Route	Adult: 4-8mg IV/IO Slowly or IM. 8mg PO. Ped: 0.1mg/kg Slow IV/IO or IM. Max dose 4mg.
Side Effects	H/A, diarrhea, Fever, dizziness, pain, seizure, EPS, QT prolongation.

PROMETHAZINE (Phenegran)	
Class	Phenothiazine, Antihistamine, Antiemetic
Indications	Allergic Reactions, Motion Sickness, N/V, Pre/Post-Operative and obstetric sedation, potentiate analgesic effects
Contraindications	CNS depression from alcohol, barbiturates or narcotics. Comatose states, Hypersensitivity, Signs of Reye's Syndrome. Children <2 years old
Dose & Route	Adult: 12.5-25mg IVP/IM Peds: 0.5mg/kg IV/IM(Max=25mg/dose)
Side Effects	Tissue injury, Dizziness, Dysrhythmias, Dystonias, Hyperexcitability, Impairment of mental and physical ability, N/V, Sedation, Tachycardia / Bradycardia. Use in children may cause hallucinations, convulsions, and sudden death.

RACEMIC EPINEPHERINE	
Class	Sympathomimetic
Indications	Croup, laryngeal edema
Contraindications	Oral inhalation. Concurrent use or within 2 weeks of MAO inhibitors
Dose & Route	Adult: 0.5ml in 3-5ml saline nebulized Peds: 0.05-0.1 ML/kg in 3-5 salin nebulized (Max=0.5ml/dose)
Side Effects	Anxiety, HA, palpitations

ROCURONIUM	
Class	Neuromuscular blocker (non-depolarizing)
Indications	Adjunct to general anesthesia. Facilitation of endotracheal intubation. Maintenance of paralysis after intubation to assist ventilations.
Contraindications	Hypersensitivity
Dose & Route	Adult and Peds: 0.6-1.2 mg/kg IV
Side Effects	Apnea, Bradycardia, Hypo/Hypertension, Prolonged paralysis.

SODIUM BICARBONATE	
Class	Buffer, Alkalinizing agent, electrolyte supplement.
Indications	Alkalinization for treatment of specific intoxication's, Intubated patients with long arrest interval, PEA, Known or pre-existing bicarb responsive acidosis, Management of metabolic acidosis, Return circulation after long arrest interval, Tricyclic antidepressant OD. Hyperkalemia.
Contraindications	Abdominal pain of unknown origin, Hypocalcemia, Hypernatrenua, Alkalosis
Dose & Route	Adult: Cardiac Arrest: 1mEq/kg SIVP, repeat doses should be guided by arterial blood gases Hyperkalemia: 50meq IV over 5 minutes Peds: Cardiac Arrest/Hyperkalemia: (> two years of age) Same as Adult Infants: (< two years of age) 4.2% solution is recommended for IV administration Slow administration rates and the 4.2% solution are recommended in neonates, to guard against the possibility of producing hypernatremia, decreasing cerebrospinal fluid pressure, and inducing intracranial hemorrhage. Tricyclic Antidepressant Overdose: 1-2 mEq/kg IV boluses Q5-10min followed by an continuous infusion of 150meq/L solution to maintain alkalosis
Side Effects	Electrolyte Imbalance. Hypoxia, Metabolic alkalosis. Rise in intracellular PcO_2 and increased tissue acidosis. Seizures. Tissue sloughing at injection site.

SODIUM CHLORIDE	
Class	Isotonic IV fluid
Indications	Dehydration / Hypovolemia, Diabetic Ketoacidosis, Heat related emergency, Hypotension, Medication route.
Contraindications	CHF. Pulmonary edema. Severe electrolyte imbalance
Dose & Route	Adult: KVO for maintenance of drug route. 250-500 ml bolus for fluid resuscitation. Repeat as needed. Peds: 20ml/kg bolus repeat as needed.
Side Effects	Electrolyte imbalance. Pulmonary edema from overload.

SUCCINYLCHOLINE	
Class	Neuromuscular blocker (depolarizing)
Indications	Muscle relaxation. Terminate laryngospasm, facilitate intubation
Contraindications	Acute injuries, Acute rhabdomyolsis, Hypersensitivity, Inability to control airway or ventilate patient, Personal or family Hx of malignant hyperthermia, Skeletal muscle myopathies.
Dose & Route	Adult: 1-1.5mg/kg IVP over 10-30 seconds or 3 to 4 mg/kg IM Peds: Same as adult
Side Effects	Allergic Reaction, Bradycardia, Dysrhythmias, Excessive salivation, Hypotension, Initial muscle fasciculations, Malignant hyperthermia, May exacerbate hyperkalemia in trauma patients, Respiratory depression

THIAMINE	
Class	Vitamin B1
Indications	Beriberi. Delirium tremors. Wernicke's Encephalopathy.
Contraindications	None
Dose & Route	Adult: 100-250mg SIVP over 30 min for doses >100mg Peds: Rarely indicated
Side Effects	Allergic reactions (rare). Anxiety. Diaphoresis. Hypotension from rapid injection or large dose. N/V

VECURONIUM	
Class	Neuromuscular blocker (non-depolarizing)
Indications	Adjunct to anesthesia. Facilitation of endotracheal intubation. Maintenance of paralysis after intubation to assist ventilations.
Contraindications	Hypersensitivity to the drug or bromides.
Dose & Route	Adult and Peds: 0.1-0.2mg/kg IVP bolus
Side Effects	Apnea, Bradycardia, Hypotension, Prolonged paralysis.

IX. LABORATORY REFERENCE

(Mosby Paramedic (VOL. 7/2010 AHA updates))

HEMATOLOGY VALUES

*HCT (HEMATOCRIT) - *Measures relative volume of cells and plasma in blood. Low values suggest hemorrhage or anemia. High values suggest polycythemia or dehydration.*
Normal Adult Male Range 40 - 54%
Normal Adult Female Range: 37 - 47%
Normal Newborn Range: 50 - 62%

*HGB (HEMOGLOBIN) - *Measures Oxygen carrying capacity of blood. Low values suggest Hemorrhage or anemia, high values suggest polycythemia.*
Normal Adult Male Range: 14 - 18 g/dl
Normal Adult Female Range: 12 - 16 g/dl
Normal Newborn Range: 14 - 20 g/dl

*RBC (RED BLOOD CELL COUNT) - *Measures the number of red blood cells. RBCs transport hemoglobin, which carries oxygen. The amount of oxygen body tissues receive depends on the amount and function of RBCs and hemoglobin. RBCs normally survive about 120 days in the blood. They are then removed by specialized "clean-up" cells in the spleen and liver.*
Normal Adult Male Range: 4.2 - 5.6 mill/mcl
Normal Adult Female Range: 3.9 - 5.2 mill/mcl
Lower ranges are found in Children, newborns and infants

*WBC (WHITE BLOOD CELL COUNT) - *Measures defense against inflammatory agents. Low values suggest aplastic anemia, drug toxicity, specific infections. High values suggest inflammation, trauma, toxicity, leukemia.*
Normal Adult Range: 3.8 - 10.8 thous/mcl
Higher ranges are found in children, newborns and infants.

*PLATELET COUNT - *A platelet count is often ordered as a standard part of a complete blood count and is almost always ordered when a patient has unexplained bruises or takes what appears to be an unusually long time to stop bleeding from a small cut or wound.*
Normal Adult Range: 150 - 450 thous/mcl
Higher ranges are found in children, newborns and infants

ELECTROLYTE VALUES

*SODIUM - *Sodium is the most abundant cation in the blood and it's chief base. It functions in the body to maintain osmotic pressure, acid-base balance and to transmit nerve impulses.*
Normal Adult Range: 135-146 mEq/L

*POTASSIUM - *Potassium is the major intracellular cation.*
Normal Range: 3.5 - 5.5 mEq/L

*SODIUM/POTASSIUM
Normal Adult Range: 26 - 38 (calculated)

*CO2 (CARBON DIOXIDE) - *The CO_2 level is related to the respiratory exchange of carbon dioxide in the lungs and is part of the buffer system. Generally when used with the other electrolytes, it is a good indicator of acidosis and alkalinity.*
Normal Adult Range: 22-32 mEq/L
Normal Childrens Range - 20 - 28 mEq/L

IX. LABORATORY REFERENCE

*ANION GAP (SODIUM + POTASSIUM – CO_2 + CHLORIDE) - *An increased measurement is associated with metabolic acidosis due to the overproduction of acids. Decreased levels may indicate metabolic alkalosis due to the overproduction of alkaloids.* Normal Adult Range: 4 - 14 (calculated)

PROTEIN

*PROTEIN, TOTAL - *Decreased levels may be due to poor nutrition, liver disease, malabsorption, diarrhea, or severe burns. Increased levels are seen in lupus, liver disease, chronic infections, alcoholism, leukemia, tuberculosis amongst many others.*
Normal Adult Range: 6.0 -8.5 g/dl

*ALBUMIN - *Major constituent of serum protein (usually over 50%). High levels are seen in liver disease (rarely), shock, dehydration, or multiple myeloma. Lower levels are seen in poor diets, diarrhea, fever, infection, liver disease, inadequate iron intake, third-degree burns and edemas or hypocalcemia*
Normal Adult Range: 3.2 - 5.0 g/dl

HEPATIC ENZYMES

AST (SERUM GLUTAMIC-OXALOCETIC TRANSAMINASE - SGOT) - *Found primarily in the liver, heart, kidney, pancreas, and muscles. Seen in tissue damage - especially damage to the heart and liver.*
Normal Adult Range: 0 - 42 U/L

ALT (SERUM GLUTAMIC-PYRUVIC TRANSAMINASE - SGPT) - *Decreased SGPT in combination with increased cholesterol levels is seen in cases of a congested liver. Increased levels seen in mononucleosis, alcoholism, liver damage, kidney infection, chemical pollutants or myocardial infarction*
Normal Adult Range: 0 - 48 U/L

ALKALINE PHOSPHATASE - *Used as a tumor marker elevated levels seen in bone injuries, pregnancy, or skeletal growth. Low levels are sometimes found in hypoadrenia, protein and vitamin deficiency, and malnutrition.*
Normal Adult Range: 20 - 125 U/L
Normal Children's Range: 40 - 400 U/L

GGT (GAMMA-GLUTAMYL TRANSPEPTIDASE) - *Elevated levels seen with liver disease, alcoholism, bile-duct obstruction, cholangitis, drug abuse, and hypermagnesemia. Decreased levels can be found in hypothyroidism, hypothalamic malfunction and hypomagnesemia.*
Normal Adult Male Range: 0 - 65 U/L
Normal Adult Female Range: 0 - 45 U/L

LDH (LACTIC ACID DEHYDROGENASE) - *Increases are usually found in cellular death and/or leakage from the cell or in some cases it can be useful in confirming myocardial or pulmonary infarction (in conjunction with other tests). Decreased levels of the enzyme may indicate malnutrition, hypoglycemia, adrenal exhaustion or low tissue or organ activity.*
Normal Adult Range: 0 - 250 U/L

*BILIRUBIN, TOTAL - *Elevated in liver disease, mononucleosis, hemolytic anemia, low levels of exposure to the sun, and toxic effects to some drugs, decreased levels are seen in people with an inefficient liver, excessive fat digestion, and possibly a diet low in nitrogen bearing foods*
Normal Adult Range 0 - 1.3 mg/dl

IX. LABORATORY REFERENCE

RENAL RELATED

*B.U.N. (BLOOD UREA NITROGEN) - *Increases can be caused by excessive protein intake, kidney damage, certain drugs, low fluid intake, intestinal bleeding, and exercise or heart failure. Decreased levels may be due to a poor diet, malabsorption, liver damage or low nitrogen intake.*
Normal Adult Range: 7 - 25 mg/dl

*CREATININE - *Low levels are sometimes seen in kidney damage, protein starvation, liver disease or pregnancy. Elevated levels are sometimes seen in kidney disease due to the kidneys job of excreting creatinine, muscle degeneration, and some drugs involved in impairment of kidney function.*
Normal Adult Range: .7 - 1.4 mg/dl

*URIC ACID - *High levels are noted in gout, infections, kidney disease, alcoholism, high protein diets, and with toxemia in pregnancy. Low levels may indicate kidney disease, malabsorption, liver damage or an acidic kidney.*
Normal Adult Male Range: 3.5 - 7.5 mg/dl
Normal Adult Female Range: 2.5 - 7.5 mg/dl

*BUN/CREATININE - *This calculation is a good measurement of kidney and liver function.*
Normal Adult Range: 6 -25 (calculated)

CARDIAC

*CREATINE PHOSPHOKINASE (CK) - *Levels rise 4 to 8 hours after an acute MI, peaking at 16 to 30 hours and returning to baseline within 4 days*
25-200 U/L
32-150 U/L

*CK-MB CK ISOENZYME - *It begins to increase 6 to 10 hours after an acute MI, peaks in 24 hours, and remains elevated for up to 72 hours.*
< 12 IU/L if total CK is <400 IU/L
<3.5% of total CK if total CK is >400 IU/L

*(LDH) LACTATE DEHYDROGENASE - Total LDH will begin to rise 2 to 5 days after an MI; the elevation can last 10 days.
140-280 U/L

LDH-1 and LDH-2 (LDH ISOENZYMES) - *Compare LDH 1 and LDH 2 levels. Normally, the LDH-1 value will be less than the LDH-2. In the acute MI, however, the LDH 2 remains constant, while LDH 1 rises. When the LDH 1 is higher than LDH 2, the LDH is said to be flipped, which is highly suggestive of an MI. A flipped pattern appears 12-24 hours post MI and persists for 48 hours.*
LDH-1 18%-33%
LDH-2 28%-40%

*MYOGLOBIN - *Early and sensitive diagnosis of myocardial infarction in the emergency department This small heme protein becomes abnormal within 1 to 2 hours of necrosis, peaks in 4-8 hours, and drops to normal in about 12 hours.*
< 1

*TROPONIN COMPLEX - Peaks in 10-24 hours, begins to fall off after 1-2 weeks.
< 0.4

X. ***REFERENCES***

The following materials have been used to provide information in this Medical Handbook:

1. Mosby Paramedic (VOL. 8/2015 AHA updates)
2. AHA ACLS 2015
3. AHA PALS 2015
4 CoTCCC Guidelines
5. Special Operations Advanced Tactical Paramedics Protocols (ATP 10th edition)
6. Tidewater Emergency Services Protocols Guide (TEMS 2017)
7. Lehne Pharmacology for Nurses
8. INFORMED ALS Field Guide (2016)
9. Dublin Rapid Interpretation of EKG's (Published 2016)
10. Advanced Trauma Life Support (ATLS)
11. Pre-hospital Trauma Life Support – Military Edition (PHTLS - Vol. 9)
12. Brady Tactical Emergency Medical Care (Published 2015)
13. Critical Care Emergency Medicine Guide
14. Emergency War Surgery Guide 4th Edition
15. COMNAVAIRFORINST 6000.2
16. BUMED Sick Call Screeners Guide and Lesson Plan
17. Pararescue Medical Operations Handbook
18. CoERCCC / Clinical Practice Guidelines

XI. Military Acute Concussion Evaluation (MACE) 2nd Edition

MACE 2
Military Acute Concussion Evaluation

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

Service Member Name: _____

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

Date of Injury: _____ Time of Injury: _____

Examiner: _____

Date of Evaluation: _____ Time of Evaluation: _____

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

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

RED FLAGS

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

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

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

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

MACE 2 - Military Acute Concussion Evaluation

MILITARY ACUTE CONCUSSION SCREENING

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

1. Description of Incident

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

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

_____
_____
_____
_____

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

B. Observable Signs

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

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

C. Record the type of event.

Check all that apply:

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

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

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

☐ YES ☐ NO ☐ UNKNOWN

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MACE 2 - Military Acute Concussion Evaluation

2. Alteration of Consciousness or Memory

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

☐ YES ☐ NO

If yes, for how long? _____ seconds
_____ minutes

☐ UNKNOWN

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

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

☐ YES ☐ NO

If yes, for how long? _____ seconds
_____ minutes

☐ UNKNOWN

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

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

☐ YES ☐ NO

If yes, for how long? _____ seconds
_____ minutes

☐ UNKNOWN

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

D. Was the AOC, LOC or PTA witnessed?

☐ YES ☐ NO

If yes, for how long? _____ seconds
_____ minutes

☐ UNKNOWN

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

3. Symptoms

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

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

4. History

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

☐ YES ☐ NO

If yes, how many? ____

☐ UNKNOWN

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

☐ YES ☐ NO

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

☐ YES ☐ NO

CONCUSSION SCREENING RESULTS (Possible Concussion?)

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

YES (to both) ⬇

POSITIVE CONCUSSION SCREEN:

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

NO (to either or both) ⬇

NEGATIVE CONCUSSION SCREEN:

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

COGNITIVE EXAM

5. Orientation

Score one point for each correct response.

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

ORIENTATION TOTAL SCORE ____/5

6. Immediate Memory

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

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

Trial 1 script: Read the script exactly as written.

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

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

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

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

IMMEDIATE MEMORY TOTAL SCORE ____/15

Immediate Memory Alternate Word Lists

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

COGNITIVE EXAM - Continued

15. Concentration - Continued

B. Months in Reverse Order

Script: Read the script exactly as written.

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

Correct Response:

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

	Incorrect	Correct
ALL months in reverse order	0	1

MONTHS IN REVERSE ORDER (16B) ____/1

CONCENTRATION TOTAL SCORE ____/5

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

16. Delayed Recall

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

Script: Read the script exactly as written.

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

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

DELAYED RECALL TOTAL SCORE ____/5

Delayed Recall Alternate Word Lists

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

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

VOMS Contraindication: Unstable Cervical Spine.

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

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

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

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

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

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

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

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

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

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

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

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

17. VOMS Score Card

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

Any score above baseline is considered abnormal

VOMS RESULTS

☐ All Normal ☐ Any Abnormal

MACE 2 - Military Acute Concussion Evaluation

EXAM SUM-

Record the data for correct MACE 2 documentation.

Cognitive Summary

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

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

VOMS RESULTS (Q 17)	☐ Abnormal (+)	☐ Normal (-)	☐ Deferred
MACE 2 RESULTS		☐ Positive (+)	☐ Negative (-)

AFTER COMPLETING MACE 2:

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

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

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

TBI CODING INSTRUCTIONS

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

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

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

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

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

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

THIS TOOL MAY BE COPIED FOR CLINICAL USE.

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

XII. NOTES

QUICK CONVERSIONS

CONVERSION CHARTS

Length Conversions

1 inch = 2.54 cm	1 mm = 0.1 cm = 0.039 in
1 foot = 30.5 cm = 0.305 m	1 cm = 10 mm = 0.39 in
1 yard = 0.91 m	1 m = 100 cm = 39 in
1 mile = 1.6 km	1 km = 100 m = 1093 yd

Weight Conversions

1 oz = 30 g	1 g = 001 kg = 0.36 oz
1 lb = 16 oz = 0.45 kg	1 kg = 1000 g = 2.2 lbs
1 ton = 2000 lbs = 907 kg	1 ton (metric) = 1000 kg = 2200 lbs
1 grain = 65 mg	

Volume Conversions

1 fl oz = 30 ml = 30 cc	1 cc = 0.001 liter
1 US Gal = 128 fl oz = 3785 ml	1 ml = 1 cc = 0.34 fl oz
	1 liter = 1000 ml = 340 fl oz

Conversion Formulas

WEIGHT	LENGTH
lb = kg X 2.2	Lnches = cm X 0.394
kg = lb X 0.45	c = inches X 2.54

TEMPERATURE

F = (1.8) X C + 32

C = (F – 32) / (1.8)

Quick Conversions

HEIGHT			WEIGHT		TEMPERATURE	
ft/in	in	cm	lb	kg	F	C
4'8"	56	142	40	18.2	212	100
4'9"	57	145	50	22.7	108	42.2
4'10"	58	147	60	27.3	107	41.6
4'11"	59	150	70	31.8	106	41.1
5'0"	60	152	80	36.4	105	40.6
5'1"	61	155	90	40.9	104	40.0
5'2"	62	157	100	45.5	103	39.4
5'3"	63	160	110	50.0	102	38.9
5'4"	64	163	120	54.5	101	38.3
5'5"	65	165	130	59.1	100	37.8
5'6"	66	168	140	63.6	99	37.2
5'7"	67	170	150	68.2	98	36.7
5'8"	68	173	160	72.7	98.6	37.0
5'9"	69	175	170	77.3	97	36.1
5'10"	70	178	180	81.8	96	35.6
5'11"	71	180	190	86.4	95	35.0
6'0"	72	183	200	90.9	94	34.4
6'1"	73	185	210	95.5	93	34.0
6'2"	74	188	225	102.3	92	33.3
6'3"	75	191	250	113.6	91	32.8
6'4"	76	193	275	125.0	90	32.1
6'5"	77	196	300	136.4		

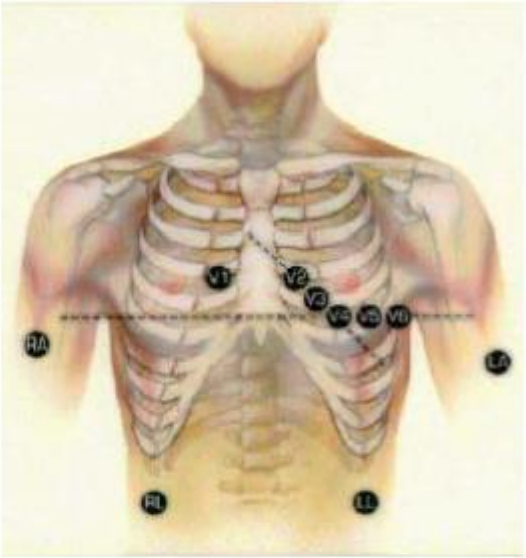
IV FLUID RATES IN DROPS PER MINUTE

ml/HR	50	75	80	100	125	150	175	200	250
10GTT-	8	13	13	17	21	25	29	33	42
15GTT-	12	19	20	25	31	37	44	50	62
60GTT-	50	75	80	100	125	150	175	200	250

12-Lead ECG

INDICATIONS (EMT, A, I, P)

- Suspected cardiac patient
- Suspected overdose
- Electrical injuries
- Syncope/Near-Syncope
- CHF
- Nausea/Vomiting
- Chest Pain
- Shortness of Breath
- Abdominal Pain
- Upper back pain (non-muscular)
- Weakness
- Toxic exposures
- Atypical presentations



PROCEDURE

Standard

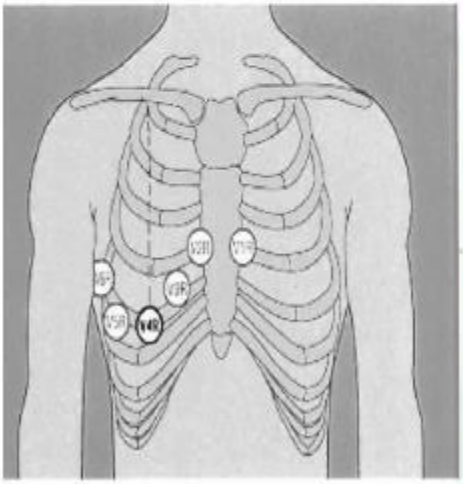
1. Prepare 12-Lead ECG monitor and connect patient cable with electrodes
2. Expose chest and prep as necessary. Modesty of the patient should be respected
3. Apply chest leads and extremity leads using the following landmarks:
    - RA- Right arm
    - LA- Left arm
    - RL- Right Leg
    - LL- Left Leg
    - V1- 4th intercostal space at right sternal border
    - V2- 4th intercostal space at left sternal border
    - V3- Directly between V2 and V4
    - V4- 5th intercostal space at midclavicular line
    - V5- Level with V4 at left anterior axillary line
    - V6- Level with V5 at left mid-axillary line
4. Instruct patient to remain still
5. Press the appropriate button to acquire the 12-Lead ECG within 5 minutes of patient contact

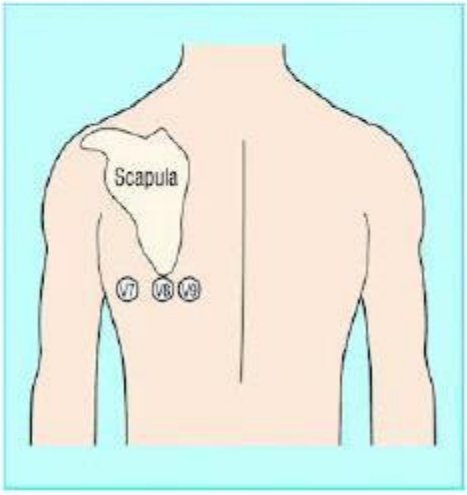
PROCEDURE FOR RIGHT-SIDED 12 LEAD

For Right-sided 12-Lead ECG (V4R) & Posterior 12-Lead ECG (V8 & V9), both together constitutes a 15-Lead ECG:

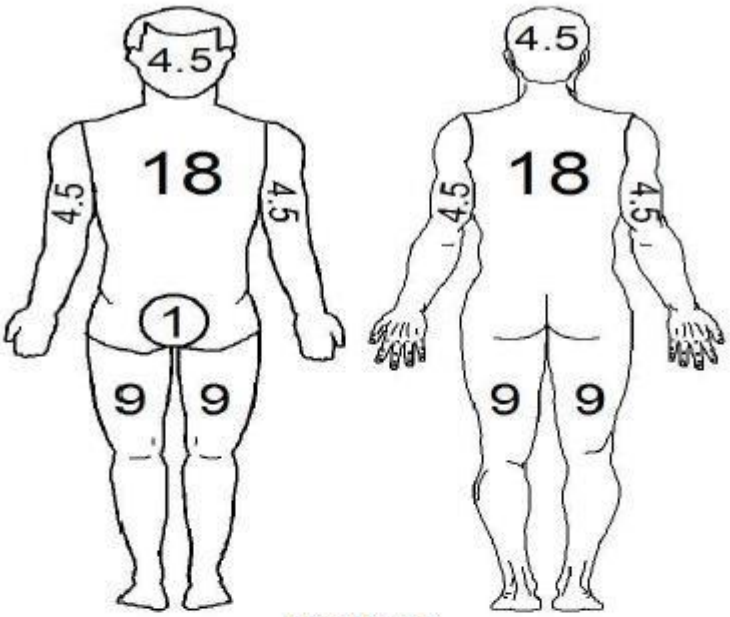
- V4R- (formerly V4) 5th intercostal space at midclavicular line on the patient's right side
- V8 - (formerly V5) 6th intercostal space left posterior at midscapular line
- V9 - (formerly V6) 6th intercostal space left at perispinal line
- Label the second 12-Lead ECG to reflect the new leads: V4 as V4R, V5 as V8, and V6 as V9

1. Print data as per guidelines and place the name and age of the patient on the paper copy of the 12-Lead ECG
2. STEMI suspected: notify and/or transmit to the closest Percutaneous Coronary Intervention (PCI) Center within 5 minutes
3. Document the procedure, time, and results on/with the patient care report (PCR)

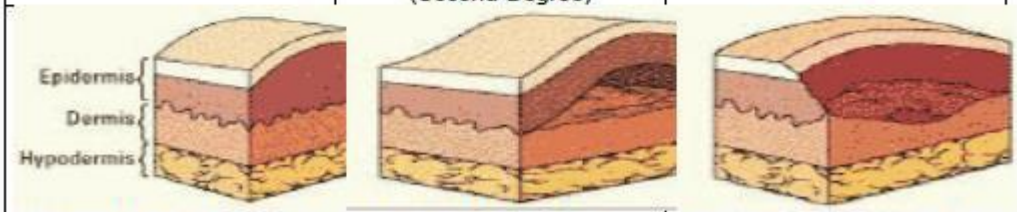




Adult Burn Chart/Reference



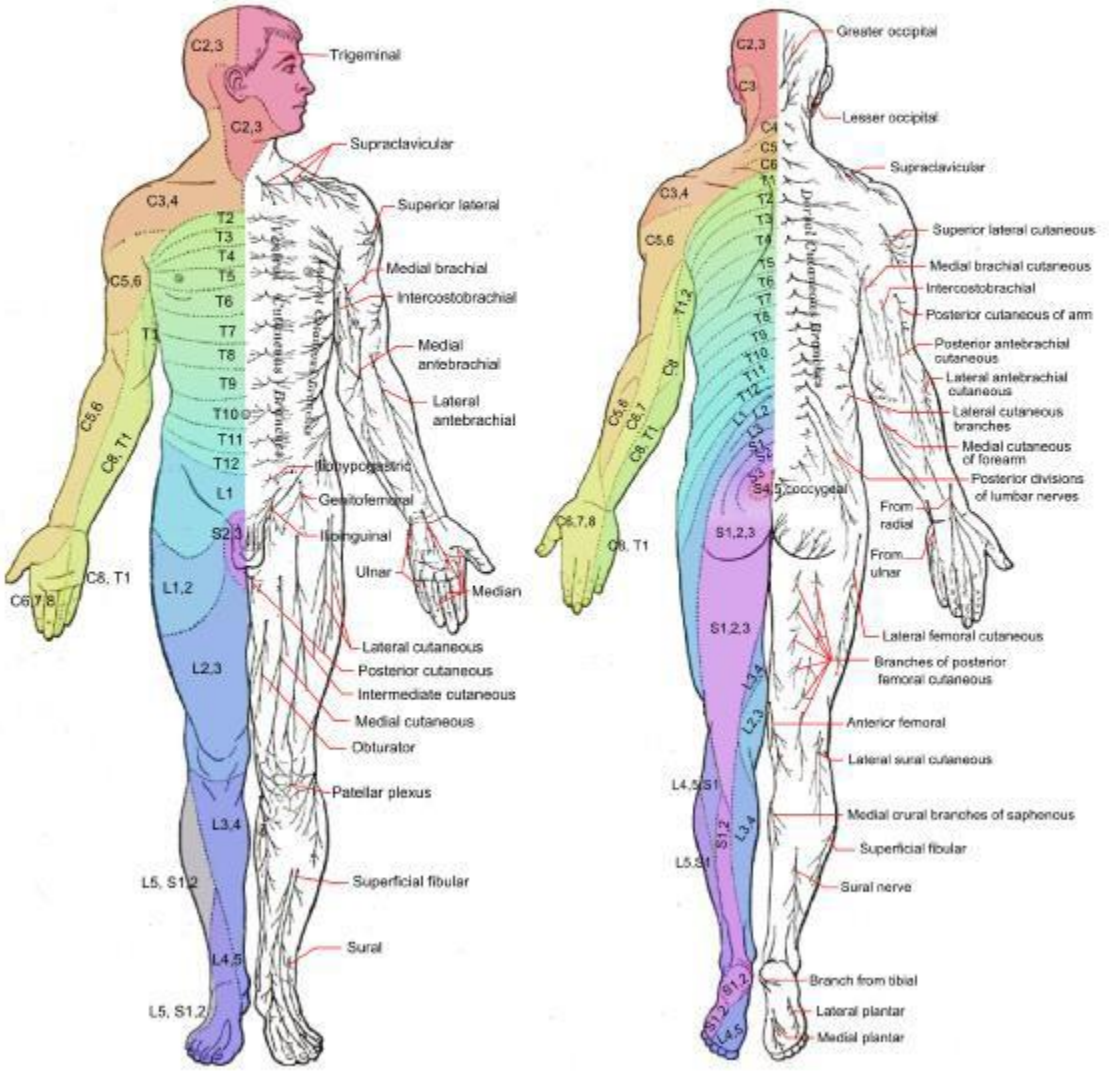
Palm Method:
The palm method is a tool whereby the size of the patients palm is used as an indicator for specific percentage of TBSA.
The surface area of a patients palm equals approximately 1% of TBSA.
This method is particularly useful where the burn has an irregular shape or has a scattered distribution.

Superficial (First-Degree)	Partial Thickness (Second-Degree)	Full Thickness (Third-Degree)
		
Damage to the outer layer of skin {epidermis}, causing pain, redness and swelling.	Damage to both outer skin and underlying tissue layers {epidermis and dermis} causing pain, redness, swelling and blistering.	Damage extends deeper into tissues {epidermis, dermis and hypodermis} causing extensive tissue destruction. The skin may feel numb.

NERVE CHARTS

Dermatomes and Cutaneous Nerves

Schematic demarcation of dermatomes
There is considerable overlap between any two adjacent dermatomes



Drug	Dose (~80 kg)	per/kg	Duration	Description	Adverse Reactions
ketamine RSI	150mg	2mg/kg	15-30 min	Sleep dose for RSI	Hallucinations, ↑secretions
ketamine analgesia	20mg	0.1mg/kg	15-30 min	Analgesia	Hallucinations, ↑secretions
midazolam	5mg	0.05mg/kg	30 min	Sedation 5 mg, anxiety 2mg, sezures 5 mg (up to 10)	Airway obstruction, hypoventilation
diazepam	5-10mg	0.1mg/kg	60 min	Sedation 5mg, anxiety 2mg, antiepileptic 5 mg (up to 10)	Airway obstruction, hypoventilation
etomidate RSI	25mg	0.4mg/kg	15 min	Sleep dose for RSI	Apnea, maintains BP
propofol RSI	200mg	3mg/kg	15 min	Sleep dose for RSI	Apnea, hypotension
morphine	10mg	0.1mg/kg	60 min	Analgesia	Hypoventilation, apnea
fentanyl	50mcg	1mcg/kg	20 min	Analgesia	Hypoventilation, apnea
succinylcholine RSI	150mg	2mg/kg	10 min	Short acting paralytic	Apnea, hyperK$^+$, rhabdomyolysis
rocuronium	100mg	1mg/kg	30 min	Intermediate acting paralytic	Apnea
vecuronium	10mg	0.1mg/kg	45 min	Intermediate acting paralytic	Apnea
atropine	0.4mg	0.01mg/kg	30min	Treats bradycardia	Tachycardia, dilated pupils
naloxone	0.4mg	0.01mg//kg	20 min	Narcotic reversal	Increased pain
flumazenil	0.2mg	0.01mg/kg	20 min	Benzodiazepine reversal	Agitation
dexamethasone	4mg	0.1mg/kg	6 hours	Anaphylaxis, HACE, severe AMS	Hyperglycemia
mannitol	50Grams	1G/kg	4 hours	Extrication for crush injury	Dehydration
ondansetron	4mg	0.1mg/kg	4 hours	Antiemetic	Caution with long QT (torsades)
diphenhydramine	50mg	1mg/kg	4 hours	Antihistamine	Sedation (Benadryl)
promethazine	50mg	1mg/kg	6 hours	Antihistamine, antiemetic	Sedation (Phenergan)
dopamine	1 to 10 mcg/kg/min	----------	Infusion	↑cardiac contractility	Hypertension, ↑HR
dobutamine	2 to 20 mcg/kg/min	----------	Infusion	↑cardiac contractility	Hypertension, ↑HR
phenylephrine	0.15-0.75mcg/kg/min	----------	Infusion	↑systemic vascular resistance	Hypertension, renal failure
norepinephrine	0.05-0.5 mcg/kg/min	----------	Infusion	↑systemic vascular resistance	Hypertension, renal failure
vasopressin	0.01-0.035 **u**/kg/**HR**	----------	Infusion	↑SVR & renal blood flow	Hypertension
epinephrine 1:1,000	0.5mg(0.5ml) **SQ**	0.01mg/kg	1 hour	Tx anaphylaxis, bronchospasm	Skin necrosis in distal areas
Sed/hypnotic	Analgesic	Paralytic	Anticholinergics	Misc.	Pressors

Critical Care Quick Resource Sheet

Thoroughly mix the bag by inverting it twice. Inspect for any leaks or particulate.

Epinephrine Drip

To prepare an epinephrine drip solution:
Add 1 mg of Epinephrine to a 250mL bag of Normal Saline (NS)
1 mg of Epinephrine is:
1mL of Epinephrine 1:1000 or 10mL of Epinephrine 1:10,000

For 4 mcg/mL

	2 mcg/ min	3 mcg/ min	4 mcg/ min	5 mcg/ min	6 mcg/ min	7 mcg/ min	8 mcg/ min	9 mcg/ min	10 mcg/ min
Epinephrine Dose	These are all drops per minute utilizing a mini-drip set (60 drop set)								
Drops per 60 seconds	30	45	60	75	90	105	120	135	150
Drops per 15 seconds	8	11	15	19	23	26	30	34	38

Levophed (Norepinephrine) to Treat Post-Arrest Hypotension Chart
Add 4 mg of Levophed (Norepinephrine) to 250 ml Normal Saline
These are all drops per minute utilizing a mini-drip set (60 drop set)

Dosage using estimated body weight	gtts by Time	0.1 mcg/kg/ min	0.2 mcg/kg/ min	0.3 mcg/kg/ min	0.4 mcg/kg/ min	0.5 mcg/kg/ min
Small Adult (100 lbs/ 45Kg)	1 minute	17 gtts	34 gtts	51 gtts	68 gtts	85 gtts
	15 seconds	4 gtts	9 gtts	13 gtts	17 gtts	21 gtts
Medium Adult (150 lbs/ 68Kg)	1 minute	26 gtts	51 gtts	77 gtts	102 gtts	128 gtts
	15 seconds	7 gtts	13 gtts	19 gtts	26 gtts	32 gtts
Large Adult (200 lbs/ 91Kg)	1 minute	34 gtts	68 gtts	102 gtts	136 gtts	170 gtts
	15 seconds	9 gtts	17 gtts	26 gtts	34 gtts	43 gtts
Extra-Large Adult (250 lbs/ 113 Kg)	1 minute	43 gtts	85 gtts	128 gtts	170 gtts	213 gtts
	15 seconds	11 gtts	21 gtts	32 gtts	43 gtts	53 gtts
Obese Adult (>300 lbs/ 136 Kg)	1 minute	51 gtts	102 gtts	153 gtts	204 gtts	255 gtts
	15 seconds	13 gtts	26 gtts	38 gtts	51 gtts	64 gtts

The infusion should be titrated to achieve a systolic blood pressure between 90-100 mmHg.

EtCO$_2$ Quick Reference

Capnography

INDICATIONS

- Altered mental status
- Cardiac arrest with return of spontaneous circulation (ROSC)
- Any serious trauma or medical condition
- Any use of Naloxone (Narcan)

CONTRAINDICATIONS

None

PROCEDURE

Follow manufacturer's instructions for placement and use of device.
Use on both adult and pediatric patients.
Endotracheal tube (ETT)/blind insertion airway device (BIAD)/bag valve mask (BVM): • Turn on recording instrumentation. • Place $ETCO_2$ sampling device in between ventilation device (BVM/ventilator) and the mask/endotracheal tube (ETT)/King Airway/Combitube/ Laryngeal Mask Airway (LMA) • Attach sampling device to recording instrumentation and ventilate. • The Capnometer shall remain in place with the airway and be monitored throughout
Non-intubated spontaneously breathing patient: • Turn on recording instrumentation. • Place the sampling nasal cannula on the patient. • Attach sampling device to recording instrumentation. Observe and record results. • The capnometer shall remain in place with the airway and be monitored throughout prehospital care and transport.
Continuous positive airway pressure (CPAP)/ Bilevel positive airway pressure (BiPAP): • Follow manufacturer's recommendations for placement of $ETCO_2$ in conjunction with use of CPAP/BIPAP. • Place sampling nasal cannula on the patient. • Place CPAP/ BiPAP mask on patient ensuring a good seal. • Observe and record results. • The capnometer shall remain in place with the airway and be monitored throughout prehospital care and transport.

PEARLS

Normal range → $ETCO_2$ in adult and pediatric patients is 35-45 mm Hg. Cardiac arrest → Attempt to keep $ETCO_2$ above 10 mm Hg.

Post-cardiac arrest → Attempt to keep $ETCO_2$ between 34-40 mm Hg.

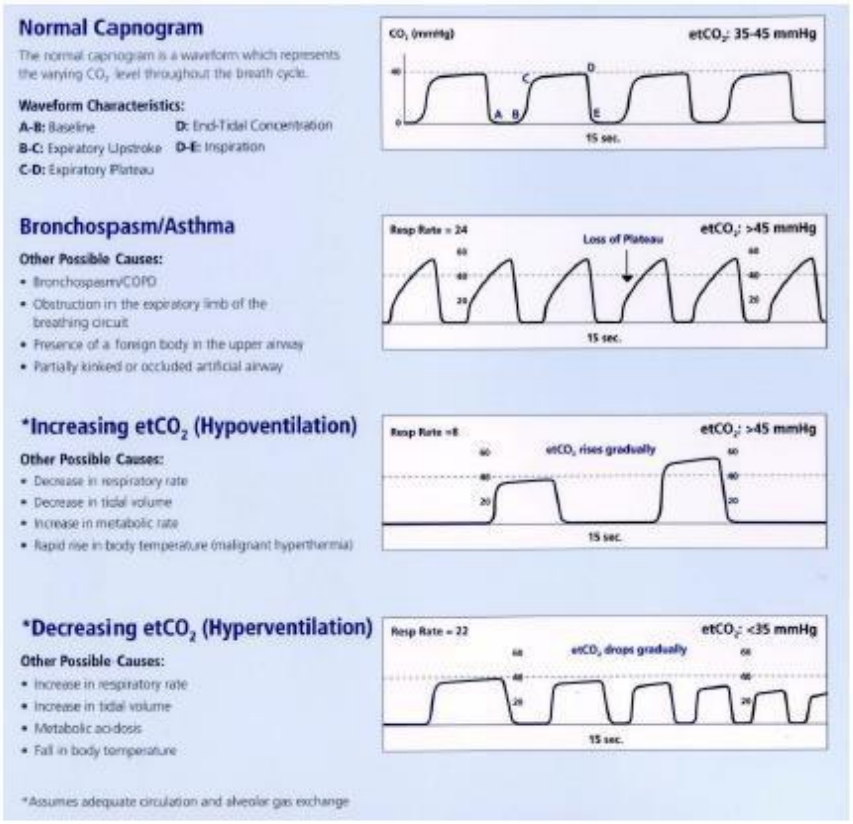
$EtCO_2$ Quick Reference

If $ETCO_2$ levels remain above 45 mm Hg despite ventilatory assistance, bronchodilators, CPAP or BIPAP, intubation may be needed.

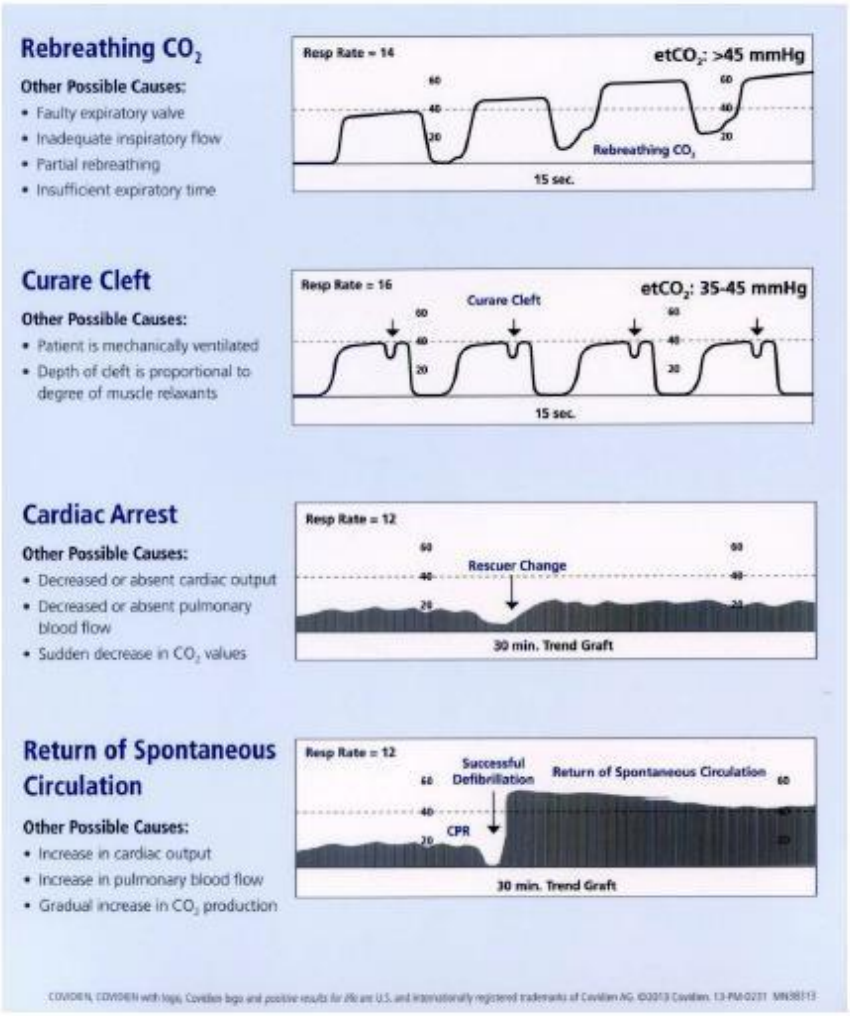
When $ETCO_2$ is not detected, three factors must be addressed:

- Loss of airway/apnea → Esophageal ETT placement or migration
- Circulatory collapse → Cardiac arrest, pulmonary embolism, hypoperfusion
- Equipment failure → Disconnected BVM or ventilator, obstruction in $ETCO_2$ detector or sampling tube

Normal and Abnormal $etCO_2$/Capnograph Waveforms



$EtCO_2$ Quick Reference



Useful Mnemonics

Causes of Coma/Decreased Level of Consciousness
A - Alcohol (and other drugs), Acidosis (hyperglycemic coma/DKA)
E - Electrolyte abnormality, Endocrine problem, Epilepsy
I - Insulin (diabetes/hypoglycemic shock)
O - Oxygen (Hypoxia), Overdose (or poisoning)
U - Uremia (renal failure/insufficiency)
T - Trauma; Temperature (hypothermia, heat stroke)
I - Infection (e.g., meningitis, encephalitis, sepsis)
P - Psychogenic ("hysterical coma")
S - Stroke or Space-occupying lesions in the cranium; Seizure; Shock

Coma Assessment
D - Depth of coma (responds to verbal or painful stimulus, unresponsive)
E - Eyes (PERRLA)
R - Respiration (rate and rhythm)
M - Motor (posturing; loss of movement/sensation)

Level of Consciousness
A - Alert
V - Responds to Verbal stimuli
P - Responds to Painful stimuli
U – Unresponsive

Patient History / Pain Assessment
A - Allergies
M - Medications
P - Past medical history (illness, injury)
P - Pain (PPQRST)
L - Last intake (food, fluid)
E - Ever happen before?
P - Pain (sharp or dull)
P - Palliative &/or Precipitating (exacerbating) measures related to the pain
Q - Quality (diffuse, pinpoint, or localized)
R - Radiating
S - Severity (scale of 1-10)
T - Timing: Time of onset; frequency; duration

Pupil Reaction
P - Pupils
E - Equal
R - Round
R - Reactive to
L - Light

Dive Related Accidents
V - Visual (Tunnel vision or blurred vision)
E - Ear symptoms (Tinnitus)
N - Nausea and/or vomiting
T - Twitching (Generally involves facial muscles, but can involve arms/legs)
L - Irritability (Change in diver's mental status)
D - Disability (Sudden neurological deficit)

Patient Care
V - Vitals
O – Oxygen
M – Monitor / Medications
I – IV/IO
T - Transport

XII. MEDICATIONS AND THEIR USES

Trade names start with an uppercase letter and appear in **blue**.
Generic names start with a lowercase letter and appear in **red**.
The primary type of medical problem for which the medication is used is listed, and the type of medication is shown in parentheses, when indicated.

Abilify Bipolar disorder, schizophrenia
Accolate Asthma
Accupril High blood pressure, congestive heart failure
acetaminophen with codeine Pain
Aciphex Gastric problems (antiulcer)
Actiq Pain (narcotic analgesic)
Actonel Osteoporosis
Actos Diabetes (oral antidiabetic)
acyclovir Viral infections (antiviral)
Adderall Attention deficit/hyperactivity disorder
Adipex Weight loss
Advair Breathing problems
albuterol Breathing problems (bronchodilator)
Aldactazide High blood pressure (diuretic/water pill)
Aldactone Congestive heart failure (diuretic/water pill)
Aldomet High blood pressure
alendronate Osteoporosis
Alesse 28 Birth control pills
Allegra Allergies (antihistamine)
Alli Weight loss
allopurinol Gout, kidney stones
alprazolam Anxiety, depression (sedative/antianxiety)
Altace High blood pressure (ACE inhibitor)
Alupent Asthma, breathing problems (bronchodilator)
Amaryl Diabetes (oral antidiabetic)
Ambien Insomnia (hypnotic)
Amitiza Gastrointestinal problems
amitriptyline Depression (antidepressant)
amlodipine High blood pressure, angina
amoxicillin Infection (antibiotic)
Amoxil Infection (antibiotic)
Anaprox Arthritis (anti-inflammatory)
Ansaid Arthritis (anti-inflammatory)
Antivert Dizziness, motion sickness (antivertigo)
Apresoline High blood pressure (antihypertensive)
Aricept Alzheimer's disease
Artane Parkinson's disease (anti-Parkinson)
Arthrotec Arthritis (anti-inflammatory)
Asacol Ulcerative colitis (antibacterial)
Asmanex Asthma (anti-inflammatory)
Aspirin Analgesic
Atarax Anxiety, behavioral disorders (sedative)
atenolol High blood pressure, heart problems, angina (beta blocker)
Ativan Anxiety (sedative/antianxiety)
Atrovent Breathing problems (bronchodilator)

Augmentin Infection (antibiotic)

Avandamet Diabetes
Avandia Diabetes (oral antidiabetic)
Avapro High blood pressure
Avodart Prostate enlargement
Axid Ulcers (antiulcer)
azithromycin Infection (antibiotic)
Azulfidine Ulcerative colitis (antibacterial)
Bactrim Infection (antibiotic)
Bactroban Impetigo (antibiotic)
Benadryl Allergies (antihistamine)
benazepril High blood pressure, congestive heart failure
Benicar High blood pressure
Bentyl Irritable bowel syndrome (anticholinergic)
benzonatate Cough (antitussive)
Biaxin Infection (antibiotic)
bisoprolol High blood pressure (diuretic)
Boniva Osteoporosis
Brethine Asthma, breathing problems (bronchodilator)
Bumex Edema, congestive heart failure (diuretic)
bupropion Depression, smoking cessation
BuSpar Anxiety (antianxiety)
buspirone Anxiety (antianxiety)
Byetta Diabetes
Caduet High blood pressure
Calan Angina, high blood pressure, rapid heart rate
Capoten High blood pressure, congestive heart failure
captopril High blood pressure, congestive heart failure
Carafate Ulcers (antiulcer)
carbamazepine Seizure disorder (anticonvulsant)
Cardizem Heart problems, angina (coronary vasodilator)
Cardura High blood pressure (alpha blocker)
carisoprodol Muscle spasms (muscle relaxant)
Cartia Angina, heart problems (calcium-channel blocker)
carvedilol High blood pressure
Catapres High blood pressure (antihypertensive)
Ceclor Infection (antibiotic)
cefaclor Infection (antibiotic)
cefdinir Infection (antibiotic)
cefixime Infection (antibiotic)
cefprozil Infection (antibiotic)
Ceftin Infection (antibiotic)
cefuroxime Infection (antibiotic)
Cefzil Infection (antibiotic)
Celebrex Arthritis (anti-inflammatory)
Celexa Depression (antidepressant)
cephalexin Infection (antibiotic)
cetirizine Antihistamine
Chantix Smoking cessation
Cialis Male impotence
Ciloxin Infection (antibiotic)
cimetidine Ulcers, gastric problems (antiulcer)

Cipro Infection (antibiotic)
citalopram Depression

Clarinex Allergies (antihistamine)
Claritin Allergies (antihistamine)
clarithromycin Infection (antibiotic)
clindamycin Infection (antibiotic)
Clinoril Arthritis pain (anti-inflammatory)
clonazepam Seizure disorder (anticonvulsant)
clonidine High blood pressure (antihypertensive)
clopidogrel Antiplatelet
clotrimazole Fungal infection (antifungal)
Colestid High cholesterol (cholesterol-lowering agent)
Combivent Breathing problems (bronchodilator)
Compazine Nausea (antiemetic)
Concerta Attention deficit/hyperactivity disorder
Coreg High blood pressure, heart problems
Corgard Heart problems, angina (beta blocker)
Cotrim Infection (anti-infective)
Coumadin Blood clots (blood thinner)
Cozaar High blood pressure
Crestor High cholesterol
cyclobenzaprine Muscle spasms (muscle relaxant)
Cymbalta Depression
Darvocet-N Pain management (narcotic analgesic)
Daypro Arthritis (anti-inflammatory)
Deltasone Severe inflammation (anti-inflammatory)
Demadex Edema, congestive heart failure (diuretic)
Demerol Pain (narcotic analgesic)
Depakote Seizure disorder (anticonvulsant)
Desyrel Depression (antidepressant)
Detrol Overactive bladder
Dexedrine Narcolepsy, attention-deficit disorder
dexmethylphenidate Attention deficit/hyperactivity disorder
DiaBeta Diabetes (oral antidiabetic)
Diabinese Diabetes (oral antidiabetic)
diazepam Anxiety (antianxiety)
diclofenac Inflammation (anti-inflammatory)
Diflucan Fungal infection (antifungal)
Digitek Heart problems
digoxin Heart problems
Dilantin Seizure disorder (anticonvulsant)
diltiazem Heart problems, angina (coronary vasodilator)
Diovan High blood pressure (antihypertensive)
Dipentum Ulcerative colitis
diphenhydramine Allergies (antihistamine)
dipyridamole Thromboembolism
Ditropan Bladder problems (antispasmodic)
Donnatal Irritable bowel syndrome (anticholinergic)
doxazosin Hypertension, prostate problems
doxycycline Infection (antibiotic)
Duricef Infection (antibiotic)
Dyazide High blood pressure, edema (diuretic)

DynaCirc High blood pressure
E.E.S. Infection (antibiotic)
Effexor Depression (antidepressant)
Elavil Depression (antidepressant)
Eldepryl Parkinson's disease (anti-Parkinson)
Elocon Dermatologic problems
Emend Nausea (antiemetic)
enalapril High blood pressure, heart failure
Enbrel Rheumatoid arthritis
E-Mycin Infection (antibiotic)
Entex Cough and congestion (expectorant)
epinephrine Cardiac arrest, allergic reactions
Epivir Antiretroviral
Ery-Tab Infection (antibiotic)
erythromycin Infection (antibiotic)
escitalopram Depression
Esidrix High blood pressure (diuretic/water pill)
Eskalith Behavioral disorders (antimanic)
Estrace Estrogen therapy
Estraderm Estrogen therapy
estradiol Menopause, gynecologic problems
etodolac Arthritis, pain (anti-inflammatory)
Evista Osteoporosis
famotidine Ulcers, gastric problems (antiulcer)
Feldene Arthritis (anti-inflammatory)
fentanyl Pain management (narcotic analgesic)
finasteride Prostate enlargement
Fiorinal Pain management (non-narcotic analgesic)
Flagyl Infections (antibacterial)
Flexeril Muscle spasms (muscle relaxant)
flexofenadine Antihistamine
Flomax Enlarged prostate (alpha blocker)
Flonase Allergies
Flovent Breathing problems
Floxin Infection (antibiotic)
fluconazole Fungal infection
fluoxetine Depression (antidepressant)
flurbiprofen Inflammation (anti-inflammatory)
folic acid Anemia
Fosamax Osteoporosis
fosinopril Osteoporosis
furosemide Congestive heart failure (diuretic/water pill)
gabapentin Seizures
Gabitril Seizure disorder (antiseizure)
Gantrisin Infection (antibiotic)
gemfibrozil High cholesterol (cholesterol-lowering agent)
Geodon Antipsychotic
glimepiride Diabetes (hyperglycemia)
glipizide Diabetes (oral antidiabetic)
Glucophage Diabetes (oral antidiabetic)
Glucotrol Diabetes (oral antidiabetic)
Glucovance Diabetes (oral antidiabetic)
glyburide Diabetes (oral hypoglycemic)

Glycolax Constipation
granisetron Nausea
guaifenesin Cough and congestion (expectorant)
Halcion Insomnia (hypnotic/sedative)
Haldol Psychotic disorders (antipsychotic)
HCTZ High blood pressure (diuretic/water pill)
Humira Rheumatoid arthritis
Humulin Diabetes (insulin)
hydrochlorothiazide High blood pressure (diuretic)
hydrocodone Cough, pain (narcotic)
HydroDiuril High blood pressure (diuretic/water pill)
hydroxyzine Anxiety, behavioral disorders (sedative)
Hygroton High blood pressure (diuretic/water pill)
Hytrin High blood pressure (alpha blocker)
Hyzaar High blood pressure (antihypertensive)
ibuprofen Inflammation, pain, fever (anti-inflammatory)
Imdur Heart problems, angina (coronary vasodilator)
Imitrex Migraine headaches (antimigraine)
Inderal High blood pressure, heart problems, angina (beta blocker)
Indocin Osteoarthritis, pain (anti-inflammatory)
indomethacin Arthritis (anti-inflammatory)
Intal Asthma (mast cell stabilizer)
Iophen Cough (antitussive)
Isoptin Angina, high blood pressure, rapid heart rate
Isordil Heart problems, angina (coronary vasodilator)
isosorbide dinitrate Heart problems, angina (coronary vasodilator)
K-Dur Potassium replacement, taken with diuretics
K-Tab Potassium replacement, taken with diuretics
Keflex Infection (antibiotic)
Keppra Seizure disorder (anticonvulsant)
ketoconazole Fungal infection (antifungal)
ketorolac Pain management (anti-inflammatory)
Klonopin Seizure disorder (anticonvulsant)
labetalol High blood pressure (beta blocker)
Lamictal Seizure disorder (anti-epileptic)
Lamisil Antifungal
Lanoxin Heart problems
Lasix Congestive heart failure (diuretic/water pill)
Lescol High cholesterol (cholesterol-lowering agent)
Levaquin Infection (antibiotic)
Levitra Male impotence
Levothroid Thyroid disease (thyroid hormone)
levothyroxine Thyroid problems (thyroid hormone)
Levoxyl Thyroid disease (thyroid hormone)
Lexapro Depression
Librax Peptic ulcer (anticholinergic)
Lipitor High cholesterol (cholesterol-lowering agent)
lisinopril High blood pressure
lithium carbonate Behavioral disorders (antipsychotic)
Lodine Arthritis, pain (anti-inflammatory)
Loestrin Fe Birth control pills
Lomotil Diarrhea (antidiarrheal)
Lopid High cholesterol (cholesterol-lowering agent)

Lopressor High blood pressure (beta blocker)
Lorabid Infection (antibiotic)
loracarbef Infection (antibiotic)
loratadine Allergies (antihistamine)
lorazepam Anxiety (sedative/antianxiety)
Lorcet Pain (narcotic analgesic)
Lortab Pain (narcotic analgesic)
Lotensin High blood pressure (ACE inhibitor)
Lotrel Hypertension
Lotrimin Fungal infection (antifungal cream and ointment)
Lotrisone Fungal infection (antifungal cream)
lovastatin High cholesterol (cholesterol-lowering agent)
Lozol Congestive heart failure, high blood pressure
Lunesta Sleep aid
Luvox Parkinson's disease (anti-Parkinson)
Lyrica Nerve pain
Macrobid Urinary tract infection (antibiotic)
Macrodantin Urinary tract infection (antibiotic)
marijuana Comfort management
Maxzide High blood pressure (diuretic/water pill)
meclizine Dizziness, vertigo, motion sickness (antiemetic)
medroxyprogesterone Gynecologic problems
meloxicam Inflammation, pain
metformin Diabetes
methadone Pain (narcotic analgesic), opiate withdrawal
methylphenidate Attention deficit disorder, narcolepsy
methylprednisolone Anti-inflammatory
metoclopromide Gastric problems (antiemetic)
metoprolol tartrate High blood pressure, heart problems (beta blocker)
metronidazole Infection (anti-infective)
Mevacor High cholesterol (cholesterol-lowering agent)
Micro-K Potassium replacement, taken with diuretics
Micronase Diabetes (oral antidiabetic)
Minipress High blood pressure (antihypertensive)
Minocin Infection (antibiotic)
minocycline Infection (antibiotic)
Miralax Constipation
Mirapex Parkinson's disease (anti-Parkinson)
Mircette Birth control pills
mirtazapine Anxiety, depression
Mobic Inflammation, pain
moexipril High blood pressure
Monopril High blood pressure
morphine Pain management (narcotic analgesic)
Motrin Inflammation, pain, fever (anti-inflammatory)
nabumetone Inflammation, pain (anti-inflammatory)
Namenda Alzheimer's disease
Naprosyn Inflammation, pain (anti-inflammatory)
naproxen Inflammation, pain (anti-inflammatory)
Nasacort Asthma, breathing problems (anti-inflammatory)
Nasonex Allergies (anti-inflammatory)
Necon Birth control pills
Neurontin Seizure disorders (anticonvulsant)

Nexium Gastric problems
Niaspan High cholesterol
nifedipine Heart problems, angina (coronary vasodilator)
Nitro-Dur Heart problems, angina (coronary vasodilator)
nitrofurantoin Urinary tract infection
nitroglycerin Heart problems, angina (coronary vasodilator)
Nitrostat Heart problems, angina (coronary vasodilator)
nizatidine Ulcers (antiulcer)
Nizoral Fungal infection (antifungal)
Norco Pain (narcotic analgesic)
Normodyne High blood pressure
nortriptyline Depression (antidepressant)
Norvasc High blood pressure (calcium-channel blocker)
nystatin Fungal infection (antifungal)
omeprazole Ulcers, gastric problems (antiulcer)
Omnicef Infections (antibiotic)
Omnipen Infections (antibiotic)
ondansetron Nausea
Ortho-Cept Birth control pills
Ortho-Cyclen Birth control pills
Ortho-Novum Birth control pills
Ortho Tri-Cyclen Birth control pills
Oruvail Arthritis pain (anti-inflammatory)
oseltamivir Antiviral
oxaprozin Inflammation, pain, fever (anti-inflammatory)
oxcarbazepine Seizures
oxybutynin Bladder problems (antispasmodic)
oxycodone Pain (narcotic analgesic)
Oxy-Contin Pain (narcotic analgesic)
Pamelor Depression (antidepressant)
pantoprazole Gastric problems, ulcers
paroxetine Depression (antidepressant)
Pataday Allergies (antihistamine)
Patanol Allergies (antihistamine)
Paxil Depression (antidepressant)
Pediazole Infection (antibiotic)
penicillin Infection (antibiotic)
pentoxifylline Vascular disease (blood thinner)
Pepcid Ulcers, gastric problems (antiulcer)
Percocet Pain (narcotic analgesic)
Percodan Pain (narcotic analgesic)
Persantine Thromboembolism
phenazopyridine Urinary tract irritation, infection
Phenergan Nausea (antiemetic)
phenobarbital Seizure disorder (anticonvulsant)
phentermine Weight loss
phenytoin Seizure disorder (anticonvulsant)
Plavix Thromboembolism (antiplatelet)
Plendil High blood pressure (calcium-channel blocker)
potassium chloride Potassium replacement, taken with diuretics
Prandin Diabetes (oral antidiabetic)
Pravachol High cholesterol (cholesterol-lowering agent)
prednisone Severe inflammation (anti-inflammatory)

Premarin Menopause, gynecologic problems (estrogen)
Prempro Menopause, gynecological problems
Prevacid Ulcers, gastric problems (antiulcer)
Prilosec Ulcers, gastric problems (antiulcer)
Prinivil High blood pressure (ACE inhibitor)
Pro-Banthine Peptic ulcer (anticholinergic)
Procan Rapid heart rate, tachycardia (antiarrhythmic)
Procardia Heart problems, angina (coronary vasodilator)
Proloprim Infection, mainly urinary tract (antibiotic)
promethazine Nausea (antiemetic)
Propacet Pain management (narcotic analgesic)
Propecia Hair loss
propoxyphene Pain management (narcotic analgesic)
propranolol High blood pressure, heart problems, angina (beta blocker)
Proscar Prostate enlargement
Protonix Gastric problems
Proventil Breathing problems (bronchodilator)
Provera Gynecologic problems (progestogen)
Provigil Narcolepsy
Prozac Depression (antidepressant)
Pulmicort Asthma
Pyridium Urinary tract infections, pain
Quinaglute Ventricular arrhythmias (antiarrhythmic)
quinapril High blood pressure (ACE inhibitor)
Qvar Asthma, breathing problems (anti-inflammatory)
ramipril High blood pressure (ACE inhibitor)
ranitidine Ulcers, gastric problems (antiulcer)
Reglan Nausea (antiemetic)
Relafen Inflammation, pain (anti-inflammatory)
Remeron Anxiety, depression (sedative)
Restoril Sleep disorders (hypnotic)
Retrovir Antiretroviral
Risperdal Psychological disorders (antipsychotic)
Ritalin Attention deficit disorder, narcolepsy
Robaxin Muscle spasms (muscle relaxant)
Roxicet Pain management (narcotic analgesic)
Rythmol Heart problems, ventricular tachycardia
Sectral High blood pressure (beta blocker)
Septra Infection (antibiotic)
Serevent Asthma, breathing problems (bronchodilators)
Seroquel Psychological disorders (antipsychotic)
sertraline Depression (antidepressant)
Serzone Depression (antidepressant)
simvastatin High cholesterol
Sinemet Parkinson's disease (anti-Parkinson)
Sinequan Anxiety, depression (antidepressant)
Singulair Asthma
Skelaxin Muscle relaxant
Slo-Bid Breathing problems, asthma (bronchodilator)
Slow-K Potassium replacement, taken with diuretics
Soma Muscle spasms (muscle relaxant)
Spiriva Breathing problems
spironolactone High blood pressure, heart failure (diuretic)

Suboxone Treatment of opioid dependence
sucralfate Ulcers (antiulcer)
Sular High blood pressure
sulfamethoxazole Infection (antibiotic)
sulfasalazine Ulcerative colitis (antibacterial)
sulfisoxazole Infection (antibiotic)
Sumycin Infection (antibiotic)
Suprax Infection (antibiotic)
Sustiva Antiretroviral
Symbicort Asthma
Synthroid Thyroid disease (thyroid hormone)
Tagamet Ulcers, gastric problems (antiulcer)
Tamiflu Antiviral
tamoxifen Cancer (antineoplastic)
Tavist Allergies (antihistamine)
TegretoI Seizure disorder (anticonvulsant)
temazepam Insomnia (sedative)
Tenex High blood pressure (alpha blocker)
Tenormin High blood pressure, heart problems, angina (beta blocker)
Tequin Infection (anti-infective)
terazosin High blood pressure (alpha blocker)
tetracycline Infection (antibiotic)
Theo-Dur Breathing problems (bronchodilator)
theophylline Breathing problems (bronchodilator)
Tiazac High blood pressure
Ticlid Stroke (antiplatelet)
Tigan Nausea and vomiting (antiemetic)
Tofranil Depression (antidepressant)
Tolinase Diabetes (oral antidiabetic)
Topamax Seizures
Toprol High blood pressure (beta blocker)
Toradol Short-term pain
tramadol Pain (analgesic)
trazodone Depression (antidepressant)
Trental Vascular disease (blood thinner)
triamterene High blood pressure (diuretic)
Triavil Anxiety, depression (antidepressant)
Tricor High triglycerides (antilipemic)
trimethoprim Infection, mainly urinary tract (antibiotic)
Trimox Infection (antibiotic)
Triphasil Birth control pill
Trivora-28 Birth control pills
Tussionex Cough (antitussive)
Tylenol with codeine (Tylenol #3) Pain
Ultram Pain (analgesic)
valacyclovir Herpes (antiviral)
Valium Anxiety (antianxiety)
valproic acid Seizure disorder (anticonvulsant)
Valtrex Herpes (antiviral)
Vantin Infections (antibiotic)
Vasotec High blood pressure, heart failure
Veetids Infection (antibiotic)
venlafaxine Depression (antidepressant)

Ventolin Breathing problems (bronchodilator)
verapamil Angina, high blood pressure, rapid heart rate
Viagra Male impotence
Vibramycin Infection (antibiotic)
Vicodin Pain (narcotic)
Vicoprofen Pain (narcotic analgesic)
Viramune Antiretroviral
Viread Antiretroviral
Voltaren Arthritis (anti-inflammatory)
Vytorin High cholesterol
warfarin sodium Blood clots (blood thinner)
Wellbutrin Depression (antidepressant)
Xalatan Glaucoma
Xanax Anxiety, depression (sedative)
Xenical Weight loss
Xopenex Breathing problems
Yasmin Birth control
YAZ Birth control
Zantac Ulcers, gastric problems (antiulcer)
Zerit Antiretroviral
Zestoretic High blood pressure
Zestril High blood pressure (ACE inhibitor)
Zetia High cholesterol
Ziac High blood pressure (beta blocker, diuretic)
Zithromax Infection (antibiotic)
Zocor High cholesterol (cholesterol-lowering agent)
Zofran Nausea
Zoloft Depression (antidepressant)
zolpidem Sleep aid
Zomig Migraine headaches
zonisamide Seizures
Zovirax Herpes, shingles, chicken pox (antiviral)
Zyflo Asthma
Zyloprim Gout
Zyprexa Psychological disorders (antipsychotic)
Zyrtec Allergies (antihistamine)

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NO FURTHER ENTRIES