Medical Technician Protocols & Procedures

Canadian Forces Health Services

5th Edition Version 5.1
Approved: Jan 2022
Last Updated: 1 Apr 2024

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Foreword

This set of medical protocols and procedures has been developed in order to provide Medical Technicians relevant protocols that govern the clinical approach to assessment and treatment of casualties/patients of high acuity. For assessment and management of routine, non-emergent cases, refer to the Scope of Practice and follow relevant policies, procedures and training.

This manual is a comprehensive reference for use by Medical Technicians and these protocols are applicable to the Med Tech working in the pre-hospital, operational, primary care, and in-patient care areas of practice. It is intended to provide practice guidelines for application in emergent situations under remote/indirect supervision, or in direct supervision settings as part of a multidisciplinary team. Where available, a higher medical authority should always be consulted as soon as practical and a transfer of care/evacuation should occur without delay.

This manual should not be taken as a simple menu of procedures to perform. Indeed, doing nothing unto itself is an intervention. It is up to each Med Tech, through formal training, experience, and participation in the Maintenance of Clinical Readiness Program, to hone these skills, achieve professional excellence, and realize when these skills should or should not be performed. One of the hardest concepts in medical practice is understanding both your clinical expertise and limitations, and then practicing in a manner consistent with this basic tenet of risk management.

This document does not supersede or alter the Med Tech Scope of Practice.

Inquiries or suggestions for changes shall be forwarded through normal channels to the Medical Technician National Practice Leader (NPL) at: MedTechMOSIDAdvisor-TechMedConseillerIDSGPM@forces.gc.ca.

Changes to this Manual are captured through a robust Record of Decision (ROD) Database, as noted in the Table of Contents that follows. To familiarize oneself with updates or for a summary of historic changes, please visit: Education & Training | Providers | Health Services | MPC (mil.ca) on DWAN.

Areas of Practice

Pre-hospital Care: This environment includes, but is not limited to, working on exercises, providing range / training / event medical coverage, moving casualties in the evacuation chain, and working outside the sick bay of a ship.

Operational Casualty Care: This environment includes named operations both domestic and expeditionary. A written order is required to utilize Class B protocols or Class B Skills.

Primary Care: This environment includes, but is not limited to, providing sick parade in the field / on ship and whilst working in a care delivery unit.

In-Patient Care: This environment includes, but is not limited to, holding a casualty in unit medical station, sick bay, brigade medical station, advanced surgical centre, field hospital, or domestic evacuation centre.

Legend / Classes Defined

Rank Qualification (RQ):
This manual denotes skills and protocols by Med Tech Rank Qualifications (RQs). As this terminology is new and may be unfamiliar to some providers/clinicians, the equivalent Occupational QLs (Qualification Levels) are noted below:

RQ Pte = QL3
RQ Cpl = QL5
RQ Sgt = QL6A

Classes of Skills:
A YELLOW box within a protocol indicates a RQ Cpl (and above) skill. This is a skill that can be performed in any environment (Class A or Class B), but only by an RQ Cpl (or above) qualified provider. Should an RQ Pte Medical Technician encounter a skill denoted for RQ Cpl (and above) only, they should skip to the next white box.

A BLUE box within a protocol indicates a Class B skill which can only be performed in an operational setting e.g. A named operation with the signed authorization from a higher medical authority. Further clarification will be provided in the box (text) if the skill is also restricted to a particular RQ.

Classes of Protocols:
Class A Protocols: Authorized for use in all areas of practice within the Med Tech's appropriate RQ.
Class B Protocols: Authorized during a named operation with formal written authorization from the Task Force Surgeon.
Exercises (both domestic and international) will utilize Class A protocols only

Phases of Care

The protocols contained in this manual provide an algorithmic approach to patient assessment and care, with each protocol focused on a specific condition, injury pattern or illness. Comprehensive clinical assessment and management requires applying protocols within an overarching, logical sequential approach. Aggressive management of life-threatening conditions, with a focus on early, highly-quality BLS, is the foundation of this approach. The following Phases of Care should be used to dictate sequence and prioritize life-saving interventions, particularly in environments with a tactical nexus. Even in a non-tactical environment, the MARCHE algorithm provides a more detailed approach than the conventional Primary and Secondary surveys.

Care Under Fire/Threat (CUF)

Definition:
"Care Under Fire" (CUF) outlines a strategy for simultaneously rendering care to a casualty while managing a tactical situation/threat in a hostile/combat environment. Optimal care to the injured is balanced against the threat of creating additional casualties or compromising mission success.

General Principles:

- Perform only lifesaving interventions that are tactically feasible and practical given the situation to address preventable causes of death on the battlefield (Refer to steps in CUF).
- The best medicine on the battlefield is fire superiority and preventing further casualties.
- Typically, in CUF, available medical equipment/resources are limited to those carried by the casualty or by the medical provider and are immediately accessible.
- Situations where a CUF approach is indicated include (but are not limited to):
    - While actively engaged by hostile/effective fire (direct or indirect);
    - Casualty in a burning building/vehicle;
    - Following detonation of an explosive device where there is a real threat of secondary devices at the location of the "X";
    - In any location where a threat makes evacuation/extraction a priority and where there is significant risk to providing medical care in that location. (This can also include non-combat situations e.g.: exposure to a CBRN agent; environmental threats; high angle rescue; etc).

Steps:

1. Update your tactical awareness.

2. Return fire and take cover.

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

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

5. When tactically feasible and if required, move or drag casualty to cover (Tactical Rescue).

6. Try to keep the casualty from sustaining additional wounds.

7. Consider establishing a TFC Bubble[1] if conditions permit.

8. Casualties should be extracted from burning vehicles or buildings and moved to places of relative safety. Do what is necessary to stop the burning process.

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[1] TFC Bubble:
In order for a care provider to establish a TFC Bubble the following conditions must be satisfied:

1. The situation surrounding the care provider and casualty, including individuals in proximity to them and potentially sharing the same cover, are actively engaged in combat and are operating in a ''Care Under Fire'' environment;
2. The care provider is not required to contribute to the engagement due to and adequate volume of outgoing fire and effective enemy suppression;
3. The care provider and the casualty are in a position of adequate cover;
4. The casualty will likely benefit from Tactical Field Care interventions.

9. Stop life-threatening external hemorrhage if tactically feasible:
    a. Direct casualty to control hemorrhage by self-aid if able;
    b. Use an Operational Medicine Working Group recommended limb tourniquet for hemorrhage that is anatomically amenable to tourniquet use;
    c. Apply the limb tourniquet over the uniform clearly proximal to the bleeding site(s). If the site of the life-threatening bleeding is not readily apparent, place the tourniquet “high and tight” (As proximal as possible) on the injured limb and move the casualty to cover.

10. Airway Management:
    a. Airway management is generally best deferred until the Tactical Field Care phase, but;
    b. If in proximity to, and tactically feasible, roll casualties with an altered level of consciousness into the recovery position.

11. Go to steps 1 through 3.

Tactical Field Care

The sequence of the clinical approach outlined in TFC (MARCHE) supersedes any reference to the sequence of interventions contained in individual protocols in this manual.

NB: The following Tactical Field Care description and sequence is a compilation of a number of references[1]. Despite being predominantly formulated using the Tactical Medical Guidelines for Canadian Forces Medical Technicians (TACMED Guidelines), it should NOT be considered a reproduction or replacement of the former.

Definition:
"Tactical Field Care" (TFC) is the care rendered once the casualty, the care provider and their unit are no longer under effective hostile fire *(or direct threat)*. It also applies to situations in which an injury has occurred on a mission but hostile fire *(or direct threat)* has not yet been encountered. Equipment is limited to that which is carried by the care provider, casualty and their team.

Simplification – Not during active combat or Under Direct Threat.

MARCHE is used within these steps. The acronym does not however comprehensively cover all the steps that need to be taken in Tactical Field Care.

1. Update your Tactical Awareness.

2. Ensure adequate security prior to attendance to the casualty(ies).

3. Consider early placement of the casualty on a litter if rapid movement is anticipated.

4. A sharps and garbage management plan should be established as SOP.

5. Casualties with an altered mental status should be disarmed immediately and their radios turned off.

6. Find the Mechanism Of Injury (MOI).

7. Consideration for spinal precautions:
    a. Casualties with penetrating trauma to the head and neck do not routinely benefit from C-spine immobilization and these precautions are generally not recommended in the tactical environment;
    b. In Class A & B environment, Spinal Motion Restriction (SMR) should be applied appropriately, if equipment is available and tactically feasible, to a casualty who has indicators that they may have sustained or are at high risk for spine injuries, or who cannot be adequately assessed clinically due to an altered level of consciousness. If so, care should be directed to the C-spine with a CCCWG recommended device;
    c. Attention to the spine should be standard for all casualties with a mechanism of injury presenting a higher risk for spinal injury as per below but not limited to:

        i. Mechanism of injury presenting a higher risk for spinal injury as per below (but not limited to):
            1. High Speed MVC
            2. Fall > Three Times Casualty's Height (No FFO)
            3. Fall from a height > 1m when FFO on
            4. Axial Load
            5. Diving Accidents

[1] PHTLS (9th Edition, 2021); JTS/CoTCCC TCCC Guidelines for Med. Pers. (Nov. 2020); Approved TACMED Guidelines for CAF Med. Techs. (Oct. 2017); ITLS (8th Edition, 2016); Relevant Joint Trauma System Clinical Practice Guidelines (consulted May 2021).

6. Penetrating Wound In or Near Spinal Column
7. Sports Injuries to Head or Neck
8. Unconscious Trauma casualty
9. History of blast trauma

ii. And/Or Signs/Symptoms of:
1. Spinal Pain or Tenderness
2. Abnormal Motor & Sensory Exam

iii. And Unreliable Patient:
1. Acute Stress Reaction
2. Head/Brain Injury
3. Altered Mental Status
4. Intoxication with Drugs/Alcohol
5. Other Distracting Injuries

d. If equipment not available and/or tactically not feasible, careful movement of the casualty with particular attention to the spine should be standard.

8. Massive Hemorrhage Control
   a. Refer to Protocols 3.1 Massive External Hemorrhage
   b. Refer to Protocol 3.11 Other Sources of External Hemorrhage
   c. Refer to Reference 8.11 Assessing & Treating Hemorrhage

9. Airway Management
   a. Refer to Protocol 2.1 Airway Algorithm;
   b. Refer to Standard Medical Procedures:
      i. 7.1 Supraglottic Airway Insertion Principles
      ii. 7.3 Transtracheal Block
      iii. 7.4 Cricothyroidotomy
   c. Refer to Reference 8.6 Airway Management Principles;
   d. Additional Information:
      i. Casualties with penetrating trauma to the head and neck do not routinely benefit from C-spine immobilization and these precautions are generally <u>not recommended in the tactical environment</u>.

10. Respiratory Management
    a. Refer to Protocol 3.9 Chest Trauma Management;
    b. Refer to Standard Medical Procedures 7.2 Chest Trauma Management.

11. STOP
    a. Situational Awareness Update;
    b. Triage all other casualties – ensure MAR is completed on casualties at CCP. If MASCAS then conduct triage as per START triage method;
    c. Ongoing documentation and Triage cards;
    d. Pass up and Pull pertinent information for 9-Liner MEDEVAC Request and MIST-AT Report. (Refer to Reference 8.10 9-Liner MEDEVAC Request and MIST-AT Report).

12. Cooling Prevention & Litter Placement
    a. If a spinal injury is suspected, initiate proper Spinal Motion Restriction if tactical situation permits it;
    b. If indicated and not done already, apply a pelvic binder before moving the casualty;
    c. Minimize casualty's exposure to the elements;
    d. Remove wet clothing;
    e. If not compromising respiratory effectiveness, keep protective gear on the casualty. Otherwise, keep the protective gear with the casualty;
    f. Place casualty on a litter to facilitate rapid movement if required. Place on an insulation pad and wrap in a CCCWG recommended or other appropriate casualty blanket if available;
    g. Expose casualty only as required for reassessment and treatment.

13. Circulation (B.I.F.T.)
    a. Bleeding Control:
        i. Perform a quick rapid body survey to find other sources of bleeding.
        ii. Control all sources of bleeding.
        iii. Splint femur fractures using a CCCWG recommended traction device if available.
    b. IV Access:
        i. Refer to Standard Medical Procedures:
            1. 7.5 Saline Lock
            2. 7.7 Intraosseous Access
    c. Fluid Resuscitation:
        i. Refer to Protocols:
            1. 3.3 Hemorrhagic Shock
            2. 3.4 Tranexamic Acid (TXA)
            3. 3.5 Burn Management
            4. 3.10 Severe Traumatic Brain Injury
        ii. Refer to Standard Medical Procedures:
            1. 7.6.1 IV Drip Rates
            2. 7.6.2 Formulae
    d. Tourniquet Assessment, Conversion & Removal:
        i. Refer to Protocol 3.2 Tourniquet Assessment, Conversion & Removal.
        ii. Refer to Standard Medical Procedure 7.12 Tourniquet Assessment, Conversion & Removal.

14. Hypothermia
    a. Refer to Protocol 5.1 Hypothermia.

15. Head Injury
    a. Refer to Protocol 3.10 Severe Traumatic Brain Injury;
    b. Additional Information:
        i. Serial assessments are vital. Patients with a mildly impaired neurologic status may rapidly deteriorate due to expanding intracranial hematomas or increasing cerebral swelling.

16. Penetrating Eye Injury
    a. Refer to Protocol 3.8 Eye Injury;
    b. Refer to Reference 8.8 Eye Trauma Principles & Management.

17. Everything Else (M-PHAAT-D)
    a. Monitoring:
        i. Pulse Oximetry; End-Tidal CO_2 detector; Blood Pressure; Heart Rate; Breathing Rate; Glucometry; Temperature.
        ii. Don't forget to update your MIST-AT (or other types of documentation).
    b. Pain Management:
        i. Refer to Protocol 3.6 Pain Management
    c. Head to toe:
        i. Expose and examine for additional wounds and fractures.
        ii. The exam should consist of inspection, auscultation, palpation, and sometimes percussion.
        iii. Remove and replace clothing (or blanket) and equipment as required (Hypothermia prevention & Protection).
        iv. Refer to Protocol 3.7 Concussion mTBI Management
    d. Address all wounds and fractures:
        i. Refer to Military First Aid / ITLS.
        ii. Refer to Protocol 3.5 Burn Management.
        iii. Refer to Reference 8.4 Burn Assessment & Fluid Replacement Principles.

e. Antibiotics:
    i. Refer to Protocol 4.3 Antibiotic.
    ii. Refer to Standard Medical Procedures 7.6 Medication Calculations, Reconstitutions & Dilutions.
f. Tactical Evacuation Preparation:
    i. For AIREVAC, secure any potential foreign object debris (FOD) around the casualty including blankets, casualty card and garbage/sharps.
    ii. Ensure mission essential equipment, explosives, fuel soaked clothing and other hazards are removed from the casualty and their weapon has been cleared if it is accompanying them. Leave PPE and weapon with ammunition with the casualty. As a general rule, crew serve weapons and ammunition remain with the unit. The decision to swap weapons or remove additional ammunition from the casualty will rest with the senior tactical commander on the ground.
    iii. Secure casualty and blankets to the litter and protect the casualty from hypothermia, including insulation from the ground/floor.
    iv. Protect the casualty with goggles, ear plugs, cover mouth and nose and other measures from brown out and aircraft noise.
    v. Provide instructions to ambulatory patients as needed.
g. Documentation of Care:
    i. Document clinical assessments, treatments rendered and changes in the casualty's status on the CCCWG recommended casualty card. Forward this information with the casualty to the next level of care.
    ii. If not done already, update and send the MIST-AT.

PROTECTED A (when completed)

Authorization for Med Tech Operational Scope of Practice Utilization

_____	_____	_____	_____
SN	Rank	Name	Unit

Is hereby authorized to provide enhanced operational casualty care in accordance with Area Two of the Med Tech Scope of Practice and their authorized Class B type protocols & procedures. While employed on operation or assessed as a task conducted under similar conditions:

_____
Operation / Task Name

This authorization is valid as of the date below and only within the task's specific area & timeline. It expires one year from the date of signature.

Date of Commencement: _____

_____
Signature of Medical Officer

_____	_____	_____	_____
SN	Rank	Name of Medical Officer	Appointment

Copy 1: Monitor Mass
Copy 2: Unit File
Copy 3: Member

PROTECTED A (when completed)

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8.10	MEDAVAC 9-Liner and MIST-AT	112	2021/05/10	ROD – 2021 WG	SG
8.11	Assessing and Treating Hemorrhage	114	2021/06/24	ROD – 2021 WG	SG
8.12	Diagnostic Criteria for Anaphylaxis - Adult and Child > 30 kg	124	2014/07/21	None	Original
8.13	Diagnostic Criteria for Anaphylaxis – Adult and Child ≤ 30 kg	124	2014/07/21	None	Original
8.14	Military Acute Concussion Evaluation (MACE) 2	125	2021/06/11 (new)	ROD – 2021 WG	SG
8.15	Pain Management	137	2021/06/22 (new)	ROD – 2021 WG	SG
8.16	Common Medical Abbreviations	140	2014/07/21	None	Original

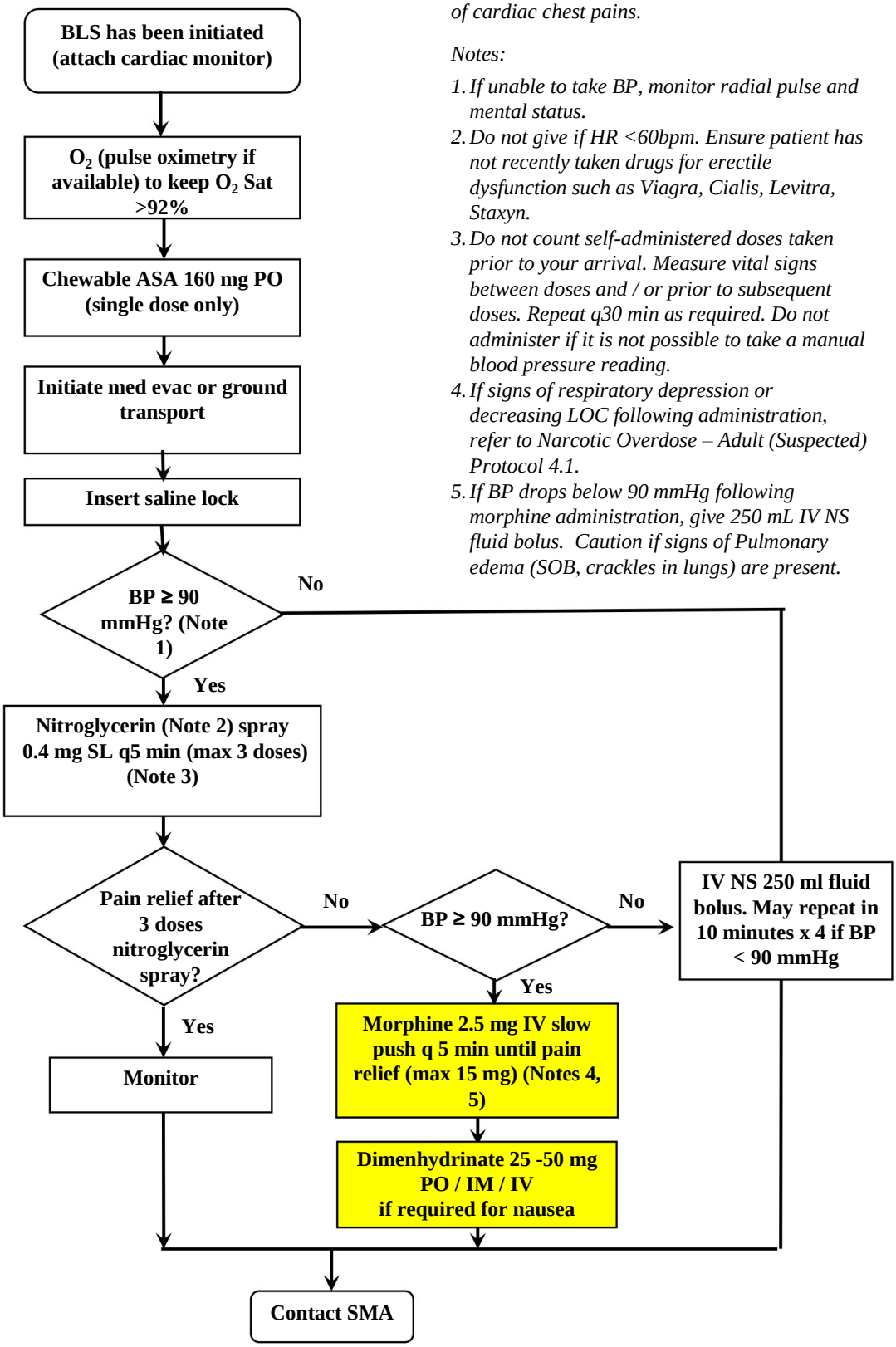
SECTION 1: CARDIAC PROTOCOLS

This section covers the protocols and procedures for:

1.1 Suspected Cardiac Chest Pain
1.2 Cardiac Arrest AED
1.3 Post Cardiac Arrest Stabilization
1.4 Discontinue Resuscitation (Adult)
1.5 Vital Signs Absent

Implementation of all protocols assumes that patient assessment and treatment are ongoing throughout the incident.

1.1 Suspected Cardiac Chest Pain - Class A



Indication – Patients with a history suggestive of cardiac chest pains.

Notes:

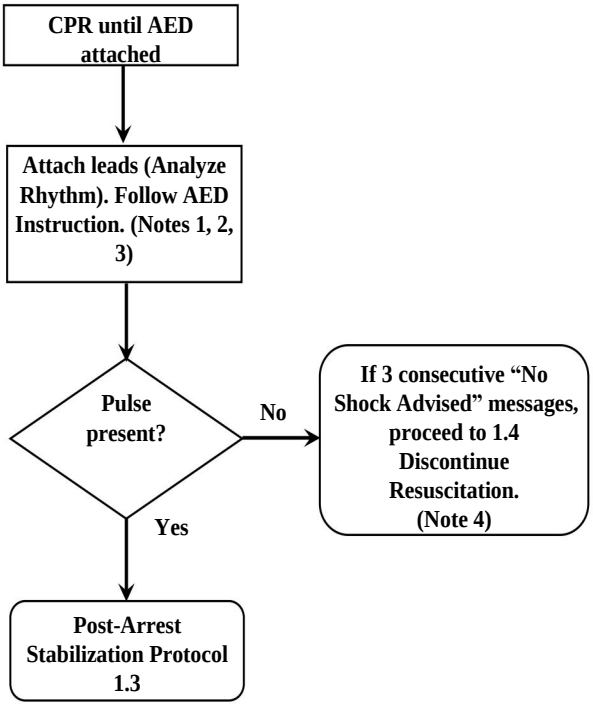
1. *If unable to take BP, monitor radial pulse and mental status.*
2. *Do not give if HR <60bpm. Ensure patient has not recently taken drugs for erectile dysfunction such as Viagra, Cialis, Levitra, Staxyn.*
3. *Do not count self-administered doses taken prior to your arrival. Measure vital signs between doses and / or prior to subsequent doses. Repeat q30 min as required. Do not administer if it is not possible to take a manual blood pressure reading.*
4. *If signs of respiratory depression or decreasing LOC following administration, refer to Narcotic Overdose – Adult (Suspected) Protocol 4.1.*
5. *If BP drops below 90 mmHg following morphine administration, give 250 mL IV NS fluid bolus. Caution if signs of Pulmonary edema (SOB, crackles in lungs) are present.*

SECTION 1: CARDIAC PROTOCOLS

1.2 Cardiac Arrest AED Protocol - Class A

Indications – Patient with absent carotid pulse AND continued loss of consciousness AND not breathing.
Cautions -

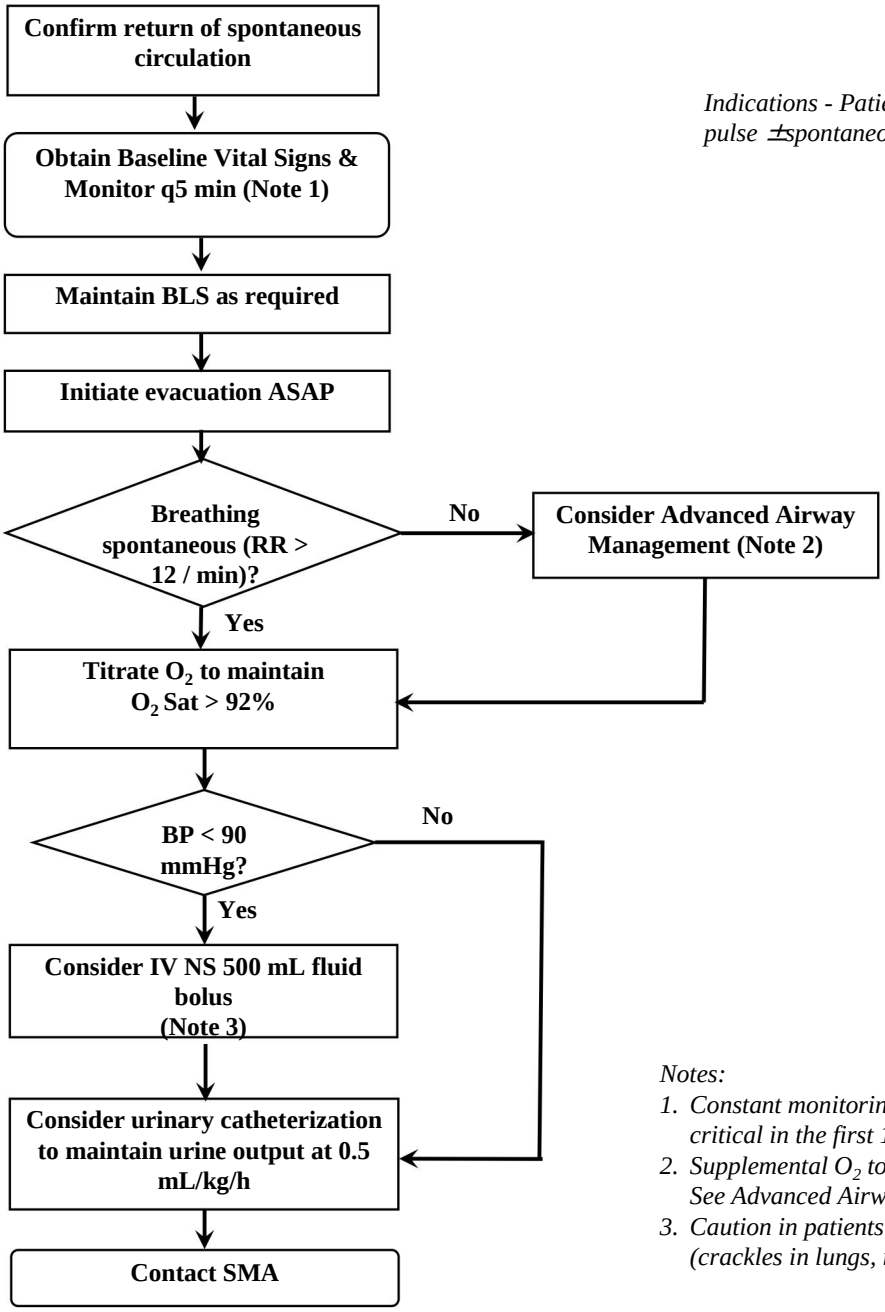
- *Severe hypothermia*
- *Asphyxiation*
- *Traumatic Arrest*



Notes

1. *Defibrillation is less likely to be effective below 30ºC core body temperature. Focus efforts on CPR and rapid transport. Re-warm patient per Hypothermia Protocol 5.1. Only defibrillate once until patient rewarms to 30ºC.*
2. *In asphyxiation, cardiac arrest is due to hypoxia. Emphasis should be on good oxygenation and initiating CPR before using AED. Causes may include hanging, airway obstruction, smoke inhalation, or drowning.*
3. *Use pediatric pads from 1-8 years old if available.*
4. *Cardiac arrest following trauma has a very low probability of survival. Resuscitative efforts should be based on available resources and operational requirements.*

1.3 Post Cardiac Arrest Stabilization - Class A



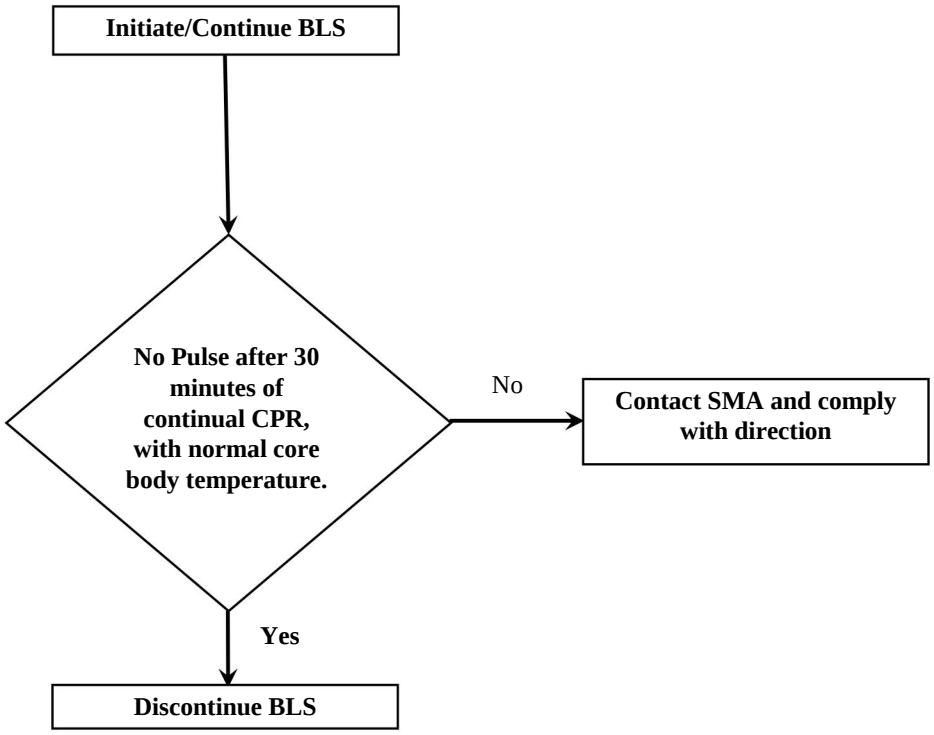
Indications - Patient post-cardiac arrest with a pulse ±spontaneous respirations.

Notes:

1. *Constant monitoring of the patient's pulse is critical in the first 10 minutes post-arrest.*
2. *Supplemental O_2 to maintain O_2 Sat >92%. See Advanced Airway Algorithm 2.1*
3. *Caution in patients with pulmonary edema (crackles in lungs, respiratory distress)*

1.4 Discontinue Resuscitation (Adult) – Class A

Indications – Patients in cardiac arrest who have not responded to interventions under other treatment protocols.



1.5 Vital Signs Absent – Class B

Indications:

- *Patient initially presents with a pulse, then no palpable pulse detected.*
- *Traumatic Cardiac Arrest.*
- *For Non-Traumatic Cardiac Arrest refer to Protocol 1.2 Cardiac Arrest AED.*
- *Note 1 & 2.*

N.B.
For interventions indicated below under MARCH(E), refer to Phases of Care – Tactical Field Care of the Foreword (page vi.) for a comprehensive list of associated protocols, procedures and references to consult.

Initiate/Continue BLS (Note 3)

If a casualty becomes VSA during treatment perform the following actions, taking into consideration equipment resources and the risk of incurring further casualties:

- **M & CPR: Control all external Massive hemorrhage and concurrently start CPR (If human resources are available).**
- **A: Secure the Airway with a CCCWG recommended Supraglottic Airway Adjunct if not previously done.**
- **R: Respiration - Ensure symmetrical air entry to lungs on 100% O_2 (If avail) and confirm advanced airway placement with CO_2 detector (Hypoxia).**
- **R: Respiration – Perform Bilateral Chest Decompression in the presence of any truncal/torso trauma (Note 4).**
- **C: Circulation – Bolus NS/RL 1L IV/IO (Hypovolemia).**
- **H: Hypothermia – Re-warm the casualty (Hypothermia).**
- **Consider initiating Cardiac Arrest Protocol 1.2 until three consecutive "No Shock Advised" messages received from AED.**

Able to Contact SMA?

No → **Refer to Protocol 1.4 Discontinue Resuscitation (Adult) or Terminate resuscitative efforts before evacuation according to the tactical situation.**

Yes → **Comply with SMA direction (Note 5)**

Notes:

1. *Resuscitation, including cardiopulmonary resuscitation (CPR), on the battlefield for victims of blast or penetrating trauma who are found with no pulse, no respirations, and no other signs of life, will not be successful and should not be attempted. This casualty is considered KIA (TACMED Guidelines Oct 2017).*
2. *In an environment other than a battlefield, initiate the VSA Protocol where Resources, Time, and Situation permit it. Resuscitative efforts should not be attempted in cases of obvious fatal injury (e.g.: Decapitation; Exposed brain matter) or when evidence exists of dependent lividity, rigor mortis, or decomposition.*
3. *Special considerations: Continue resuscitation on hypothermic; near-drowning victims; pediatric victims; or victims of electrocution or lightning strikes.*
4. *Perform a Bilateral Chest Decompression for traumatic arrests where the cause is penetrating or blunt trauma to the truncal/torso area, the cause is unknown, or not definitively clear. Generally, our battlefield injuries involve polytrauma where tension pneumothoraces cannot be ruled out. As such, Bilateral Chest Decompression is generally among the expected interventions/treatments. In a case of traumatic arrest where trauma (Penetrating or Blunt) to the truncal/torso area can be effectively eliminated, a Bilateral Chest Decompression may not be indicated (i.e.: GSW to the leg; Blunt trauma to the head; etc).*
5. *Where possible, SMA should be contacted to provide direction on the discontinuation of resuscitation.*

SECTION 2: RESPIRATORY PROTOCOLS

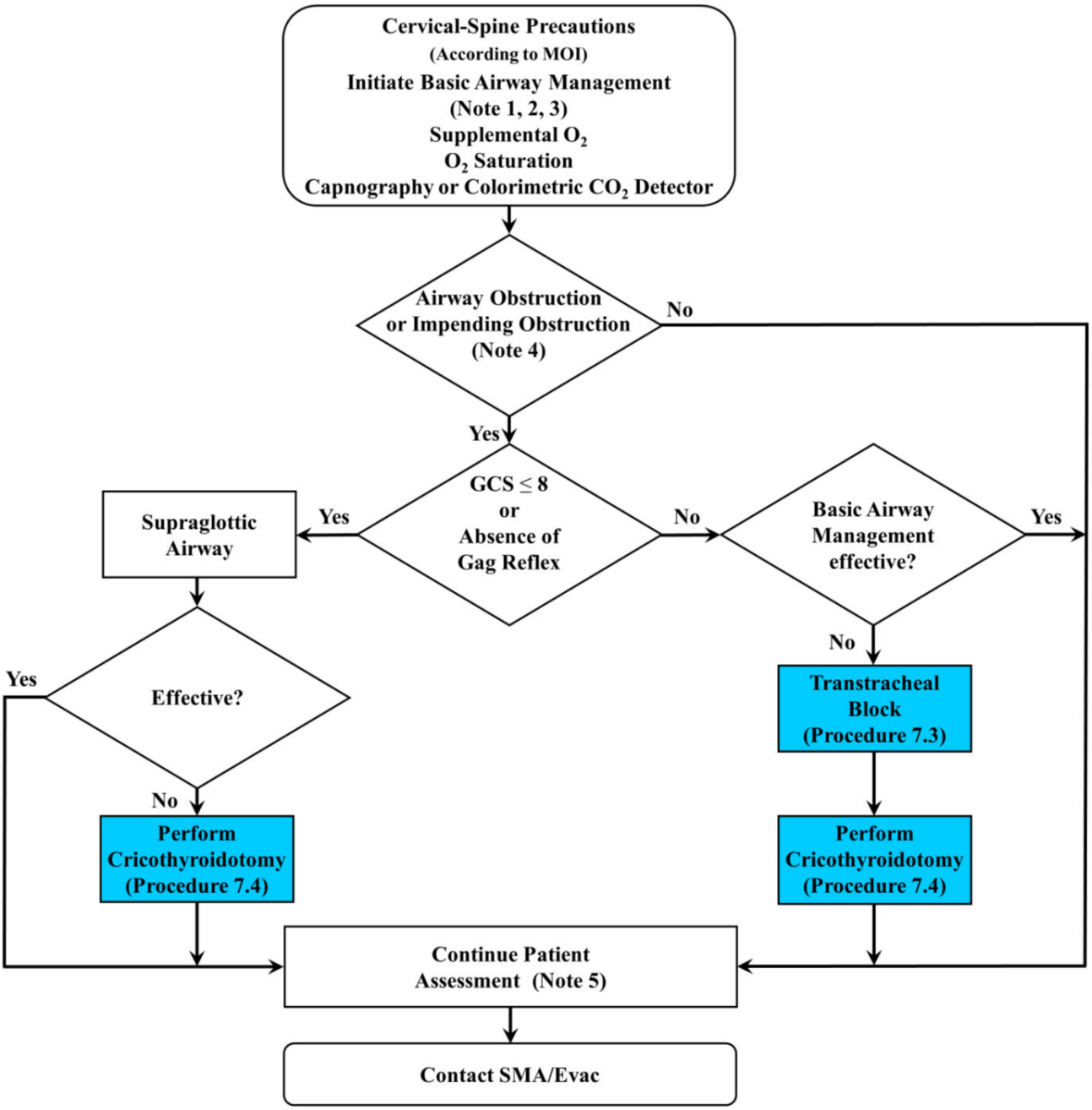
This section covers the protocols and procedures for:

2.1 Airway Algorithm
2.2 SOB Suggestive of Asthma/COPD (Adult)
2.3 Anaphylaxis/Anaphylactic Shock – Adult & Children > 30 Kg
2.4 Anaphylaxis/Anaphylactic Shock – Adult & Children ≤ 30 Kg

Implementation of all protocols assumes that patient assessment and treatment are ongoing throughout the incident.

SECTION 2: RESPIRATORY PROTOCOLS

2.1 Airway Algorithm – Class A (All RQ) / Class B with Cric (RQ Cpl & above)



Notes:

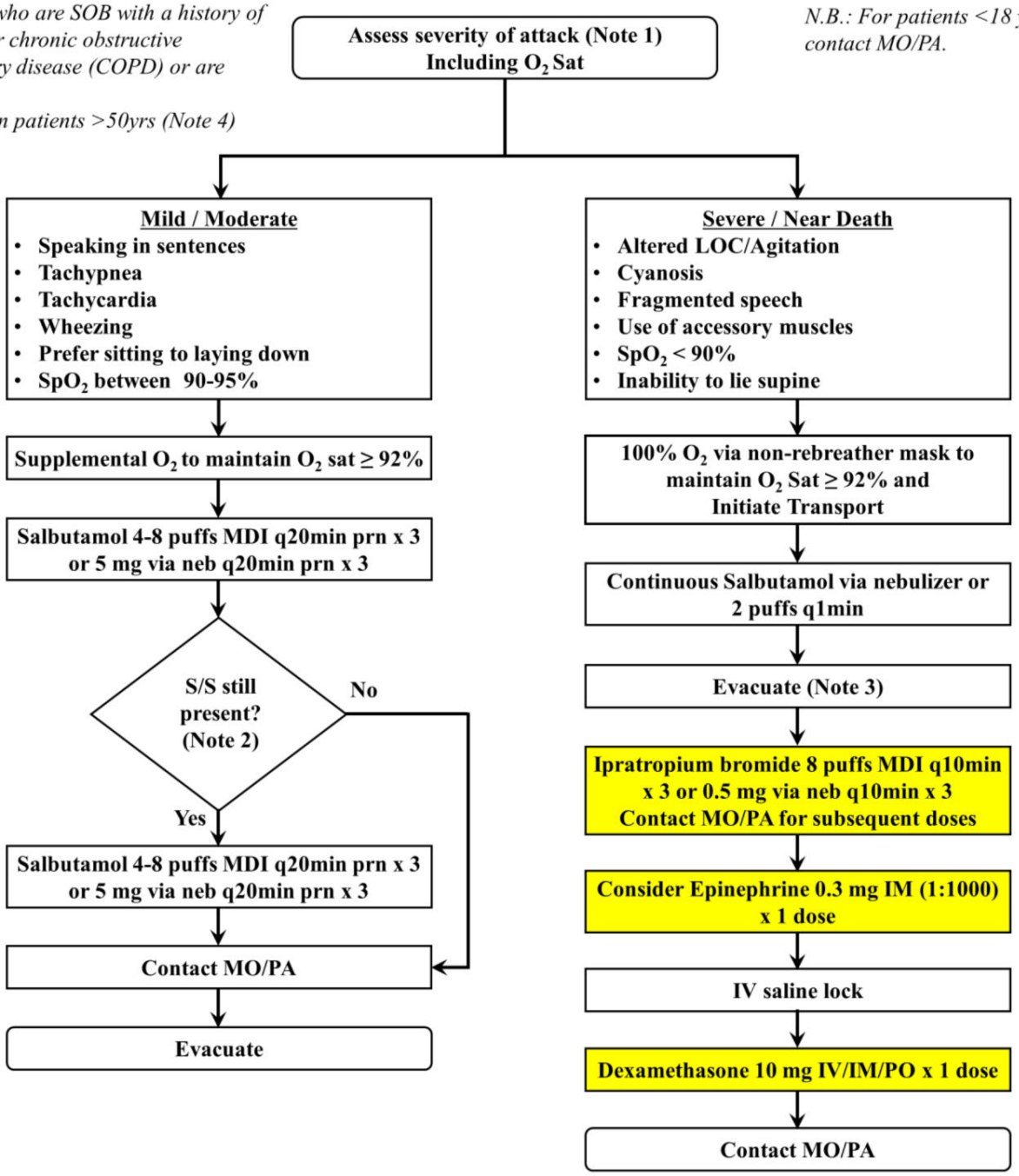
1. *Positioning; Chin-lift; Jaw-thrust; Head-tilt-chin-lift; Suction; NPA; OPA; BVM (Reference 8.6 - Airway Management Principles).*
2. *Always be prepared to escalate to next level of airway management. Reassess at each intervention. Do not delay airway interventions to initiate O_2 or for SpO_2 / $ETCO_2$ monitoring.*
3. *Allow a conscious casualty to assume any position that best protects the airway, to include sitting up/or leaning forward.*
4. *E.g.: Edema from facial trauma; Burns to the face and upper airway; Smoke inhalation injury; Angioedema in anaphylaxis.*
5. *Airway should be reassessed frequently and the provider should be prepared to escalate management measures. After addressing all life-threatening injuries, the Med Tech can consider converting an NPA/OPA to a supraglottic airway device to obtain more reliable protection of the airway (in the unconscious casualty without an intact gag reflex).*

2.2 SOB Suggestive of Asthma / COPD (Adult) - Class A

Indications:

- *Patients who are SOB with a history of asthma or chronic obstructive pulmonary disease (COPD) or are wheezing.*
- *Caution in patients >50yrs (Note 4)*

N.B.: For patients <18 yrs, contact MO/PA.



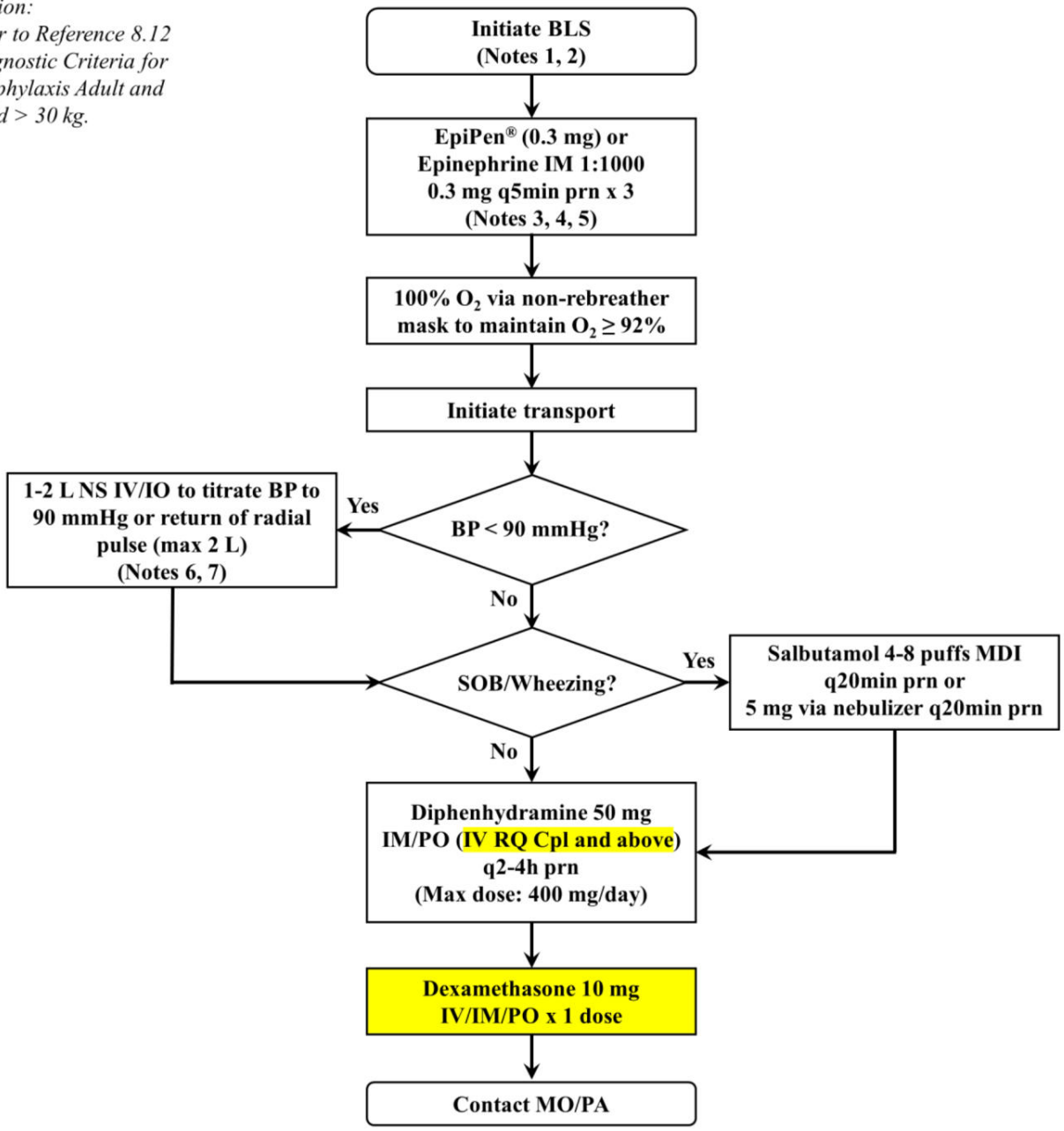
Notes:

1. *Use of accessory muscles of respiration; Brief, fragmented speech; Inability to lie supine; Profound diaphoresis; and Agitation are severe symptoms. Inability to maintain respiratory effort; Cyanosis; and Depressed mental status predict imminent respiratory arrest. Life-threatening airway obstruction can still occur when these signs are NOT present.*
2. *Anytime during treatment, if the patient condition worsens, consider if the Severe/Near Death algorithm is indicated.*
3. *If evacuation platform is available, do not delay transport for subsequent treatments.*
4. *With patients 50+, the likelihood of other etiologies with a similar presentation increases. With increasing age, the provider must exercise greater caution that additional diagnostic and different treatment interventions may be required, and that treatments in this protocol can cause harm.*

2.3 Anaphylaxis / Anaphylactic Shock - Adult & Children > 30 kg - Class A

Indication:

- *Refer to Reference 8.12 Diagnostic Criteria for Anaphylaxis Adult and Child > 30 kg.*



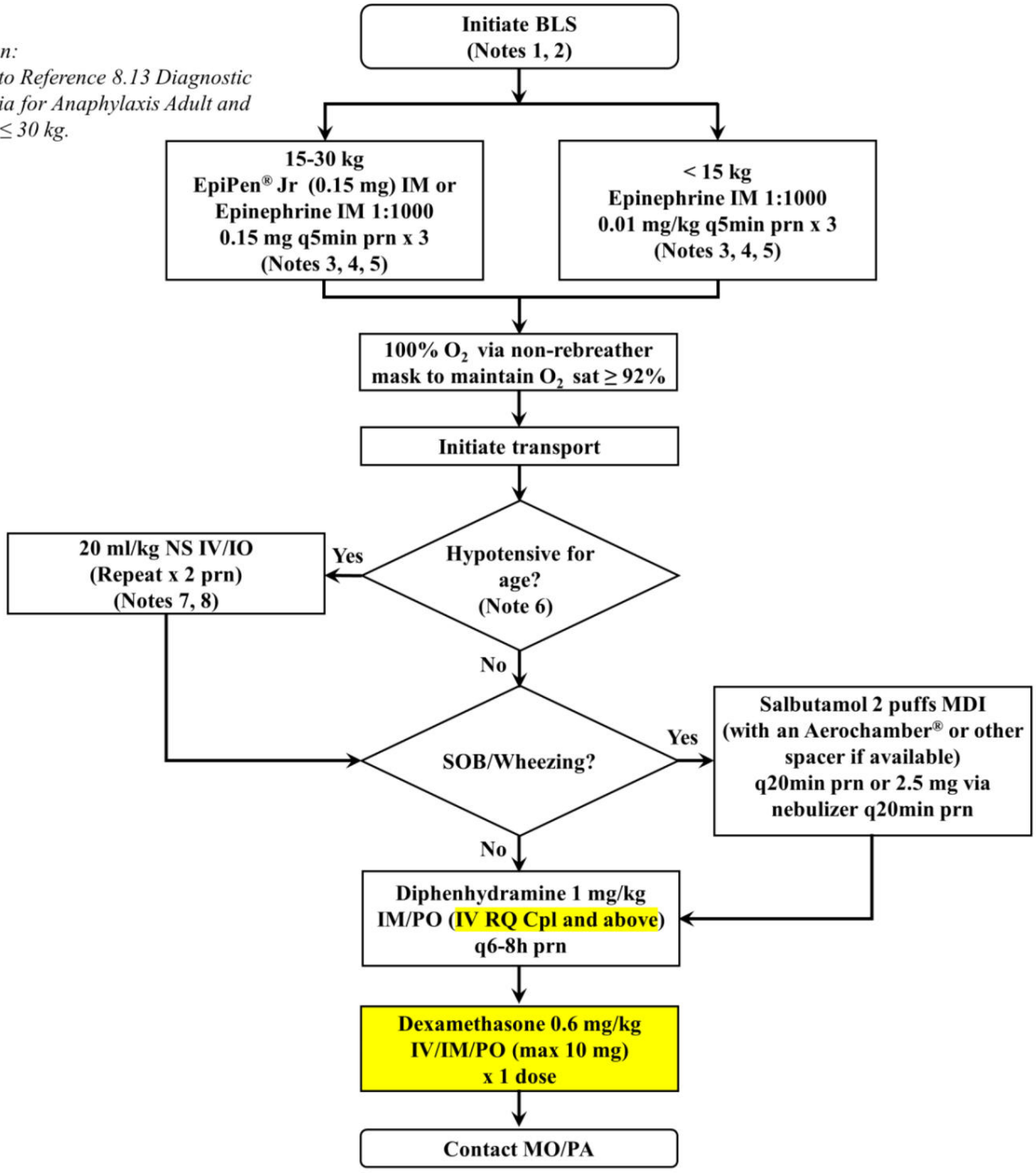
Notes:

1. *If airway compromised, refer to Protocol 2.1 Airway Algorithm.*
2. *Remove suspected offending agent.*
3. *Assess for airway obstruction and hypotension after each dose of Epinephrine.*
4. *Keep EpiPen® needle in the muscle for 5 sec.*
5. *If you use Epinephrine ampoule, remember that it contains more than one dose in each ampoule.*
6. *Patients should be monitored carefully and continuously for clinical response and for volume overload.*
7. *Massive fluid shifts can occur rapidly due to increased vascular permeability, with transfer of up to 35% of the intravascular volume into the extravascular space within minutes. Any patient whose hypotension does not respond promptly and completely to IM Epinephrine may require large volume fluid resuscitation. Contact MO/PA for serial boluses.*

2.4 Anaphylaxis / Anaphylactic Shock - Adult & Children ≤ 30Kg - Class A

Indication:

- *Refer to Reference 8.13 Diagnostic Criteria for Anaphylaxis Adult and Child ≤ 30 kg.*



Notes:

1. *If airway compromised refer to Protocol 2.1 Airway Algorithm.*
2. *Remove suspected offending agent.*
3. *Assess for airway obstruction and hypotension after each dose of Epinephrine.*
4. *Keep EpiPen® needle in the muscle for 5 sec.*
5. *If you use Epinephrine ampoule, remember that it contains more than 1 dose in each ampoule.*
6. *Refer to Pediatric Table 8.3 for Pediatric maintenance rates & other pediatric indices.*
7. *Patients should be monitored carefully and continuously for clinical response and for volume overload.*
8. *Massive fluid shifts can occur rapidly due to increased vascular permeability, with transfer of up to 35% of the intravascular volume into the extravascular space within minutes. Any patient whose hypotension does not respond promptly and completely to IM epi may require large volume fluid resuscitation. Contact MO/PA for serial boluses.*

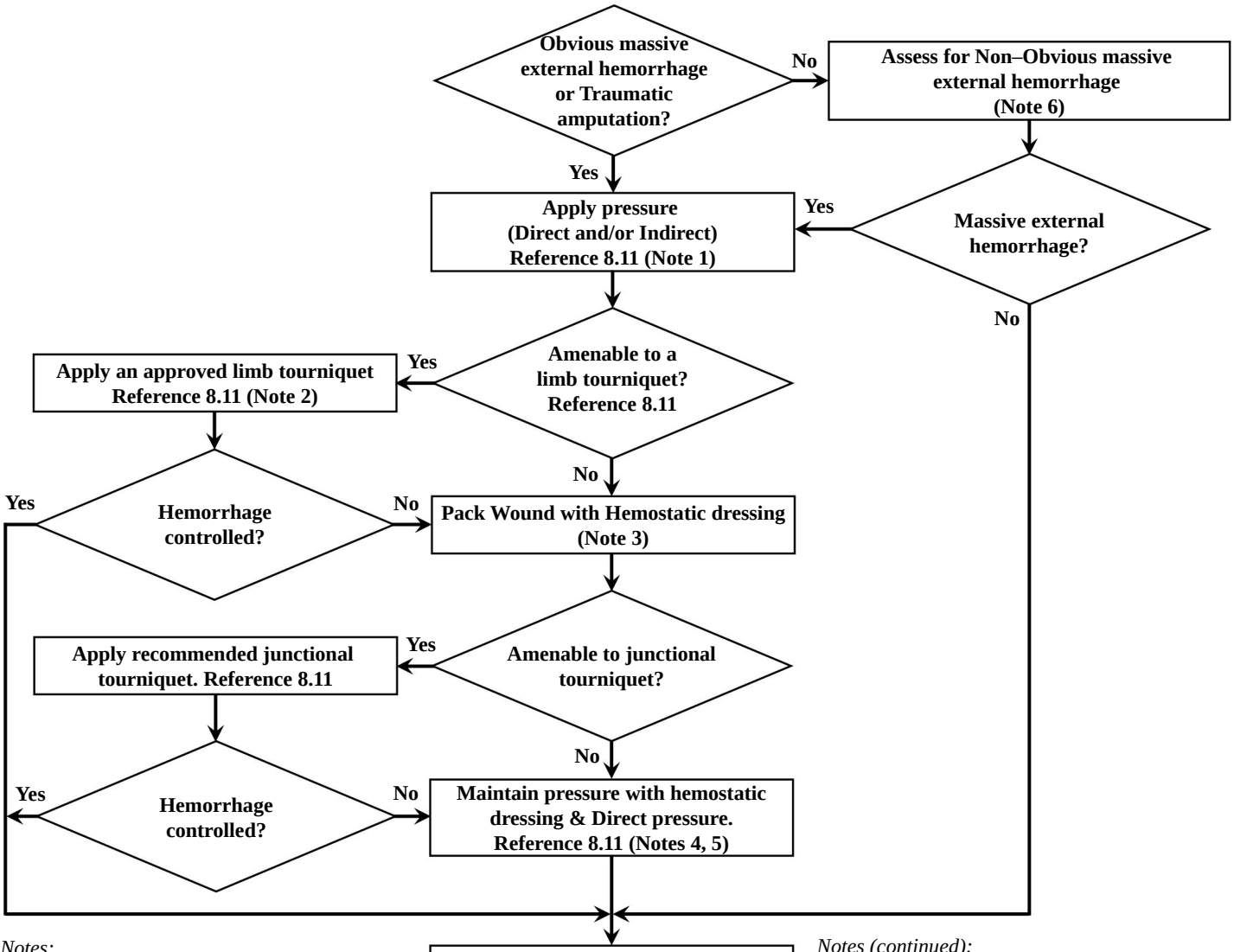
SECTION 3: TRAUMA PROTOCOLS

This section covers the protocols and procedures for:

3.1 Massive External Hemorrhage
3.2 Tourniquet Assessment, Conversion and Removal
3.3 Hemorrhagic Shock
3.4 Tranexamic Acid (TXA)
3.5 Burn Management
3.6 Pain
3.7 Concussion (mTBI) Management
3.8 Eye Injury
3.9 Chest Trauma Management (Class B RQ Pte)
3.10 Severe TBI
3.11 Other Sources of External Hemorrhage

Implementation of all protocols assumes that patient assessment and treatment are ongoing throughout the incident.

3.1 Massive External Hemorrhage – Class A



Notes:

1. *If direct pressure is effective in controlling all life threatening hemorrhage, assess airway. If airway is compromised, hemorrhage control and airway management should be done concurrently with additional help if available.*
2. *A 2nd TQ, and in some cases 3rd TQ, may be required to control the hemorrhage before moving to hemostatic dressing. Refer to Reference 8.11 Assessing & Treating Hemorrhage.*
3. *Packing should not be done on wound in the abdominal, thoracic or cranial cavity.*
4. *If hemostatic dressing fails to control bleeding after adequate pressure, remove hemostatic dressing and attempt a 2nd application with new hemostatic dressing.*
5. *Manual pressure should be maintain for 5 min then secure with a pressure dressing. If hemostatic dressing is not available, use plain gauze and maintain pressure for 10 min.*

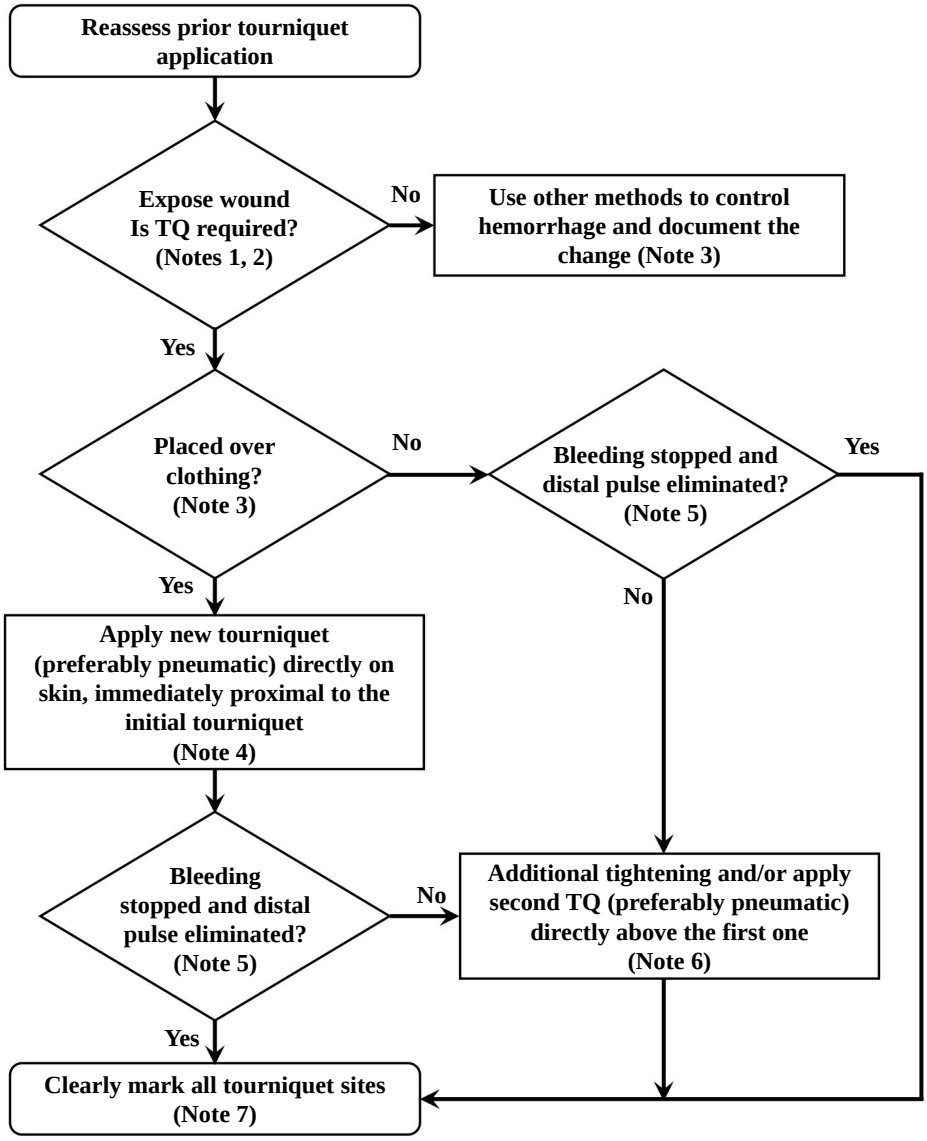
Notes (continued):

6. *The assessment should start at the inguinal region, both legs, the neck, axilla and then both arms.*
7. *If the bleeding from a wound that is of significant rate in the opinion of the Medical Technician enough to compromise the hemodynamic status of the patient immediately or in the near future without treatment, refer to Protocol 3.11 Other Sources of Significant Hemorrhage.*
8. *Needs to be applied before moving the casualty. Indications for pelvic binder:*
   a. *Penetrating or blunt pelvic trauma;*
   b. *Unexplained hypotension in suspected or known blunt or blast trauma;*
   c. *Blast injury with lower limb amputation or partial amputation;*
   d. *Complaints of pelvic pain or pelvis tenderness on examination.*

3.2 Tourniquet Assessment, Conversion & Removal – Class A

Conditions under which a Limb Tourniquet <u>may</u> be considered for Conversion/Removal:

- *Effective hemorrhage control can be continuously maintained by other means;*
- *To replace a strap style tourniquet with a pneumatic tourniquet when there is a minimal risk of puncture;*
- *To replace a tourniquet that was placed over clothing during CUF.*



Notes:

1. *Contraindications for conversion of a Limb Tourniquet (TQ) to a hemostatic dressing and/or pressure dressing:*
   a. *Complete amputation;*
   b. *Casualty is in hemorrhagic shock or has decreased level of consciousness presumed secondary to hemorrhagic shock;*
   c. *The tourniquet has been on for ≥ 4 hours;*
   d. *If you cannot monitor the limb continuously for re-bleeding;*
   e. *Bleeding cannot be controlled by other means.*
2. *Every effort should be made to convert tourniquets in less than 2 hours **<u>if</u>** bleeding can be controlled by other means.*
3. *If the Tourniquet was placed over clothing or is **<u>not</u>** required, refer to Procedure 7.12 Tourniquet Assessment, Conversion & Removal Sequence.*
4. *Do not apply a Tourniquet over a joint. If a Tourniquet needs to be applied above the knee, apply-it at least 5 cm (2 inches) above the medial femoral condyle to avoid the adductor hiatus. For an initial TQ applied "high and tight", over clothing during CUF, apply the new TQ on skin, 2-3 inches above the wound. For Tourniquet Removal or Conversion, refer to Procedure 7.12.*
5. *Bleeding from bone marrow is normal and not indicative of tourniquet ineffectiveness. Slow bleeding from the marrow should be controlled with dressing and elevation.*
6. *If Hemorrhage is still active where 2 tourniquets have been applied to a lower limb (below the elbow or knee), a 3rd tourniquet above the knee/elbow is indicated before proceeding to other hemorrhage control means. Refer to Protocol 3.1 Massive Hemorrhage.*
7. *Clearly mark all Tourniquet sites with the time of application. Note on casualty documentation: Tourniquet application site and time of application; Time of re-application (if removed and re-applied); Time of conversion; Time of removal.*

3.3 Hemorrhagic Shock – Class A

Indications:

- ***Adult trauma patient*** *with clinical evidence of significant hemorrhage:*
  - *SBP < 90 or;*
  - *HR > 110 or;*
  - *Both and/or;*
  - *Loss of Radial Pulse.*
- ***Pediatric trauma patient*** *with clinical evidence of significant hemorrhage:*
  - *BP < 70 mmHg + 2x age in years.*
- ***Injury patterns*** *predictive of need for transfusion/ressuscitation (Note 1).*

Aggressive Hemorrhage Control Protocol 3.1 Massive External Hemorrhage (Note 2)

↓

Basic Airway Management (Airway Algorithm 2.1) Respiratory Management (Chest Trauma Protocol 3.9)

↓

Cooling Prevention and Litter Placement

↓

Establish IV/IO access

Pediatric

↓

20 ml/kg NS IV/IO bolus (Note 7)

↓

Initiate Rapid Transport and Contact MO/PA

Adult

↓

(TXA Protocol 3.4) (Note 3)

↓

Prioritize Rapid Evacuation for Initiation of Damage Control Resuscitation (DCR) to Include Blood Product Administration (Note 4)

↓

RL or NS 250 ml bolus, titrated to BP 90 mmHg or return of radial pulse (Note 5) (Except in suspected severe TBI; Note 6)

↓

Initiate Hypothermia Management (Hypothermia 5.1)

↓

Consider Urinary Catheterization in Prolonged Evac (Procedure 7.8)

N.B.:

Mitigate the "Lethal Triad":

- *Coagulopathy;*
- *Acidosis;*
- *Hypothermia.*

Notes:

1. *Proximal/Bilateral/Multiple amputations; Clinically obvious penetrating injury to the chest or abdomen; Uncontrolled truncal or junctionnal bleeding; Uncontrolled major bleeding secondary to large soft tissue injuries; Mangled extremity; Clinical signs of coagulopathy (e.g.: Paucity of clots or petechial bleeding); and/or Severe Hypothermia in the trauma patient.*
2. *For Hemorrhagic Shock classes, refer to Reference 8.5 Classification of Hemorrhagic Shock.*
3. *The IV/IO line needs to be completely flushed with NS after TXA administration (before administration of blood products).*
4. *Blood Products include Whole Blood, Component Therapy, and Fractionated Blood Products (e.g. Fibrinogen Concentrate).*
5. *After the first bolus, if the patient is responding positively or does not demonstrate deterioration attributable to increased hemorrhage, serial boluses of 250 ml LR or NS (up to 1L maximum) can be given. Assess patient response between each bolus.*
6. *If severe TBI is suspected, refer to sTBI Protocol 3.10 for fluid type and target BP.*
7. *Permissive Hypotension should not be utilized in the pediatric population.*

3.4 Tranexamic Acid (TXA) – Class A (RQ Cpl and above)

Indications:
- *Adult trauma patient with clinical evidence of significant hemorrhage (SBP < 90 or HR > 110 or both).*
- *To be administered as soon after injury as feasible.*

Cautions:
- *Delivery of TXA should never delay evacuation of casualty.*
- ***Maximum Dosage: 2 grams**.*

Hemorrhagic Shock Protocol 3.3

↓

Draw up 2 gm of TXA (1 gm/10 ml) in a 20 ml syringe

↓

Give 2 gm (20 ml) IV/IO slow push (Note 1)

↓

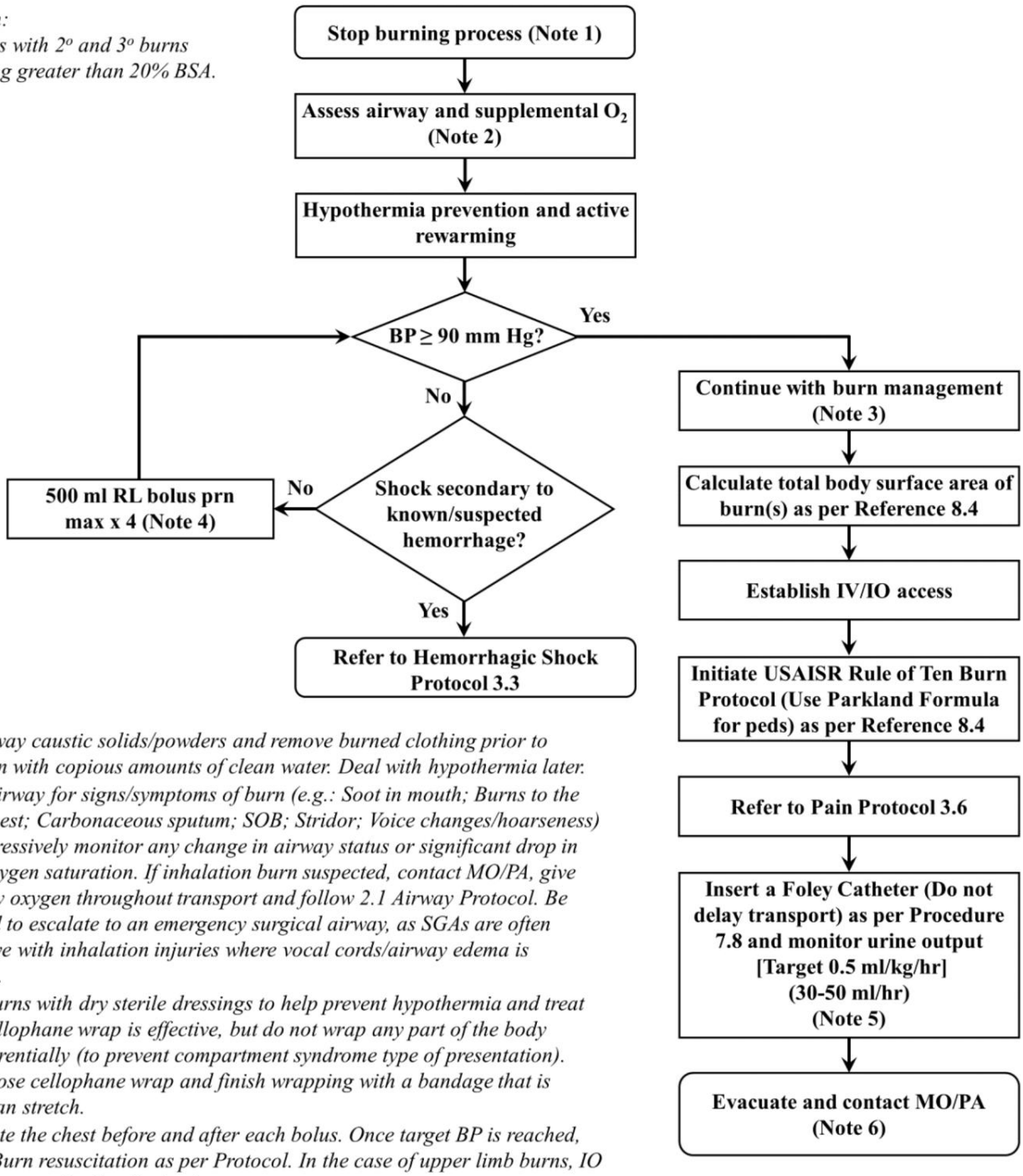
Reassess Patient

Contra-indications:
- *Documented allergy to TXA.*
- *> 3 hrs after initial injury.*

Note:
1. Watch for allergic reaction.

3.5 Burn Management – Class A

Indication:
- *Patients with 2º and 3º burns covering greater than 20% BSA.*



Notes:

1. *Brush away caustic solids/powders and remove burned clothing prior to irrigation with copious amounts of clean water. Deal with hypothermia later.*
2. *Assess airway for signs/symptoms of burn (e.g.: Soot in mouth; Burns to the upper chest; Carbonaceous sputum; SOB; Stridor; Voice changes/hoarseness) and aggressively monitor any change in airway status or significant drop in blood oxygen saturation. If inhalation burn suspected, contact MO/PA, give high flow oxygen throughout transport and follow 2.1 Airway Protocol. Be prepared to escalate to an emergency surgical airway, as SGAs are often ineffective with inhalation injuries where vocal cords/airway edema is common.*
3. *Cover burns with dry sterile dressings to help prevent hypothermia and treat pain. Cellophane wrap is effective, but do not wrap any part of the body circumferentially (to prevent compartment syndrome type of presentation). Apply loose cellophane wrap and finish wrapping with a bandage that is elastic/can stretch.*
4. *Auscultate the chest before and after each bolus. Once target BP is reached, initiate Burn resuscitation as per Protocol. In the case of upper limb burns, IO access may need to be obtained.*
5. *For Prolonged Field Care, fluid resuscitation should be titrated to maintain urinary output (30-50 ml/hr or 0.5 ml/kg/hr). If UOP < 30 ml/hr, increase volume by 25% for the next hour and reassess. If UOP > 50 ml/hr, decrease IV fluid by 25% for the next hour and reassess.*
6. *Antibiotics are not normally used as a prophylactic treatment in the absence of open wounds. If cellulitis develops after several days, contact MO/PA.*

3.6 Pain – Class A / Class B with OTFC, Ketamine

Indication:
- *Management of pain in trauma patients (Note 1).*

Cautions:
- *Severe chest injuries.*
- *Blunt or penetrating head trauma.*

Assess patient
Evaluate pain cause and severity

Consider initiating saline lock/IV

N.B.: For all patients given opioids or ketamine, closely monitor airway, breathing and circulation, reassessing frequently. If respirations are noted to be reduced after administration, provide ventilatory support with BVM.

Child 4-16 years (Note 2)

Ibuprofen
10 mg/kg PO q8h prn
and/or
Acetaminophen
15 mg/kg PO q6h prn
(Note 3)

Adult (>16 years) Moderate to Severe Pain

Patient in shock, respiratory distress or at significant risk of either?

Yes (or No)

RQ Cpl and Above
Ketamine 25 mg IV/IO (over 1 min) q20min prn x 4 doses in 2 hours max
or
Ketamine 50 mg IM or IN with atomizer q30min prn x 2 doses total
(Notes 3, 6, 7, 8)

No

Oral transmucosal fentanyl citrate (OTFC)
800 µg transbucally
May repeat with second lozenge after 15 mins
(Note 3, 4)

OR

Morphine 2.5 mg IV/IO (over 1 min) q5min prn
or
Morphine 10 mg IM q30min prn
(Notes 3, 4, 5)

Adult (>16 years) Mild to Moderate Pain

Ibuprofen
800 mg PO q8h prn
or
Meloxicam
15 mg PO once
and/or
Acetaminophen
1 g PO q6h prn (Note 3)

Pain completely controlled?

No

Yes

For opiate or ketamine induced nausea/vomiting:
Ondansetron 8 mg IV/IM/PO q8h prn
or
Dimenhydrinate 50 mg IV/IM/PO q4h prn

Contact MO/PA and Evac

Notes:

1. For pain of a non-traumatic etiology (medical pain), consult relevant protocol (e.g. Protocol 1.1 Chest Pain) or consult MO/PA. For management of non-acute, mild pain, refer to Scope of Practice.

2. If < 4 years of age or for severe pain in the child patient (4-16 years of age), contact MO/PA.

3. For incomplete pain control of moderate/severe pain or where more potent meds are not indicated / available, Ibuprofen, Meloxicam or Acetaminophen can be used as an adjunct. Ibuprofen and other nonsteroidal anti-inflammatory drugs (NSAIDs) other than Meloxicam should be avoided in hemorrhage. Meloxicam and Acetaminophen are preferred in bleeding patients as they DO NOT interfere with platelet function.

4. Have Naloxone available and be prepared to assist respirations following administration. Refer to Protocol 4.1 – Narcotic Overdose.

Notes (Continued):

5. IV/IO Morphine should be titrated to effect but is not to exceed 15 mg in 30 mins. Otherwise there is no absolute max dose. IM Morphine should only be considered as a last resort when IV access or other analgesics are unavailable.

6. Endpoint: Pain control or nystagmus. Ketamine may be added to patients who have received opiates with incomplete pain control. Monitor for increased secretions or transient laryngospasm and be prepared to reposition airway, suction or use BVM.

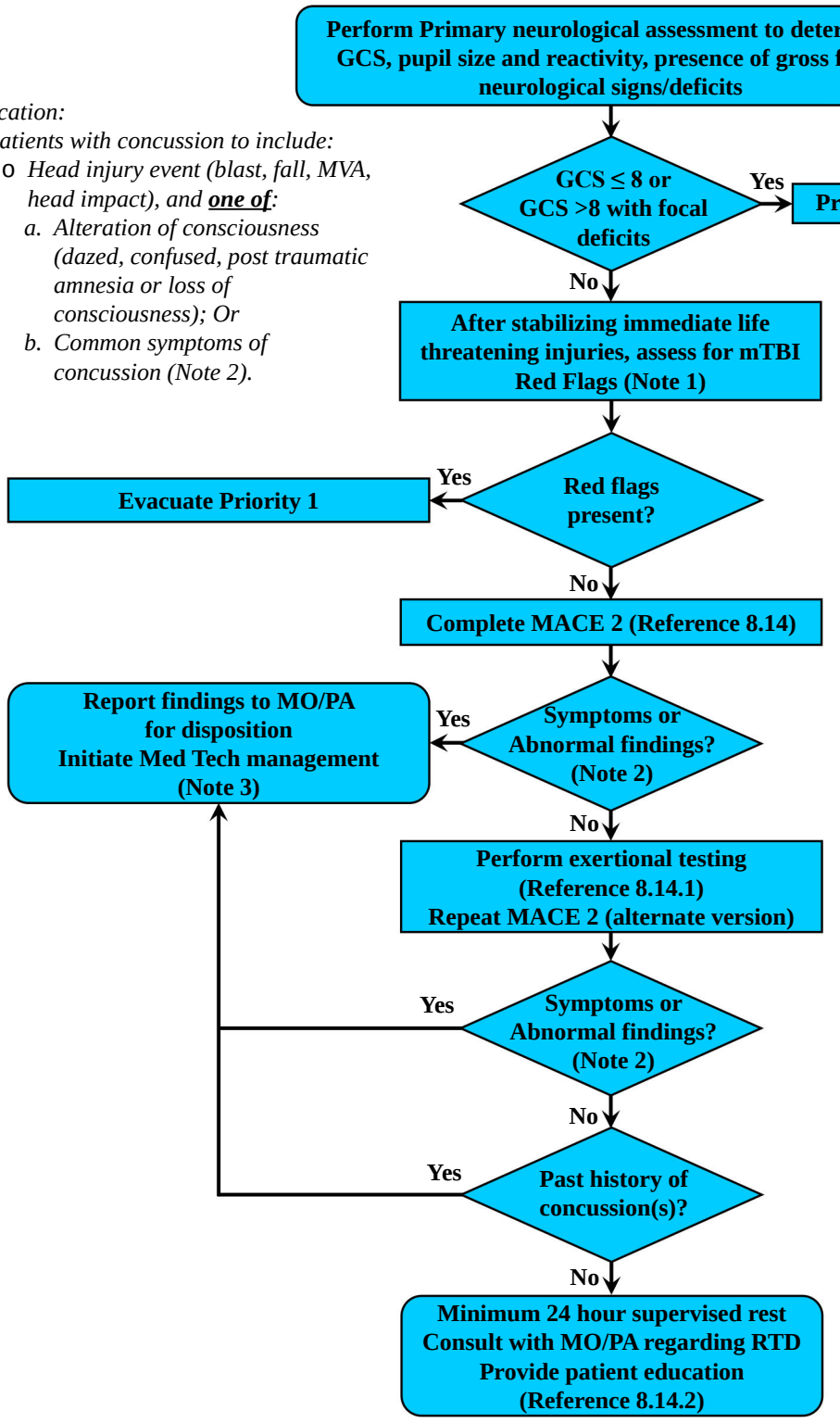
7. Treat emergence / recovery reactions with Midazolam 2 mg IV/IO/IM q10min prn x 4 doses max (refer to 8.15 Pain Management).

8. For Ketamine preparation, dilution and administration (including IN), refer to Reference 8.15 Pain Management.

3.7 Concussion (mTBI) Management – Class B

Indication:

- *Patients with concussion to include:*
  - *Head injury event (blast, fall, MVA, head impact), and **one of**:*
    - *a. Alteration of consciousness (dazed, confused, post traumatic amnesia or loss of consciousness); Or*
    - *b. Common symptoms of concussion (Note 2).*



Note 1 Red Flags for mTBI Concussion:

1. **ANY loss of consciousness**
2. **Severe/worsening headache**
3. **GCS <15**
4. **Seizure(s) with current event**
5. **Repeated vomiting**
6. **Declining neurological status**
7. **Signs/Symptoms of basilar skull fracture: Hemotympanum; Racoon eyes; Battle's sign; Otorrhea; rhinorrhea**
8. **Pupil asymmetry**
9. **Abnormal speech**
10. **Double vision**
11. **Weakness/Numbness in arms, legs or face**
12. **Any post traumatic amnesia**
13. **Unusual behaviour**

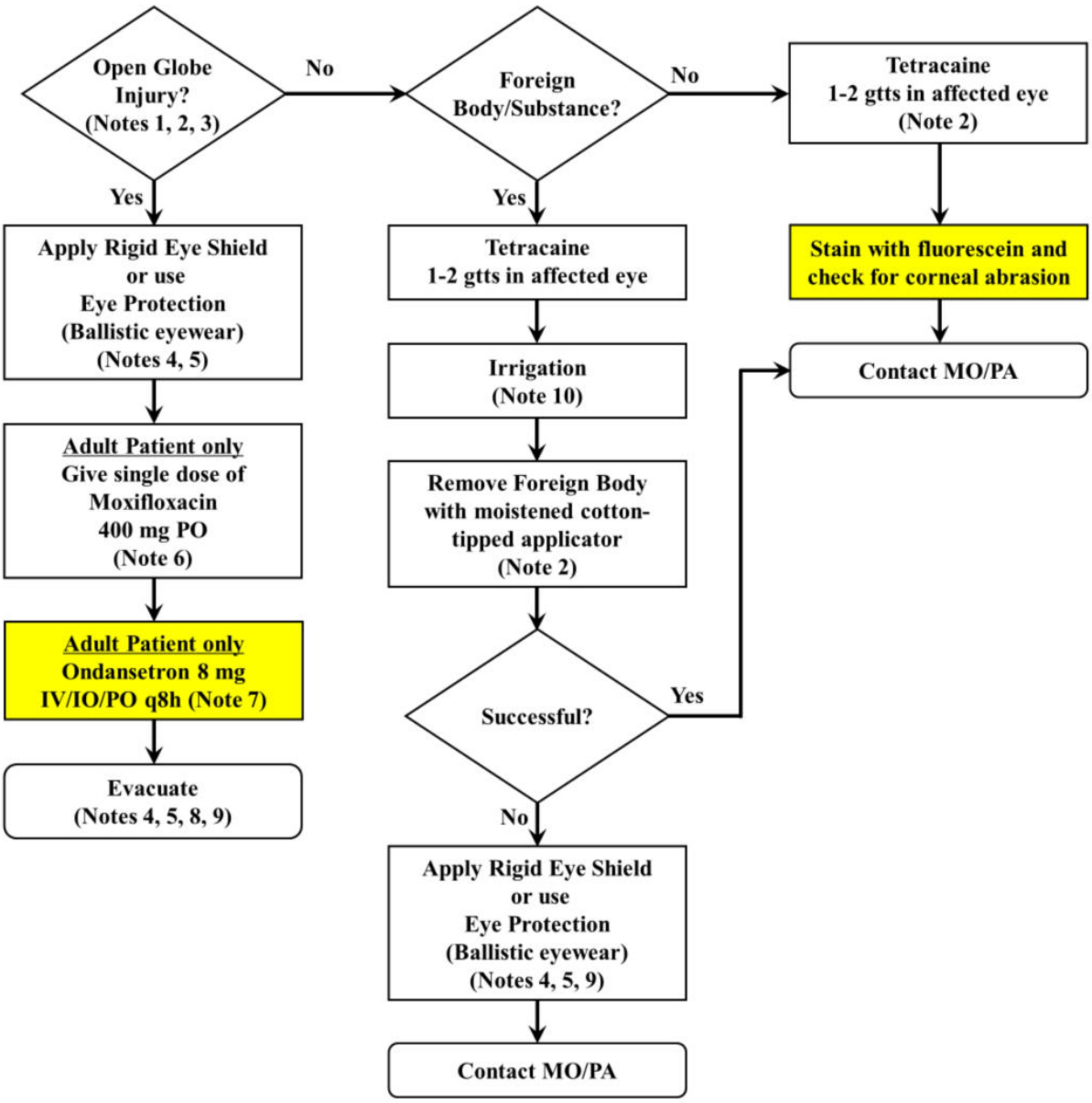
Note 2 Common Symptoms of Concussion:

1. **Headache**
2. **Irritability**
3. **Sleep disturbance**
4. **Fatigue**
5. **Difficulty concentrating**
6. **Dizziness**
7. **Photo/Phonophobia**

Note 3 Med Tech Management:

1. **Headache management as per Pain Protocol**
2. **Hydration**
3. **Rest (Reduced stimulus)**
4. **Reassess every 6 hours for a minimum of 24 hours**
5. **Provide regular updates to MO/PA**

3.8 - Eye Injury – Class A



Notes:

1. *There are 2 mechanisms for an open globe injury:*
   - *Laceration from penetrating or perforating trauma;*
   - *Ruptured globe from blunt trauma (e.g.: Collapsed or severely distorted eye; Open wound, full-thickness corneal or scleral laceration; Prolapse of intraocular contents outside the eye [Dark tissues are iris or uveal tissues]; Peaked or irregular pupil; Shallow anterior chamber).*
2. *Assess and document visual acuity when possible. Remove contact lenses if present.*
3. *Refer to Reference 8.8 Eye Trauma Principles and Management.*
4. *Elevate the head 30 degrees if possible.*
5. *Avoid manoeuvers that increase intraocular pressure (No Valsalva manoeuvers or nose blowing).*
6. *If unable to tolerate oral medication or allergic to Moxifloxacin, refer to Antibiotic Protocol 4.3 (RQ Cpl & above).*
7. *Treat nausea and vomiting aggressively with Ondandetron (RQ Cpl & above).*
8. *Evacuation for urgent surgical repair within 4 hrs (evac vs triage).*
9. *Nothing to eat or drink.*
10. *For chemical injury, irrigate immediately and copiously unless there is an open globe injury.*

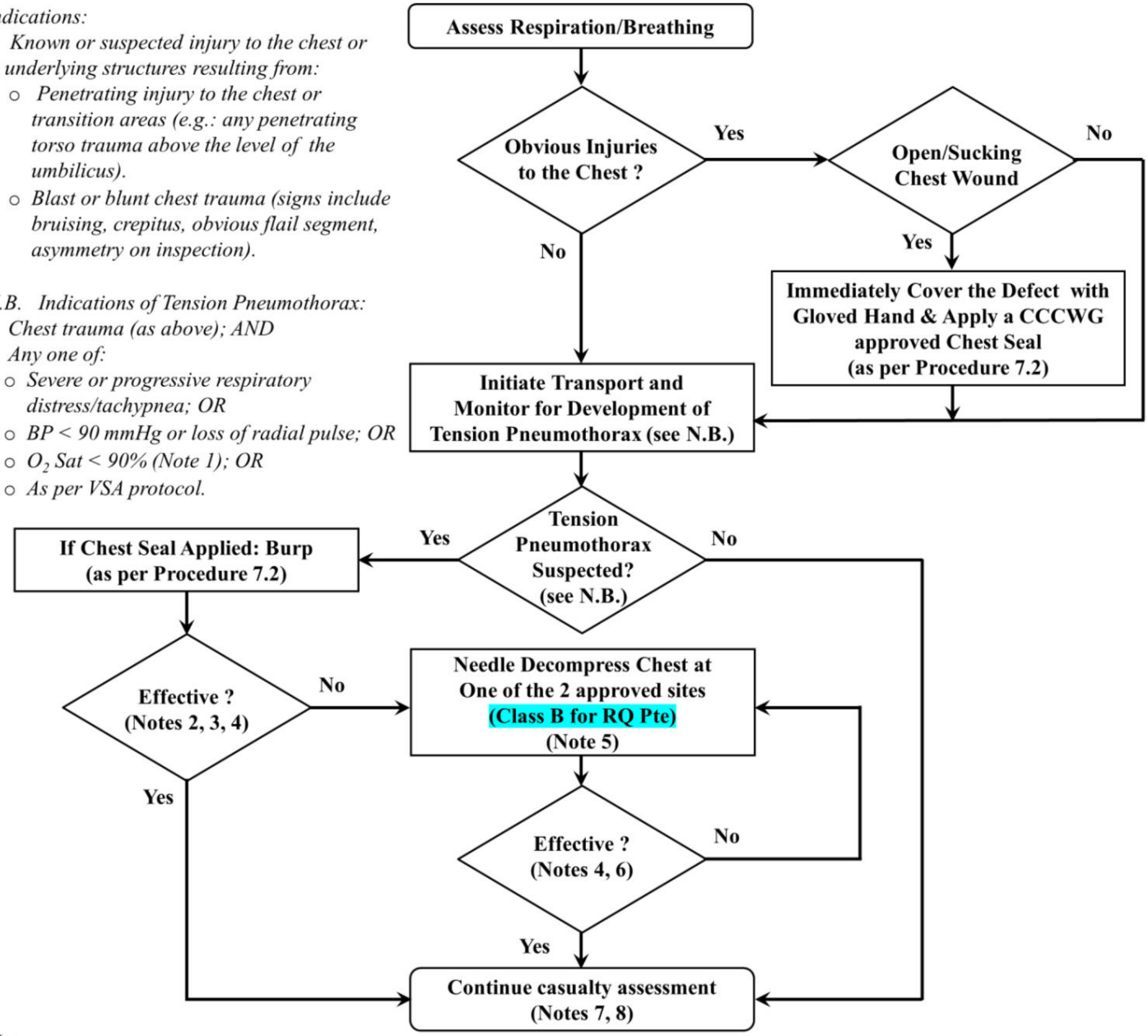
3.9 Chest Trauma Management – Class A (RQ Cpl and above), Class B (RQ Pte – ND Only)

Indications:

- *Known or suspected injury to the chest or underlying structures resulting from:*
  - *Penetrating injury to the chest or transition areas (e.g.: any penetrating torso trauma above the level of the umbilicus).*
  - *Blast or blunt chest trauma (signs include bruising, crepitus, obvious flail segment, asymmetry on inspection).*

N.B. Indications of Tension Pneumothorax:

- *Chest trauma (as above); AND*
- *Any one of:*
  - *Severe or progressive respiratory distress/tachypnea; OR*
  - *BP < 90 mmHg or loss of radial pulse; OR*
  - *O_2 Sat < 90% (Note 1); OR*
  - *As per VSA protocol.*



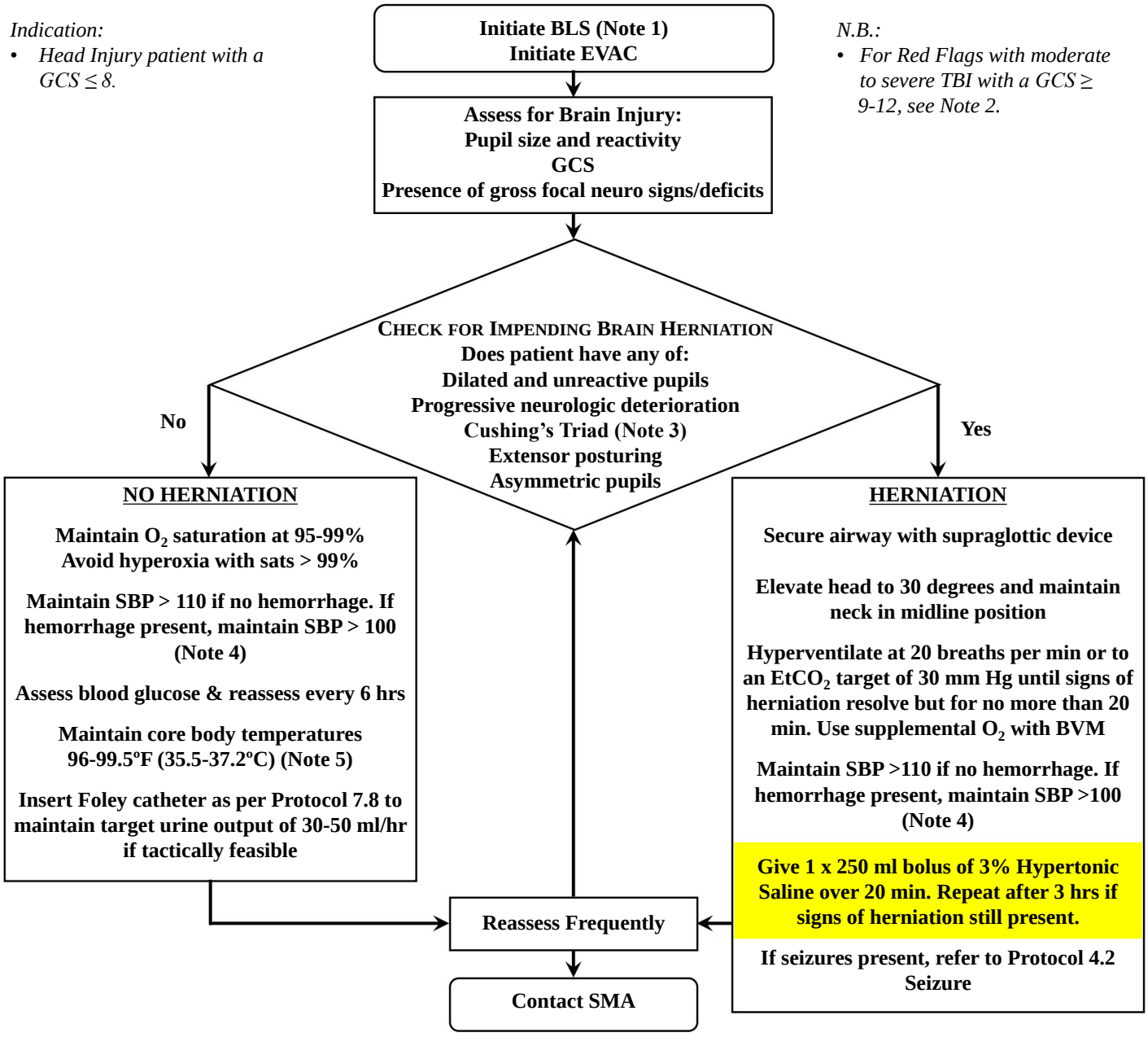
Notes:

1. *Hypoxia alone is not an accurate indicator of tension pneumothorax. The Med Tech should consider other causes of hypoxia that do not necessitate needle decompression (ND). These include chest wall defects (e.g. flail chest) and/or injuries (pulmonary contusion) to the chest that cause pain or mechanically interfere with proper ventilation. Refer to Chest Trauma Management Procedure 7.2.*
2. *Allow 2 attempts at Burping before changing to needle decompression (ND).*
3. *Burping can be repeated as many times as necessary, as long as it's effective. Refer to Chest Trauma Management Procedure 7.2.*
4. *Indications of a successful/effective decompression (Burp or ND), Refer to Procedure 7.2.*
5. *The 2 approved sites: Anterior Site (2^{nd} intercostal space midclavicular) and lateral site (4^{th} or 5^{th} intercostal space anterior axillary line). Refer to Procedure 7.2.*
6. *If the first ND attempt is not successful, perform a second ND on the same side of the chest, at whichever of the two recommended sites was not previously used. If 2 consecutive NDs have resulted in no clinical improvement, the casualty's presentation may be due to hemorrhagic shock or other conditions, and provider should continue with assessment of circulation.*
7. *If Tension Pneumothorax redevelops, repeat the ND procedure at same site but laterally/posteriorally as applicable.*
8. *Do not delay ND with application of O_2, but if already in place, O_2 flow may be reduced to maintain sat ≥ 92%.*

3.10 Severe TBI – Class A

Indication:
- *Head Injury patient with a GCS ≤ 8.*

N.B.:
- *For Red Flags with moderate to severe TBI with a GCS ≥ 9-12, see Note 2.*

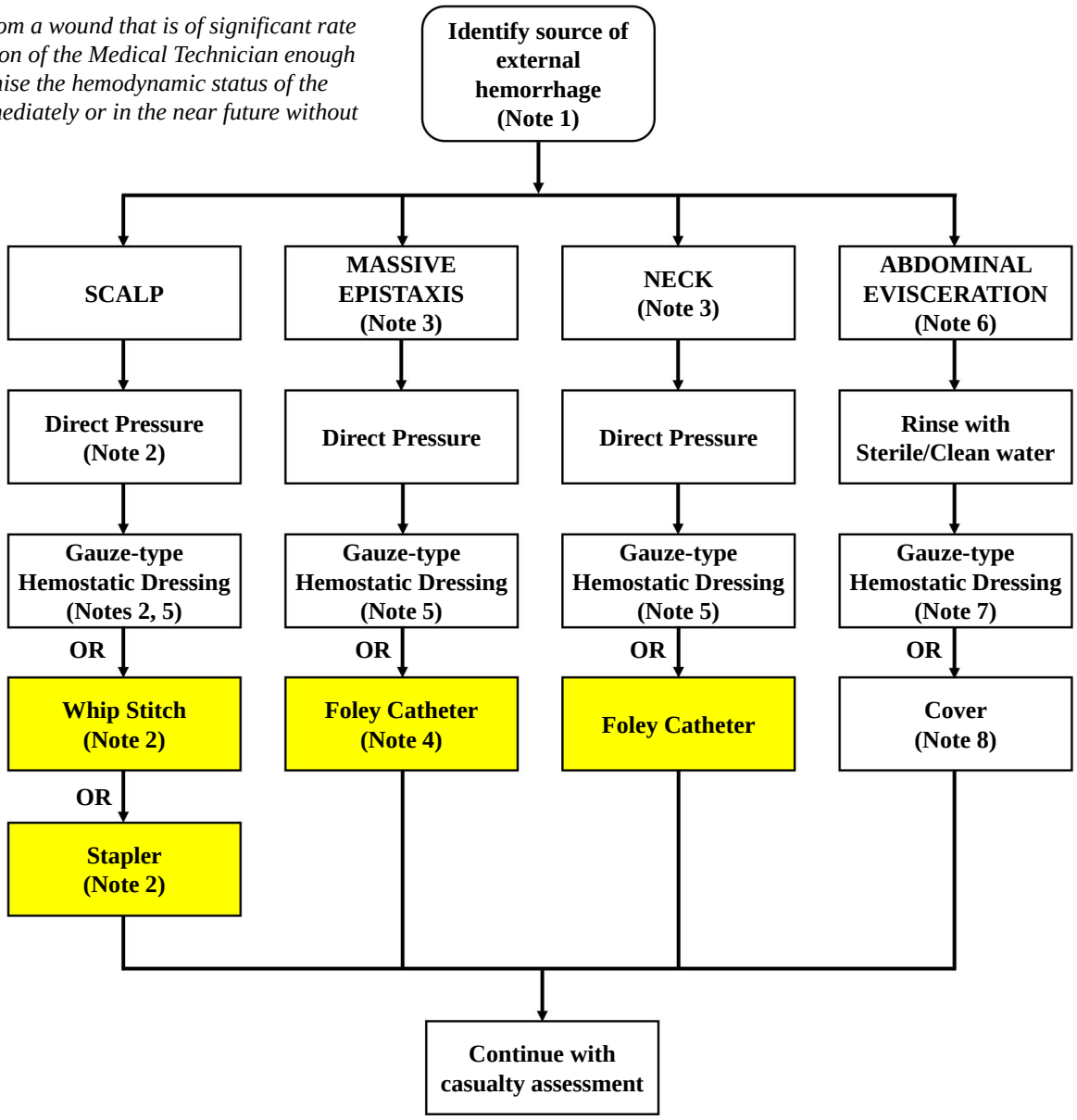


Notes:

1. *C-collar and C-spine precautions need to be considered early. Ensure C-collar does not compress the jugular veins in the neck (could worsen ICP).*
2. *Red flags with moderate to severe TBI with a GCS ≤ 12: Witnessed loss of consciousness; Two or more blasts exposures within 72 hrs; Unusual behaviour or combativeness; Double vision or loss of vision; Weakness on one side of the body; Cannot recognize people or disoriented to place; Worsening headache; Unequal pupils; Seizure; Abnormal speech; Repeated vomiting.*
3. *Cushing's triad (increase systolic pressure (widening pulse pressure); Bradycardia; Irregular respirations) is a physiologic response that can occur with elevated ICP, resulting in medullary compression. While a late finding, it should be viewed as a sign of cerebral herniation.*
4. *Target SBP without hemorrhage is > 110 (bolus of 250 ml NS prn x 4 max, goal is to maintain SPB > 110). If known or suspected hemorrhage, target SBP is > 100 (bolus of 250 ml NS prn x 4 max, goal is to maintain SPB > 100). Avoid Ringer's Lactated as it can exacerbate brain swelling.*
5. *Hypothermia is part of the Lethal Trauma Triad and should be avoided in multitrauma (refer to 5.1 Hypothermia). Hyperthermia will increase cerebral metabolism and may increase ICP (refer to 5.2 Hyperthermia for cooling methods).*

3.11 Other Sources of External Hemorrhage - Class A

Indication:
Bleeding from a wound that is of significant rate in the opinion of the Medical Technician enough to compromise the hemodynamic status of the patient immediately or in the near future without treatment.



Notes:

1. *Refer to Reference 8.11 Assessing and Treating Hemorrhage.*
2. *In significant hemorrhage from scalp laceration with suspected underlying depressed skull fracture, do not pack wound or perform wound closure with sutures/staples. Attempt to control hemorrhage with dressing (not packing) avoiding excessive pressure. If evacuation is delayed/prolonged or experiencing difficulty managing the hemorrhage, contact MO/PA for guidance.*
3. *Airway and hemorrhage must be managed concurrently.*
4. *Avoid if suspected basal skull fracture.*
5. *If gauze-type hemostatic dressing not available, use plain gauze for packing and apply pressure for 10 minutes.*
6. *For management of significant hemorrhage originating from eviscerated abdominal organs.*
7. *If the source of the bleed can be visualized, use gauze-type hemostatic dressing with 5 minutes of finger clamping. If the source of bleed cannot be visualized, cover the area with gauze-type hemostatic dressing without pressure. <u>Do Not:</u> Reduce bleeding evisceration; close the skin by any means; or pack the abdominal cavity.*
8. *Gently cover exposed bowel with a moist, sterile dressing or sterile water-impermeable covering (e.g.. Saran Wrap). Prevent evaporative cooling as exposed abdominal contents will result in more rapid heat loss.*

SECTION 4: MEDICAL PROTOCOLS

This section covers the protocols and procedures for:

4.1 Narcotic Overdose – Adult (Suspected)
4.2 Seizure
4.3 Antibiotic (Class B RQ Pte)
4.4 Hostile/Violent Patient
4.5 Hypoglycemic Emergency
4.6 Unconscious Patient NYD

Implementation of all protocols assumes that patient assessment and treatment are ongoing throughout the incident.

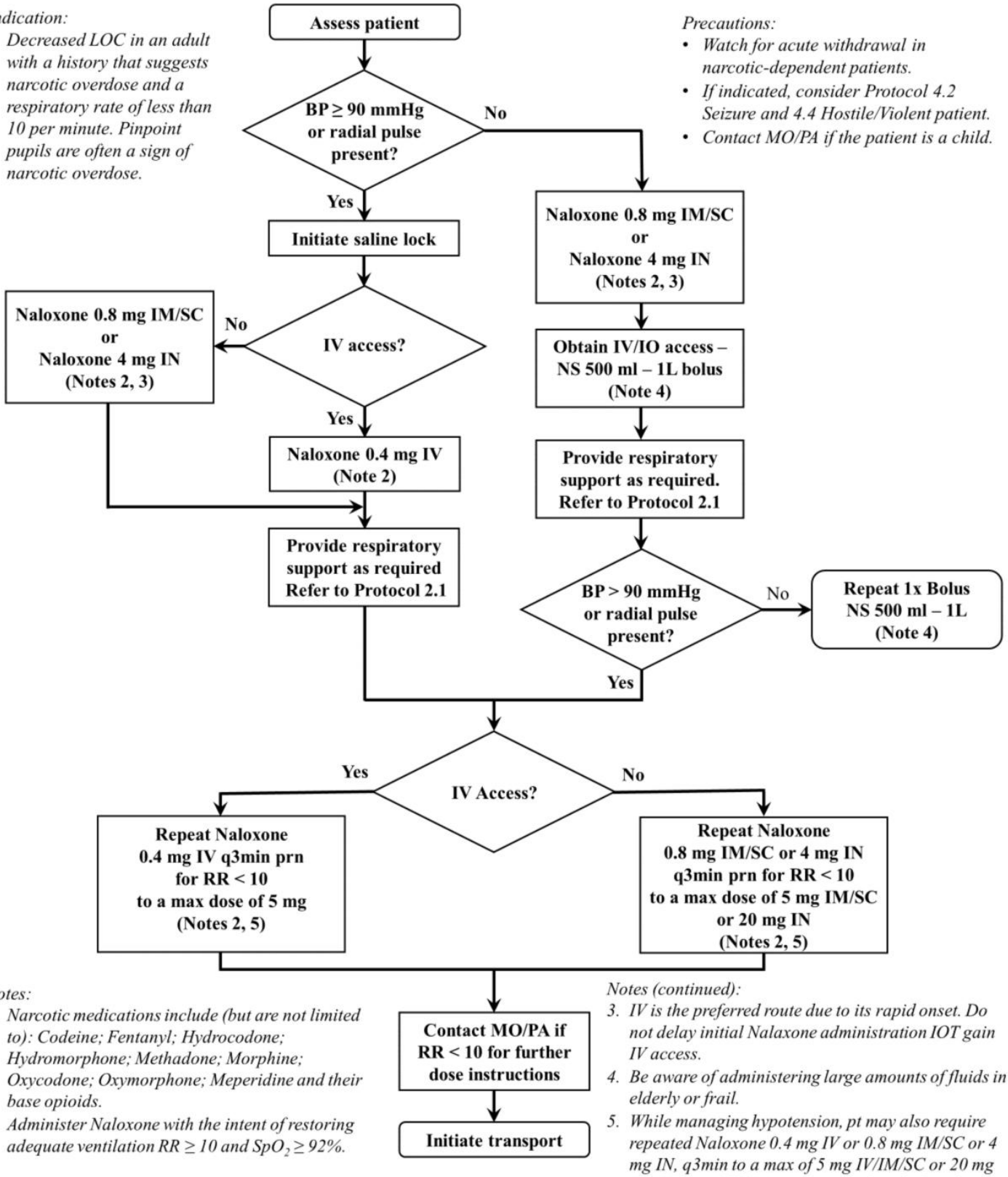
4.1 Narcotic (Note 1) Overdose - Adult (Suspected) - Class A

Indication:

- *Decreased LOC in an adult with a history that suggests narcotic overdose and a respiratory rate of less than 10 per minute. Pinpoint pupils are often a sign of narcotic overdose.*

Precautions:

- *Watch for acute withdrawal in narcotic-dependent patients.*
- *If indicated, consider Protocol 4.2 Seizure and 4.4 Hostile/Violent patient.*
- *Contact MO/PA if the patient is a child.*



Notes:

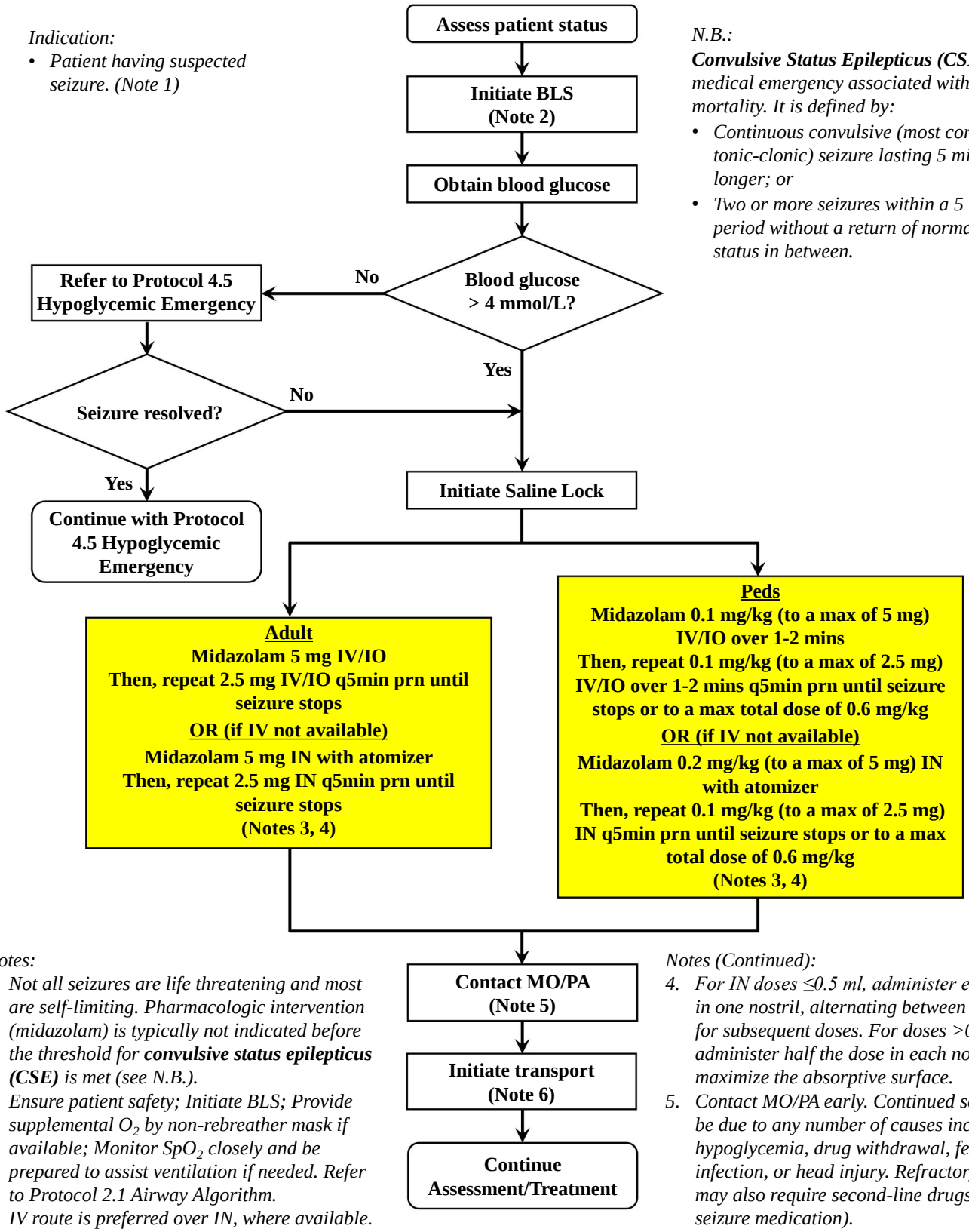
1. *Narcotic medications include (but are not limited to): Codeine; Fentanyl; Hydrocodone; Hydromorphone; Methadone; Morphine; Oxycodone; Oxymorphone; Meperidine and their base opioids.*
2. *Administer Naloxone with the intent of restoring adequate ventilation RR ≥ 10 and $SpO_2 \geq 92\%$.*

Notes (continued):

3. *IV is the preferred route due to its rapid onset. Do not delay initial Nalaxone administration IOT gain IV access.*
4. *Be aware of administering large amounts of fluids in elderly or frail.*
5. *While managing hypotension, pt may also require repeated Naloxone 0.4 mg IV or 0.8 mg IM/SC or 4 mg IN, q3min to a max of 5 mg IV/IM/SC or 20 mg IN. Contact MO/PA early and before further dosing.*

4.2 Seizure - Class A

Indication:
- *Patient having suspected seizure. (Note 1)*



N.B.:
***Convulsive Status Epilepticus (CSE)** is a medical emergency associated with high mortality. It is defined by:*
- *Continuous convulsive (most commonly tonic-clonic) seizure lasting 5 minutes or longer; or*
- *Two or more seizures within a 5 minute period without a return of normal mental status in between.*

Notes:
1. *Not all seizures are life threatening and most are self-limiting. Pharmacologic intervention (midazolam) is typically not indicated before the threshold for **convulsive status epilepticus (CSE)** is met (see N.B.).*
2. *Ensure patient safety; Initiate BLS; Provide supplemental O_2 by non-rebreather mask if available; Monitor SpO_2 closely and be prepared to assist ventilation if needed. Refer to Protocol 2.1 Airway Algorithm.*
3. *IV route is preferred over IN, where available. Do not delay treatment once indicated (**CSE**) to establish IV access.*

Notes (Continued):
4. *For IN doses ≤0.5 ml, administer entire dose in one nostril, alternating between the nostrils for subsequent doses. For doses >0.5 ml, administer half the dose in each nostril to maximize the absorptive surface.*
5. *Contact MO/PA early. Continued seizure may be due to any number of causes including hypoglycemia, drug withdrawal, fever, infection, or head injury. Refractory seizure may also require second-line drugs (anti-seizure medication).*
6. *Protect the patient from injury throughout the incident.*

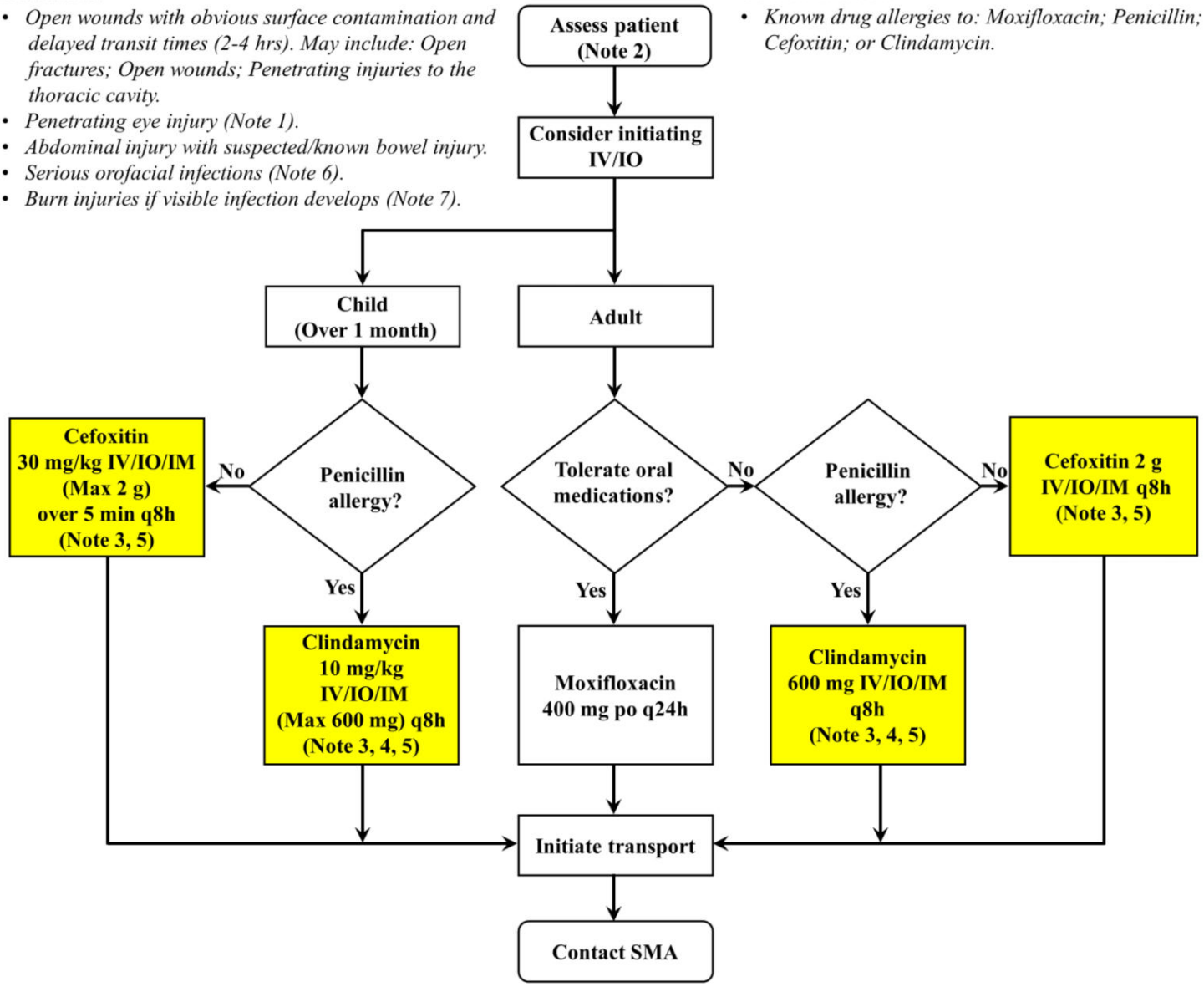
4.3 Antibiotic - Class A (Class B for RQ Pte)

Indications:

- *Open wounds with obvious surface contamination and delayed transit times (2-4 hrs). May include: Open fractures; Open wounds; Penetrating injuries to the thoracic cavity.*
- *Penetrating eye injury (Note 1).*
- *Abdominal injury with suspected/known bowel injury.*
- *Serious orofacial infections (Note 6).*
- *Burn injuries if visible infection develops (Note 7).*

Contraindication:

- *Known drug allergies to: Moxifloxacin; Penicillin; Cefoxitin; or Clindamycin.*

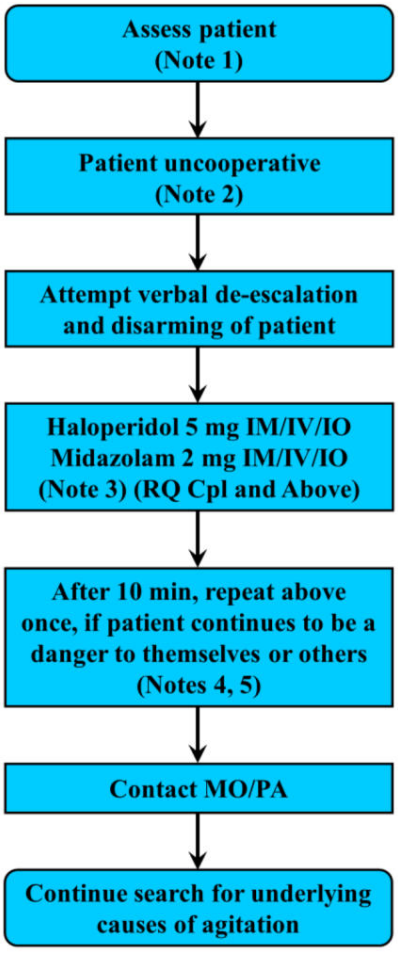


Notes:

1. *Antibiotics should be given ASAP and ideally within 60 minutes of penetrating eye injury.*
2. *Where tactically feasible cleanse wound with copious irrigation (NS) and apply dry, sterile dressing. If NS is not available, clean water can be used. Avoid hypothermia. Do not irrigate an eye injury until a ruptured globe as been excluded as a diagnosis.*
3. *IV administration is preferred if feasible. IM administration, when required should be into a large muscle mass. If IO already established, antibiotics can be delivered by this route.*
4. *Clindamycin is the alternative to Cefoxitin when a patient is allergic to Penicillin.*
5. *See Reference Section 7.6 Calculation, Reconstitution & Dilution.*
6. *Only administer Clindamycin 600 mg IV/IO/IM q8h for adults or 10 mg/kg IV/IO/IM (Max 600 mg) q8h for children (See Note 3).*
7. *Prophylactic antibiotics are not indicated for burn injury in the absence of infection. If cellulitis or invasive burn wound infections develop in a prolonged field care setting, contact SMA.*

4.4 Hostile / Violent Patient – Class B

Indication:
- *Uncontrollable adult patient threatening to harm themselves, others or otherwise jeopardizing safety.*



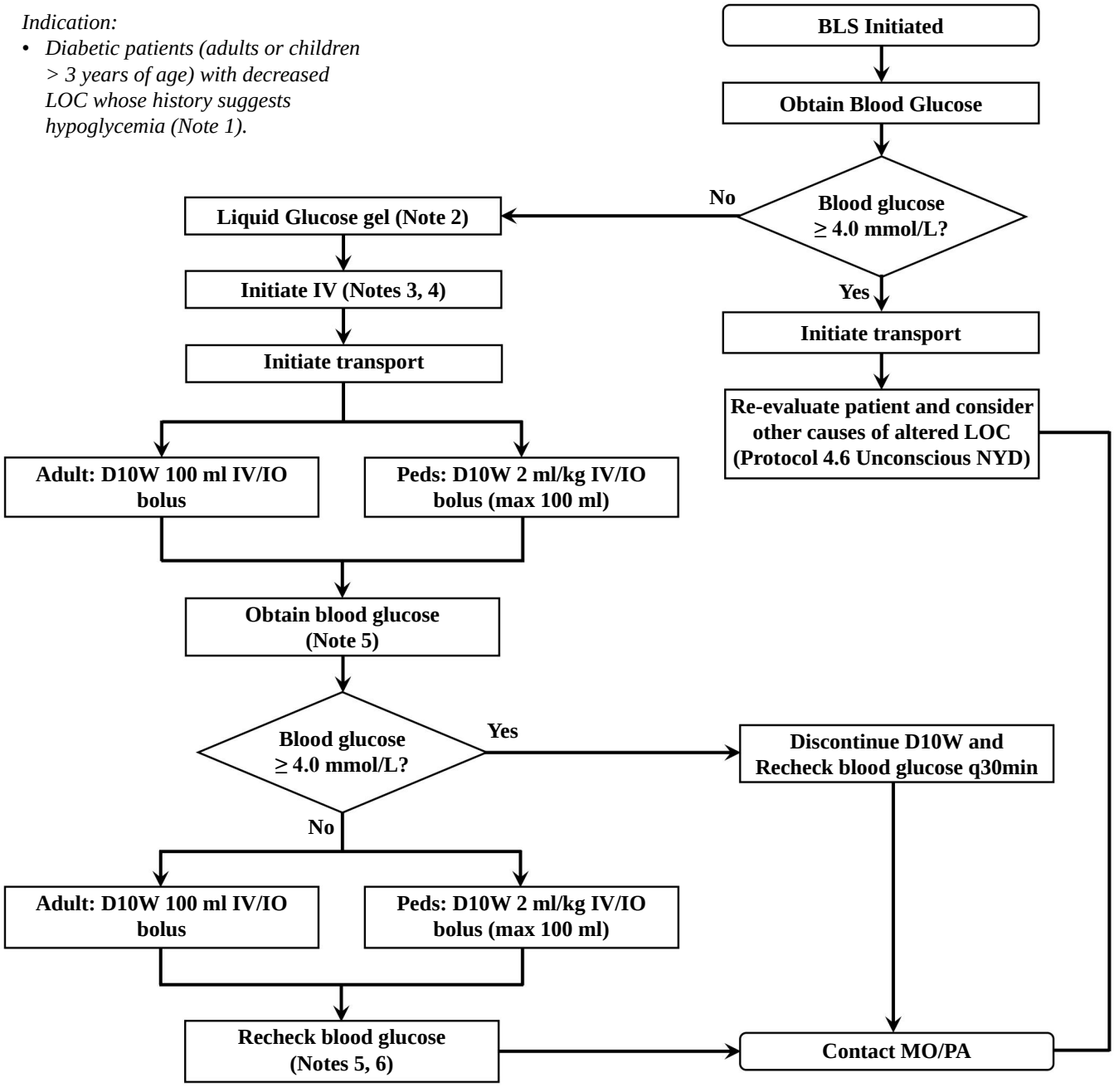
Notes:

1. *Assess for medical causes of agitation including: Hypoglycemia; Hypoxia; Drug overdose/poisoning; Infection; Intracranial lesion; Others.*
2. *Agitation or uncooperativeness alone is not grounds for medical intervention. The need to intervene should be evaluated given appropriate consideration of the situation, the patient's need for care and the degree of risk/threat presented. The provider's safety is a priority. Any attempt at de-escalation and disarming should utilize appropriate/available resources (e.g. Military Police).*
3. *Chemical restraint should only be considered when all other means of de-escalation have failed. Ideally in highly uncooperative patients, there should be 5 people to hold patient in place for IM injection; one for the head and one for each extremity. Haloperidol and Midazolam are compatible when combined in the same syringe.*
4. *Max dose – Haloperidol 10 mg IM/IV/IO, Midazolam 4 mg IM/IV/IO. Monitor for adverse reactions to medications: Haloperidol – dystonic reactions (muscle spasms) may require treatment with Diphenhydramine 50 mg IV/IM q6h; Midazolam and Haloperidol may cause respiratory depression requiring ventilatory support.*
5. *If chemical restraint is unsuccessful, patients may also be physically restrained with non-constrictive padded items around each extremity and pelvis. Ensure patient is restrained face up on their back and continuously monitored. Physical restraint should be performed only as a last resort and by qualified personnel.*

4.5 Hypoglycemic Emergency - Class A

Indication:

- *Diabetic patients (adults or children > 3 years of age) with decreased LOC whose history suggests hypoglycemia (Note 1).*

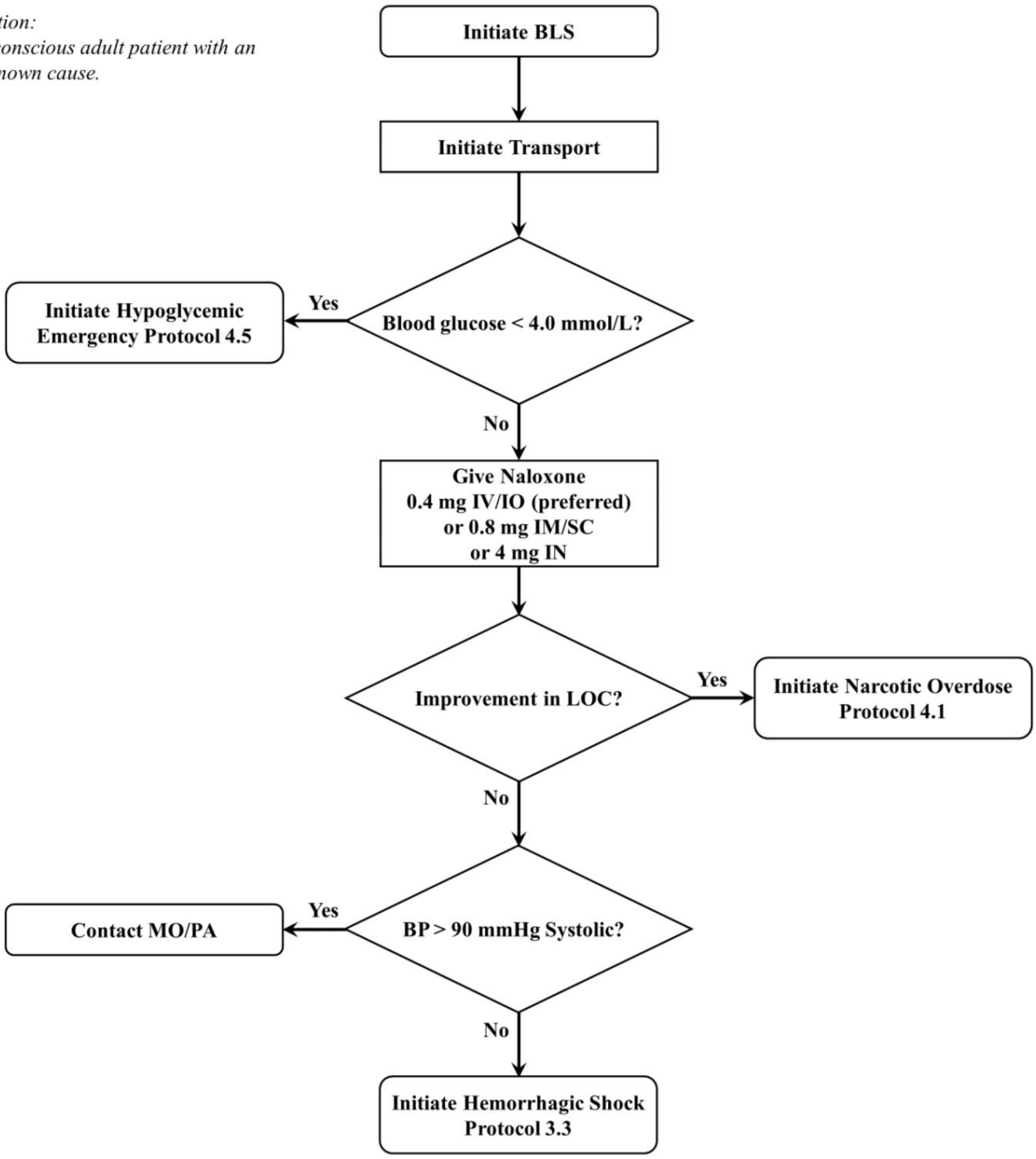


Notes

1. *If under 3 y/o, contact MO/PA.*
2. *Not to be administered to an unconscious patient or a patient that is unable to swallow.*
3. *If unable to obtain IV access, give Glucagon (Baqsimi™) 3 mg intranasally in both adult and pediatric patients. May repeat with second 3 mg intranasal dose after five minutes if inadequate response.* ***When the patient responds, administer oral carbohydrate (e.g. Glucose Gel) to restore liver glycogen to prevent secondary hypoglycemia. Additional effort should be made to gain IV access to provide Dextrose in case of secondary hypoglycemia. If hypoglycemia recurs and still no IV access, consider obtaining IO access to provide Dextrose and contact MO/PA.***
4. *Preferably, apply a saline lock prior to D10W administration.*
5. *After 10 minutes for adults and after 15 to 20 minutes for children.*
6. *For Adult: If blood glucose still < 4.0 mmol/L, reduce flow rate to 100 ml/hr and contact MO/PA. For Children: If blood glucose still < 4.0 mmol/L, convert to saline lock and contact MO/PA.*

4.6 Unconscious NYD – Class A

Indication:
- *Unconscious adult patient with an unknown cause.*



SECTION 5: ENVIRONMENTAL PROTOCOLS

This section covers the protocols and procedures for:

5.1 Hypothermia
5.2 Hyperthermia
5.3 Diving Related Emergencies
5.4 Nerve agent Exposure

Implementation of all protocols assumes that patient assessment and treatment are ongoing throughout the incident.

SECTION 5: ENVIRONMENTAL PROTOCOLS

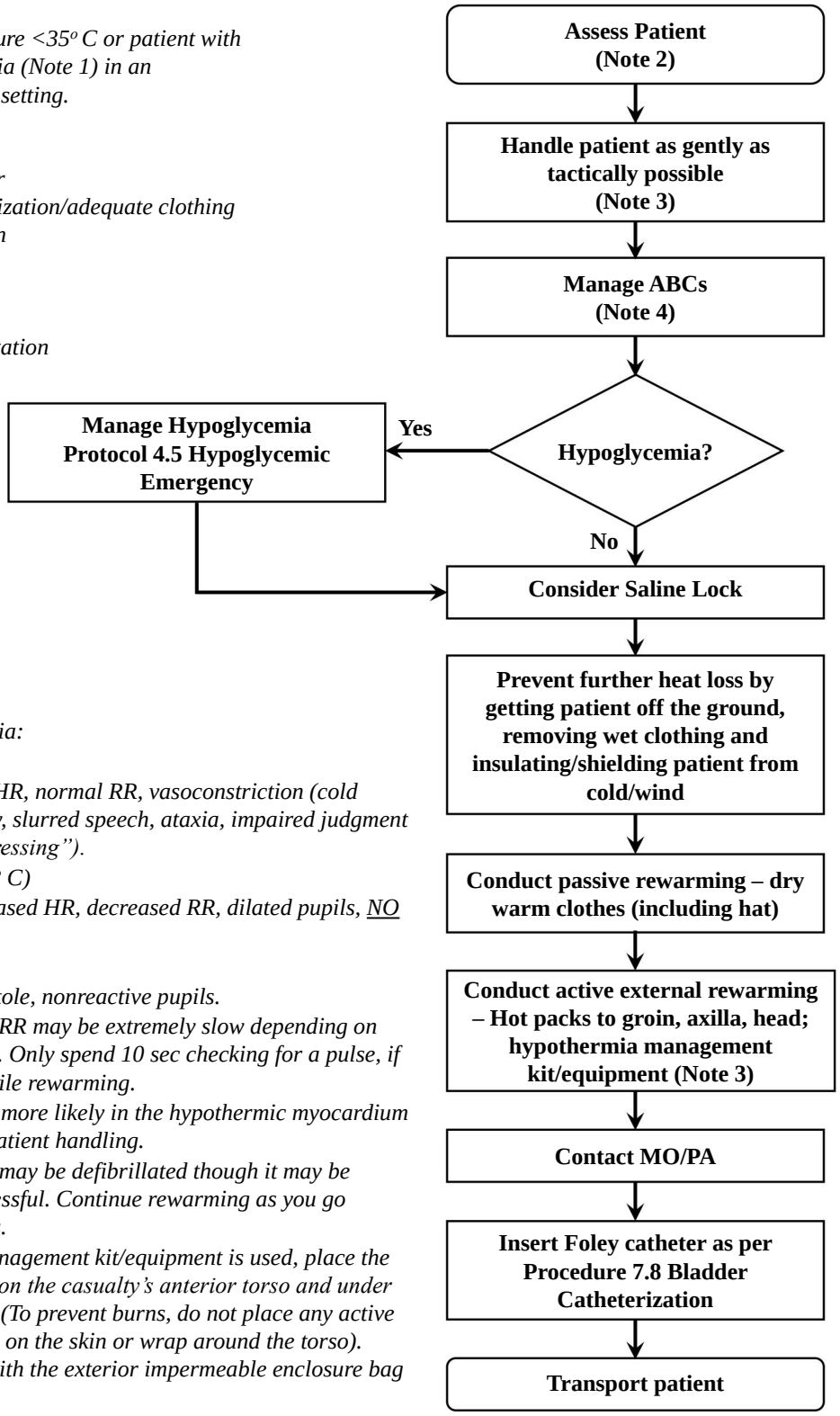
5.1 Hypothermia – Class A

Indication:

- *Core body temperature <35º C or patient with S & S of Hypothermia (Note 1) in an appropriate clinical setting.*

Risk Factors:

- *Lack of cold weather experience/acclimatization/adequate clothing*
- *Alcohol consumption*
- *Cold weather*
- *Dehydration*
- *Undernutrition*
- *Darker skin pigmentation*
- *Wind chill*
- *Immersion*
- *Fatigue*



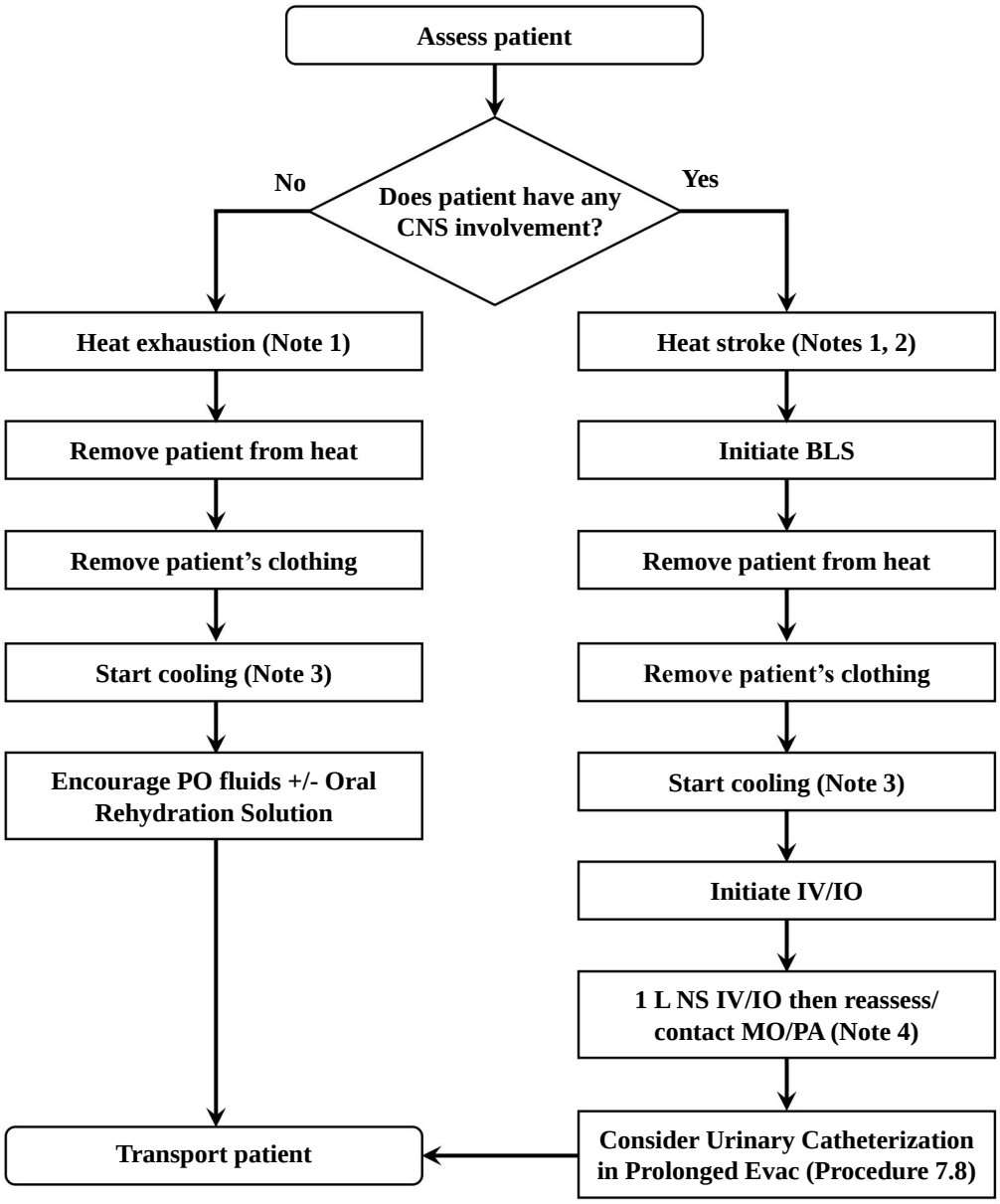
Notes:

1. *Degrees of Hypothermia:*
   - ***Mild*** *(32 – 35º C)*
     Shivering, normal HR, normal RR, vasoconstriction (cold extremities), apathy, slurred speech, ataxia, impaired judgment ("paradoxical undressing").
   - ***Moderate*** *(28 – 32º C)*
     Altered LOC, decreased HR, decreased RR, dilated pupils, NO SHIVERING.
   - ***Severe*** *(< 28º C)*
     Coma, apnea, asystole, nonreactive pupils.
2. *Understand pulse and RR may be extremely slow depending on how cold the patient is. Only spend 10 sec checking for a pulse, if none felt start CPR while rewarming.*
3. *Arrhythmias are much more likely in the hypothermic myocardium and mandate careful patient handling.*
4. *A hypothermic patient may be defibrillated though it may be theoretically less successful. Continue rewarming as you go through your protocols.*
5. *If the Hypothermia management kit/equipment is used, place the active heating blanket on the casualty's anterior torso and under the arms in the axillae (To prevent burns, do not place any active heating source directly on the skin or wrap around the torso). Enclose the casualty with the exterior impermeable enclosure bag*

5.2 Hyperthermia – Class A

Indication:
- *Core body temperature >40ºC or symptoms consistent with Hyperthermia in an appropriate clinical setting.*

Risk Factors:
- *Warm/Hot weather*
- *High humidity*
- *Physical activity*
- *Drugs/Alcohol*
- *Dehydration*
- *Inadequate clothing*
- *Lack of training/experience in warm climate*
- *Obesity*

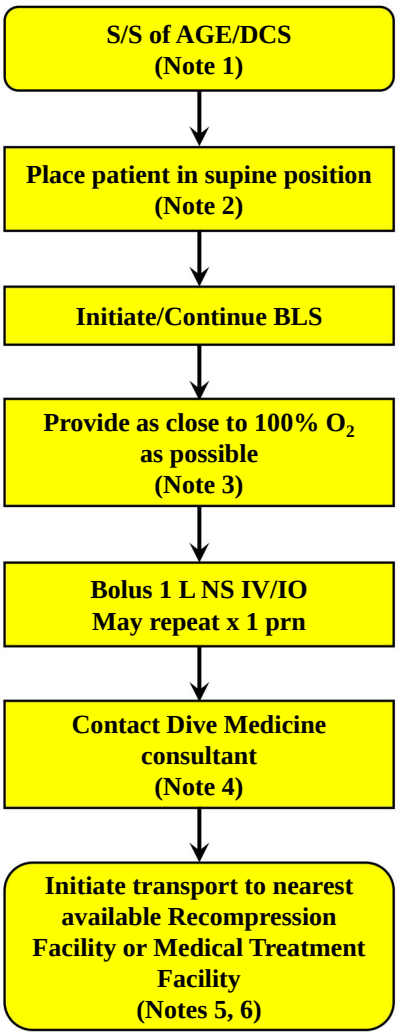


Notes:

1. *<u>Heat cramps</u>: Involuntary muscle spasms most often affect calves, arms, abdominal muscles and back.*
   <u>Heat exhaustion</u>: Nausea; Muscle cramps; Headache; Feeling faint; Fatigue; Pale/cool/clammy skin; **Heavy sweating.**
   <u>Heat stroke</u>: Core body temperature >40ºC; Confusion; Irrational behavior (or delirium); Tachycardia initially than bradycardia late; Hypotension; Rapid and shallow breathing; Dry or wet hot skin; ***No sweating****; Loss of consciousness; Seizures and Coma.*
2. *A heat stroke casualty requires immediate evacuation whereas a casualty with heat exhaustion may be delayed after consultation with MO/PA.*
3. *Cooling methods are dependent on available resources. Wet patient with water, fan dry and repeat. If cold/ice packs are available, pack in groin/axilla/neck.*
4. *Exertional hyperthermia usually has a component of dehydration. However, too much IV fluid can also be detrimental so contact MO/PA after initial bolus for further direction.*

5.3 Diving Related Emergencies – Class A (RQ Cpl and Above)

Indication – Diver with S/S of arterial gas embolism (AGE) or decompression sickness (DCS).

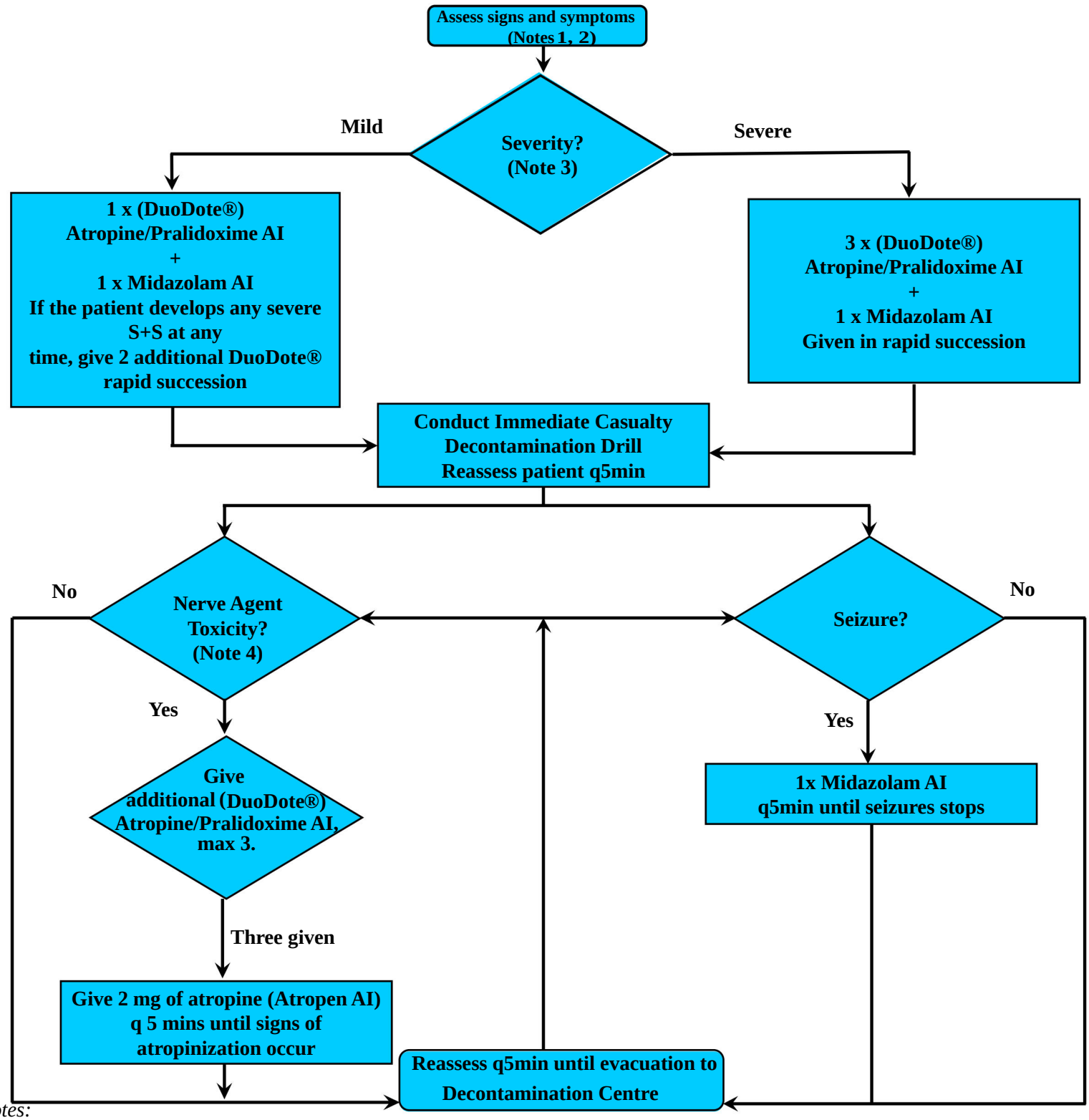


Notes:

1. ***Arterial Gas Embolism*** *(AGE) – Generally presents immediately or within 5-10 min of surfacing. Most commonly results in: LOC; Neurologic deficits or confusion; Chest pain; Shortness of breath may also be present. It requires immediate treatment in a recompression chamber.*

   Decompression Sickness *(DCS) – Generally severe symptoms will present within 1-3 hrs of decompression, and most symptoms will present within 24hrs (further decompression via altitude exposure may lengthen these timelines). The most common presenting symptoms are: Joint pain; Paresthesia; Skin rash or swelling. Less common but more severe signs can include: Neurologic deficits; Vertigo; Shortness of breath; Chest pain.*
2. *Supine position recommended. If decreased LOC, recovery position is recommended.*
3. *Ideally use of DAN® Oxygen Kit (held by dive team), demand valve, or BVM to provide 100% O_2. If unavailable, NRB mask may be used.*
4. *The CAF has a consultant in Dive Medicine available 24/7 for consultation via pager. They shall be consulted in any suspected case of AGE or DCS. Pager number should be known prior to commencing dive.*
5. *If air asset utilized for transport, ideally aircraft pressurized to 1 atmosphere (surface) will be used to avoid further decompression. If unpressurized aircraft, then recommend to fly as low as safely possible.*
6. *The best outcomes are more likely seen with earlier treatment. In more serious cases, recompression treatment should be obtained as soon as safely possible. In mild cases, a delay may not worsen long-term outcomes, however treatment should still be obtained as soon as safely possible. Recompression facilities often do not operate 24/7 and this information should be known prior to commencing dive.*

5.4 Nerve Agent Exposure - Class B



Notes:

1. *For MARCHE sequence and immediate actions in a CBRN environment, refer to Reference 8.20 Nerve Agent Exposure MARCHE & Immediate Actions.*
2. *Use the acronym CRESS: **C**onscious (unconscious/seizure); **R**espiration (increased↑↑/decreased↓); **E**yes (pinpoint pupils); **S**ecretion (increased↑↑); **S**kin (sweaty) and **Other** (vomiting; incontinence; bradycardia).*
3. *Severity: **Mild** (Walking; Pinpoint pupils only; Minimal secretions); **Severe** Non-ambulatory, copious airway secretions, confusion, not obeying commands, severe respiratory distress/arrest, involuntary urination/defecation, convulsions, unconsciousness*
4. *Nerve agent toxicity: ''Three B's" **B**ronchospasm; **B**radycardia; **B**ronchorrhea (production of more than 100 ml per day of watery sputum).*

SECTION 6: DRUG MONOGRAPHS

N.B. The drug monographs in this section are provided in the context of this Protocol and Procedure Manual. Accordingly, the following monographs contain pharmacological information, dosing and direction for administration that is intended to directly reflect and be applied in the confines of, the preceding protocols.

The medications in this section are indicated for life-saving interventions, treatments or adjuncts. Any precautions listed are strictly included for a more fulsome understanding of the drug and, in an emergent setting, would not generally prelude administration. The information contained in this section is also, accordingly, not applicable to other areas of practice/situations. For non-emergent, routine use, refer to your Scope of Practice and a full drug monograph.

This section covers the drug monographs for:

6.1 Acetaminophen
6.2 Acetylsalicylic Acid
6.3 Atropine
6.4 Cefoxitin
6.5 Clindamycin
6.6 Dexamethasone
6.7 Dextrose
6.8 Diazepam
6.9 Dimenhydrinate
6.10 Diphenhydramine
6.11 Epinephrine
6.12 Fentanyl Lozenges
6.13 Fluorescein
6.14 Glucose Gel
6.15 Glucagon
6.16 Haloperidol
6.17 Ibuprofen
6.18 Ipratropium Bromide
6.19 Ketamine
6.20 Lactated Ringer's (Ringer's Lactate)
6.21 Meloxicam
6.22 Midazolam
6.23 Morphine
6.24 Moxifloxacin
6.25 Naloxone
6.26 Nitroglycerin Spray
6.27 Normal Saline
6.28 Obidoxime
6.29 Ondansetron
6.30 Oxygen
6.31 Salbutamol (Ventolin)
6.32 Tetracaine
6.33 Tranexamic Acid (TXA)
6.34 Xylocaine 1% and 2%
6.35 3% Sodium Chloride Injection (3% HS)

SECTION 6: DRUG MONOGRAPHS

6.1 Acetaminophen
(Tylenol, Atasol, Tempra)

Indications:
Pain Protocol 3.6

Contraindications:
Hypersensitivity to acetaminophen; Known G6PD deficiency; Liver failure.

Precautions:
May cause severe liver toxicity in overdose.

Use cautiously in patients with alcoholic liver disease.

Excessive alcohol intake can increase risk of acetaminophen-induced liver toxicity.

Adverse Effects:
Uncommon, as <1% patients experience any adverse effects.

Pharmacology:
Onset of action: <1 hr.
Time to peak effect: Oral dosing: 10-60 min.
Duration of action: 4-6 hrs.

Dosage and Administration:

- Adults over 16 yrs: 1 g PO q6h prn (max/24hr: 4000 mg).
- Children 4-16 yrs: 15 mg/kg q6h (max/24hr: 75 mg/kg, do not exceed 4000 mg).
- Children under 4 yrs: Contact PA/MO.

6.2 Acetylsalicylic Acid
(Aspirin, ASA)

Indications:
Suspected Cardiac Chest Pain Protocol 1.1

Contraindications:
Hypersensitivity to ASA or other anti-inflammatories; Bleeding disorder; Or active gastrointestinal bleeding.

Precautions:
Use with caution in patients with a history of asthma or nasal polyps.

Adverse Effects:
Mainly gastrointestinal complaints; Nausea; Heartburn.

Pharmacology:
Onset of action: <1 hr.
Time to peak effect: Oral chewable dose: 2 hrs.
Duration of action: 4-6 hrs.

6.2 Acetylsalicylic Acid continued

Dosage and Administration:

- Chewable ASA 160 mg PO (single dose only).
- If chewable ASA 160 mg not available, give ASA 325 mg preferably non-enteric coated to chew (single dose only).

Non-chewable ASA can be chewed if needed. However, the absorption may be delayed.

Enteric coated tablet could also be chewed if that is all that is available, but the time to peak concentration would be significantly delayed in comparison to chewable or non-chewable immediate release tablet.

6.3 Atropine

(Antiparasympathetic/Anticholinergic agent)

Indications:
Nerve Agent Exposure 5.4, in combination product with a cholinesterase reactivator. Atropine combats the effects of nerve agent in the airways, reduces secretions and improves breathing.

Contraindications:
Hypersensitivity; Narrow angle glaucoma; Myasthenia gravis; GI disorders involving movement of bowels; Thyrotoxicosis; Prostatic hypertrophy; Unstable cardiovascular status with tachycardia and during acute hemorrhage.

Note: In nerve agent exposure, risk versus benefit assessment is crucial.

Precautions:
Atropine is a highly potent anticholinergic (or antiparasympathetic) and can lead to anticholinergic toxicity if care is not taken to avoid overdose (e.g. Acute glaucoma with blindness; Agitation; Delirium; Confusion; Drowsiness; Tachycardia).

Adverse Effects:
Tachycardia; Headache; Restlessness; Insomnia; Dizziness; Dry and hot skin; Light sensitivity; Urticaria; Dry mouth; Impaired GI mobility; Blurred vision; Mydriasis.

Note: In nerve agent exposure, risk versus benefit assessment is crucial.

Pharmacology:
Onset of action: Increased HR ~2-40 min; salivation inhibited ~30 min.
Time to peak effect (IM): 20-90 min.

Dosage and Administration:

- Atropine Sulfate 2 mg per auto-injector (Atropine AI or DOUBLEPEN Obidoxime/Atropine).
- DOUBLEPEN Obidoxime/Atropine (auto-injector) q15min prn up to 3 doses max.
- Only give Atropine AI q5min prn (after 3 doses of DOUBLEPEN OA).

6.4 Cefoxitin
(Antibiotic)

Indications: Antibiotic Protocol 4.3

Contraindications: Patients who are hypersensitive to cefoxitin or to any ingredient in the formulation. Patients who are hypersensitive to other cephalosporin antibiotics

Precautions: History of allergic reactions, note type and severity of reaction. History of penicillin allergy. Cefoxitin has been associated with C. difficile-associated diarrhoea and colitis.

Adverse Effects: Diarrhoea, generally mild, headache, generally mild, rash, urticaria and/or pruritus, manifestations of allergic reaction which may be severe

Dosage and Administration:

- Adult: Cefoxitin 2gm IV/IO/IM q8h;
- Paediatric: Cefoxitin 30 mg/kg IV/IO/IM (over 5 min) q8h to a maximum of 80-160 mg/kg/day
- IV administration is preferred. IM administration, when required, should be into a large muscle mass. If IO already established, antibiotics can be delivered by this route

6.5 Clindamycin
(Dalacin-C)

Indications:
Antibiotic Protocol 4.3

Contraindications:
Hypersensitivity to clindamycin; Liver impairment; Do not use in infants <1 month old (neonates).

Precautions:
Use with caution in patients with history of Ulcerative Colitis or Crohn's.

Adverse Effects:
Hypotension; Nausea; Vomiting; Diarrhea and abdominal pain; Urticaria and rashes; Thrombophlebitis; Irritation at injection site.

Dosage and Administration:
- Adults: 600 mg IV/IO over at least 20 min or IM q8h.
- Children (> 1 month): 10 mg/kg IV/IO (over 30 min) or IM q8h, not to exceed adult dose above.

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6.6 Dexamethasone
(Corticosteroid)

Indications:
SOB Suggestive of Asthma/COPD Protocol 2.2; Anaphylaxis/Anaphylactic Shock – Adult & Children > 30 Kg Protocol 2.3; Anaphylaxis/Anaphylactic Shock – Adult & Children ≤ 30 Kg Protocol 2.4

Contraindications:
Severe allergy to other corticosteroids; Systemic fungal infections.

Precautions:
Existing emotional instability or psychotic tendencies (can exacerbate pre-existing psychiatric conditions); Diverticulis; Active/Latent peptic ulcer; CHF/hypertension; Increased susceptibility to infection.

Adverse Effects:
Salt and water retention; Potassium loss; Hypertension; Anaphylactic reaction (to excipient); Hyperglycemia.

Pharmacology:
Onset of action: IV: Rapid
Time to peak effect: IV: 5-10 min; IM: 30-120 min; PO: 1-2 hrs.
Biological half-life: 36-54 hrs, Corticosteroids relieve inflammation but do not affect disease progression.

Dosage and Administration:
- Adult: 10 mg IV/IM/PO (max. 10 mg).
- Children: 0.6 mg/kg IV/IM/PO (max. 10 mg).

Avoid deltoid muscle for IM injection (High incidence of tissue atrophy).

6.7 Dextrose
(D10W)

Indications:
Hypoglycemic Emergency Protocol 4.5

Contraindications:
Hyperglycemia.

Precautions:
Contact MO/PA before administering to a patient with suspected head injury.

Dosage and Administration:
- Adult:
    - 100 ml IV/IO bolus x 2 prn if blood glucose < 4.0 mmol/L.
    - If blood glucose still < 4.0 mmol/L, reduce flow rate to 100 ml/hr and contact MO/PA.
- Child (above 3 y/o):
    - 2 ml/kg IV/IO bolus if blood glucose < 4.0 mmol/L (Max 100 ml).
    - If blood glucose still < 4.0 mmol/L after 15-20 min, provide another 2 ml/kg bolus (Max 100 ml).
    - If blood glucose still < 4.0 mmol/L, convert to saline lock and contact MO/PA.
    - If under 3 y/o contact MO/PA.

6.8 Diazepam

(Antiseizure; benzodiazepine; GABA agonist)

Indication:
Nerve Agent Exposure 5.4 – in combination with cholinesterase reactivator and an anticholinergic. To prevent and/or treat seizures after nerve agent exposure.
Contraindications:
Hypersensitivity to diazepam or other benzodiazepines.
Note: In nerve agent exposure risk versus benefit assessment is crucial.
Precautions:
Benzodiazepines can exacerbate respiratory depression, bradycardia and CNS effects (e.g. Ataxia; Dizziness; Light-headedness; Drowsiness; Weakness and fatigue).
Adverse Effects:
Tachycardia; Hypotension; Syncope; CNS effects (Ataxia; Dizziness; Light-headedness; Drowsiness; Muscle weakness; Fatigue; Lack of muscle coordination).

Note: In nerve agent exposure risk versus benefit assessment is crucial. Irritation at the injection site may also occur.

Pharmacology:
Onset of action: Fast but erratic absorption (<1h).
Time to peak effect: ~1h (depend on absorption); 20-120h (has an active metabolite).

Dosage and Administration of concern:

- 1 x Diazepam (10mg) auto-injector q5min until seizing stops.
- SINGLEPEN D Diazepam auto-injector:
    - Remove the pin at the top.
    - Place the auto-injector on mid outer thigh in the same area as you injected DOUBLEPEN (OA).
    - Ensure your thumb is over the button where the pin was and push the button firmly.
    - Hold in place for ten (10) seconds.

For suspected nerve agent exposure with moderate or severe symptoms, use immediately after the first DOUBLEPEN (OA) auto-injector.

Act Early: It is easier to prevent convulsions and permanent brain damage than to try and stop seizures after they have begun.

6.9 Dimenhydrinate
(Gravol)

Indications:
Suspected Cardiac Chest Pain Protocol 1.1, Pain Protocol 3.6

Contraindications:
Glaucoma; Chronic lung disease; Difficulty in urination due to prostatic hypertrophy.

Precautions:
Use of alcohol should be avoided; Occupational hazard.

Should not be used with other sedatives unless MO is consulted.

Adverse Effects:
Drowsiness; Dizziness; Dry mouth; Excitement in children; Nausea.

Pharmacology:
Onset of action: IV: Almost immediately; IM: 20 to 30 min; PO: 15 to 30 min.
Duration: 4-6 hrs.
Time to peak effect: 60-120 min.

Dosage and Administration:

- Adults: 25-50 mg PO/IV/IM q4h prn (max 400 mg in 24 hrs).
- Children > 2 years of age: Between 15-50 mg; consult MO prior to giving medication.
- Children < 2 years of age: Not recommended.

For IV injection, each 50 mg of Dimenhydrinate must be diluted with 10 ml of 0.9% sodium chloride injection and administered slowly over a period of 2 min.

Diluted solutions can be stored up to 24 hrs at room temperature.

Dimenhydrinate is never to be injected intra-arterially.

Always inspect the solution visually for particulate matter and discoloration prior to administration.

Discard any unused portions.

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6.10 Diphenhydramine

(Antihistamines - Benadryl, Allerdryl, Allernix)

Indications:

Anaphylaxis/Anaphylactic Shock – Adult & Children > 30 Kg Protocol 2.3; Anaphylaxis/Anaphylactic Shock – Adult & Children ≤ 30 Kg Protocol 2.4; Hostile/Violent Patient Protocol 4.4

Contraindications:

Hypersensitivity to Diphenhydramine or acute asthma.

Do not use in neonates.

Precautions:

Use with caution in patients with: Angle-closure glaucoma; Urinary obstructions; Symptomatic prostatic hypertrophy; Stenosing peptic ulcer; Elderly; and may cause paradoxical excitation in children.

Adverse Effects:

Hypotension; Tachycardia; Palpitations; Drowsiness; Dizziness; Coordination difficulties; Headache; Nervousness; Paradoxical excitement; Insomnia; Euphoria; Confusion; Nausea; Vomiting; Diarrhoea; Dry mouth and mucous membranes; Urinary retention; Urinary frequency; Difficulty urinating; Tremor; Paresthesia; Blurry vision.

Pharmacology:

Onset of action: < 1 hr.
Duration of action: 6-8 hrs.

Dosage and Administration:

- Anaphylaxis/Anaphylactic Shock:
    - Adults: 50 mg IM/PO (IV RQ Cpl and above) q2-4h prn (Max dose 400 mg/day).
    - Children ≤ 30 kg: 1mg/kg IM/PO (IV RQ Cpl and above) q6-8h prn (Max dose 5 mg/kg/day), not to exceed adult dose above.

- Hostile/Violent Patient (and Other Indications) – RQ Cpl and above:
    - Adult dose: 50 mg IM/IV q6h prn (Max dose 400 mg/day).

Elderly (> 60 yrs): Decrease dose by ½, as this population can be more susceptible to side effects.

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6.11 Epinephrine

(Adrenaline - EpiPen®, EpiPen® Jr, Epinephrine ampoule)

Indications:

Anaphylaxis/Anaphylactic Shock – Adult & Children > 30 Kg Protocol 2.3; Anaphylaxis/Anaphylactic Shock – Adult & Children ≤ 30 Kg Protocol 2.4; SOB Suggestive of Asthma/COPD Protocol 2.2

Contraindication:

There are no contraindications to giving epinephrine for a life threatening allergic response such as anaphylaxis.

Adverse Effects:

Tachycardia; Arrhythmias; Angina; Flushing; Anxiety; Tremor; Headache; Dizziness; Nausea and vomiting (in children); Dry mouth; Acute urinary retention in patients with bladder outflow obstruction; Weakness and trembling; Wheezing and dyspnea; and increased diaphoresis.

Precautions:

Use with caution in: Elderly; Diabetes mellitus; Cardiac arrhythmias; Cardiovascular disease; Thyroid disease.

Watch for tachycardia and hypertension, which may compromise a patient with poor cardio-pulmonary reserve. Be prepared to go to the Protocol 1.1 Cardiac Chest Pain.

Dosage and Administration:

Anaphylaxis/Anaphylactic Shock:

- Above 30 kg: EpiPen® (0.3 mg) IM q5min prn x 3 doses. Epinephrine 0.3 mg IM (1:1000) q5min prn x 3 doses.
- 15-30 kg: EpiPen® Jr (0.15 mg) IM q5min prn x 3 doses. Epinephrine 0.15 mg IM (1:1000) q5min prn x 3 doses.
- Under 15 kg: Epinephrine 0.01 mg/kg IM (1:1000) q5min prn x 3 doses (max of 0.14 mg per dose).

SOB Suggestive of Asthma /COPD (Adult):

- Epinephrine 0.3 mg IM (1:1000) x 1 dose.

The preferred site for administration of Epinephrine IM is in the thigh (use the shoulder as an alternative). Massage the site after administration to promote localized circulation of blood. Keep EpiPen® needle in the muscle for 5 sec.

If you use Epinephrine ampoule, remember that it contains more than one dose in each ampoule.

Storage: Protect medication from light.

6.12 Fentanyl Lozenge

Indication:

Pain Management Protocol 3.6

Contraindications:

Acute/Severe bronchial asthma/COPD/Status asthmaticus; Acute respiratory depression; Head injury; Known intolerance/Hypersensitivity to Fentanyl/Opioid; Known/suspected mechanical gastrointestinal obstruction; Suspected surgical abdomen (e.g. acute appendicitis).

6.12 Fentanyl Lozenge continued

Precautions:
Use with caution in patients with lung disease or breathing difficulties.

Use with caution during pregnancy. Not recommended in nursing women and during labor and delivery, unless potential benefits outweigh the risks. MO/PA should be contacted.

Adverse Effects:
Nausea; Constipation; Somnolence; Headache; Respiratory and central nervous system depression.

NB: Peak respiratory depression may be seen as early as 15-30 min from the start of oral administration and may persist for several hours.

Pharmacology:
Onset of action (transmucosal): 5 to 15 min.
Duration of action: Related to blood level.
Time to peak effect: 20 to 40 min (median).

Dosage and Administration:

- Place the unit in the mouth between the cheeks and gums and instruct not to suck on the medicine.
- Move the unit around in the mouth, especially along the cheeks. Twirl the handle often.
- Finish the unit completely to get the most relief. If it is finished too early, more of the medicine will be swallowed and pain relief will be less effective.
- More than one unit may be required to control pain. Wait at least 15 minutes after finishing a unit completely before using another.

Max dose: 2 (800ug) lozenges.

Administer the second lozenge in the opposite buccal mucosa (opposite cheek).

6.13 Fluorescein

Indication: Eye Injury Protocol 3.8

Contraindication: ruptured global injury.

Common Side Effects: local irritation on the eye, short-term blurry vision, stinging of the eye.

Precautions: brief discoloration of skin if touched.

Dosage and Administration:

- remove eyeglasses or contact lenses before the test.
- touch the blotting paper or drops to the surface of the eye.
- ask the patient to blink. Blinking spreads the dye and coats the tear film covering the surface of the cornea. The tear film contains water, oil, and mucus to protect and lubricate the eye.
- shine a blue light at the eye. Any problems on the surface of the cornea will be stained by the dye and appear green under the blue light.

6.14 Glucose Gel
(Insta-Glucose)

Indications:
Hypoglycemic Emergency Protocol 4.5

Contraindications:
Nil.

Precautions:
Not to be administered to an unconscious patient or a patient that is unable to swallow.

Dosage and Administration:
- Apply up to 1 tube to inside lip and cheeks. Rub on and do not apply as a “clump” if any concern of airway compromise.

6.15 Glucagon (Baqsimi)

Indications:
Hypoglycemic Emergency Protocol 4.5

Contraindications:
Known allergy to glucagon; Pheochromocytoma (an adrenal tumour that can cause a sudden and marked increase in blood pressure).

Precautions:
Glucagon may be less effective in presence of acute or chronic alcohol ingestion.

Adverse Effects:
Nausea and vomiting, abdominal pain or discomfort

Pharmacology:
Onset of action: IN: 10 min.
Duration: 35 min.
Time to maximal glucose concentration: 15 min.

Dosage and Administration:
- Adult: 3 mg IN.
- Pediatric: 3 mg IN.

Glucagon is helpful in treating hypoglycemia only if sufficient liver glycogen is present. When the patient responds, give supplemental carbohydrate to restore the liver glycogen to prevent secondary hypoglycemia.

6.16 Haloperidol

(Haldol – Antipsychotic)

Indications: Hostile/Violent Patient Protocol 4.4

Contraindications: Patients with severe CNS depression. History of spastic disorders or Parkinson's disease. Hypersensitivity to haloperidol.

Precautions: Risk of orthostatic hypotension, History of seizure disorder, Severe hepatic or renal impairment.

Dosage and Administration:

- Haloperidol 5mg IM/IV. Can repeat haloperidol 5mg IM/IV q10 min prn to a maximum of 2 doses then contact MO.
- May be administered concurrently with midazolam 2mg IM/IV.

6.17 Ibuprofen

(Anti-inflammatory, Advil, Motrin)

Indication:
Pain Management Protocol 3.6

Contraindications:
Not for use in the bleeding patient, refer to Protocol 3.6 for alternate pain management.

Hypersensitivity to ASA, Ibuprofen, or other NSAIDs; GI ulcer; Bleeding; Active inflammatory bowel disease; Severe liver impairment; Severe kidney impairment; Hyperkalemia; Systemic lupus erythematous; Pregnancy.

Precaution:
High blood pressure.

Adverse Effects:
Nausea; Diarrhea; Epigastric pain; Abdominal cramps or pain; Heartburn; Bloating or flatulence; Dizziness; Headache; Nervousness; Rash; Pruritus; Tinnitus; Anaemia; Decreased appetite; Edema; Fluid retention.

Pharmacology:
Onset of action: Less than 1 hr.
Duration of action: 4 to 6 hrs.
Time to peak effect (oral dosing): 1 to 1.5 hr.

Dosage and Administration:

- Adult: Ibuprofen 800 mg PO q8h prn (Max 2400 mg/day).
- Pediatric: Ibuprofen 10mg/kg PO q8h prn, not to exceed adult dose above.

Ipratropium Bromide

(Atrovent - Bronchodilator)

Indications:
SOB Suggestive of Asthma/COPD Protocol 2.2 (Adult)

Contraindications:
Ipratropium bromide inhalation aerosol should not be taken by patients that are hypersensitive to Ipratropium bromide, atropinics, or any other aerosol components.

Precautions:
Ipratropium bromide inhalation aerosol should not be used for the abatement of acute episodes of bronchospasm where rapid response is required, since the drug has a slower onset of effect than that of an adrenergic agonist aerosol.

Adverse Effects:
Cardiovascular effects (atrial arrhythmias and tachycardia); Dry mouth; Cough.

Pharmacology:
Onset of action: <15 min.
Time to peak effect: Between 1 and 2 hrs.
Duration of action: Metered-dose inhaler: 2 to 4 hrs; Nebulizer: 4 to 5 hrs.
Half-life: 2 hrs.

Dosage and Administration:

- Metered-dose inhaler (MDI): 8 puffs q10min x 3 doses.
- Nebulizer: 0.5 mg q10min x 3 doses.
- Contact PA/MO for subsequent doses.

Atrovent is recommended for use with patients 18 yrs and over.

6.19 Lactated Ringer's (Ringer's Lactate)

(LR / RL)

Indications:
Vital Signs Absent Protocol 1.5; Hemorrhagic Shock Protocol 3.3; Burn Management Protocol 3.5; Burn Assessment and Fluid Replacement Principles 8.4

Contraindications:
Newborn (≤ 28 days of age).

Precautions:
Avoid use concurrent with blood transfusion.
Avoid use of Lactated Ringer's (Hypotonic solution) with severe TBI whenever possible as it can exacerbate brain swelling.

6.19 Lactated Ringer's (Ringer's Lactate) continued

Adverse Effects:
Hypersensitivity/Infusion reaction.

Dosage and Administration:
- As per relevant Protocol.

6.20 Ketamine

Indication:
Pain Management Protocol 3.6

Contraindication:
Hypersensitivity to the drug.

Precautions:
(Relative contraindications): Acute psychosis; Cardiovascular disease; Increase in ocular pressure.
Resuscitative equipment should be ready for use.
Respiratory depression or apnea may occur with over dosage or too rapid administration. IV administration should be over a period of 60 seconds.
Narcan does not antagonize ketamine analgesic effects.

Adverse Effects:
Catalepsy; Bolus can cause transient decrease in ventilation; Diplopia; Nystagmus; Tachycardia; Increase of blood pressure.
Refer to Reference 8.17 Pain Management for other possible adverse effects.

Pharmacology:
Onset of action: IV: 30 sec; IM: 3 to 4 min; IN: Less than 10 min.
Duration of action (of dissociation): IV: 5 to 10 min; IM: 15 to 30 min; IN: Up to 60 min.

Dosage and Administration:
- 25 mg IV/IO over 60 sec q20min prn x 4 doses in 2 hrs max; Or
- 50 mg IM/IN with atomizer q30min prn x 2 doses total.

For IM/IN Ketamine, use 50 mg/ml undiluted.
For IV/IO Ketamine, mix 1 ml of 50 mg/ml with 4 ml NS to make 10 mg/ml.
For IN route, split the 50 mg/ml in two (0.5 ml per nostril) to maximize the total mucosal absorptive surface area by using both nostrils.

6.21 Meloxicam

Indication:
Pain Management Protocol 3.6

Contraindications:
Known hypersensitivity; History of asthma; Urticaria or other allergic type reactions after taking aspirin or NSAIDs; Post coronary bypass graft (CABG).

Precautions:
Meloxicam can increase the risk of fatal heart attack or stroke, especially if used for long term or taken in high doses.

Avoid drinking alcohol as it increases the risk of GI bleeding.

Pregnancy or breast-feeding.

Adverse Effects:
Cardiovascular thrombotic events; GI bleeding; Ulcerations and perforation; Hepatotoxicity; Hypertension; Heart failure and edema; Renal toxicity and hyperkalemia; Anaphylactic reactions; Serious skin reactions; Hematologic toxicity.

Pharmacology:
Onset of action: PO <60 min.
Time to peak effect: 4-5 hrs.
Duration of action: 24 hrs.

Dosage and Administration:

- 15 mg once PO.

6.22 Midazolam

(Versed)

Indications:
Pain Protocol 3.6; Seizure Protocol 4.2; Hostile/Violent Patient Protocol 4.4

Contraindications:
Known hypersensitivity to midazolam or other benzodiazepines.

Precautions:
May cause hypotension, particularly in pediatric patients or patients with hemodynamic instability. Hypotension may occur more frequently in patients who have received opioid analgesics. Use caution when administering to elderly or debilitated patients, children, and patients with liver disease or low serum albumin as they are more likely to experience CNS adverse effects.

Adverse Effects:
The most common adverse effects are dose dependant CNS effects: Ataxia; Dizziness; Light-headedness; Drowsiness; Weakness and fatigue. The more serious, occasionally reported adverse effects are: Hypersensitivity reactions; Mental depression; Behavioural problems; Paradoxical stimulant reactions; Leucopenia; Jaundice; Hypotension; Memory impairment; Phlebitis or venous thrombosis; and Seizures.

Pharmacology (General):
Onset of action: IV/IO: 1 to 5 mins; IM: 5 to 15 mins; IN: 5 to 10 mins.
Time to peak effect: IV/IO: 3 to 5 mins; IM: 30 to 60 mins; IN: 5 to 10 mins.
Duration of action: IV/IO: <2 hrs (dose dependent); IM: up to 6 hrs (mean 2 hours); IN: ~ 20 mins.

Dosage and Administration:

- Pain Protocol 3.6
  - For treatment of "recovery reaction" following Ketamine administration:
    - 2 mg IV/IO/IM q10min prn (max 4 doses).

- Seizure Protocol 4.2:
  - Adult:
    - 5 mg IV/IO then repeat 2.5 mg q5min prn until seizure stops; OR (if IV not available)
    - 5 mg IN with atomizer then repeat 2.5 mg IN q5min prn until seizure stops.
  - Pediatric:
    - 0.1 mg/kg (to a max of 5 mg) IV/IO over 1-2 minutes then repeat 0.1 mg/kg (to a max of 2.5 mg) IV/IO over 1-2 minutes q5min prn until seizure stops or to a max total dose of 0.6 mg/kg; OR (if IV not available)
    - 0.2 mg/kg (to a max of 5 mg) IN with atomizer then 0.1 mg/kg (to a max of 2.5 mg) IN with atomizer q5min prn until seizure stops or to a max total dose of 0.6 mg/kg.

Note: For IN doses ≤0.5 ml, administer entire dose in one nostril, alternating between the nostrils for each subsequent dose. For doses >0.5 ml, administer half the dose in each nostril to maximize the absorptive surface.

- Hostile / Violent Patient Protocol 4.4:
  - 2 mg IV/IM repeat q10min (max 2 doses) prn.

NB: Recovery reaction following Ketamine administration is treated with up to 4 doses of Midazolam 2 mg (see 3.6 Pain ***Protocol), as contrasted with only 2 doses recommended in the management of "aggressive patients" (see 4.4 Hostile/Violent*** *Patient Protocol). This variance is intentional and based on a more conservative approach in hostile/violent patients where a range of etiologies are possible (e.g.: Head injury; Hypoglycemia; etc). In Ketamine administration, it is most plausible that aggression and agitation are caused by recovery reaction.*

6.23 Morphine

(Narcotic - Analgesic)

Indications:
Suspected Cardiac Chest Pain Protocol 1.1; Pain Protocol 3.6.

Contraindications:
Hypersensitivity to morphine; Severe respiratory distress; Severe hypotension; Head injuries; Decreased LOC.

Precautions:
Use with caution in pregnancy, elderly patients, those with pre-existing respiratory conditions (COPD) and those patients that are intoxicated. Contact MO/PA.

NB: If severe respiratory depression or decreased LOC refer to Narcotic Overdose - Adult (Suspected) Protocol 4.1. If the patient goes hypotensive, ensure supine head down position and consider fluid bolus.

Adverse Effects:
Hypotension; Dizziness; Sedation and euphoria; Nausea and vomiting; Respiratory depression.

Pharmacology:
Onset of action: IV: 5 to 10 min (~5 min); IM: 10 to 30 min (~20).
Duration of action: IV: 3 to 5 hrs (variable); IM: 3 to 5 hrs (variable).
Time to peak effect: IV: ~20 min; IM: 30 to 60 min.

Dosage and Administration:

- Pain Protocol 3.6
    - Morphine sulphate 2.5 mg IV/IO over 1 min q5min prn (max of 15 mg in 30 minutes).
        - IV/IO Morphine should be titrated to effect but is not to exceed 15 mg in 30 minutes. Otherwise, there is no absolute max dose for IV/IO Morphine.
        - Dilute to 10ml (total volume) with NS.
    - Morphine sulphate 10 mg IM q30min prn
        - Given unreliable absorption, should only be considered as a last resort when IV access or other analgesics are unavailable.
- Suspected Cardiac Chest Pain Protocol 1.1
    - Morphine sulphate 2.5 mg IV/IO over 1 min q5min until pain relief (max of 15 mg).
        - Dilute to 10ml (total volume) with NS.

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6.24 Moxifloxacin

(Avelox - Antibiotic)

Indications: Antibiotic Protocol 4.3, Eye Injury Protocol 3.8

Contraindications: Patients who are hypersensitive to Moxifloxacin hydrochloride or other quinolone antibacterial agents.

Precautions: Serious hypersensitivity and or anaphylactic reactions have been reported in patients receiving quinolone therapy, see anaphylaxis protocol 2.3/ 2.4. Seizures may occur with quinolone therapy. Moxifloxacin should be used with precaution in patients with known or suspected CNS disorders which may predispose to seizures or lower the seizure threshold. Administration of an NSAID with a quinolone may increase the risk of CNS stimulation and convulsions. Initiate seizure protocol 4.2 if required.

Adverse Effects: Most common adverse reactions are abdominal pain, headache, nausea, diarrhoea, vomiting.

Dosage and Administration:

- Recommended dose for Moxifloxacin tablets is 400 mg once daily for all indications.

6.25 Naloxone

(Narcan – Narcotic antagonist)

Indications:
Suspected Narcotic Overdose Protocol 4.1; Unconscious NYD Protocol 4.6

Contraindication:
Hypersensitivity to Naloxone.

Precautions:
Naloxone may have a half-life as short as 30 min.

In the case of narcotic overdose, the patient should be closely observed for a change in mental state (agitation, combativeness, etc.). The patient may require further Naloxone if the underlying problem is narcotic overdose.

Pharmacology:
Onset of action: IV: ~2 min; IM/SC: 2-5 min; IN: 8-13 min.
Duration of action: variable, but usually 1hr or less.
Half-life: approx 1hr.

Dosage and Administration:

- Adults: Naloxone 0.4 mg IV/IO over 1 min q3min prn maximum dose of 5 mg (discuss with MO/PA ASAP).
  0.8 mg IM/SC q3min prn maximum dose of 5 mg (discuss with MO/PA ASAP).
  4 mg IN q3min prn (alternating nostrils) maximum 5 doses (discuss with MO/PA ASAP) – available as Narcan nasal spray 4mg/0.1mL.
- Children: Naloxone 0.01 mg/kg IV/IM (after discussion with MO/PA) q3min up to 0.4 mg per dose.

Massage site after SC injection.

6.26 Nitroglycerin

(Nitroglycerin Spray)

Indications: Suspected Cardiac Chest Pain Protocol 1.1

Contraindications: Hypersensitivity and severe hypotension. Due to hemodynamic concerns, nitrates of any kind should not be used within the following timeframes: Not within 24 hr of Viagra (sildenafil), not within 48 hr of Cialis (tadalafil), and not within 24 hr of Levitra (vardenafil).

Precautions: Watch for hypotension. Monitor the BP q 5-10 min.

Pharmacology: Onset of action: Sublingual spray: 1-2 min. Peak effect: 4-10 min. Duration of action: 30-60 min.

Adverse Effects: Hypotension, headache, fainting, dizziness, weakness and face flushing, burning sensation of the tongue,

Dosage and Administration:

- Nitroglycerin spray 0.4 mg SL q5 min (max 3 doses every 30 min). If administering the patient's own nitroglycerin tablets, place them under the tongue.

6.27 Normal Saline

(Crystalloid, NS, 0.9% Sodium Chloride)

Indications: Protocols requiring IV Access

Contraindications: Pulmonary edema.

Maintenance Rates (unless otherwise specified):

- Adults: 100 mL/hr
- Children: See Paediatric Table 8.3 for maintenance rates and other paediatric indices.

6.28 Obidoxime

(Not licensed in Canada, but CAF has access to DOUBLEPEN Obidoxime/Atropine (OA) through Health Canada's Special Access Programme)

Indication:
Nerve Agent Exposure Protocol 5.4

Contrindication:
There are no absolute contraindication due to the life-threatening nature of nerve agent poisoning.

Precautions:
Serious kidney and/or liver disease; Allergy to any of the ingredients in DOUBLEPEN OA.

Adverse Effects:
Possible side effects for Obidoxime include: Uncommon liver and kidney disturbances; Heart arrhythmias; Sensations of heat or cold; Taste of menthol; Numbness; Muscle weakness; Dry mouth; Slight increase in heart rate and blood pressure.

H Svcs Ops is responsible for maintaining a nominal roll of all personnel who use or are administered this product and any adverse events. IT IS THEREFORE IMPORTANT TO REPORT ANY SIDE EFFECTS TO YOUR MEDICAL OFFICER.

Pharmacology:
Onset of action: Within 15 min of injection.

Dosage and Administration:

- For Moderate to Severe Symptoms of Nerve Agent Poisoning:
    - Inject one (1) DOUBLEPEN OA immediately and one (1) anti-convulsant auto-injector immediately afterwards.
    - Wait fifteen (15) minutes for antidote to take effect.
    - If symptoms are still present, inject a second DOUBLEPEN OA.
    - If symptoms are still present after another fifteen (15) minutes, inject a third DOUBLEPEN OA.
    - Do not exceed 3 DOUBLEPEN OA.

- DOUBLEPEN OA:
    - Used for self-injection or buddy-administration.
    - For intramuscular injection as an auto-injector.
    - Content of the two-chamber auto-injector:
        - 1st chamber – Obidoxime Dichloride - 220mg/2ml
        - 2nd chamber – Atropine Sulphate - 2mg/2ml
- Administration procedure:
    - Move excess clothing out of the way to minimize its thickness around the injection site.
    - Inject one (1) DOUBLEPEN OA by removing the cotter pin near the top, placing the auto-injector on mid outer thigh halfway between hip and knee, ensuring your thumb is over the button on the opposite side where the pin was and pushing the button firmly. Hold for ten (10) seconds.
    - Place used DOUBLEPEN OA and anti-convulsant auto-injector in the casualty's Mask Carrier Bag.

Seek medical attention for casualty and provide information on whether contamination is suspected in the area, the number of injections used, whether artificial respiration was applied, and other injuries and treatments used.

6.29 Ondansetron
(Zofran)

Indications:
Antiemetic as adjunct to algorithm 3.6 Pain Management Protocol; Eye Injury Protocol 3.8

Contraindication:
Hypersensitivity to Ondansetron.

Precaution:
Avoid Ondansetron in patients with congenital long QT syndrome.

Adverse Effects:
Headache; Malaise/Fatigue; Constipation.

Pharmacology:
Selective 5-HT3 receptor antagonist.
Half-life: 2-7 hr (children <15yrs); 3-7 hr (adult).

Dosage and Administration:
- 8 mg IV/IO/IM/PO q8h prn (for adult only).

Concentration 2 mg/ml.

IV (preferred over IM) should be administered over 2-5 min (ideally) and no less than 30 seconds. If given too quickly, can increase adverse effects.

For pediatric patient, contact MO/PA.

6.30 Oxygen
(O_2)

Indications:
All Protocols

Contraindications:
Nil

Precautions:
Caution in those patients with COPD, as it may depress respiratory drive.

These patients require frequent monitoring.

Be prepared to assist ventilation if required.

Dosage and Administration:
- As per protocol.
- As required to achieve/maintain target SpO_2/O_2 saturation.

SECTION 6: DRUG MONOGRAPHS

6.25 Salbutamol

(Ventolin)

Indications:
SOB Suggestive of Asthma/COPD Protocol 2.2 (Adult); Anaphylaxis/Anaphylactic Shock – Adult & Children > 30 Kg Protocol 2.3; Anaphylaxis/Anaphylactic Shock – Adult & Children ≤ 30 Kg Protocol 2.4

Contraindication:
Hypersensitivity to salbutamol.

Adverse Effects:
Palpitations; Tachycardia; Nervousness; Headache; Tremor; Paradoxical bronchospasm (breathing worsen).
If paradoxical bronchospasm occurs, discontinue administration immediately and contact MO/PA

Pharmacology:
Onset of action: 5-15 min before measurable decrease in airway resistance.
Duration of action: 3-6 hrs.
Time to peak effect: MDI: 60-90 min; Nebulizer: 1-2 hrs.

Dosage and Administration:

- Anaphylaxis/Anaphylactic Shock **–** Adult & Children > 30 Kg
  - 4-8 puffs MDI q20min prn; Or
  - 5 mg via nebulizer q20min prn.
- Anaphylaxis/Anaphylactic Shock **– Adult & Children ≤ 30 Kg**
  - 2 puffs MDI q20min prn; Or
  - 2.5 mg via nebulizer q20min prn.
- SOB Suggestive of Asthma/COPD (Adult)
  - Mild/Moderate: 4-8 puffs MDI q20min prn x 3 doses or 5 mg via nebulizer q20min prn x 3 doses. The doses can be repeated for another 3 doses (6 doses total max) if improvement noted. If no improvement, contact MO/PA.
  - Severe/Near Death: 2 puffs MDI q1min or continuous salbutamol via nebulizer.

Administration with a spacer (can be improvised) is preferred.

Frequency and dosing may be adjusted in accordance with symptoms and onset of adverse effect.

6.32 Tetracaine

(Minims Tetracaine Hydrochloride 0.5% & 1.0%, Eye drops solution)

Indication: Eye Injury Protocol 3.8

Contraindication: Severe allergy (anaphylaxis) to other anaesthetics.

Precautions: Consult physician if:

- Patient is a premature baby
- If patient is taking a sulfonamide for diabetic treatment (Gliclazide, Glyburide); for a bacterial infection (Septra); for diuresis (Hydrochlorothiazide, furosemide, indapamide, acetazolamide); for migraines (sumatriptan, other triptans).
- The cornea may be damaged by prolonged application of anaesthetic eye drops.

6.32 Tetracaine continued

N.B.: Tetracaine is hydrolyzed in the body to p-amino-benzoic acid and should not therefore be used in patients being treated with sulphonamides (lists under precautions). In view of the immaturity of the enzyme system which metabolizes the ester type local anaesthetics in premature babies, tetracaine should be avoided in these patients.

Adverse Effects: Transient blurring of vision, burning sensation, itching around the eye, corneal damage with prolonged application.

Dosage and Administration:

- Adults and children – one drop or as required.
- Each unit should be discarded after use. Store in original package to protect from light, at room temperature.

6.33 Tranexamic Acid (TXA)

(Antifibrinolytic)

Indication:
TXA Protocol 3.4

Contraindications:
Deep Vein Thrombosis (DVT); Pulmonary embolism; Cerebral thrombosis; Hypersensitivity to ingredients; Hematuria.

Precaution:
No evidence in patients under 18 years of age.

Adverse Effects:
Dizziness; Nausea; Vomiting; Diarrhea; Reduced blood pressure; Allergic dermatitis; Impaired colour vision.

Pharmacology:
Promotes clotting by stopping breakdown of clotting factors (antifibrinolytic).

Dosage and Administration:

- Administer 2 gm of tranexamic acid via slow IV or IO push as soon as possible but NOT later than 3 hours after injury.
- Maximum Dose: 2 g (20 ml).

6.34 Xylocaine 1% or 2%

(Lidocaine or Lidocaine with Epinephrine)

Indications:
Airway Algorithm Protocol 2.1; Other Sources of Massive Hemorrhage Protocol 3.11

Sutures: For routine, non-emergency procedure, refer to your Scope of Practice.

6.34 Xylocaine 1% or 2% continued

Contraindications:
History of hypersensitivity reaction to other anaesthetics.

Precautions:
Maximum Lidocaine to be injected:

- Transtracheal Block: 10 ml as per Transtracheal Block Procedure 7.3;
- Emergency wound closure:
    - With Epinephrine: 7 mg/kg (max of 500mg);
    - Without Epinephrine: 4.5 mg/kg (max of 300 mg).

Adverse Effects:
Depends on dosage, concentration, and rate/method of administration.

Most common: Bradycardia; Hypotension; CNS depression (Dizziness; Confusion; Light-headedness; Euphoria); Allergic reactions (Cutaneous lesions; Urticarial; Edema; Anaphylactic); Headache; Backache; Double vision.

Dosage and Administration:

- Concentration/dosage:
    - Lidocaine 1% with epi: 10 mg/ml (a patient of 70 kg should receive a max of 49 ml of Lidocaine).
    - Lidocaine 2% with epi: 20 mg/ml (a patient of 70 kg should receive a max of 24.5 ml of Lidocaine).
    - Lidocaine 1% without epi: 10 mg/ml (a patient of 70 kg should receive a max of 31.5 ml of Lidocaine).
    - Lidocaine 2% without epi: 20 mg/ml (a patient of 70 kg should receive a max of 15.75 ml of Lidocaine).

Inject using a needle placed directly into the wound (for whip stich).
e.g.: A 3 to 4 cm laceration should require about 3 to 5 ml of anesthetic.

6.35 3% Sodium Chloride Injection

(3% Hypertonic Saline, HS)

Indications:
Severe TBI 3.10

Contraindications:
No known specific.

Precautions:
Being strongly hypertonic, may cause vein damage (with administration 24hrs +) and may result in sodium retention. Use with caution in patients with congestive heart failure or severe renal insufficiency.

Adverse Effects:
Febrile response; Infection at the site of injection; Venous thrombosis or phlebitis extending from the site of injection; Extravasation; Hypervolemia.

Dosage and Administration:

- 250 ml IV/IO bolus, q3h prn for elevated ICP.

SECTION 7: STANDARD MEDICAL PROCEDURES

This section covers the procedures for:

7.1 i-gel® (Supraglottic Airway Device) Insertion Principles
7.2 Chest Trauma Management Procedure
7.3 Transtracheal Block
7.4 Cricothyroidotomy
7.5 Saline Lock
7.6 Medication Calculation, Reconstitution & Dilution
7.7 Intraosseous (IO) Access
7.8 Bladder Catheterization
7.9 Emergency Child Birth
7.10 Transfer of Care
7.11 NPA/OPA Principles
7.12 Tourniquet Assessment, Conversion and Removal Sequence

SECTION 7: STANDARD MEDICAL PROCEDURES

7.1 i-gel® (Supraglottic Airway Device) Insertion Principles

NOTE: A SUPRAGLOTTIC AIRWAY DEVICE DOES NOT PROTECT AIRWAYS FROM ASPIRATION

Indications:

- Patient that is unable to maintain a patent airway (GCS ≤ 8 or absence of gag reflex).
- Cardio-respiratory arrest.

Contraindications:

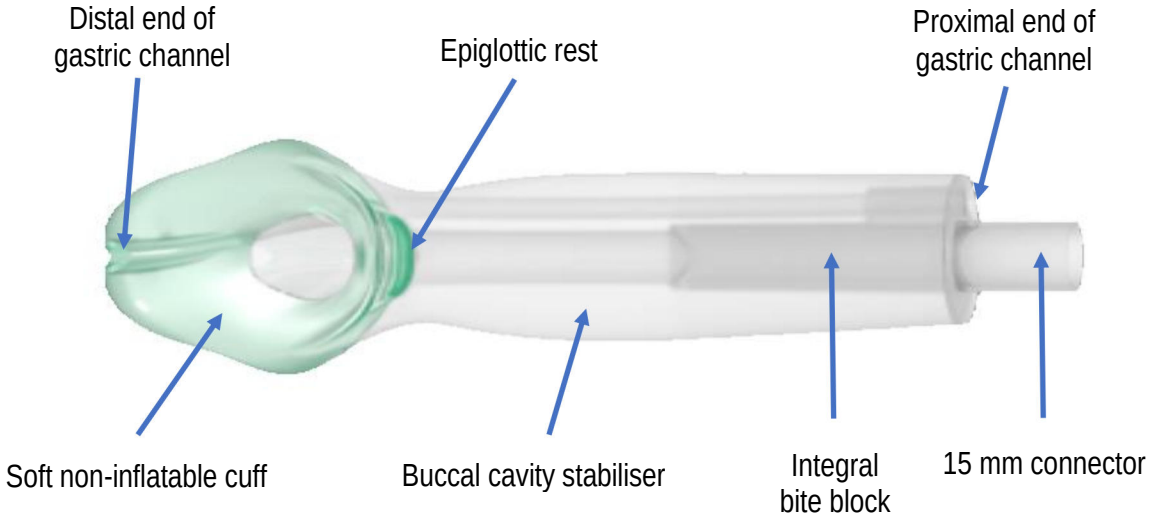
- Gag reflex present.
- Trismus; Limited mouth opening; Pharyngo-perilaryngeal abscess; Trauma or mass.
- Patient with any condition which may increase the risk of a full stomach (e.g.: Hiatus hernia; Sepsis; Morbid obesity; Pregnancy; History of upper gastro-intestinal surgery; etc).

Cautions:

- Do not allow peak airway pressure of ventilation to exceed 40 cm H_2O.
- Do not use excessive force to insert the device.
- Do not leave the device in place for more than four hours.
- Do not reuse or attempt to reprocess the i-gel®.

Key components and their function (i-gel® and Resus Pack)

Description: The i-gel® is made from a medical grade thermoplastic elastomer. i-gel® has been designed to create a non-inflatable, anatomical seal of the pharyngeal, laryngeal and perilaryngeal structures whilst avoiding compression trauma.



Front image of Adult sizes

Front image of Pediatric sizes

7.1 i-gel® (Supraglottic Airway Device) continued

Soft non-inflatable cuff:

- Fits snugly onto the perilaryngeal framework, mirroring the shape of the epiglottis, aryepiglottic folds, piriform fossa, peri-thyroid, peri-cricoid, posterior cartilages and spaces.

Gastric channel:

- The gastric channel runs through the device from its proximal opening at the side of the flat connector wing to the distal tip of the non-inflatable cuff. Since the distal tip of the device fits snugly and anatomically correctly into the upper esophageal opening, the distal opening of the gastric channel allows for the passing of a nasogastric tube to empty the stomach contents and can facilitate the venting of gas from the stomach. The gastric channel can also provide an early indication of regurgitation. Please note the size 1 i-gel® does not have a gastric channel.

Epiglottic rest:

- An artificial epiglottis and a protective ridge help prevent the epiglottis from down-folding or obstructing the distal opening of the airway. The epiglottic ridge at the proximal end of the bowl rests at the base of the tongue, thus keeping the device from moving upwards out of position and the tip from moving out of the upper esophagus.

Buccal cavity stabiliser:

- The buccal cavity stabiliser has a built-in natural curvature and an inherent propensity to adapt its shape to the oropharyngeal curvature of the patient. It is anatomically widened and concaved to eliminate the potential for rotation, thereby reducing the risk of malposition. It also provides vertical strength to aid insertion.

15 mm connector:

- Provide a standard 15 mm connection to the anaesthetic system or BVM connection.
- A port of entry for the gastric channel – the port is independent of the main 15 mm connection and is located on the right hand side of the connector wing. Not applicable to size 1 i-gel®.
- An integral bite block – this function is provided by the distal (Below the wing) part of the connector, which runs through the centre of the proximal part of the buccal cavity stabiliser.
- As a guide to correct positioning – the integral part of the bite-block is marked with a horizontally placed black line, which signifies the optimum position of the teeth while the device is in situ (Not applicable to the pediatric sizes).

Types of Presentation:

- i-gel® alone
    - i-gel®
    - Cradle
- i-gel® Resus Pack
    - i-gel®
    - Cradle
    - Airway Support Strap
    - 12FG Suction Tube
    - Water base Lubricant

7.1 i-gel® (Supraglottic Airway Device) continued

Assemble the necessary equipment:

1. Select appropriate size airway.

   Color coded full range size:

   - Size 1: Neonate 2-5 kg (4-11 Pounds).
   - Size 1.5: Infant 5-12 kg (11-26 Pounds).
   - Size 2: Small Pediatric 10-25 kg (22-55 Pounds).
   - Size 2.5: Large Pediatric 25-35 kg (55-77 Pounds).
   - Size 3: Small Adult 30-60kg (66-132 Pounds) Resus Pack Yellow.
   - Size 4: Medium Adult 50-90kg (110-198 Pounds) Resus Pack Green.
   - Size 5: Large Adult 90 + kg (Over 198 Pounds) Resus Pack Orange.

2. Water based lubricant (Provided with Resus Pack).
3. Bag Valve Mask (BVM).
4. C-collar (To help stabilizing the i-gel®).
5. Tape or the Airway Support Strap.
6. CO_2 Colorimetric Detector.

Pre-use checks:

- Inspect the packaging and ensure it is not damaged prior to opening.
- Inspect the device carefully and confirm there are no foreign bodies or a bolus of lubricant obstructing the distal opening of the airway or gastric channel.
- Carefully inspect inside the bowl of the device, ensuring surfaces are smooth and intact and also that the gastric channel is patent.
- Discard the device if the airway tubes or the body of the device looks abnormal or deformed.

Pre-insertion preparation:

1. Always wear gloves.
2. Open the i-gel® package and on a flat surface take out the protective cradle containing the device.
3. Place a small bolus of the water-based lubricant (Provided with resus pack) onto the middle of the smooth surface of the cradle in preparation for lubrication. Do not use silicone based lubricant.
4. Grasp the i-gel® along the integral bite block and lubricate the back, sides and front of the cuff with a thin layer of lubricant. This process may be repeated if lubrication is not adequate, but after lubrication has been completed, check that no bolus of lubricant remains in the bowl of the cuff or elsewhere on the device. Avoid touching the cuff of the device with your hands.
5. Place the i-gel® back into the cradle in preparation for insertion.

N.B.: The i-gel® must always be separated from the cradle prior to insertion. The cradle is not an introducer and **must never be inserted into the patient's mouth.**

7.1 i-gel® (Supraglottic Airway Device) continued

Warnings:

- Do not place the device onto a pillow or the patient's chest and always use the protective cradle/cage pack provider.
- Do not use unsterile gauze to help in lubricating the device.
- Do not apply lubricant too long before insertion.

Insertion technique:

1. Grasp the lubricated i-gel® firmly along the integral bite block. Position the device so that the i-gel® cuff outlet is facing towards the chin of the patient.

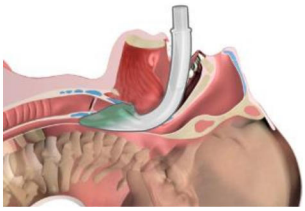
2. The patient should be in ''Sniffing'' position with the head extended and neck flexed (If no spine injury).

3. Introduce the leafing soft tip into the mouth of the patient and direct towards the hard palate.

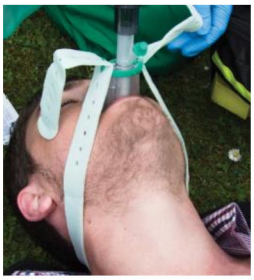
4. Glide the device downwards and backwards along the hard palate with a continuous but gentle push until a definitive resistance is felt.

NB: If there is early resistance during insertion, a ''jaw thrust'' is recommended.

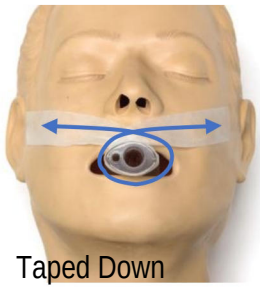
5. At this point, the tip of the airway should be located into the upper esophageal opening and the cuff should be located against the laryngeal framework. Once resistance is met and the teeth are located on the bite block, do not repeatedly push i-gel® down or apply excessive force during insertion.



6. i-gel® should be secure with the Airway Support Strap or taped down from ''maxilla to maxilla''.



Airway Support Strap



Taped Down

Taped Down

7.1 i-gel® (Supraglottic Airway Device) continued

7. Attach BVM.

8. Confirm placement:
    a. Auscultate the epigastric region to r/o gastric inflation;
    b. Auscultate breaths sounds bilaterally;
    c. Confirm that the thorax rises evenly;
    d. Attach a CO_2 Colorimetric Detector.

9. Apply C-collar if available.

Important notes:

- Sometimes a feel of ''giving-way'' is felt before the end point resistance is met. This is due to the passage of the bowl of the i-gel® through the faucial pillars (Pharyngo-epiglottic folds).

Incorrect position:

- A horizontal line (Adult sizes 3, 4, 5 only) at the middle of the integral bite-block represents the correct position of the teeth. If the teeth are located lower than the distal tip of the bite block, then it is likely the device has been incompletely inserted. In this instance, remove the i-gel® and reinsert with a gentle jaw thrust applied by an assistant. If that does not resolve the problem, use one size smaller i-gel®.
- The pediatric sizes of i-gel® (Sizes 1 to 2.5) do not have a horizontal line on the integral bite block. This is due to the greater variability in the length of the oro-pharyngeal-laryngeal arch in children. As a result, insertion should continue, as with the adult sizes, until definitive resistance is felt.

Air leakage through the gastric channel:

- A small air leak, or air venting through the gastric channel may be a useful mechanism to protect against gastric insufflation, but an excessive leak means the device is incompletely inserted. In such instances, remove the device and reinsert with a gentle jaw thrust applied by an assistant.

Withdrawal Procedure:

1. Place Casualty in recovery position and have suction ready.

2. Unsecure the tube.

3. Remove the tube.

Monitor patient, record and document procedure

7.2 Chest Trauma Management Procedure

Indications:

- Known or suspected injury to the chest or underlying structures resulting from penetrating, blunt or blast trauma.
- Vital Signs Absent Protocol 1.5.

Blunt Force Injury

- Blunt force applied to the chest wall is transmitted through the chest wall to the thoracic organs, especially the lungs.
- This wave of energy can tear lung tissue, which may result in bleeding into the alveoli. In this setting, the injury is called a pulmonary contusion (essentially a bruise of the lung).
- It can be made worse with fluid resuscitation.
- The impact on oxygenation and ventilation is the same as with penetrating injury.
- If the force applied to the lung tissue also tears the visceral pleura, air may escape from the lung into the pleural space, creating a pneumothorax and the potential for a tension pneumothorax.
- Blunt force trauma to the chest can also break ribs, which can then lacerate the lung, resulting in pneumothorax as well as hemothorax (Both caused by bleeding from the broken ribs, torn lung and intercostal muscles).
- Blunt force injury typically associated with sudden deceleration incidents may cause shearing or rupture of the major blood vessels in the chest, particularly the aorta, leading to catastrophic hemorrhage.
- Finally, in some cases, blunt force can disrupt the chest wall, leading to instability of the chest wall and compromise of the changes in intrathoracic pressure, leading to impaired ventilation.

Rib Fractures

- Several factors have been shown to contribute to the morbidity and mortality of patients with multiple rib fractures, including total number of ribs fractured, the presence of bilateral fractures, and increased age (65 yrs and older). The elderly are especially susceptible to rib fractures, likely due to loss of cortical bone mass (osteoporosis), which allows the ribs to fracture after sustaining less kinetic force. Regardless of age, mortality increases as more ribs are fractured.
- Despite the ribs being fairly well protected by overlying musculature, rib fractures are a common occurrence in thoracic trauma. The upper ribs are broad, thick, and particularly well protected by the shoulder girdle and muscles.
- Because it requires great energy to fracture the upper ribs, patients with upper rib fractures are at risk for harbouring other significant injuries, such as traumatic disruption of the aorta.
- Rib fractures occur most often in ribs 4 to 8 laterally, where they are thin and have less overlying musculature.
- The broken ends of the ribs may tear muscle, lung, and blood vessels, with the possibility of an associated pulmonary contusion, pneumothorax, or hemothorax. Underlying pulmonary contusion is the most commonly associated injury seen with multiple rib fractures. Compression of the lung may rupture the alveoli and lead to pneumothorax.
- Fracture of the lower ribs may be associated with injuries of the spleen and liver and may indicate the potential for other intra-abdominal injuries. These injuries may present with signs of blood loss or shock.

Assessment of Rib Fractures:

- Patient with simple rib fractures will most often complain of chest pain with breathing or movement and difficulty breathing.
- They may have laboured respirations.
- Careful palpation of the chest wall will usually reveal point tenderness directly over the site of the rib fracture, and crepitus may be felt as the broken ends of the rib grind against each other.
- The Med Tech must assess vital signs, paying particular attention to the ventilatory rate and depth of breathing.
- Pulse oximetry also should be performed, as well as capnography if available.

7.2 Chest Trauma Management Procedure continued

Management of Rib Fractures:

- Pain relief is a primary goal in the initial management of patients with rib fractures. This may involve reassurance and positioning of the patient's arms using a sling and swath.
- Keep in mind the potential for deterioration in ventilation and development of shock.
- Establishing IV access should be considered, depending on the patient's condition and anticipated transport time.
- The patient is encouraged to take deep breath and cough to prevent the collapse of the alveoli (atelectasis) and the potential for pneumonia and other complications.
- Rigid immobilization of the rib cage with tape or straps should be avoided because these interventions predispose to the development of atelectasis and pneumonia.
- Supplemental oxygen and assisting ventilations may be necessary to ensure adequate oxygenation.

Flail Chest

- Flail chest occurs when two or more adjacent ribs are fractured in more than one place along their length. The result is a segment of chest wall that is no longer in continuity with the remainder of the chest. When the respiratory muscles contract to raise the ribs up and out and lower the diaphragm, the flail segment paradoxically moves inward in response to the negative pressure being created within the thoracic cavity.
- This paradoxical motion of the flail segment makes ventilation less efficient. The degree of inefficiency is directly related to the size of the flail segment.
- The significant force necessary to produce such an injury is generally transmitted to the underlying lung, resulting in a pulmonary contusion. The patient thus may have two mechanisms compromising ventilation and gas exchange, the flail segment and the underlying pulmonary contusion; which is the bigger problem when it comes to compromising ventilation. The pulmonary contusion does not allow for gas exchange in the contused portion of the lung because of alveoli flooding with blood.

Assessment of Flail Chest:

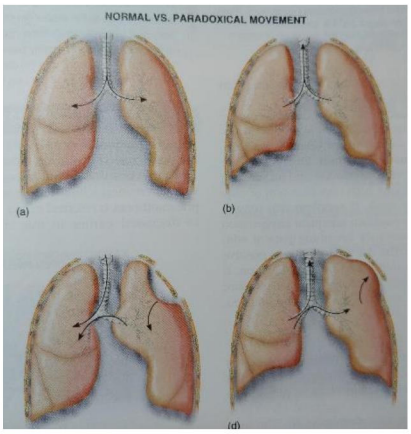
- As with a simple rib fracture, assessment of flail chest will reveal a patient in pain. The pain is typically more severe, and the patient usually appears to be in distress.
- Respiratory rate is elevated, and the patient does not take deep breaths because of the pain.
- Hypoxia may be present, as demonstrated by pulse oximetry or cyanosis.
- Paradoxical motion may or may not be evident or easily recognized. Initially, the intercostal muscles will be in spasm and tend to stabilize the flail segment. As these muscles fatigue over time, the paradoxical motion becomes increasingly evident. The patient will have tenderness and potentially bony crepitus over the injured segment. The instability of the segment may also be appreciated on palpation.

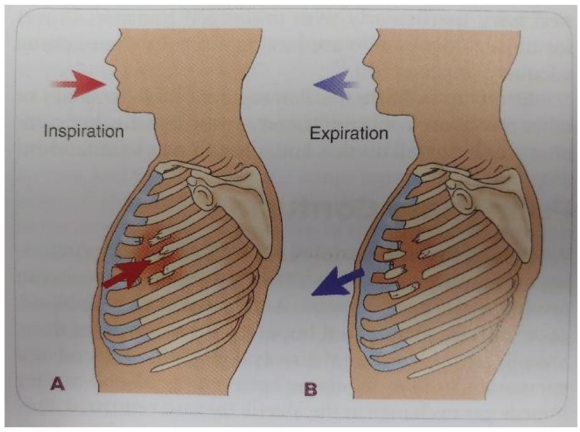
Management of Flail Chest:

- Management of flail chest is directed toward pain relief, ventilatory support, and monitoring for deterioration.
- The ventilatory rate may be the most important parameter to follow and carefully measure.
- Patients who are developing underlying pulmonary contusion and respiratory compromise will demonstrate an increase in their ventilatory rate over time.
- Pulse oximetry, if available, is also useful to detect hypoxia.
- Oxygen should be administered to ensure an oxygen saturation of at least 92%.
- Obtain IV access.
- Analgesia should be considered (refer to Protocol 3.6 Pain).

7.2 Chest Trauma Management Procedure continued

- Support of ventilation with supraglottic airway and BVM may be necessary (particularly with prolonged transport times) for those patients who are having difficulty maintaining adequate oxygenation.
- Effort to stabilize the flail segment with sandbags or other means are contraindicated as they may further compromise chest wall motion and, thus, impair ventilations.





Pulmonary Contusion

- When lung tissue is lacerated or torn by blunt or penetrating mechanisms, bleeding into the alveolar air space can result in pulmonary contusion. As the alveoli fill with blood, gas exchange is impaired because air cannot enter these alveoli from the terminal airways.
- In addition, blood and edematous fluid in the tissue between the alveoli further impede gas exchange in the alveoli that are ventilated.
- Pulmonary contusion is almost always present in the patient with a flail segment and is a common and potentially lethal complication of thoracic injury.
- Deterioration to the point of respiratory failure may occur over the first 24 hrs after injury.

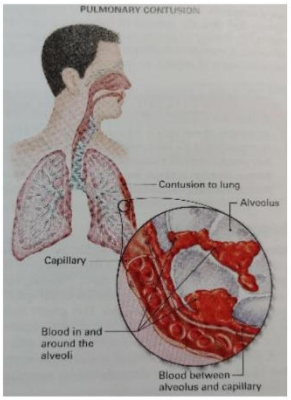
Assessment of a Pulmonary Contusion:

- Assessment findings of the patient are variable depending on the severity of the contusion (% of involved lung).
- Early assessment typically reveals no respiratory compromise.
- As the contusion progresses, the ventilatory rate will increase and rales may be heard on auscultation.
- In fact, a rising ventilatory rate is often the earliest clue that a patient is deteriorating from pulmonary contusion.
- A high index of suspicion is necessary, particularly in the presence of a flail segment.

Management of a Pulmonary Contusion:

- Management is directed toward support of ventilation.
- Frequently reassess the ventilatory rate and any signs of respiratory distress.
- Continuous pulse oximetry and capnography, if available, should be utilized.
- Supplemental oxygen should be provided to all patients with suspected pulmonary contusion with a goal of maintaining oxygen saturation in the normal range (≥ 92%).
- Support of ventilation with supraglottic airway and BVM (if patient condition permits) may be necessary.
- In absence of hypotension (<90 mmHg), aggressive IV/IO fluid administration may further increase edema and compromise ventilation and oxygenation. Instead, IV/IO fluids should be administered judiciously and only as necessary to maintain blood pressure greater than 90 mmHg.

7.2 Chest Trauma Management Procedure continued



Tension Pneumothorax

- Tension pneumothorax is a life threatening emergency.
- As air continues to enter the pleural space without any exit or release, intrathoracic pressure builds up.
- Intrathoracic pressure rises, ventilatory compromise increases and venous return to the heart decreases.
- The decreasing cardiac output coupled with worsening gas exchange results in profound shock.
- The increasing pressure on the injured side of the chest may eventually push the structures in the mediastinum toward the other side of the chest. This distortion of anatomy may further impede venous return to the heart through the kinking of the inferior vena cava as it passes through the diaphragm.
- Additionally, inflation of the lung on the uninjured side is increasingly restricted, and further respiratory compromise results.
- If not treated promptly, tension pneumothorax may progress from respiratory distress to shock and traumatic cardiac arrest.
- Respiratory distress may also result from other etiologies such as pulmonary contusion, hemothorax, inhalation injury, in addition to non-traumatic causes such as asthma.

Note: For indications of a Tension Pneumothorax, refer to Protocol 3.9 Chest Trauma Management.

Procedure for Burp:

1. Assess patient's torso (expose and rake above the level of the umbilicus, including armpits) and respiratory status. Consider sitting up casualties (without S/S of spinal injury) to perform a thorough inspection of trunk and to help relieve dyspnea.

2. Immediately cover the defect with gloved hand and apply a CCCWG approved chest seal. A vented chest seal should be used if available.

3. If indications of tension pneumothorax are present, peel back the chest seal, place gloved hands circumferentially around chest defect (align the tissues) and provide gentle downward pressure with the patient's expiration.

4. Replace chest seal immediately (before patient's inspiration).

5. If this procedure is ineffective (after 2 attempts) proceed with needle decompression (ND).

6. In case of a penetrating injury, place the casualty in the supine position, recovery position or semi sitting position to help keep the airway clear/open (without S/S of spinal injury).

7.2 Chest Trauma Management Procedure continued

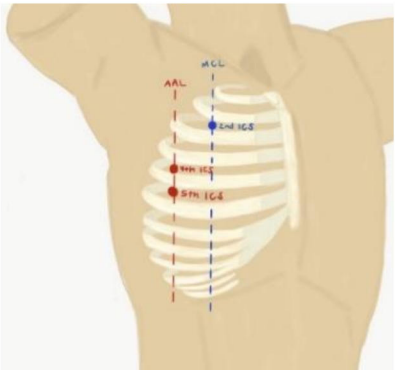
Indications for Needle Decompression (Thoracostomy):

- Penetrating MOI: Unable to perform a burp or burp is ineffective.
- Blast/Blunt MOI: Casualty still present S/S of tension pneumothorax.

Procedure for Needle Decompression (Thoracostomy):

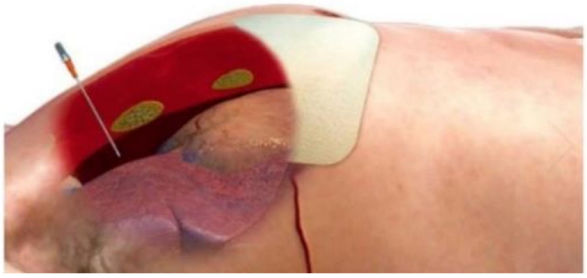
1. Assess the patient's chest and respiratory status.

2. Landmarks are: 2nd intercostal space in the mid-clavicular line (MCL)
   (always err on the approach of going too lateral rather than risk going too medial) or 4th/5th intercostal space anterior axillary line (AAL).



3. Prepare site by wiping with an alcohol swab.

4. Insert a 14 gauge 3.25 inches cathlon/angiocatheter, perpendicular to the chest wall, along the superior border of the 3rd rib (mid-clavicular) or the 5th / 6th rib anterior axillary line, to avoid the neurovascular bundle.



5. Insert the needle/catheter unit all the way to the hub and hold it in place for 5-10 sec to allow decompression to occur.

6. After the ND has been performed, remove the needle and leave the catheter in place.

7. If the Med Tech has a limited supply of needles/catheters units, they may be required to reuse them.

   - Reinsert the used needle in the protective cover to retain in the event of a future need.

7.2 Chest Trauma Management continued

8. Reassess the catheter often for effectiveness and consider the need to repeat the procedure.
    - If catheter becomes ineffective and you don't have another needle/catheter unit available:
        - Pull out the catheter from the chest.
        - Take your pre-used needle.
        - Gently push the needle through the catheter to remove any obstructions and to give the catheter its original shape.
        - Re-do the ND procedures with this needle (only on the same casualty).

9. It is generally not advised to replace protective equipment over the thorax of an individual with a pneumothorax as it prohibits ready access for reassessment and repeat needle decompression. It can also interfere with normal chest wall movement and effective ventilation.

The ND should be considered successful if:

- Respiratory distress/tachypnea improves; Or
- There is an obvious hissing sound as air escapes from the chest when ND is performed (This may be difficult to appreciate in high-noise environments); Or
- O_2 Sat increases to 90% or greater (Note that this may take several minutes and may not happen at altitude); Or
- A casualty with no vital signs has return of consciousness and/or return radial pulse.
- Return of a previously absent radial pulse or increase of SBP ≥ 90 mmHg.

If the initial ND **fails to improve the casualty's signs/symptoms from the suspected tension pneumothorax:**

- Perform a second ND on the same side of the chest at whichever of the two recommended sites was not previously used. Use a new needle/catheter unit for the second attempt.

If the initial ND was successful, but symptoms later recur:

- Perform another ND at the same site that was used previously but laterally/posteriorly. Use a new needle/catheter unit for the repeat ND.
- Continue to reassess.

If the second ND is also not successful:

- If two consecutive needle decompressions have resulted in no clinical improvement, the casualty's signs & symptoms may be caused by hemorrhagic shock or other conditions, and the provider should continue with assessment of circulation.
- Contact MO/PA.

Cardiac Tamponade

- Cardiac tamponade occurs when a wound of the heart allows fluid (usually blood) to accumulate between the pericardial sac and the heart. The pericardial sac is comprised of a fibrous, inelastic tissue.
- Because the pericardium is inelastic, the pressure begins to rise rapidly within the pericardial sac as fluid accumulates within it acutely.
- The rising pericardial pressure impedes venous return to the heart. This, in turn, leads to diminished cardiac output and blood pressure.
- With each contraction of the heart, additional blood may enter the pericardial sac, further impeding the hearts ability to fill in preparation for the next contraction.
- This condition can become profound enough to precipitate pulseless electrical activity, a life threatening injury requiring urgent transport to a surgical facility.

7.2 Chest Trauma Management continued

- The normal adult pericardium may be able to accommodate as much as 300 ml of fluid before pulselessness occurs, but as little as 50 ml is usually enough to impede cardiac return and, thus, cardiac output.
- Most often, cardiac tamponade is caused by a stab wound to the heart (gunshot wound or impaled object cause more severe damage, so the pericardium cannot contain the haemorrhage, resulting in rapid exsanguination). This mechanism of injury may result in penetration into one of the cardiac chambers or just a laceration of the myocardium.
- The right ventricle is the most anterior chamber in the heart and is therefore the most commonly injured chamber in penetrating trauma.
- Cardiac tamponade should be kept in mind as a possibility when evaluating any patient with a thoracic penetration. This index of suspicion should be raised to the level of ''present until proven otherwise'' when the penetrating injury is within the cardiac box.

Assessment of a Cardiac Tamponade:

- Assessment involves quickly recognizing the presence of at-risk wounds in combination with an appreciation for the physical finding of pericardial tamponade.
- Beck's triad is a constellation of findings indicative of cardiac tamponade:
    a. Distant or muffled heart sounds;
    b. Jugular venous distension (Cause by the increasing pressure in the pericardial sac backing blood up into the neck veins);
    c. Low blood pressure.
- Another physical finding described in cardiac tamponade is paradoxical pulse.

Management of a Cardiac Tamponade:

- Management requires rapid monitored transport to surgical facility.
- Oxygen in high concentration should be administered.
- IV access should be obtained and judicious fluid therapy initiated, because this can augment central venous pressure and thus improve cardiac filing for a time.
- Med Tech should strongly consider supraglottic airway and BVM if the patient is hypotensive.

SECTION 7: STANDARD MEDICAL PROCEDURES

7.3 Transtracheal Block

Indication

- Performing cricothyroidotomy on an awake patient

Contraindication

- Hematoma or burn over the anterior neck

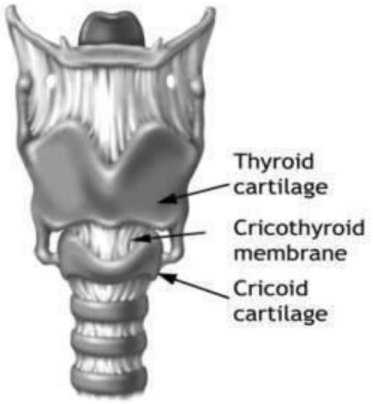
Procedure:

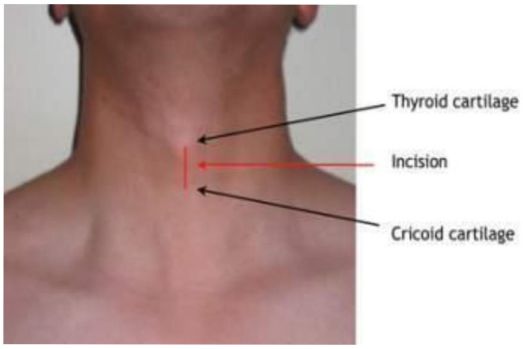
1. Draw up 10 mL 1% Xylocaine
2. Palpate patient's neck and identify cricothyroid membrane
3. Inject 2 mL Xylocaine subcutaneously directly over cricothyroid membrane
4. Inject 2 mL Xylocaine subcutaneously 2 cm cephalad above the cricothyroid membrane
5. Inject 2 mL Xylocaine subcutaneously 2 cm caudad below the cricothyroid membrane
6. Re-landmark and identify cricothyroid membrane
7. At 90 degrees push needle through cricothyroid membrane into trachea
8. Withdraw air into syringe to confirm placement in trachea
9. Rapidly inject remaining 4 mL Xylocaine into trachea and immediately withdraw needle[1]
10. Perform cricothyroidotomy

[1] Expect patient to cough. Though this improves anaesthesia, it will potentially push your needles posterior which might injure the posterior trachea or penetrate the oesophagus.

SECTION 7: STANDARD MEDICAL PROCEDURES

7.4 Cricothyroidotomy Procedure





Indications:

- Airway obstruction due to injuries to the face or neck in which blood or disrupted anatomy precludes the ability to secure an airway by any other means.
- Inhalation burns that compromise the airway.
- Chemical inhalation injury that compromises the airway.
- Anaphylaxis that compromises the airway.

Procedure:

1. If patient is conscious and time/conditions permit, perform a transtracheal block. (Procedure 7.3)

2. Assemble equipment:
    a. Cricothyroidotomy kit;
    b. End-tidal CO_2 Detector;
    c. Bag-Valve-Mask device.

3. Place casualty in supine position.

4. Hyperextend the casualty's neck unless you suspect a Cervical Spine Injury (CSI). Even in a casualty with a suspected CSI, an emergency surgical airway takes precedence. Every effort should be made to avoid movement of a potentially unstable CSI, but hyperextension is appropriate if a cricothyroidotomy cannot be performed effectively and without delay, in a neutral position.

5. Clean the area with iodine and/or alcohol swabs using aseptic technique.

6. Stabilize the larynx between your thumb and middle finger, ensuring not to pull the skin over the larynx to the left or right. Make a vertical incision 2-3 cm (3/4 – 1 inch) long midline over the cricothyroid membrane.

7. Retract the skin around the incision by applying slight downward pressure. Palpate the cricothyroid membrane with your index finger.

8. Lift your index finger and while still maintaining stabilization with your thumb and middle finger, puncture the membrane with the scalpel at 90 degrees to the patient. Extend the incision one scalpel blade width in both directions, to the patient's left and right. The scalpel blade should not be removed from the trachea (Until the tracheal hook is inserted, it is essential to maintain your landmark).

7.4 Cricothyroidotomy Procedure continued

9. Using your non-dominant hand, slide the tracheal hook along the scalpel on the inferior side of the blade until you feel the posterior wall of the trachea and lift upward hooking the trachea.

10. Once trachea is hooked, remove the scalpel.

11. While maintaining tracheal traction, insert tube approximately 7.5 cm (3 inches) into trachea.

12. Inflate balloon.

13. Maintaining position of the tube, attach the BVM. Auscultate the epigastrium to rule out gastric insufflation. Ensure symmetrical chest rise and good breath sounds bilaterally. Confirm effective ventilation with a colorimetric end-tidal CO_2 monitor.

14. Secure tube in place with supplied device.

Monitor and reassess casualty's respirations on a regular basis.

SECTION 7: STANDARD MEDICAL PROCEDURES

7.5 Saline Lock

Indications:

- Any time IV access is required but fluid volume replacement is not immediately indicated. [1]
- In a tactical environment (in TFC), and where a casualty is in shock or at risk of going into shock, start a saline lock with an 18G catheter. [2]

N.B.:

- Where a patient is anticipated to require multiple IV medications or therapies, the Med Tech may consider initiating bilateral saline locks (If time permits and does not delay appropriate care/evac of the patient).
- If IV access is not obtainable and fluid therapy is indicated, use the IO route with CCCWG recommended IO device (Procedure 7.7 Intraosseous Access).

Preparation of a Saline Lock

- Fill a 3-5 cc syringe with NS.
- If the saline lock was not in its sealed package, clean interlink with alcohol swabs.
- Fill the saline lock with NS (no air bubbles).

Maintenance of Saline Lock

- Flush with 3-5 ml NS
- Must be done:
    - On all sizes and types of saline lock (Interlink® Injection site, SmartSite® Extension set and others).
    - At insertion.
    - After 6 hrs of inactivity.
    - Before and after medication administration.
    - When blood is present in the lock.

Procedure for clinical setting:

1. Gain IV access if not already achieved.
2. Attach saline lock to the IV catheter.
3. Secure IV catheter with small Tegaderm®.
4. Slowly flush catheter with 3-5 ml NS.

Procedure for field setting:

1. Gain IV access if not already achieved.
2. Attach saline lock to the IV catheter.
3. Slowly flush catheter with 3-5 ml NS.
4. Completely cover the saline lock and IV catheter with large Tegaderm®.
5. If the Saline Lock needs to be flushed again later, slowly flush catheter with 3-5 ml NS using a syringe / needle unit. Pierce through the Tegaderm® after cleaning the area with an alcohol swab
6. If the casualty subsequently requires fluid, attach the IV line to the BD Interlink® Lever Lock Cannula and pierce through the Tegaderm® after cleaning the area with an alcohol swab.

[1] The saline lock may facilitate the loading and transporting of a patient. If the patient's condition changes, it may require changing to an appropriate IV solution.

[2] A saline lock is preferred in a dynamic environment where a conventional IV access line presents restrictions on mobility and risks being inadvertently dislodged.

SECTION 7: STANDARD MEDICAL PROCEDURES

7.6 Medication Calculations, Reconstitutions & Dilutions

Calculations

Principle Calculations:

1. Basics Conversions:

1 kg = 2.2 lbs

Examples: kg to lbs 30 kg x $\frac{2.2 \text{ lbs}}{1 \text{ kg}}$ = 66 lbs

lbs to kg 30 lbs x $\frac{1 \text{ kg}}{2.2 \text{ lbs}}$ = 13 kg

Note: Always round down to the nearest kilogram or pound.

1 kg = 1000 g

1 g = 1000 mg

1 L = 1000 ml

2. What amount do I have to draw from the ampoule/vial to get the correct dose?

$$\left(\text{Concentration of drug I have}\right) \times \left(\frac{\text{Dose of drug needed}}{\text{X ml}}\right)$$

X = # of ml to draw from ampoule/vial

Example:

Protocol 3.6: I have to give Morphine 2.5mg IV/IO over 1 min q5min to a max 15mg in 30 minutes.

How much do I draw from the ampoule?

Concentration of Morphine: 10mg/ml
Dose of drug needed: 2.5mg

7.6 Medication Calculations, Reconstitutions & Dilutions continued

$$\left[\text{Concentration of drug I have}\right] \times \left[\frac{\text{Dose of drug needed}}{\text{X ml}}\right]$$

X = # of ml to draw from ampoule/vial

Step 1:

$$\left[\frac{10\text{mg}}{1\text{ ml}}\right] \times \left[\frac{2.5\text{mg}}{\text{X ml}}\right]$$

Step 2:

$$\left[\frac{10\text{mg}}{1\text{ ml}}\right] \times \left[\frac{2.5\text{mg}}{\text{X ml}}\right]$$

(10mg)(X) = (2.5mg) (1.0 ml)

$$X = \frac{(2.5\text{mg})(1.0\text{ ml})}{10\text{ ml}}$$

X = 0.25 ml

7.6 Medication Calculations, Reconstitutions & Dilutions continued

3. Weight Based Dose Calculation: You are given an order by an MO to prepare 0.1 mg/kg Morphine for a child, how much medication is to be given?

(Dosing I have to use) X (Child's Weight in Kg) = Dose in mg required

Example:

I have to give Morphine 0.1mg/ kg IV (max 2.5mg) over 1 min (as per MO's order) to a 2 year old child that is 30 lbs.

What dose do I give this child?

(Dosing I have to use according to MO's order) X (Child's Weight in Kg) = Dose in mg

Dosing I have to use: 0.1mg/kg to a maximum of 2.5mg

Child's weight in kg : 30 lbs X $\frac{1\text{ kg}}{2.2\text{ lbs}}$ = 13.6 kg = 13 kg

0.1mg X 13 kg (child's weight) = 1.3mg

This child's dose is 1.3 mg. Refer to Principle Calculation #2 to find out how much to draw from your ampoule.

Withdrawing a medication or diluent from a vial:

- Determine how much you need to withdraw.
- Attach needle to the syringe.
- Wipe vial with alcohol swab.
- Pull syringe plunger back to fill the syringe with air equal to the amount of substance you will need.
- At a 90 degree angle, inject air into the substance vial. Keep needle in the vial.
- Tilt the needle and vial on a 45 degree angle and pull the syringe plunger back to obtain the correct amount of the substance needed. Remove any large bubbles by tapping side of syringe.
- Remove needle from vial.
- Substance is now ready for next step (e.g. Dilution; Reconstitution; IM injection; IV push).

7.6 Medication Calculations, Reconstitutions & Dilutions continued

Reconstitution

1. Ensure you have: 10 ml syringe; needle attachment; diluent appropriate for the medication used; 2 x alcohol swabs.
2. Determine what dose you need to treat the patient (e.g.: adult vs. child).
3. Read label on drug vial to ensure you are using the exact amount of diluent needed.
4. Determine what type of diluent you need.
5. Use withdrawal of diluents technique to get the determined amount of diluent.
6. Shake powder in drug vial.
7. At a 90 degree angle, inject the diluent into the drug vial and remove needle.
8. Manipulate vial gently to ensure all powder has dissolved with no precipitates visible.
9. The drug is now ready for use.
10. Use *withdrawal of medications from a vial* technique to prep the dose for the next step.

Drug: CEFOXITIN

Product Monograph, CEFOXITIN, USP

I.M. RECONSTITUTION TABLE

Strength	Amount of Diluent to be Added* (mL)	Approximate Withdrawable Volume (mL)	Nominal Concentration (mg/mL)
1 g vial	2	2.5	400
2 g vial	4	5.0	400

*Shake to dissolve and let stand until clear.

Solutions that can be used for IM reconstitution (CEFOXITIN):

- Sterile Water for Injection
- Bacteriostatic Water for Injection

7.6 Medication Calculations, Reconstitutions & Dilutions continued

I.V. RECONSTITUTION TABLE

Strength	Amount of Diluent to be Added* (mL)	Approximate Withdrawable Volume (mL)	Nominal Concentration (mg/mL)
1 g vial	10	10.5	95
2 g vial	10 or 20	11.1 or 21.0	180 or 95

* Shake to dissolve and let stand until clear. The prepared solution may be further diluted to the desired volume with any of the solutions for I.V. infusion listed below.

Solutions that can be used for IV reconstitution (CEFOXITIN):

- Sterile Water for Injection
- 0.9% Sodium Chloride
- Dextrose 5 % Water
- Dextrose 10% Water

Dilution:

1. Read label on medication vial.
2. Determine dosage of medication needed.
3. Determine the type of diluent needed.
4. Use withdrawal of drug technique to get determined amount of drug from the vial.
5. Wipe IV bag injection port with an alcohol swab.
6. Inject drug into the IV bag and remove the needle.
7. Manipulate bag to ensure full dispersion of drug.
8. Check IV bag for precipitates and large bubbles.
9. IV bag is now ready for administration.

7.6 Medication Calculations, Reconstitutions & Dilutions continued

Drug: CLINDAMYCIN

Product Monograph, CLINDAMYCIN, USP

Dilution and infusion rates:

Dose (mg)	Diluent (mL)	Time (Minutes)
300	50	10
600	50	20
900	100	30
1200	100	45

Product Monograph, CLINDAMYCIN, USP

Solutions that can be used for IV administration (CLINDAMYCIN):

- 0.9& Sodium Chloride
- Dextrose 5% Water

7.6.1 IV Drip Rate

Macro Infusion Set – 10 Gtt Per Milliliter (Gtt/ml)

Solution Per Hour	Drop Rate Interval (Seconds)
50 ml	7.2
100 ml	3.6
150 ml	2.4
200 ml	1.8
250 ml	1.4
300 ml	1.2
360 ml	1.0

Micro Infusion Set – 60 Gtt Per Milliliter (Gtt/ml)

Solution Per Hour	Drop Rate Interval (Seconds)
10 ml	6
20 ml	3
30 ml	2
40 ml	1.5
50 ml	1.2
60 ml	1.0

7.6.2 Formulae

IV Flow Rates

$$\frac{\text{Vol to be Infused in (ml)} \times \text{Drops of Admin Set in (Gtt/ml)}}{\text{Total time of Infusion in (min)}} = \text{Gtts/min}$$

Example:

- Volume to be infused 5040 ml in 8 hrs

$$\frac{5040 \text{ ml} \times 10 \text{ Gtt/ml}}{480 \text{ min}} = 105 \text{ Gtt/min or at 2 Gtt/sec}$$

Drug Administration

$$\frac{\text{Desired dose in (mg)}}{\text{Concentration on Hand in (mg/ml)}} = \text{Volume to be Administered}$$

Example:

Desired Dose is 20 mg, Concentration on Hand is 10 mg/ml

$$\frac{20 \text{ mg}}{10 \text{mg/ml}} = 2 \text{ ml Volume to be administered}$$

Child's Weight (1-6 yrs)

2 x Age in (years) + 8 = Approx Weight in (kg)

Example:

2 x 2 years + 8 = Approx 12 kg

Catheterization Urinary Output

Adult = > 0.5 ml/kg/hr
Child = 0.5 -1 ml/kg/hr

Example:

Weight of Adult = 72 kg

Adult $\frac{0.5 \text{ ml} \times 70 \text{ kg}}{\text{hr}} = 35$ ml/hr urinary output

Weight of Child = 12 kg

Child $\frac{1 \text{ ml} \times 12 \text{ kg}}{\text{hr}} = 12$ ml/hr urinary output (or up to 35 ml/hr = 1 ml/kg/hr)

SECTION 7: STANDARD MEDICAL PROCEDURES

7.7 Intraosseous (IO) Access

Indication:

- Requirement to give fluid and unable to obtain IV access.

Contraindications:

- Fracture of the bone selected for IO infusion (Select an alternate site).
- Infection at the site selected for insertion (Select an alternate site).
- Excessive tissue (Severe obesity and/or absence of adequate anatomical landmarks), consider alternate site.
- Osteoporosis (Not a contraindication with a drill).
- Previous, significant orthopedic procedure at the site, prosthetic limb or joint.
- IO access (or attempted) in targeted bone within past 48 hrs.

Considerations:

- Ensure the administration of a rapid and vigorous 10 ml flush with normal saline prior to infusion "NO FLUSH = NO **FLOW"**:
  - Repeat syringe bolus (flush) as needed.
- FAST 1™ IO and T.A.L.O.N.™ IO can be left in place for up to 24 hrs.
- IO through burns:
  - An IO device can be inserted through burned skin as long as the underlying bone has not been compromised. It is important to be aware that swelling due to post-burn edema may be severe enough to affect the stability of the IO access site. Important: Reassess site frequently for signs of dislodgement.
- CPR and sternal IO:
  - With the FAST 1™ IO, CPR can be perform with IO in place and/or a C-collar installed.
- IO medication administration is the same as IV administration.
- Use in pediatrics:
  - Pediatric patients use proximal tibial insertion site only.
  - Compartment Syndrome is a serious complication that can result if a large infiltration and/or extravasation goes undetected.
  - The IO insertion site should be monitored frequently for any signs of infiltration and/or extravasation.

Equipment:

- Appropriate type of intraosseous needle set based on insertion location.
- Alcohol swabs.
- One (1)10 ml syringe with Sterile Saline solution for flush.
- One (1) infusion tube primed with fluid of choice.
- IV line and IV bag primed and ready for use.

7.7 Intraosseous Access continued

TELEFLEX FAST 1™ IO

Description:

- Muscle-powered (not battery-dependent, spring loaded or pneumatic). Actual force will vary depending on patient anatomy.
- ‘‘All-in-one’’ IO engineered for automatic depth control (penetrates 6 mm into the manubrium).
- Can be use on adult patients only.

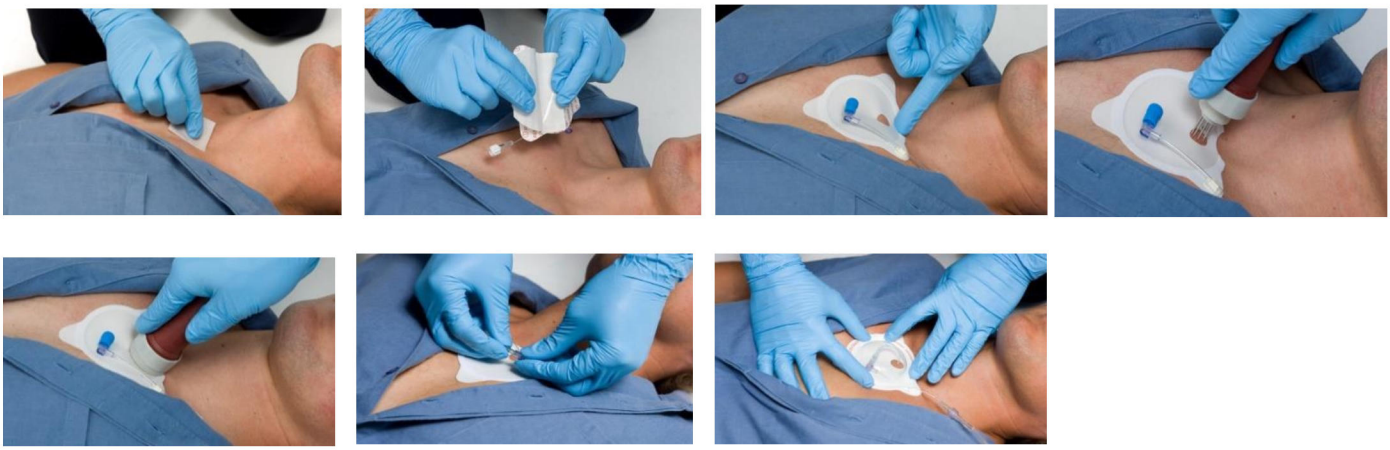
Site of insertion:

- Only sternal.

Procedure:

1. Expose the sternum and locate the sternal notch.
2. Clean infusion site with alcohol swabs.
3. Place Target patch.
4. Stand or kneel at patient head.
5. Twist to remove Sharps Protection Cap.
6. Place Stabilizer needles in target zone.
7. Hold FAST 1™ perpendicular to manubrium.
8. Press down smoothly with increasing force until you hear and feel the Infusion Tube separate from the FAST 1™.
9. Pause & Pull Back: Withdraw FAST 1™ straight back (on axis) while holding down the Target patch.
10. Immediately push Stabilizer needles into the bright red sharps foam plug.
11. Remove blue cap and connect infusion tube to friction fitting on tubing attached to Target patch.
12. Remove white cap from Luer fitting and connect IV tubing.
13. Confirm placement by flushing 2-3 ml into the intraosseous space and draw back into syringe to observe for flashback (blood or marrow). Then flush the contents of the syringe back.
14. Remove the liner from the Protective Dome and apply the Dome over the Target foot infusion site.
15. Begin infusion, secure tubing and monitor insertion site for complications.

7.7 Intraosseous Access continued

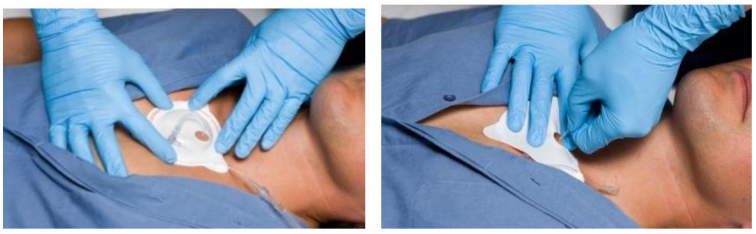


Removal procedure:

1. Remove protective dome from the Target foot.
2. Turn off the source of fluid and disconnect.
3. Grasp infusion tube with fingers as close as possible to patient's skin.
4. Pull perpendicular to manubrium until entire infusion tube emerges from the patient's chest.

Note: Pull in one quick continuous motion until remove.

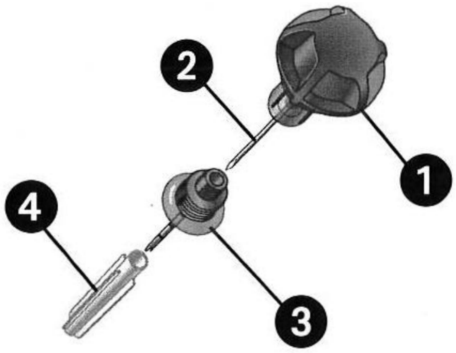
Note: Use the tube to pull, not the Luer connection. It is normal for the tubing to stretch.



7.7 Intraosseous Access continued

T.A.L.O.N.™
Description:

- Manual Needle Set contain a stylet and a catheter. When the stylet is removed the catheter Luer Lock is exposed. The catheter is a 15 gauge, 38.5 mm, made of 304 stainless and provided sterile, non-pyrogenic in a sealed kit.



Manual Needle Set:

1. Manual Handle
2. Stylet
3. Catheter
4. Needle Cap

Sites of insertion:

- The T.A.L.O.N.™ device provides intraosseous access in the proximal tibia, distal tibia, and humeral head (proximal humerus) of adult and proximal tibia for pediatric patients, when intravenous access is difficult or impossible to obtain for up to 24 hrs.

Procedure (T.A.L.O.N.™):

1. If the patient is conscious, explain procedure.
2. Locate insertion site.
3. Prepare insertion site.
4. Prepare infusion system.
5. Remove and discard the needle set safety cap.
6. Insert:
   a. Control patient's movement prior and during Needle Set insertion;
   b. Position the needle set at a 90° angle to the bone surface;
   c. Gently pierce the skin with the Needle Set until the Needle Set tip touches the bone;
   d. Ensure at least one black line is visible. If not, select different site;
   e. Penetrate bone cortex by rotating clockwise while applying gentle, steady downward pressure;
   f. Stop insertion process when a desired depth is obtained or catheter hub is flushed with the skin (A ''POP'' can be felt when the space is entered);
   g. Do not rock or bend during needle insertion, maintain 90° angle.
7. Remove stylet from catheter by turning counter-clockwise and immediately dispose of stylet in appropriate biohazard sharps container.

7.7 Intraosseous Access continued

Do Not return used stylet to the EZ-IO kit.

8. Confirm catheter stability. Catheter should be stabilized to prevent dislodgement.

9. Attach primed EZ-Connect® extension set to catheter Luer Lock hub.

Do Not attach a syringe directly to the T.A.L.O.N. ™ **catheter hub's Luer Lock.**

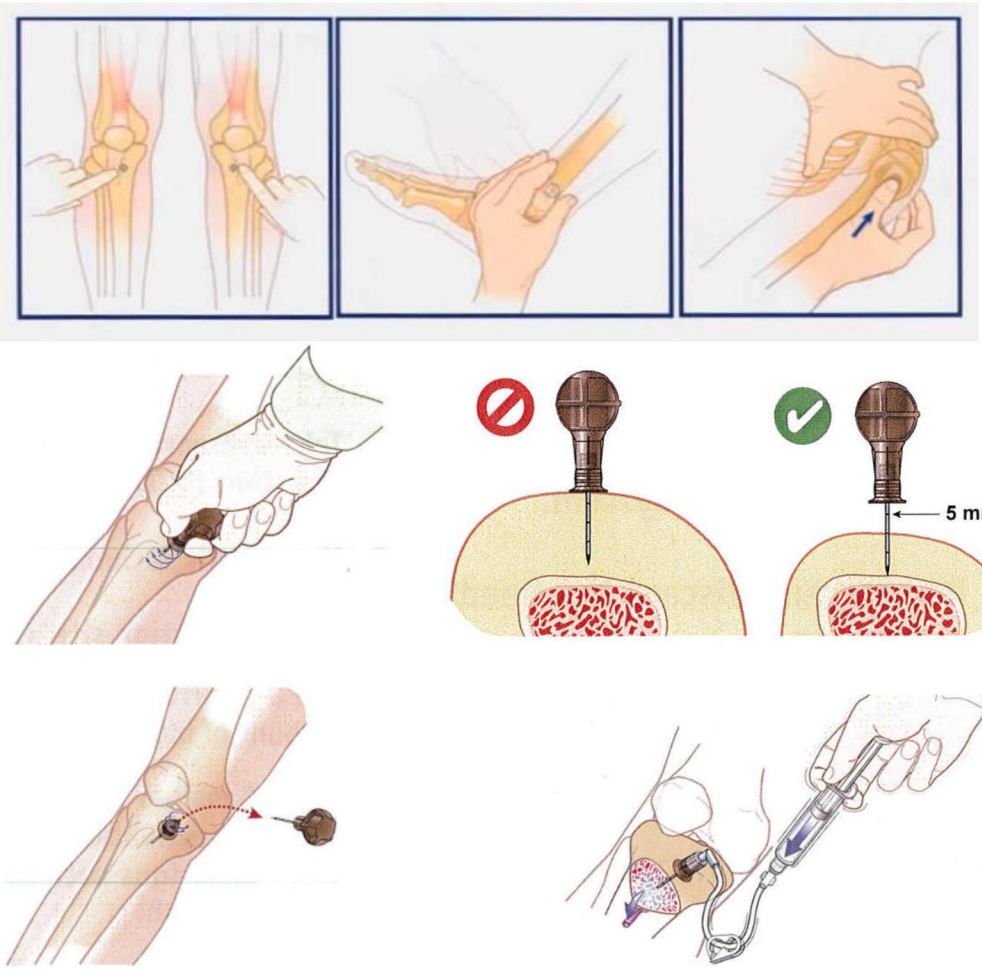
10. Confirm placement by flushing 2-3 ml into the intraosseous space and draw back into syringe to observe for flashback (blood or marrow). Then flush the contents of the syringe back.

11. Disconnect 10 ml syringe from EZ-Connect® extension set.

12. Connect primed EZ-Connect® extension set to primed IV tubing.

13. Begin infusion, secure tubing and monitor extremity for complications.

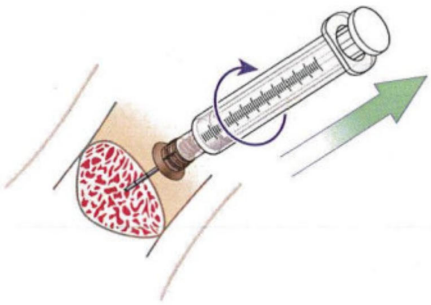
Note: Frequently monitor the insertion site for infiltration and /or extravasation.



7.7 Intraosseous Access continued

Removal procedure:

1. Attach syringe to the catheter.
2. Gently twist clockwise while slowly applying traction to catheter.
3. Do not rock or bend the catheter during this procedure.
4. Once removed, immediately place catheter in appropriate sharps container.
5. Apply dressing.



Removal procedure

7.8 Bladder Catheterization

Indication:

- Patients who will be under care for an extended time period and who require urinary output monitoring.

Contraindication:

- Blood at meatus, perineal bruising, blood in scrotum, or suspected pelvic fracture.

Precaution:

- Physical resistance on insertion.

Procedure:

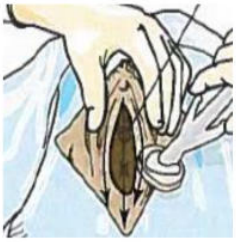
1. Explain procedure to patient.

2. Position patient on back with legs apart (knees bent for females).

3. Ensure aseptic technique to prevent contamination of catheter.

4. Prepare equipment.

5. Expose genitalia and clean with Betadine swabs (dispose after each wipe):



   a. Females: With the non-dominant hand, retract labia to expose urethral meatus and maintain this position throughout the procedure. Clean labia and urinary meatus from clitoris toward anus. Clean by wiping far labial fold, near labial fold, and directly over center of urethral meatus.

   b. Males: With the non-dominant hand, grasp penis at the shaft, just below glans. Retract foreskin (If not circumcised) and maintain hand in this position throughout procedure. Wipe in a circular motion from urethral meatus to base of glans. Repeat 3 times.

6. Hold catheter in the dominant hand (using sterile glove) about 7.5 - 10 cm from tip. Dip exposed tip in lubricant and insert into urethra. In males, hold penis at 60 degrees to patient's body and apply light traction. Advance catheter 5 - 7.5 cm (for female), 17 - 22.5 cm (for male) or until urine flow and then advance a further 2.5 - 5 cm.

7. Inflate balloon with recommended volume of sterile water (marked on the balloon port). Sterile water is preferred and should be utilized when possible to reduce irritation and help to keep the catheter stable with pressure variations that can occur during evacuation by air. In the absence of sterile water, the following products are acceptable (use the same amount as sterile water): Normal saline for AIREVAC; Air for ground transportation.

8. Secure catheter to bag, tape catheter to leg allowing some slack in catheter.

9. Monitor Urine output hourly.

The patient may feel the urge to urinate or experience the sensation that the catheter will slip out. This is not abnormal and will typically disappear in about 30 minutes.

SECTION 7: STANDARD MEDICAL PROCEDURES

7.9.1 Emergency Childbirth – Normal Delivery:

Indications: Inspect vagina to determine if head is visible. If the area of the head is larger than a $2.00 coin then birthing is likely to occur within the next few minutes.

Considerations: If birthing is going to be delayed, place in the recumbent position, on her left side. Consider transport.

Caution: Do not let the mother use the washroom.

Equipment:

- Oxygen
- Gloves (Sterile, if possible)
- Bulb Syringe
- Clamps x 2
- Scissors

Procedure:

1. Assess the mother to include discharge, length of labour, prenatal events, medical history, vital signs, pulse oximeter reading, and previous birthing history.
2. Reassure mother.
3. Administer oxygen.
4. Place mother on her back with knees bent and spread apart.
5. Place clean material under buttocks to slightly elevate.
6. Don gloves (sterile if possible)
7. Contact SMA.
8. Encourage mother not to bear down or strain during each contraction. Have her breathe with short panting breaths during contractions and deep breaths between contractions.
9. As the baby's head presents ensure that the membrane is torn. If it is not torn, gently grasp and tear with a haemostat. Ensure that the membrane is away from the nose and mouth of the baby.
10. As the head comes out place one hand over the head and apply gentle pressure in order to prevent the head from suddenly emerging. Support the head as it rotates.
11. Feel around the baby's neck for a loop of the umbilical cord (may not be present). If present, slip over the baby's head.
12. Clear mouth and nose with bulb syringe.
13. Support head and neck and lift slightly to help the shoulders emerge.
14. As the body emerges grasp firmly and support. Keep at level of the vagina.
15. Clamp and cut the umbilical cord. Place one clamp 10 cm from the baby and the second clamp 5 cm further away. Cut the cord between the two clamps.
16. Dry baby immediately and keep warm.
17. Assess baby after 30 seconds. If not breathing start artificial respiration.
18. Record time of birth and conduct initial APGAR score.
19. Assess mother. Massage fundus to help deliver the placenta and decrease bleeding.
20. If placenta delivers, place in garbage bag and transport with mother. Do not delay transport to wait for placental delivery.
21. Transport casualty.

7.9.2 Emergency Childbirth – Abnormal Presentation:

Indications: Inspect vagina to determine if head is visible. If abnormal presentation such as breech, prolapsed cord, or limb presentation, place mother in the Trendelenburg or knee-chest position.

Considerations: If abnormal presentation is evident, rapid transport is critical.

Caution: Do not let the mother use the washroom.

1. Assess the mother to include discharge, length of labour, prenatal events, medical history, vital signs, pulse oximeter reading, and previous birthing history.
2. Reassure mother.
3. Administer oxygen.
4. Place mother on her back with knees bent and spread apart.
5. Place clean material under buttocks to slightly elevate.
6. Don gloves (sterile if possible)
7. Initiate rapid transport.
8. Contact SMA.
9. If cord is prolapsed apply a saline moistened dressing. Do not pull or replace cord in vagina.

SECTION 7: STANDARD MEDICAL PROCEDURES

7.10 Transfer of Care

These formats are to be adopted in order to standardize the method of providing receiving medical personnel with patient information.

Patient Report

Ensure a written report is given upon transfer of care.

Provide the receiving medical personnel with the following information:

- Age and gender
- Patient's C/C
- History of C/C
- History of vital signs
- Medical history if available
- Medications
- Allergies
- Relevant physical exam findings
- Treatment, Protocols used and effectiveness

MIST-AT

Ensure a written report is given upon transfer of care.

Depending on the environment or context (e.g. AIREVAC, Combat Environment) MIST-AT format can be used as a rapid handover to receiving medical personal (Reference 8.10 MEDEVAC Request):

- M: Mechanism of injury
- I: Injury or Illness Sustained
- S: Symptoms and Vital Signs
- T: Treatment Given
- A: Age of Casualty
- T: Time of Wounding

A casualty's identity is not sent in clear. Each soldier should have an identification code (Or "ZAP" number). If the casualty is a local national some means of differentiating casualties should be used, *e.g.: Casualty #1.*

SECTION 7: STANDARD MEDICAL PROCEDURES

7.11 NPA/OPA Principles

NPA

Indications:

- Patient with a decreased LOC.
- Patient unable to maintain a patent airway.
- NPA can be used prophylactically, if tolerated, in the conscious patient with a patent airway if the provider suspects that the patient's GCS may rapidly deteriorate and/or regular monitoring of the patient/airway may not be possible.

Contraindications:

- Evidence has NOT supported the claim that facial/basilar skull fractures are a contraindication to the placement of an NPA. Correct insertion technique should minimize the risk.
- Patient has no need for an airway adjunct.

Complications:

- Bleeding caused by the insertion may be a complication.
- Mild hemorrhage from the nose after insertion is not an indication to remove it.

NPA Insertion Principles

Measurement:

- The length of the NPA is important. It needs to be long enough to supply an air passage between the patient's tongue and posterior pharynx.
- The distance from the patient's nose (Tip) to the earlobe is a good estimate for the proper size.
- For an adjustable NPA, move the flange to the position that corresponds with the tip of the nose during sizing.

Insertion:

1. Bring the patient's head and neck into a neutral in-line position.
2. Select the nostril that is the largest and least deviated or obstructed.
3. Measure the NPA.
4. Lubricate the distal tip of the NPA with a water-based lubricant, ensuring not to occlude the lumen of the device.
5. Gently pull backward the tip of the nose (''Piggy'' nose).
6. Insertion should follow an anterior-to-posterior plane, along the floor of the nasal cavity.
7. The bevel should be facing the septum:
   a. For Right nostril: Insert the NPA straight back through the nostril following the natural curvature of the airway.
   b. For Left nostril: Turn the NPA upside down (so that the bevel is toward the septum) and insert straight back through the nostril until you reach the posterior pharynx. Rotate the NPA 180 degrees and advance it down the pharynx.

7.11 NPA/OPA Principles continued

8. If resistance is met at the posterior end of the nostril, a gentle back-and-forth rotation of the NPA between the fingers will usually aid in passing it beyond the turbinate bones of the nostril.

9. Should the NPA continue to meet with resistance, the NPA should not be forced past the obstruction but rather withdrawn, and the distal tip should be relubricated and inserted into the other nostril.

10. Continue insertion until the flange end of the NPA is next to the anterior nares or until the patient gags.

11. If patient gags or coughs, it can be a sign that the end of the NPA tube is in contact with the upper part of the larynx and has to be withdrawn slightly.

12. Verify appropriate sizing/placement of the NPA by visually confirming it has reached the pharynx. If sized and inserted correctly, you should not see the distal tip of the NPA as it sits posterior to the base of the tongue.

OPA

Indications:

- Patient who is unable to maintain a patent airway.
- Patients who are easily able to tolerate an OPA should be considered candidates for SGA intubation.

Contraindications:

- Patient who is conscious or semiconscious.
- Patient with an intact gag reflex.

Complications:

- Because it stimulates the gag reflex, use of the OPA may lead to gagging, vomiting, and laryngospasm in patients who are conscious or have an intact gag reflex.
- If the device is too long, it can push the epiglottis over the opening of the larynx obstructing airflow to the trachea and causing a complete obstruction of the airway.
- If not inserted properly, it may push the tongue back into the airway, causing complete or partial obstruction.

OPA Insertion Principles

Measurement:

- The distance from the corner of the mouth to the earlobe (or to the angle of the jaw) is a good estimate for the correct size OPA.

Insertion:

1. Insert the OPA upside down or sideways and rotate into place after tip of OPA passes the tongue. This method should ***not*** be used for children.

2. The flanges of the OPA should be resting against the outside surface of the patient's teeth.

3. If OPA causes gagging, remove it and replace it with NPA.

4. If OPA is displaced, remove it and redo the insertion procedure. ***Do not push it back into place.*** It might push the tongue back, obstructing the airway.

SECTION 7: STANDARD MEDICAL PROCEDURES

7.12 TQ Assessment, Conversion and Removal Sequence

During M.A.R.C.H.E (B-I-F-T):

- Reassess prior Tourniquet (TQ) applications. Expose wound and determine if a TQ is needed based on wound characteristics and casualty's clinical condition.
- Every effort should be made to convert a TQ in less than 2 hours if bleeding can be controlled by other means.

Conditions under which a Limb TQ may be considered for Conversion/Removal:

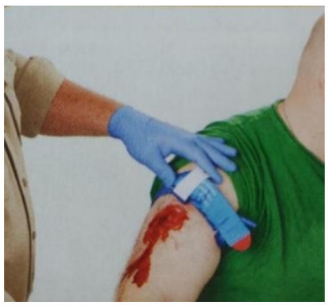
- Effective hemorrhage control can be continuously maintained by other means, such as direct pressure, wound packing, hemostatic dressing and pressure dressing.
- To replace a strap style TQ (CAT, SOFTT-W) with a pneumatic TQ when there is minimal risk of puncture.
- To replace a TQ that was placed over clothing during CUF.

Contraindications for conversion of a TQ to a CCCWG recommended hemostatic dressing and/or pressure dressing:

- Complete amputation.
- Casualty is in hemorrhagic shock or has decreased LOC presumed secondary to hemorrhagic shock.
- The TQ has been on for ≥ 4 hours.
- If you cannot monitor the limb continuously for re-bleeding.
- Bleeding cannot be controlled by other means.

Conversion of a TQ placed over the clothing to a TQ placed on skin:

- There are two possibilities for a TQ that was placed over clothing (CUF):
    a. Clearly proximal to a bleeding site that was visualized.
    b. "High and Tight" (as proximal as possible on the injured limb) where a bleeding site was not able to be visualized.



- TQ applied clearly proximal to a bleeding site:
    a. Cut away the clothing above and proximal to the initial TQ;
    b. Apply a 2nd TQ (ideally pneumatic) immediately above the initial TQ, directly on skin;
    c. Then slowly loosen the initial TQ (over the clothing) while monitoring for rebleeding;
    d. If at any point bleeding restarts, retighten the initial TQ, verify proper application of the new TQ and consider reattempting conversion one final time. If a serial attempt results in rebleeding, secure and retain the initial TQ;
    e. If there is no rebleeding, confirm elimination of distal pulse and remove the initial TQ;
    f. Document all changes including conversion time and keep the initial TQ (CUF) application time;
    g. Prior to any movement of a patient where a limb TQ has been applied, the limb should be immobilized where tactically feasible to preserve the effectiveness of the TQ (do not delay evacuation).

7.12 TQ Assessment, Conversion and Removal Sequence continued

- TQ applied High & Tight
    a. Cut away the clothing distal to the TQ;
    b. Apply a 2nd TQ (ideally pneumatic) 2-3 fingers above the wound, directly on the skin;
    c. Slowly loosen the initial TQ (over the clothing) while monitoring for rebleeding;
    d. If at any point bleeding restarts, move the initial TQ (on clothing) side by side with the new TQ (on skin) and retighten;
    e. Verify proper application of the new TQ and consider reattempting conversion one final time. If a serial attempt results in rebleeding, secure and retain the initial TQ;
    f. If there is no rebleeding, confirm elimination of distal pulse and remove the initial TQ;
    g. Document all changes including conversion time and keeping the initial TQ (CUF) application time;
    h. Prior to any movement of a patient where a limb TQ has been applied, the limb should be immobilized where tactically feasible to preserve the effectiveness of the TQ (do not delay evacuation).

Conversion of a strap style TQ (placed on the skin) to a pneumatic TQ (EMT):

- Apply a pneumatic TQ immediately above the initial TQ (strap style).
- Then slowly loosen the initial TQ (close to the wound TQ) while monitoring for rebleeding.
- If at any point bleeding restarts, retighten the initial TQ.
- Verify proper application of the new TQ and consider reattempting conversion one final time. If a serial attempt results in rebleeding, secure and retain the initial TQ.
- If there is no rebleeding, confirm elimination of distal pulse and remove the initial TQ.
- Document all changes including conversion time and keeping the initial TQ (CUF) application time.
- Prior to any movement of a patient where a limb TQ has been applied, the limb should be immobilized where tactically feasible to preserve the effectiveness of the TQ (do not delay evacuation).

Notes:

- Do not periodically loosen a TQ to permit blood circulation. When a TQ is loosened, creatine kinase, lactic acid, myoglobin, potassium and other anaerobic and cellular death by-products in the limb are released into central circulation. Therefore, the longer the TQ has been in place, the higher the risk of a reperfusion injury (e.g. cardiac arrest, kidney failure).
- A TQ requires sufficiently intact/stable underlying bone structure to be effective. In cases where the underlying skeletal structure has been significantly compromised (e.g. complex blast trauma, mangled extremity), The Med Tech may need to apply the TQ very proximal (''High and Tight'').

Conversion of a TQ to a Hemostatic dressing (Combat Gauze):

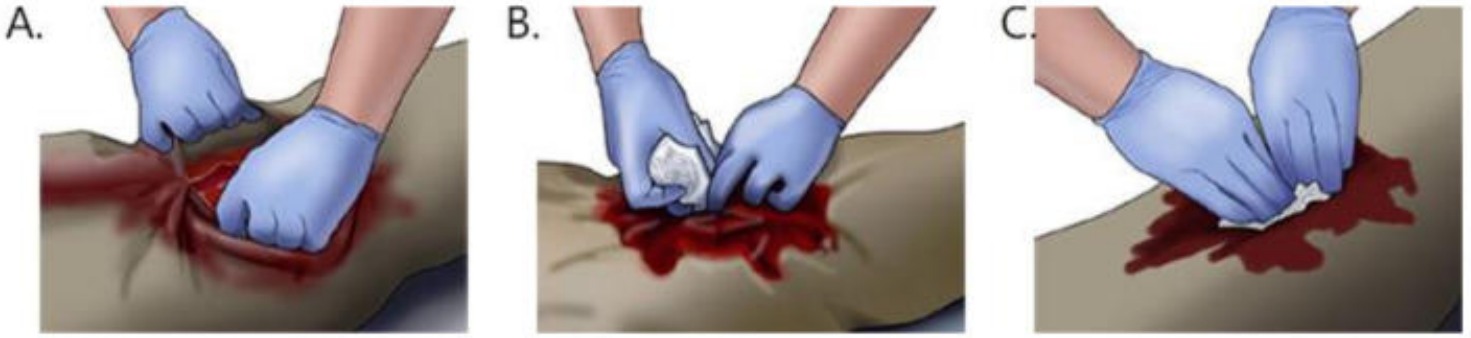
- Every effort should be made to convert a TQ in less than 2 hrs if bleeding can be controlled by other means.
- The goal of wound packing is to replace the free space caused by wound cavitation or tissue displacement/injury. When applied tightly, it can provide the pressure required to help establish homeostasis.
- A limb TQ should be converted to other hemorrhage control means (e.g. packing with hemostatic dressing/gauze, pressure dressing, etc) as soon as possible if the following 3 criteria are met:
    a. Casualty is not in shock or no decreased level of consciousness secondary to hemorrhagic shock;
    b. Effective hemorrhage control can be continuously maintained until arrival at the medical treatment facility;
    c. The TQ is not being used to control bleeding from an amputated extremity.

7.12 TQ Assessment, Conversion and Removal Sequence continued

- Packing Procedure:
    1. Expose and assess the wound (swipe the wound to remove any debris or blood clots).
    2. Prepare/Remove the gauze from the sterile package.
    3. Slowly loosen the TQ to locate the source of bleeding through digital exploration of the wound ("Feel the Bleed").
    4. Make a small ball with the end of the gauze. While maintaining continuous finger pressure, feed the gauze under your finger, packing the wound toward the source of the bleeding[1].
    5. Pack the entire wound cavity and fill it tightly with a CCCWG approved hemostatic gauze[2]. Make sure that no air pockets are created as you pack. Overfill the cavity (this helps to transmit surface pressure to the source of the bleeding within the wound).
    6. Release the TQ.
    7. Maintain direct pressure for 5 minutes[3,4].
    8. Monitor for rebleeding/packing ineffectiveness (soaking through) and be prepared to retighten the TQ[5].
    9. If packing is successful, apply a CCCWG pressure dressing directly over the wound to continue maintaining pressure.
    10. If at any point, in the opinion of the Med Tech, the rate of blood loss is too significant to attempt packing, retighten the initial TQ.
    11. Document all changes including conversion time and keeping the initial TQ (CUF) application time.
    12. Prior to any movement of a patient where a limb TQ has been applied, the limb should be immobilized where tactically feasible to preserve the effectiveness of the TQ (do not delay evacuation).

[1] Occlusion through compression of the blood vessel against anatomical structures (e.g. bones).
[2] If no hemostatic agents are available, use regular gauze or clean fabric to pack the wound.
[3] Disregard Combat Gauze manufacturer's instructions (3 minutes) and use proper technique (apply pressure with both hands, locked elbows and own body weight squared on top of wound).
[4] If hemostatic dressing is not available, use plain gauze and maintain pressure for 10 min.
[5] If a packing attempt fails, where it is expected to have been conducted under ideal conditions (with the aid of an effective TQ), the Med Tech should generally err on the side of treating the wound/bleed as one that CANNOT be controlled by other means. A serial re-packing should only be attempted if there is a known/suspected reason for the first packing failure (too loose, direct pressure not long enough, etc).

7.12 TQ Assessment, Conversion and Removal Sequence continued



General information:

Signs of TQ effectiveness:

- Bleeding stops and no distal pulse (if applicable).
- Bleeding from bone marrow is normal and not indicative of TQ ineffectiveness. Slow bleeding from the marrow should be controlled with dressing and elevation following management of life-threatening injuries.

Common mistakes:

- Pain doesn't mean that the TQ is effective.
- Install a TQ and forget it; a TQ needs constant monitoring in case of rebleeding.
- TQ placed over a joint/articulation.
- When installing the TQ, not wrapping the main strap completely around the limb and securing it in the rod locking clip.

Reasons why TQs can become ineffectiveness:

- Limb was not immobilized before moving the patient.
- Limb/TQ was not closely monitored during treatment/transport.
- TQ was not secured properly during application.

Venous TQ INCREASES bleeding:

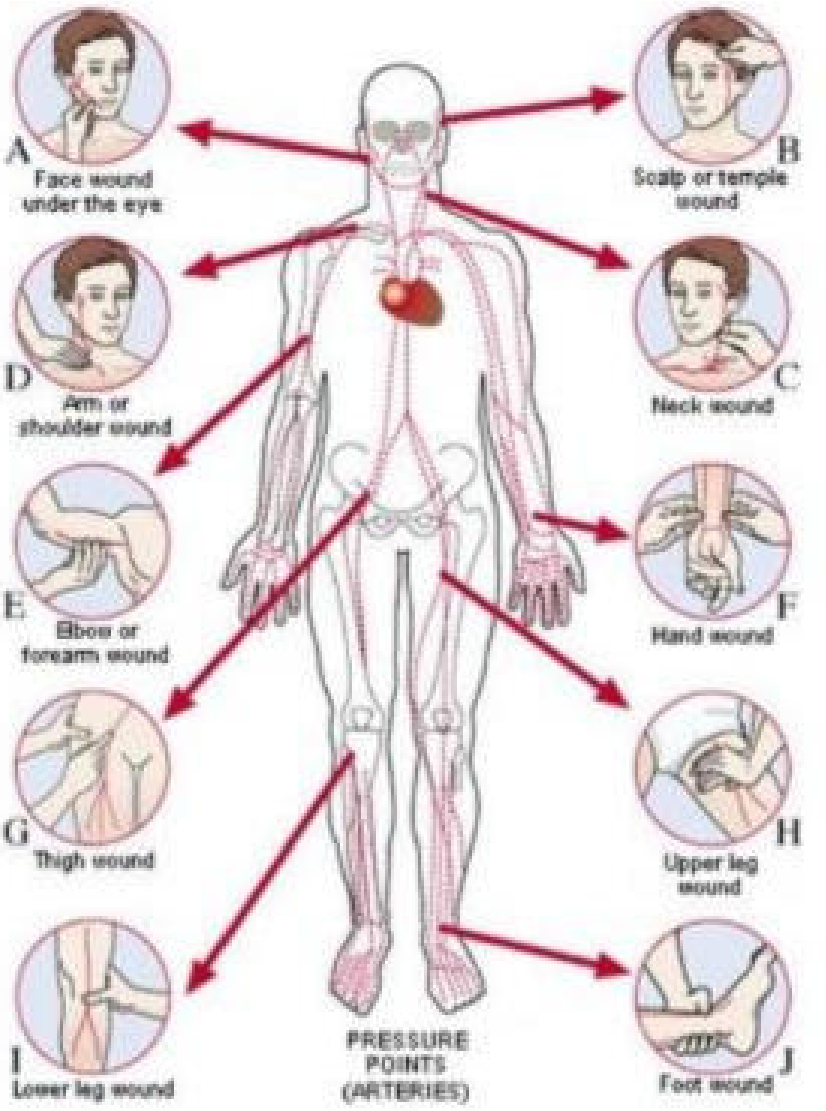
- Persistent distal arterial flow and continual blood loss.
- Distal venous distension, engorgement, venous hypertension.
- Distal blood pooling, expanding wound hematomas.
- Loss of fluid from plasma into tissues distally and distal limb swelling and edema.
- Increased pressure in distal tissues risking compartment syndrome, ischemia, necrosis and requiring fasciotomy.
- Continued hemorrhage often paradoxically worse than with no TQ and may be difficult to control.

TQ and Limb temperature:

- Keep the limb distal to the TQ cool, but protect from freezing and keep the remainder of the body warm.
- There is no risk of hypothermia from cooling the limb because the cold blood is not returning to the core.
- A cool extremity improves limb survival as the lower temperature slows the cellular metabolism within the limb reducing lactic acid production. Thus it mitigates a reperfusion injury. It also decreases clotting in the limb.
- It is more important to warm the body than it is to cool the limb.
- Place the limb outside of any blankets if able. This also allows monitoring for rebleeding.

7.12 TQ Assessment, Conversion and Removal Sequence continued

Indirect pressure points:



SECTION 8: REFERENCES/ABBREVIATIONS

This section covers the following information:

8.1 Glasgow Coma Scale
8.2 APGAR Scale
8.3 Paediatric Table
8.4 Burn Assessment and Fluid Replacement Principles
8.5 Classification of Hemorrhagic Shock
8.6 Airway Management Principles
8.7 Oxygen Flow Rate
8.8 Eye Trauma Principles and Management
8.9 Nerve Agent Exposure MARCHE and Immediate Actions
8.10 MEDEVAC 9-liner and MIST-AT
8.11 Assessing and Treating Haemorrhage
8.12 Diagnostic Criteria for Anaphylaxis – Adult and Child > 30 kg
8.13 Diagnostic Criteria for Anaphylaxis – Adult and Child ≤ 30 kg
8.14 Military Acute Concussion Evaluation (MACE) 2
8.15 Pain
8.16 Common Medical Abbreviations

SECTION 8: REFERENCES/ABBREVIATIONS

8.1 Glasgow Coma Scale

Eye Opening	Adult **and Children ≥ 4 years**	Children < 4 years
4	Spontaneously	Spontaneously
3	To command	To command
2	To pain	To pain
1	No response	No response
Best Verbal Response	Adult **and Children ≥ 4 years**	Children < 4 years
5	Oriented	Appropriate words, social interaction*, fixes, follows
4	Confused	Cries but consolable
3	Inappropriate words	Persistently irritable
2	Incomprehensible	Restless, agitated
1	No response	No response
		**** related to age: smiling; babbling; cooing***
Best Motor Response	Adult **and Children ≥ 4 years**	Children < 4 years
6	Obeys commands	Spontaneous, purposeful
5	Localizes pain	Localizes pain
4	Withdraws from pain	Flexion withdrawal
3	Abnormal flexion	Abnormal flexion
2	Extension	Extension
1	No response	No response

8.2 APGAR Scale

N.B.: For reporting the status of a newborn infant and response to resuscitation.

	Sign	0 Point	1 Point	2 Points	1 Min	5 Min
A	Activity (muscle tone)	Absent	Arms and Legs Flexed	Active Movement		
P	Pulse	Absent	Below 100 beats/min	Above 100 beats/min		
G	Grimace (reflex irritability)	No Response	Grimace	Sneezing, Coughing, Pulling Away		
A	Appearance (skin color)	Blue-Gray, Pale	Normal, Except Extremities	Normal over entire body		
R	Respiration	Absent	Slow, Irregular	Good, Crying		
				Total		

8.3 Paediatric Table

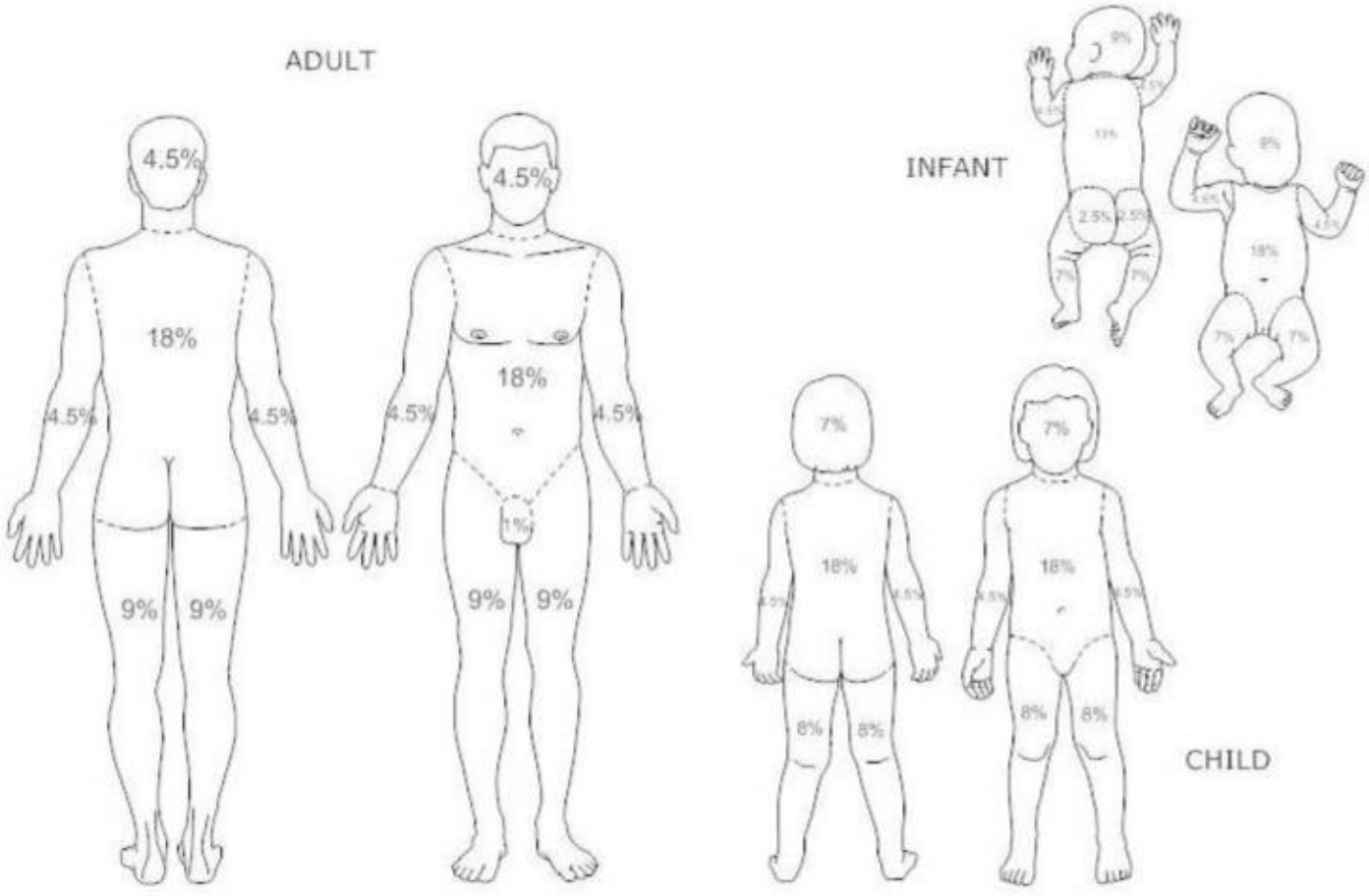
	Preterm	Term	6 Mo	1 Yr	3 Yr	6 Yr
Weight (lbs)	3	7.5	15	22	33	44
Weight (kg)	1.5	3.5	7	10	15	20
Heart Rate (bpm)	140	125	120	120	110	100
Respirations	40-60	40-60	24-26	22-30	20-26	20-24
Systolic BP (mmHg)	50-60	70	90±30	95±30	100±25	100±15
Fluid Challenge (mL)	30	70	140	200	300	400
Fluid Maint (mL/hr)	6	14	28	40	60	80

	8 Yr	10 Yr	11 Yr	12 Yr	14 Yr
Weight (lbs)	55	66	77	88	99
Weight (kg)	25	30	35	40	45
Heart Rate (bpm)	90	90	85	85	80
Respirations	18-22	18-22	16-22	16-22	14-20
Systolic BP (mmHg)	105±15	110±20	110±20	115±20	115±20
Fluid Challenge (mL)	500	500	500	500	500
Fluid Maint (mL/hr)	100	100	100	100	100

SECTION 8: REFERENCES/ABBREVIATIONS

8.4 Burn Assessment and Fluid Replacement Principles

Rule of Nines Body Surface Area (BSA) Estimation



Fluid Replacement Requirements for Burn Victims

Basic Principles:

- If burns are greater than 20% of Total Body Surface Area (TBSA), fluid resuscitation should be initiated as soon as IV/IO access is established.
- Resuscitation should be initiated with Lactated Ringer's (LR) preferably.
- If Hemorrhagic Shock is present/suspected, resuscitation for Hemorrhagic Shock takes precedence over resuscitation for burns. If in Hypovolemic Shock not associated with suspected Hemorrhage, give IV bolus of 500 ml LR (or Normal Saline if LR unavailable) up to 4 times until BP ≥ 90 mm Hg, then, start the burn fluid resuscitation as per Parkland Formula (Paediatric) or USAISR Rule of Ten (Adult).
- Both calculations (Parkland/USAISR) provide initial IV fluid rate of administration. Adjust fluid rate hourly based on urinary output in order to titrate IV administration (Refer to Prolonged Field Care section below for target urinary output and titration).
- If no IV solution available, use following improvised electrolyte solution to administer orally for patient with a TBSA under 30% (Use same administration/volume rate as IV administration):
    - Oral Rehydration Solution (as per package instructions).
    - Or 1 liter of potable water with 6 level teaspoons sugar and 0.5 level teaspoon salt.

8.4 Burn Assessment and Fluid Replacement Principles continued

Prolonged Field Care:

- The main target is a urine output of 30-50 ml/hr (0.5 ml/kg/hr) for adult and 0.5 ml/kg/hr to 1 ml/kg/hr for pediatric patients. Urine output needs to be monitored hourly and IV fluid rate should to be titrated to achieve target urine output.
- If UOP > 50 ml/hr, decrease IV fluid by 25% and reassess after 1 hr.
- If < 30 ml/kg, increase infusion volume by 25% for the next hour and reassess.
- The IV fluid should not exceed 1500 ml/hr x 2 hrs or a maximum of 250 ml/kg in 24 hrs to avoid over resuscitation/abdominal compartment syndrome.
- Antibiotics are not indicated for prophylaxis in the absence of open wounds. If after several days a cellulitis develops, contact the SMA.

Fluid Replacement Formula

Parkland Formula (for Paediatrics):

- 3 ml RL (or NS) x Weight in (kg) x TBSA with 2nd & 3rd degree burns in (%) = total ml given in the first 24 hrs.
  1/2 in 1st 8 hrs
  1/4 in 2nd 8 hrs
  1/4 in 3rd 8 hrs
  = Total in 24 hrs
- Example: Pt weighing 30 kg with 36% TBSA
  3 ml x 30 kg x 36 = 3240 ml/24 hrs
  1/2 in 1st 8 hrs = $\frac{3240 \text{ ml}}{2}$ = 1620 ml
  1/4 in 2nd 8 hrs = $\frac{3240 \text{ ml}}{4}$ = 810 ml
  1/4 in 3rd 8 hrs = $\frac{3240 \text{ ml}}{4}$ = 810 ml
- Pt would receive 1620 ml in the first 8 hours, 810 ml in the second 8 hours, and 810 ml in the last 8 hours for a total of 3240 ml in 24 hrs.
- If fluid was given to treat Hypovolemic/Hemorrhagic Shock, that amount needs to be subtracted from the total volume that will be administered in the 1st 8 hrs (e.g.: 1620 ml in the 1st 8 hrs - 500 ml given for Hypovolemic/Hemorrhagic Shock = the new volume for the 1st 8 hrs will be 1120 ml).
- Refer to Prolonged Field Care section above, for target urine output and titration.

USAISR Rule of Ten (For Adults):

- Initial IV/IO fluid rate is calculated as:
  a. %TBSA x 10 ml/hr (for adults weighing 40- 80kg);
  b. For every 10 kg ABOVE 80 kg, increase initial rate by 100 ml/hr;
  c. Refer to Prolonged Field Care section above, for target urine output and titration.

SECTION 8: REFERENCES/ABBREVIATIONS

8.5 Classification of Hemorrhagic Shock

Signs	Class I	Class II	Class III	Class IV
Blood Loss (ml)	< 750	750 to 1 500	1 500 to 2 000	> 2 000
Pulse Rate	< 100	100 to 120	120 to 140	> 140
Blood Pressure	Normal	Normal	Decreased	Decreased
Ventilatory Rate	14 to 20	20 to 30	30 to 40	> 35
Mental Status	Slightly Anxious	Mildly Anxious	Anxious, Confused	Confused, Lethargic

8.6 Airway Management Principles

Patent Airway:

Definition:

- An open, unobstructed airway of sufficient size to allow for normal volumes of air exchange (e.g.: If a patient speaks clearly with no difficulty, no interventions are required for the management of the airway).

Special Considerations:

- Allow conscious casualty to assume any position that best protects airway, to include sitting up/ leaning forward.
- NPA can be used prophylactically, if tolerated, in the conscious patient with a patent airway if the provider suspects that the patient's GCS may rapidly deteriorate and regular monitoring of the patient/airway may not be possible.

Airway intervention required if:

Airway needs protection:

Definition:

- Diminished level of consciousness.

Treatment:

- Consider basic airway management principles including open the airway using basic airway manoeuvres (Head-tilt-chin-lift; Jaw thrust; Chin lift; Recovery position if no spinal injuries); Suction; NPA; OPA; and use of Bag-Valve-Mask device prior to advanced management.
- Consider Supraglottic airway device for long transport.
- To be done during Tactical Field Care if tactically feasible.

Impending airway obstruction:

Definition:

- Expanding hematoma/mass causing airway distortion.
- Difficulty clearing secretions/blood/mucus from airway after injury.
- Anaphylaxis.
- Burned airway.
- Ventilation/oxygenation are preserved.

8.6 Airway Management Principles continued

Special Consideration:

- Supraglottic airway does not protect the airway against aspiration.

Treatment:

- Consider basic airway management principles including open the airway using basic airway maneuvers (Head-tilt-chin-lift; Jaw thrust; Chin lift; Recovery position if no spinal injuries); Suction; NPA; OPA; Supraglottic airway device; and use of Bag-Valve-Mask device prior to advanced management.
- Supraglottic airway; allow one attempt orotracheally then move to surgical airway.

Mechanical obstruction/direct injury:

Definition:

- Blunt or penetrating direct tracheal injury and mechanical blockages such as food bolus, foreign object or depressed tongue; causing impaired ventilation/oxygenation.

Treatment:

- Consider basic airway management principles including open the airway using basic airway maneuvers (Head-tilt-chin-lift; Jaw thrust; Chin lift; Recovery position if no spinal injuries); Suction.
- Finger sweep to remove foreign objects.
- Chest compressions or Heimlich maneuver in case of choking.
- Consider accessing airway through direct tracheal injury (opening) if possible.
- Consider emergency surgical airway as a last resort.

Inability to oxygenate:

Definition:

- SpO_2 <92% on room air.

Treatment:

- Search for respiratory causes such as tension pneumothorax, flail chest, circumferential burn to chest, etc.
- Allow a conscious casualty to assume any position that best protects the airway, to include sitting up/or leaning forward if no spinal injury.
- Consider basic airway management principles: open the airway using basic airway manoeuvers (Head-tilt-chin-lift; Jaw thrust; Chin lift; Recovery position if no spinal injuries); NPA; OPA; Supraglottic airway device and use of Bag-Valve-Mask (BVM) device to assist breathing (if required).
- Provide supplemental oxygen, if available, to maintain saturation > 92%.

8.7 Oxygen Flow Times

"D" Format O_2 Tank						
Pressure	Litres Per Minute (LPM)					
(PSI)	2	4	6	8	10	15
2200	160	80	53	40	32	21
2000	144	72	48	36	29	19
1800	128	64	43	32	26	17
1600	112	56	37	28	22	15
1400	96	48	32	24	19	13
1200	80	40	27	20	16	11
1000	64	32	21	16	13	9
900	56	28	19	14	11	7
800	48	24	16	12	10	6
700	40	20	13	10	8	5
600	32	16	11	8	6	
500	24	12	8	6	5	
400	16	8	5			
300	8	4				
200						

Prepare to Replace O_2 Tank

Flow Rate (litres/min)	Tank Size and Duration (in hours)				
	D	E	F	G	H/K
2	2.5	4.4	24.7	38.2	49.7
5	1	1.8	9.9	15.3	19.9
10	0.5	0.9	4.9	7.6	9.9
15	0.3	0.6	3.3	5.1	6.6

SECTION 8: REFERENCES/ABBREVIATIONS

8.8 Eye Trauma Principles and Management

Prevent an Eye Injury:

- Encourage all military personnel to wear only approved eye protection (Issued ballistic eyewear).
- Discourage contact lens use.

The eye is extremely intolerant to injury

- Eye trauma requires prompt evaluation and treatment by an eye surgeon.
- The foundation for successful treatment and preservation of vision is most often laid in the initial phases by forward medical providers at all echelons of care.

Maintain high index of suspicion based upon mechanism of injury:

- Blast injury.
- Direct facial and eye trauma.
- Cranial or brain injury.
- Metal on metal mechanism.
- Compressive blunt force trauma.
- Multisystem trauma (It is easy to overlook ocular trauma).
- Unconscious patient who cannot report vision change.
- Thermal burns.

Diagnostic Criteria for Ruptured Globe:

- Exam findings:
  - Collapsed or severely distorted eye.
  - Open wound, full-thickness corneal or scleral laceration.
  - Shallow anterior chamber (Refer to Pen Torch method for assessment of anterior chamber).
  - Peaked or irregular pupil.
  - Prolapse of intraocular contents outside the eye. Dark tissue is iris or uveal tissue.

DO NO HARM (Do nots):

- Do not let a suspected eye injury leave your level of care without rigid eye protection.
- Do not patch (it puts pressure on the eye).
- Do not wrap (it puts pressure on the eye).
- Do not place anything under an eye shield, including gauze.
- Do not put pressure on an eye with suspected open globe injury; it may increase the risk of extrusion of the intraocular contents.
- Do not remove impaled or resistant foreign bodies.
- Do not attempt to repair eye.

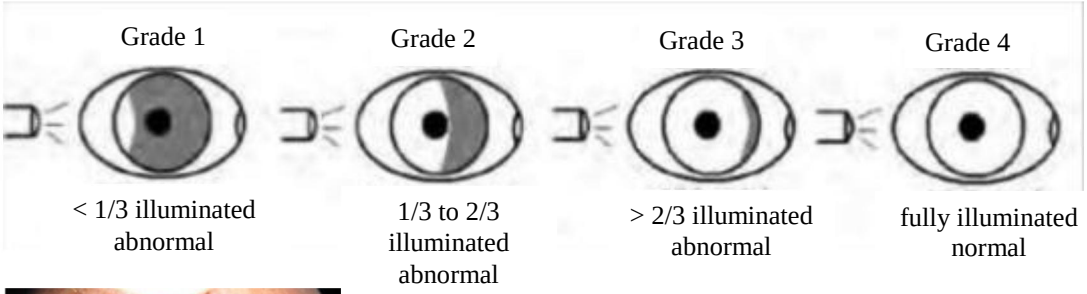
8.8 Eye Trauma Principles and Management continued

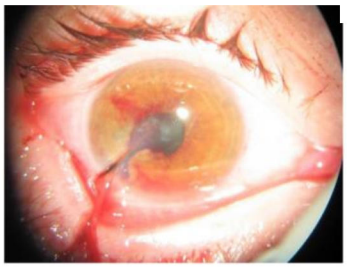
Pen Torch method for assessment of anterior chamber:

1. Shine a pen torch into the pt's eye from the temporal canthus such that the pen torch lies in the same plane of eye.

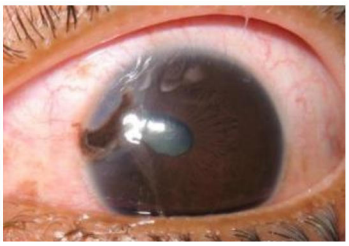
2. In the case of a deep anterior chamber (normal), the iris lies flat and the whole iris will be illuminated (Grade 4).

3. In the case of very shallow anterior chamber (abnormal) the iris lies forward, blocking some of the light and very little of the iris is illuminated (Grade 1 to 3).

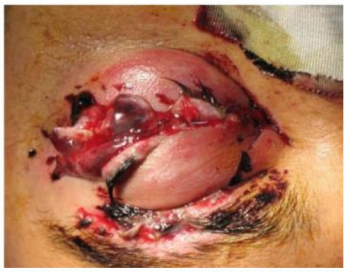




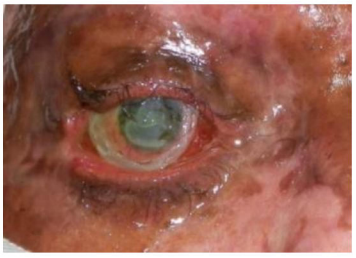
Corneal laceration and eyelid laceration



Open globe with peaked pupil and iris prolapse



Open globe with eyelid laceration



Eye and facial thermal burns

SECTION 8: REFERENCES/ABBREVIATIONS

8.9 Nerve Agent Exposure MARCHE & Immediate Actions

MARCHE in a CBRN Environment (For detailed MARCHE sequence, refer to Tactical Field Care definition in forward section)

M:

- Massive Bleeding
- Gas Mask

A:

- Airway
- Antidote

R:

- Respiration
- Remove casualty from hazard

S-T-O-P

C:

- Cooling Prevention and Litter Placement
- Circulation (BIFT)

H:

- Hypothermia
- Head injury

E:

- Eye injury
- Everything Else (M-PHAAT-D)
- Evacuate to Decontamination Center

D:

- Decontaminate

Immediate Actions:

1. Ensure self-immediate action and decontamination drills are completed. Mask casualty if possible.
2. If active seizures, administer additional diazepam auto-injectors until seizure stops. 1x auto-injector q5min.
3. When seizure stops, monitor airway and breathing.
4. Continue with administration of auto-injector as you progress down the algorithm. Do not delay next step waiting for successful control of seizures or atropinization.
5. Stop administration of Atropine/Obidoxime when:
   a. Drying of secretions; and/or
   b. Reduced ventilatory resistance; and/or
   c. Increase in heart rate to 90/min.
6. Casualties who are unconscious and/or convulsing and/or post-ictal and/or breathing with difficulty and/or flaccid should be triaged as immediate only if appropriate treatment including ventilation can be provided. Otherwise triage as expectant.

SECTION 8: REFERENCES/ABBREVIATIONS
8.10 MEDICAL EVACUATION REQUEST (MEDEVAC 9-LINER)

PREFIX	DESCRIPTION / NOTES	MESSAGE CONTENT
1	Call Sign To / From	_____ this is _____
	Warning Order	MEDEVAC 9-LINER
2	Location	
	GRID of Pick-Up Zone	
3	Number of Patients / Priority	P1 = P2 = P3 =
	PRIORITY 1 (P1) Urgent. To be hospitalized within 60 minutes	PRIORITY 2 (P2) To be hospitalized within 4 hours / PRIORITY 3 (P3) To be hospitalized within 24 hours (R2/R3)
4	Special Equipment Required	
	None; Hoist; Ventilator; Extraction device	
5	Patients / Type	S = W = E = O =
	S (Stretcher) / W (Walking) / E (Escort) / O (Other, Give details)	
6	Security at Pick-Up Zone	
	N (No enemy) / P (Possible enemy) / E (Enemy in area) / X (Hot, Armed escort required)	
7	Pick-up Zone Marking Method	
	How will zone be marked: Smoke; Light; etc (Include colour)	
8	Patients by Nationality / Status	A: NATO military = B: NATO civilian = C: Non-NATO military = D: Non-NATO civilian = E: Detainee, POW = F: Embedded interpreter = G: Civ Cas caused by FF = H: Child =
	NOTE: POW = Prisoner of War; FF = Friendly Forces; Civ Cas = Civilian Casualties	
9	Tactical Considerations and other info	
	Give details of any changes to the tactical situation and any other relevant information	

SECTION 8: REFERENCES/ABBREVIATIONS

8.10.1 MIST-AT

PREFIX	DESCRIPTION / NOTES	MESSAGE CONTENT		
	Call Sign To / From	_____ this is _____		
	Warning Order	MISTAT		
	Casualty Identity (Zap)			
	DO NOT SEND IN CLEAR (See Note 1)			
M	Mechanism of Injury			
	How did the casualty get injured? Gunshot wound; Explosion; MVC; etc.			
I	Injury or Illness Sustained			
	What are the injuries or illness sustained? Describe the nature and location of each injury, if possible, starting with the most severe.			
S	Symptoms and Vital signs	Time: _____ C _____ A _____ B _____ C _____ D _____ E _____	Time: _____ C _____ A _____ B _____ C _____ D _____ E _____	Time: _____ C _____ A _____ B _____ C _____ D _____ E _____
	C – Catastrophic bleed A – Airway B – Breathing Rate C – Pulse Rate / Location D – LOC E – Other Signs			
T	Treatment Given			
	Describe the treatment given. GIVE TIME Morphine administered as written on the casualty; Tourniquet; Fluids; Haemostasis			
A	Age of Casualty			
T	Time of Wounding			

Notes:

1. *A casualty's identity is not sent in clear. Each soldier should have an identification code (Or "ZAP" number). If the casualty is a local national, some means of differentiating casualties should be used, e.g.: Casualty #1.*

SECTION 8: REFERENCES/ABBREVIATIONS

8.11 Assessing and Treating Hemorrhage

There are six potential sites for massive hemorrhage:

1. External (visible)
2. Thoracic cavity
3. Abdominal cavity
4. Retroperitoneal space
5. Pelvic fractures
6. Extremity (long bone fracture)

However, only external hemorrhage is amenable to compression in the field. Therefore, massive compressible hemorrhage will always refer to treating identified massive "external bleeding".

The definition of massive compressible hemorrhage is the presence of ongoing external bleeding from a wound that is of significant rate, in the opinion of the Med Tech, enough to compromise the hemodynamic status of the patient immediately or in the near future, if left untreated.

The Med Tech typically operates in a dynamic environment, where changing conditions will dictate the most appropriate care provided to the patient. Accordingly, they must be prepared to adapt their clinical approach in managing hemorrhage to the changing situation (e.g. CUF/Threat, TFC).

A. Obvious Massive External Hemorrhage or Traumatic Amputation[1]

1. Direct/Indirect pressure
   - In Care Under Fire/Threat, apply direct or indirect pressure with hand or knee until you access equipment. Knee pads interfere with appropriate application of direct pressure.
   - In Tactical Field Care, apply direct pressure with two digits directly on the damaged vessel and/or indirect pressure to a pressure point proximal to the wound with heel of hand, knee or elbow.
2. If Amenable to a Limb TQ
   - Description
     - Any bleeding from the arms or legs that occurs from a wound distal enough from the inguinal or axillary area to allow proximal control of the bleeding with TQ placement. Only use an issued CCCWG recommended limb TQ:
       a. Windlass TQ
          i. Combat Application Tourniquet (CAT)
          ii. SOF Tactical Tourniquet-Wide (SOFTT-W)
       b. Pneumatic TQ
          i. Emergency and Military Tourniquet (EMT)
     - Amputation: No distinction has to be made between arterial or venous bleeding. The TQ is placed on the limb as close to the wound as possible (generally 2 to 3 fingers width above the level of the amputation, but not over a joint; directly on the skin) and tightened until the bleeding stops. Bleeding from bone marrow is normal and not indicative of TQ ineffectiveness. Slow bleeding from the marrow should be controlled with dressing and elevation following assessment and management of life threatening injuries (M.A.R.C.H.E.).

[1] Non-Obvious Massive External Hemorrhage
In the absence of an Obvious Massive External Hemorrhage or after controlling an Obvious Massive External hemorrhage, the assessment should start at the inguinal region, both legs, the neck, axillae and then both arms.

- TQ applied on an amputated limb should not be removed. A pelvic binder should be applied before moving a patient with a lower limb amputation secondary to a blast. If tactically feasible, clean the amputated part by gentle rinsing with LR or NS solution. Wrap the part in sterile gauze moistened with LR or NS solution and place it in a plastic bag/container. After labeling the bag/container, place it in an outer container filled with crushed ice. Do not freeze the part by placing it directly on the ice or by adding another coolant such as a dry ice. Keep out of sight of the victim.
- A tourniquet requires sufficiently intact/stable underlying bone structure to be effective. In cases where the underlying skeletal structure has been significantly compromised (e.g. complex blast trauma, mangled extremity), the Med Tech may need to apply the TQ very proximal ("High and Tight").
- Limb preserved: A TQ should be applied, when anatomically amenable, for the initial management of all life threatening hemorrhage. Assessment, Conversion & Removal occurring later (Protocol 3.2 and Procedure 7.12).

- Care Under Fire/Threat
  - Apply the Combat Application Tourniquet (CAT) over clothing clearly proximal to the bleeding site(s). If the hemorrhage location is readily apparent, apply the TQ 2 to 3 fingers width above the wound, but not over a joint. If the site of the life-threatening bleeding is not readily apparent, place the tourniquet “High and Tight” (as proximal as possible) on the injured limb.
  - CAT application procedure:
    1. Proceed with aggressive initial tightening of the strap, removing all slack.
    2. Twist the rod until bleeding has stopped and loss of distal pulse.
    3. Secure the rod inside a clip to lock it in place.
    4. Route the band between the clips and over the rod. Secure rod and band with TIME strap. Record time of application.
    5. If bleeding continues or restarts at any time, verify correct application of the 1st TQ and consider applying a 2nd TQ directly above (proximal to) the first. Based on the tactical situation, the Med Tech may choose to proceed directly to a "High and Tight" (as proximal as possible) TQ. If the initial TQ was applied High and Tight, apply a 2nd TQ directly below (distal).
    6. If two TQs are ineffective and are distal to the knee or elbow joints, apply a 3rd TQ mid-thigh or above the elbow.
    7. Mark TQ application time on patient tag/forehead/device (e.g. TQ 2230hrs).

- Tactical Field Care
  - Visually assess the patient. Cut & Expose the wound/bleeding site.
  - If TQ installed in Care Under Fire/Threat, assess its effectiveness.
  - For newly identified or previously uncontrolled hemorrhage, a SOF Tactical Tourniquet-Wide (SOFTT-W) or an Emergency Medical Tourniquet (EMT)[1] is preferred.
  - Apply TQ on extremity:
    1. Directly on the skin; 2-3 fingers width above the wound; not over a joint; and at least 5cm above the medial femoral condyle to avoid the adductor hiatus.
    2. Twist rod or pump air into EMT until bleeding has stopped and distal pulse is eliminated.

[1] The SOFTT-W or the EMT are the preferred options in TFC, but for the patient’s comfort and to reduce tissue damage, the EMT is considered the most ideal (if available and safe to utilize).

3. If at any given time bleeding is still active, reassess 1st TQ and consider applying a 2nd TQ directly above (proximal to) the first TQ.
4. If two TQs are ineffective and are distal to the knee or elbow joints, apply a 3rd TQ mid-thigh or above the elbow.
5. Mark TQ application time on patient tag/forehead/device (e.g. TQ 2230hrs).
6. Reassess frequently[1].

- N.B: In TFC and TACEVAC Phases of Care: Prior to any movement of a patient where a limb TQ has been applied, the limb should be immobilized where tactically feasible to preserve the effectiveness of the TQ (do not delay evacuation).

3. If NOT Amenable to a Limb TQ (or Limb TQs have failed)
   - Care Under Fire/Threat
     - Apply direct or indirect pressure with hand or knee if tactically feasible.
   - Tactical Field Care
     - Pack Wound with Hemostatic Dressing.
     - Important: Packing should not be done on wound in the abdominal, thoracic or cranial cavity.
     - Packing procedure:
       1. Apply pressure with two digits (if possible) directly on the damaged vessel; and/or indirect pressure to a pressure point proximal to the wound with heel of hand, knee or elbow.
       2. Expose and assess the wound (swipe the wound to remove any debris or blood clots).
       3. Prepare/Remove the gauze from the sterile package.
       4. Slowly remove the direct or indirect pressure to locate the source of bleeding through digital exploration of the wound (''Feel the Bleed'').
       5. Make a small ball with the end of the gauze. While maintaining continuous finger pressure, feed the gauze under your finger, packing the wound toward the source of the bleeding[2]. Simultaneous indirect pressure is preferred if feasible.
       6. Pack the entire wound cavity and fill it tightly with a CCCWG approved hemostatic gauze[3]. Make sure that no air pockets are created as you pack. Overfill the cavity (this helps to transmit surface pressure to the source of the bleeding within the wound).
       7. Maintain direct pressure for 5 minutes[4,5,6].
       8. If packing successful, apply a CCCWG pressure dressing directly over the wound to continue maintaining pressure.
       9. If at any point, in the opinion of the Med Tech, the rate of blood loss is too significant to attempt packing, consider a TQ application.

---

[1] Vigilantly in the first 10 minutes of application to account for muscle relaxation and subsequent bleeding; during and after patient movement; and after any period where the patient was left unmonitored.

[2] Occlusion through compression of the blood vessel against anatomical structures (i.e.: bones).

[3] If no hemostatic agents are available, use regular gauze or clean fabric to pack the wound.

[4] Disregard Combat Gauze manufacturer's instructions (3 minutes) and use proper technique (apply pressure with both hands, locked elbows and own body weight squared on top of wound).

[5] If hemostatic dressing is not available, use plain gauze and maintain pressure for 10 min.

[6] If hemostatic dressing fails to control bleeding after adequate pressure, remove hemostatic dressing and attempt a 2nd application with a new hemostatic dressing. If a 2nd packing attempt fails, apply a TQ.

8.11 Assessing and Treating Hemorrhage continued

4. If Amenable to a Junctional TQ (or for extremity hemorrhage where other hemorrhage control measures have failed)
   - Junctional hemorrhage is compressible hemorrhage from the groin proximal to the inguinal ligament, the buttocks, the gluteal and pelvic area, the perineum, the axilla and the shoulder girdle and the base of the neck. Junctional hemorrhage also includes extremity bleeding from sites too proximal for effective use of extremity TQs.
   - If the bleeding site is amenable to use of a junctional TQ (inguinal region only), immediately apply a CCCWG recommended junctional TQ. Do not delay in the application of the junctional TQ once it is ready for use. Apply hemostatic dressings with direct pressure if a junctional TQ is not available or while the junctional TQ is being readied for use. A junctional TQ may also be applied for lower extremity hemorrhage that has not be controlled by other means (as an indirect hemorrhage control device).
   - Packing alone should be used in junctional hemorrhage from the axillary region.
   - Apply SAM® Junctional Tourniquet <u>(only for inguinal region)</u>
     - Procedure:
       1. Slide the belt underneath the patient, positioning the Target Compression Device (TCD) over the area to be compressed. Use sterile gauze or hemostatic dressing if targeting directly over a wound. For bilateral application, use a second TCD.
       2. Hold the TCD in place and connect the belt using the buckle.
       3. Pull the BROWN HANDLES away from each other until the buckle secures. You will hear an audible click. Fasten excess belt in place by pressing it down on the Velcro. You may hear a second click once the belt is secure.
       4. Use the hand pump to inflate the TCD until hemorrhage stops.
       5. Secure the patient's feet (using a figure 8 knot).
       6. Monitor patient during movement/transport for hemorrhage control and adjust the device if necessary.
       7. TO REMOVE: Unbuckle the belt[1].

B. Suspected Pelvic Fracture

1. Description/Assessment
   - Blood loss is the leading cause of death in patients with pelvic fractures (PHTLS). Because the pelvis is a strong bone and difficult to fracture, patients with pelvic fractures frequently have associated injuries.
   - Examples of pelvic fractures include: Rami fractures (typically not associated with significant internal hemorrhage); Acetabular fractures (may be associated with significant internal hemorrhage); and Pelvic ring fractures (can lead to a life-threatening hemorrhage).
   - Fractures of the pelvic ring are typically classified into three categories:
     - Lateral compression fractures (60-70% frequency).
     - Anterior-posterior compressing fractures aka open book (15-20% frequency).
     - Vertical shear fractures (5-15% frequency).

[1] WARNING: SAM® Junctional Tourniquet is intended to be left for up to four hours. Remove only at a Definitive Care Facility. Additional hand pumps may be necessary with changes in altitude. If altitude change is a concern, a syringe can be used to fill the TCD with water, saline, or other non-compressible fluid.

8.11 Assessing and Treating Hemorrhage continued

- The identification of a pelvic fracture in a prehospital environment is challenging and should not solely rely on the assessment of the pelvic ring (see Indications below). Strategies to identify pelvic fracture in the prehospital environment include identification of risk factors and signs/symptoms. Physical examination findings, in general, are not sensitive for identification of pelvic fracture. Accordingly, the Med Tech should first evaluate the presence of any indications for Pelvic Binder (below), prior to physical examination. The presence of any one indication negates the requirement to perform further evaluation of the pelvis, and a binder is required prior to movement of the patient.
- If necessary, the pelvis should only be evaluated once by a SMA. Pelvic "springing" as an assessment technique is a poor predictor of the presence or absence of pelvic fracture. Examination should start with gentle palpation and progress to gentle manual pressure anterior to posterior and from the sides. This pressure may identify crepitus or instability and any discomfort/tenderness is a positive indication for pelvic binder application.
- The Med Tech should, in a suspected pelvic fracture, use a pelvic binder or any other pelvic splint to stabilize unstable pelvic fractures; close a disrupted pelvic ring; and decrease the volume of the pelvis thus preventing more damage to the surrounding structures and reducing potential hemorrhage.
- Another challenge is the movement of a patient with a pelvic fracture. Movement or logroll can shift bone fragments even with a splint applied (especially Lateral compression fractures and Vertical shear fractures). The best way to move a patient with a suspected pelvic fracture may be with a scoop stretcher or by a direct patient lift while maintaining spine immobilization and placement onto a long backboard. For assessment, treatment or positioning purposes, a maximum logroll of approximately 15° can be performed.

2. Indications
   - Penetrating or blunt pelvic trauma.
   - Unexplained hypotension in suspected or known blunt or blast trauma.
   - Blast injury with lower limb amputation or partial amputation.
   - Complaints of pelvic pain or tenderness on examination.

3. Splints for suspected pelvic fracture (Must be applied prior to moving the patient)
   - SAM® Junctional Tourniquet
     - Procedure:
       1. Carefully put patient in supine position with device's belt located under the pelvis.
       2. The lower extremities should be adducted and internally rotated.
       3. Align the center of the device's belt with the greater trochanters.
       4. Slowly draw tension (creating simultaneous circumferential compression) and secure the device, in accordance with the manufacturer's recommendations.
       5. Complete splinting of the extremities with padding between legs (if tactically feasible) and secure the victim's feet (using a figure 8 knot) if not done already.
       6. Record the date and time of application.

8.11 Assessing and Treating Hemorrhage continued

- Arrow® T-POD™ Pelvic Stabilization Device[1]
  - Procedure:
    1. Carefully put patient in supine position with device's belt located under the pelvis.
    2. The lower extremities should be adducted and internally rotated.
    3. Align the center of the device with the greater trochanters.
    4. Wrap T-Pod around patient's pelvis & cut the exceeding T-Pod belt leaving a 6-8 inch gap of exposed pelvis (the T-Pod is 8'' wide, use it has a reference).
    5. Apply tightening apparatus.
    6. Slowly tighten T-Pod until stabilisation is achieved.
    7. Complete splinting of the extremities with padding between legs (if tactically feasible) and secure the patient's feet (using a figure 8 knot) if not done already.
    8. Record the date and time of application.
- Improvised Pelvic Stabilisation Devices
  - Patient's belt, Sam Pelvic Sling, K.E.D. installed upside down, Blanket, 2 x Triangular Bandages, Elastic Straps from SAGER, etc.
  - Same as above, the center of the device chosen as to be aligned with the greater trochanters.

C. Other Sources of External Hemorrhage (Protocol 3.11)

1. Description
   - Minor bleeds: Bleeding from a wound that is not of significant rate in the opinion of the Med Tech enough to compromise the hemodynamic status of the patient immediately or in the near future without treatment. The Med Tech, however, needs to consider the cumulative effect of significant but minor sources of hemorrhage. Several minor bleeds combined or in the presence of fractures can eventually compromise the hemodynamic status of the patient.

2. Scalp
   - Description
     - Scalp injuries may bleed substantially and may be associated with underlying open skull fractures and brain injury. As well, the presence of hair reduces the efficacy of hemostatic agents and dressing. Therefore, first line therapy for massive hemorrhage from the scalp is sutures or staples.
   - Depressed Skull Fracture Suspected
     - In significant hemorrhage from scalp laceration with suspected underlying depressed skull fracture, do not pack the wound or perform wound closure with sutures/staples. Attempt to control the hemorrhage with a dressing (not packing), avoiding excessive pressure. If evacuation is delayed/prolonged or experiencing difficulty managing the hemorrhage, contact MO/PA for guidance.
   - Depressed Skull Fracture <u>Not</u> Suspected
     - Direct Pressure.
     - Packing

[1] Obese patient may require 2 x T-POD affixed together. Med Tech should release pelvic binder every 12 hrs (skin integrity). Replaced when soiled or after every 24hrs of use.

8.11 Assessing and Treating Hemorrhage continued

a. Pack wound with hemostatic dressing. Apply pressure for 5 minutes. If gauze-type hemostatic dressing not available, use plain gauze for packing and apply pressure for 10 minutes. Apply pressure dressing.

- Whip Stitch (RQ Cpl and Above)
  a. Note: Not definitive repair of the laceration;
  b. The area is NOT cleaned, prepped or draped;
  c. If possible, the edges of the wound are anesthetised with 1% Xylocaine with epinephrine;
  d. The two ends of the bleeding laceration are identified;
  e. A running whip stitch is performed, using the #2 silk, taking full thickness bites of scalp;
  f. The stitch is started just beyond the border of the laceration, furthest from the Med Tech. A square knot is used to secure this stitch;
  g. The running stitch is performed, and the Med Tech tries to sew towards himself/herself.
- Skin-Stapler (RQ Cpl and Above)
  a. In tactical situations a disposable stapler may be used to bring the edges of the wound together in order to control bleeding. This initial approximation of the wound will eventually need to be reopened and properly cleaned on arrival at a surgical facility;
  b. Place staples over the approximated wound and firmly squeeze the trigger to deliver each staple, everting the tissue edges. Staples should be placed are regular intervals and sufficiently close to maintain wound closure.

3. Epistaxis
   - Description
     - Massive facial trauma can result in massive epistaxis, as bleeding continues from lacerated facial branches of the external carotid artery. First line therapy for massive epistaxis from facial trauma is posterior/anterior packing.
   - Basal Skull Fracture Suspected
     - Direct Pressure
       a. If the hemorrhage is at significant rate enough to compromise the hemodynamic status of the patient, compress nares below nasal bridge firmly between the thumb and the index finger.
   - Basal Skull Fracture Not Suspected
     - Direct Pressure
       a. Compress nares below nasal bridge firmly between the thumb and the index finger.
     - Packing
       a. Use hemostatic gauze and pack the anterior nostril that is bleeding. Compress nares firmly between the thumb and the index finger. Repeat on the contralateral side if necessary.
     - Foley Catheter (RQ Cpl and Above)
       a. Prepare and check the Foley and other equipment;
       b. An 18 French Foley catheter is inserted into the nares of the affected side;
       c. The Foley catheter is advanced with gentle pressure into the nares;
       d. Do not push through resistance. If resistance is encountered, withdraw the Foley and change the direction of insertion;
       e. Once the balloon of the catheter is clearly in the nasopharynx, inflate the balloon with 10 ml of saline, and then remove the syringe;
       f. Withdraw the Foley firmly until clear resistance is encountered;

8.11 Assessing and Treating Hemorrhage continued

g. Maintaining tension of the Foley, tape the catheter to the forehead using tape. Alternatively, take any clamp and clamp the catheter just at the nares, maintaining tension on the Foley;
h. Use hemostatic gauze and pack the anterior nares around the catheter to complete the packing;
i. Repeat on the contralateral side if necessary.

4. Neck
   - Description
     - Pulsatile bleeding from the neck most likely represents injury to the carotid artery. Two major consequences of this injury in the field are exsanguination and loss of airway from compression by the expanding hematoma. Therefore, control of hemorrhage and establishment of a definitive airway must occur almost simultaneously.
   - Direct Pressure
     - Direct pressure with digits directly on the damaged vessel or direct pressure directly over the wound.
   - Packing
     - If the hematoma appears to be expanding, or if there are any signs of impending airway obstruction, secure the airway (Protocol 2.1).
     - Continue dealing with the massive compressible hemorrhage:
       a. Wound is large: Pack with hemostatic gauze then secure with pressure dressing;
       b. Wound is small: If unable to pack or digitally access the source of the bleed, apply a pressure dressing. If ongoing exsanguination hemorrhage continues, For RQ Cpl and above, a Foley catheter can be inserted gently into the wound and advanced until resistance is met. The Foley balloon should be inflated to a maximum of 10 ml of NS. Inflation can stop before 10 ml if bleeding is controlled. The Foley is then secured in place with tape.

5. Hemorrhage from Abdominal Eviscerated Organs
   - Description
     - For management of significant hemorrhage originating from eviscerated abdominal organs.
   - Procedure:
     1. Rinse with clean fluid to reduce gross contamination.
     2. If the source of the bleed can be visualized, use gauze-type hemostatic dressing with 5 minutes of finger clamping.
     3. If the source of bleed cannot be visualized, cover the area with gauze-type hemostatic dressing without pressure.
     4. Gently cover exposed bowel with a moist, sterile dressing or sterile water-impermeable covering (e.g. Saran Wrap).
     5. Prevent evaporative cooling as exposed abdominal contents will result in more rapid heat loss.
     6. <u>Do Not</u> reduce bleeding evisceration; close the skin by any means; or pack the abdominal cavity.

8.11 Assessing and Treating Hemorrhage continued

D. Femur fracture

1. Description
   - Internal hemorrhage is also common with musculoskeletal trauma. It may result from damage to major blood vessels (many of which are located in close proximity to the long bones of the body), from disrupted muscle, and from the marrow of fractured bones. Significant blood loss can be associated with fractures. The internal blood loss from a femur fracture is approximately 1000 ml to 2000 ml (PHTLS). A bleeding fractured femur combined with other sources of hemorrhage, can quickly compromise the hemodynamic status of the patient. Accordingly, proper splinting of a suspected femur fracture is important.

2. CT-6 (if available)
   - Indications
     - Midshaft femoral fractures.
     - CT-6 may be used as a rigid splint without traction (e.g. Tib/Fib fracture; Fractures adjacent to the knee).
   - Contraindications
     - Patient with additional life threatening injuries; time should not be taken to apply a traction splint.
     - Pelvic fracture.
     - Suspected femoral neck (hip) fracture.
     - Supracondylar fracture of the distal head of the femur.
     - Suspected fractures adjacent to the knee (a traction splint may be used as a rigid splint in this situation, but traction should not be applied).
     - Fracture/Amputation of the ankle and foot.
   - Procedure:
     1. Hold leg at the ankle and foot; Apply gentle traction to straighten out the fracture.
     2. Measure on the uninjured leg, leaving 6'' below heel.
     3. Set the CT-6 to the right length and secure the top strap around patient hip.
     4. Remove patient boot and check distal pulse.
     5. Install the traction strap securely and tightly around patient ankle above malleolus.
     6. Apply moderate traction using pulley, just to stabilize the splint.
     7. Attach the straps to patient leg.
     8. Start applying traction until pain is relieved, the distal pulse is returned and/or patient legs are equal length.
     9. Secure traction device with a knot and secure the extra rope in the bottom strap.
     10. Check distal pulse.
     11. Place a blanket between patient legs and secure both legs together
     12. If the bone ends of an open fracture retract into the wounds during splinting, this information must be documented.
   - External hemorrhage from an open fracture
     - Check distal pulse.
     - Support leg.
     - Cover the wound with a sterile dressing.

8.11 Assessing and Treating Hemorrhage continued

- Put bulky padding lengthwise on both sides of the fracture, over the dressing to protect the bone ends and tape the padding in place.
- Apply pressure dressing tightly enough to put pressure on the padding (so not on the fractured bone).
- Check distal pulse.
- Immobilize the leg.

E. For all other external, bleeding wounds, options include

1. Apply pressure dressing.
2. For small wounds where packing is not possible, consider inserting a Foley catheter if a pressure dressing does not control hemorrhage.
3. If the wound is large, pack tightly with hemostatic agent and non-hemostatic gauze. Then apply a pressure dressing.
4. Long, deep bleeding lacerations may be amenable to running whip stitches with the #2 silk.

SECTION 8: REFERENCES/ABBREVIATIONS

8.12 Diagnostic Criteria for Anaphylaxis - Adult and Child > 30 kg

Anaphylaxis is highly likely when any ONE of the following 3 criteria are fulfilled:
1. Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips-tongue-uvula)
AND AT LEAST ONE OF THE FOLLOWING
A. Respiratory compromise (e.g., dyspnea, wheeze-bronchospasm, stridor, SPO_2 < 92%)
B. Reduced BP or absent radial pulse or decreased level of consciousness

2. TWO OR MORE OF THE FOLLOWING that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours):
A. Involvement of the skin-mucosal tissue (e.g., generalized hives, itch-flush, swollen lips-tongue-uvula)
B. Respiratory compromise (e.g., dyspnea, wheeze-bronchospasm, stridor, SPO_2 < 92%)
C. Reduced BP or absent radial pulse or decreased level of consciousness
D. Persistent gastrointestinal symptoms (e.g., crampy abdominal pain, vomiting)

3. Reduced BP after exposure to a known allergen for that patient (minutes to several hours):
A. Infants and children: low systolic BP (age specific)* or greater than 30 percent decrease in systolic BP
B. Adults: systolic BP of less than 90 mm Hg or greater than 30 percent decrease from that person's baseline

8.13 Diagnostic Criteria for Anaphylaxis – Adult & **Child ≤ 30 kg**

Anaphylaxis is highly likely when any ONE of the following 3 criteria are fulfilled:

1. Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips-tongue-uvula)
AND AT LEAST ONE OF THE FOLLOWING
A. Respiratory compromise (e.g., dyspnea, wheeze-bronchospasm, stridor, SPO_2 < 92%)
B. Reduced BP* or absent radial pulse or decreased level of consciousness

2. TWO OR MORE OF THE FOLLOWING that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours):
A. Involvement of the skin-mucosal tissue (e.g., generalized hives, itch-flush, swollen lips-tongue-uvula)
B. Respiratory compromise (e.g., dyspnea, wheeze-bronchospasm, stridor, SPO_2 < 92%)
C. Reduced BP* or absent radial pulse or decreased level of consciousness
D. Persistent gastrointestinal symptoms (e.g., crampy abdominal pain, vomiting)

3. Reduced BP* after exposure to a known allergen for that patient (minutes to several hours):
A. Infants and children: low systolic BP (age specific)* or greater than 30 percent decrease in systolic BP
B. Adults: systolic BP of less than 90 mm Hg or greater than 30 percent decrease from that person's baseline

* Low systolic blood pressure for children is defined as:
- less than 70 mm Hg from 1 month to 1 year,
- less than (70 mm Hg + [2 x age]) from 1 to 10 years, and
- less than 90 mm Hg from 11 to 17 years.

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SECTION 8: REFERENCES/ABBREVIATIONS

8.14 Military Acute Concussion Evaluation (MACE 2)

MHS Military Health System health.mil

MACE 2

Military Acute Concussion Evaluation

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

Service Member Name: _____

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

Date of Injury: _____ Time of Injury: _____

Examiner: _____

Date of Evaluation: _____ Time of Evaluation: _____

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

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

RED FLAGS

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

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

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

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

MILITARY ACUTE CONCUSSION SCREENING

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

1. Description of Incident

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

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

_____

_____

_____

_____

Key questions:

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

B. Observable Signs

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

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

C. Record the type of event.

Check all that apply:

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

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

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

☐ **YES** ☐ **NO** ☐ **UNKNOWN**

SECTION 8: REFERENCES/ABBREVIATIONS

8.14 Military Acute Concussion Evaluation (MACE 2) continued

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**

MACE 2 - Military Acute Concussion Evaluation

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).

SECTION 8: REFERENCES/ABBREVIATIONS

8.14 Military Acute Concussion Evaluation (MACE 2) continued

MACE 2 - Military Acute Concussion Evaluation

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

MACE 2 - Military Acute Concussion Evaluation

NEUROLOGICAL EXAM

7. Speech Fluency

☐ **Normal**
☐ **Abnormal**

- Speech should be fluid and effortless - **no pauses or unnatural breaks.**

unnatural breaks.
- Stuttering or struggling to speak is abnormal.

8. Word Finding

☐ **Normal**
☐ **Abnormal**

- Assess difficulties with word finding:
  - Difficulty in coming up with the name of an object or grasping to find words is abnormal.

9. Grip Strength

☐ **Normal**
☐ **Abnormal**

- Assess grip strength. Grip strength should be strong and equal bilaterally.
  - Unequal or weak grip strength is abnormal.

10. Pronator Drift

☐ **Normal**
☐ **Abnormal**

- Direct service member to stand with eyes closed and arms extended forward, parallel to the ground with palms up. Assess for five to 10 seconds:
  - Any arm or palm drift is abnormal.

11. Single Leg Stance

☐ **Normal**
☐ **Abnormal**

- Remove shoes if possible. Have service member stand on one leg, arms across chest, hands touching shoulders, eyes open initially. Once service member is balanced, have them close their eyes and time for 15 seconds how long they can maintain their balance. Repeat test with opposite leg.
  - Loss of balance on either leg before eight seconds is abnormal.

SECTION 8: REFERENCES/ABBREVIATIONS

8.14 Military Acute Concussion Evaluation (MACE 2) continued

NEUROLOGICAL EXAM - Continued

12. Tandem Gait

☐ Normal
☐ Abnormal

- Remove shoes if possible. Have service member take six steps one foot in front of the other, heel-to-toe, with arms at side
  - Stumbling or shifting feet is

13. Pupil Response

☐ Normal
☐ Abnormal

- Pupils should be round, equal in size and briskly constrict to a direct, bright light.
  - Unequal pupil size, dilation or constriction delay is abnormal.

14. Eye Tracking

☐ Normal
☐ Abnormal

- Both eyes should smoothly track your finger side-to-side and up and down.
  - Unequal, irregular or delayed eye tracking is abnormal.

NEUROLOGICAL EXAM RESULTS (Questions 7-14) ☐ All Normal ☐ Any Abnormal

COGNITIVE EXAM

15. Concentration

A. Reverse Digits

Read the script and begin the trial by reading the first string of numbers in Trial 1.

Circle the response for each string.

- If correct on string length of Trial 1, proceed to the next longer string length in the same column.
- If incorrect on string length of Trial 1, move to the same string length of Trial 2.
- If incorrect on both string lengths in Trials 1 and 2, **STOP** and record score as zero for that string length. Record total score as sum of previous correct trials.

COGNITIVE EXAM - Continued

15. Concentration - Continued

A. Reverse Digits

Script: Read the script exactly as written.

- *"I am going to read you a string of numbers. When I am finished, repeat them back to me backward. That is, in reverse order of how I read them to you. For example, if I said 7 - 1 - 9, then you would say 9 - 1 - 7."*

List A			
Trial 1	**Trial 2** (if Trial 1 is incorrect)	**Incorrect**	**Correct**
4-9-3	6-2-9	0	1
3-8-1-4	3-2-7-9	0	1
6-2-9-7-1	1-5-2-8-5	0	1
7-1-8-4-6-3	5-3-9-1-4-8	0	1

REVERSE DIGITS SCORE (15A) ☐ /4

Concentration Alternate Number Lists

Note: Use the same list (A-F) that was used in Question 6.

List B	
Trial 1	**Trial 2**
5-2-6	4-1-5
1-7-9-5	4-9-6-8
4-8-5-2-7	6-1-8-4-3
8-3-1-9-6-4	7-2-7-8-5-6

List C	
Trial 1	**Trial 2**
1-4-2	6-5-8
6-8-3-1	3-4-8-1
4-9-1-5-3	6-8-2-5-1
3-7-6-5-1-9	9-2-6-5-1-4

List D	
Trial 1	**Trial 2**
7-8-2	9-2-6
4-1-8-3	9-7-2-3
1-7-9-2-6	4-1-7-5-2
2-6-4-8-1-7	8-4-1-9-3-5

List E	
Trial 1	**Trial 2**
3-8-2	5-1-8
2-7-9-3	2-1-6-9
4-1-8-6-9	9-4-1-7-5
6-9-7-3-8-2	4-2-7-9-3-8

List F	
Trial 1	**Trial 2**
2-7-1	4-7-9
1-6-8-3	3-9-2-4
2-4-7-5-8	8-3-9-6-4
5-8-6-2-4-9	3-1-7-8-2-6

SECTION 8: REFERENCES/ABBREVIATIONS

8.14 Military Acute Concussion Evaluation (MACE 2) continued

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 (15B) ____/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

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.

SECTION 8: REFERENCES/ABBREVIATIONS

8.14 Military Acute Concussion Evaluation (MACE 2) continued

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

Any score above baseline is considered abnormal

VOMS RESULTS

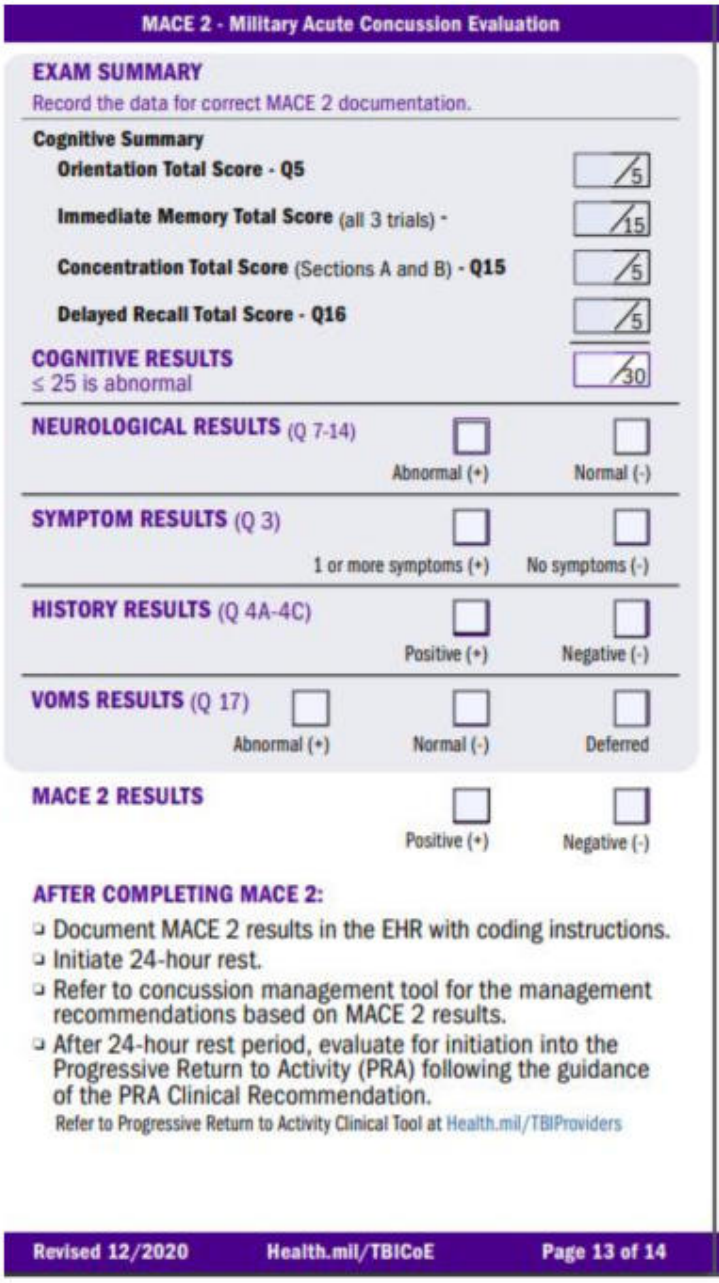
All Normal ☐

Any Abnormal ☐

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						

SECTION 8: REFERENCES/ABBREVIATIONS

8.14 Military Acute Concussion Evaluation (MACE 2) continued



MACE 2 - Military Acute Concussion Evaluation

EXAM SUMMARY

Record the data for correct MACE 2 documentation.

Cognitive Summary

Orientation Total Score - Q5	/5
Immediate Memory Total Score (all 3 trials) -	/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 Health.mil/TBIProviders

MACE 2 - Military Acute Concussion Evaluation

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

Centimeter Ruler 0 cm 5 cm 15 cm

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 TBICoE ICD-10 Coding Guidance Tool.

References available at Health.mil/TBIProviders.

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 4901.1.2.8
Released: February 2012 | Revised December 2020
by Traumatic Brian Injury Center of Excellence.
This product is reviewed annually and is current until superseded.

8.14.1 Concussion Management – Exertional Testing

Calculate target heart rate = 65%-85% maximum heart rate (Maximum heart rate = 220-age)
Have patient reach target heart rate using push-ups, step ups or other aerobic activity.
Assess for Common Symptoms of Concussion:

- Headache
- Irritability
- Sleep disturbance
- Fatigue
- Difficulty concentrating
- Dizziness
- Photo/Phonophobia

8.14.2 Return to Activity Following TBI

RETURN TO ACTIVITY EDUCATIONAL BROCHURE

Guidance for Service Members With Symptoms Following a Concussion

Defense and Veterans Brain Injury Center

WHAT IS A CONCUSSION?

A concussion is a head injury from a hit, blow or jolt to the head that:

- briefly knocks you out (loss of consciousness), or
- may affect your ability to remember information before, during or after the event (post-traumatic amnesia), or
- makes you feel dazed, like you had your bell rung (alteration of consciousness)

A concussion is also known as mild traumatic brain injury (mTBI).

This brochure will help you to recover as quickly and safely as possible. Each stage is designed to help you gradually return to your normal routine, while your brain heals. You may have to stay at one stage longer than another if your symptoms do not go away or return when you try to do more activities. Everyone is different.

Do not rush your progress.

WHAT SHOULD I EXPECT?

- Most people fully recover from concussions.
- Immediately or soon after the injury, you may have the symptoms noted on the table on the following page.
- Symptoms after a concussion can affect your performance, placing the safety of you or your unit at risk.
- These temporary symptoms resolve faster when your brain gets rest, so it is important for you to take time to gradually recover.
- Recovery is different for each person, but symptoms typically improve within hours, and resolve completely within days to weeks.

Red Flags: When Should I Seek Help?

If you experience any of the following, contact your primary care manager immediately:

- passing out or blackouts
- weakness or numbness of any part of the body
- one pupil larger or smaller than the other
- slurred speech or difficulty speaking
- changes in hearing, taste or vision
- difficulty recognizing people
- not knowing where you are
- worsening headache
- unsteady on feet
- seizures
- vomiting
- unusual behavior
- double vision
- something just isn't right

Released: January 2014 | Revised: April 2020 by Defense and Veterans Brain Injury Center.
This product is reviewed annually and is current until superseded. 800-870-9244 • dvbic.dcoe.mil
4.3.0.6.1.2.3

8.14.1 Return to Activity Following TBI continued

AVOID

- caffeine (it interferes with sleep)
- tobacco products
- sleeping aids or drugs, unless recommended to you by your health care provider

RATE YOUR SYMPTOMS:

Each morning, rate your symptoms based on the table on the following page from 0-4.

0 = Rarely or never present. (**None**)
1 = Occasionally present but doesn't disrupt my activities. (**Mild**)
2 = Often present and occasionally disrupts my activities. I feel somewhat concerned. (**Moderate**)
3 = More frequently present and disrupts my activities. I can only do fairly easy, simple things. I feel I need help. (**Severe**)
4 = Almost always present. I can't perform at work, school or home because of it and I need help. (**Very Severe**)

HOW DO I FEEL TODAY?

RATE ON A SCALE OF 0 4	0	1	2	3	4
Feeling dizzy					
Loss of balance					
Poor coordination, clumsy					
Headaches					
Nausea					
Vision problems, blurring, trouble seeing					
Sensitivity to light					
Hearing difficulty					
Sensitivity to noise					
Numbness or tingling on parts of my body					
Change in taste and/or smell					
Loss of appetite or increased appetite					
Poor concentration, can't pay attention, easily distracted					
Forgetfulness, can't remember things					
Difficulty making decisions					
Slowed thinking, difficulty getting organized, can't finish things					
Fatigue, loss of energy, getting tired easily					
Difficulty falling or staying asleep					
Feeling anxious or tense					
Feeling depressed or sad					
Irritability, easily annoyed					
Poor frustration tolerance, feeling easily overwhelmed by things					

Based on Neurobehavioral Symptom Inventory (NSI)
Used with permission: Cicerone, KD. J Head Trauma Rehabil 1997;12(3):1-17.

DAILY GUIDANCE

- Complete the table on the previous page every morning. If you rate your symptoms as None or Mild (0-1), then move on to the next stage.
- If any symptoms get worse or you develop new ones, immediately stop what you are doing and rest for the remainder of that day.
- If your symptoms go away or are rated as mild (0-1) the next morning, you may carefully try the activities that you were doing the day before. Make certain that you follow the guidelines closely and do a little less of the activity that caused your symptoms to worsen.
- If your symptoms are rated at 2 or higher on the NSI the next morning, go back to the last stage where you had no symptoms. Stay at that stage and contact your Primary Care Manager for further instructions.

WHAT SHOULD I DO?

After Mandatory 24 Hours of Recovery:

❑ **Stage 1: Rest**

Rest or do very light activity for another 24 hours. Only do basic things like eating, using the bathroom, resting and sleeping.

- Keep your head above your heart (when you put on your shoes, bring your foot to your knee).
- Sit down when dressing and showering if needed.
- Walk on level surfaces at an easy pace.
- Limit head movements that cause symptoms.
- Stay in a quiet environment with low lighting.
- Watch periods of television with rest breaks each hour.
- Sleep as needed.
- Dress comfortably.

After this stage, see your primary care manager to discuss symptoms and determine next steps.

DO NOT!

- work or study
- drink alcohol
- exercise
- drive
- hold your breath or grunt*
- exert yourself to the point of making your heart race
- play video games

*Pay attention to whether you are holding your breath when you bend over or are under stress.

❑ **Stage 2: Light Routine Activity**

You may wear a uniform and boots.
May perform these activities no longer than 30 minutes:

- walk and stretch
- ride a stationary bike at a slow pace with low resistance
- no light housework
- use the computer
- play simple games, such as cards

DO NOT!

- drink alcohol
- drive
- play video games
- do resistance training or repetitive lifting
- do sit-ups, push-ups or pull-ups
- go to crowded areas where you may be bumped into

❑ Stage 3: Light Occupation-oriented Activity

May perform these activities no longer than 60 minutes:

- lift and carry objects less than 20 pounds
- take a brisk walk
- ride in car and look around
- use an elliptical machine or stair climber
- perform light military tasks such as cleaning equipment

May perform these activities no longer than 30 minutes:

- shop for one item at the store
- talk to someone as you walk
- gently increase your exposure to light and noise
- perform a maintenance check on a vehicle

DO NOT!

- drink alcohol
- drive
- play video games
- do resistance training or repetitive lifting
- go to crowded places
- participate in combatives or contact sports

❑ Stage 4: Moderate Activity

You may wear personal protective equipment.

May perform these activities no longer than **90 minutes**:

- take a brisk walk
- do light resistance training
- participate in non-contact sports
- perform moderate job-related tasks
- climb, crawl or jog

May perform these activities no longer than 40 minutes:

- play video games, foosball, putting and ping pong
- play strategy games such as chess or sudoku
- shop for groceries
- perform target practice
- drive in a simulator

DO NOT!

- drink alcohol
- participate in combatives or contact sports
- drive

❑ Stage 5: Intensive Activity

- Resume normal routine and exercise.
- Participate in normal military, training and social activities.
- Use night vision goggles, take part in simulations, or be exposed to bright light.

See your primary care manager in the morning after completing this stage to complete exertional testing.

- Start driving again.
- Do heavy job-related tasks, such as digging.
- Communicate by signals during patrol duty or use radio communication.

DO NOT!

- drink alcohol
- participate in combatives or contact sports
- go outside the wire in a combat zone

❑ Stage 6: Unrestricted Activity

- Return to pre-injury activities.

If your heart starts to race, immediately STOP what you are doing and rest.

Practice good sleep habits (get 7-8 hours)
See Healthy Sleep fact sheet at dvbic.dcoe.mil.

Do you have questions about this fact sheet? Feedback? Email dha.dvbicinfo@mail.mil.

SECTION 8: REFERENCES/ABBREVIATIONS

8.15 Pain Management

Context:

- The following reference should be used in conjunction with Protocol 3.6 Pain and provides additional guidance/considerations for analgesia in the adult trauma patient with pain.

Analgesia General Considerations:

- Patients should be disarmed when given Morphine, Oral transmucosal fentanyl citrate (OTFC) or Ketamine.
- For all patients given opioids or ketamine, closely monitor airway, breathing and circulation. Initiate close monitoring of vital signs, using an advanced electronic monitor (if available).
- Evaluate mental status and document findings prior to administering opioids or ketamine.
- Have Naloxone readily available when using opioid analgesics (e.g. Fentanyl, Morphine) – Refer to Protocol 4.1 Narcotic Overdose.
- If respirations are noted to be reduced after using opioids or Ketamine, provide ventilatory support with a BVM.
- Prior to escalating any treatment for pain, consider other potential physiologic etiologies.
- Adequate early pain control has been shown to reduce incidence of post-traumatic stress disorder and development of chronic pain syndromes.

Mild to Moderate Pain:

- Ibuprofen 800mg PO q8h prn OR Meloxicam 15 mg PO once; AND/OR Acetaminophen 1g PO q6h.
- Preferred where casualty able to fight (e.g. isolated fracture, eye injury, minor burns) as alternative analgesia (opioid) would require disarming.
- Aspirin, Motrin, Toradol and other nonsteroidal anti-inflammatory drugs (NSAIDs) other than Meloxicam should be avoided in hemorrhage because they interfere with blood clotting. Meloxicam and Tylenol DO NOT interfere with platelet function.
- For management of non-acute, mild pain – refer to Scope of Practice.
- For management of pain of a non-traumatic etiology (medical) – consult relevant protocol (e.g. Protocol 1.1 Chest Pain) or consult MO/PA.

Moderate to Severe Pain
(and NOT in Respiratory Distress or Shock and NOT at significant risk of developing either condition):

- Oral transmucosal fentanyl citrate (OTFC) 800 µg transbucally – CLASS B:
    - Tape lozenge on a stick to casualty's thumb as an added safety measure.
    - Reassess in 15 minutes.
    - May repeat with a second lozenge as necessary to control severe pain.
    - Monitor for respiratory depression and decreasing level of consciousness.
    - For medication induced nausea and vomiting: Dimenhydrinate 50 mg IV/IM/PO q4h prn OR Ondansetron 8 mg IV/IM/PO q8h prn.
- Morphine sulphate 2.5 mg IV/IO over 1 min q5min prn (max of 15 mg in 30 minutes) – CLASS A, RQ CPL AND ABOVE:
    - Monitor for respiratory depression and decreasing level of consciousness.
    - IV/IO Morphine should be titrated to effect but is not to exceed 15 mg in 30 minutes. Otherwise, there is no absolute max dose for IV/IO Morphine.
    - For medication induced nausea and vomiting: Dimenhydrinate 50 mg IV/IM/PO q4h prn OR Ondansetron 8 mg IV/IM/PO q8h prn.

8.15 Pain Management continued

- Morphine sulphate 10 mg IM q30min prn- CLASS A, RQ CPL AND ABOVE:
    - Given unreliable absorption, should only be considered as a last resort when IV access or other analgesics are unavailable.
    - Monitor for respiratory depression and decreasing level of consciousness.
    - For medication induced nausea and vomiting: Dimenhydrinate 50 mg IV/IM/PO q4h prn OR Ondansetron 8 mg IV/IM/PO q8h prn.
- Ketamine IV/IO/IM/IN, refer below for dosing – CLASS B, RQ CPL AND ABOVE.

Moderate to Severe Pain
(Casualty IS in Respiratory Distress or Shock OR at significant risk of developing either condition):

- Ketamine 25 mg IV/IO push over 1 min q20min prn x 4 doses in 2hr max – CLASS B, RQ CPL AND ABOVE; OR
- Ketamine 50 mg IM or IN with atomizer q30min x 2 doses total – CLASS B, RQ CPL AND ABOVE
- IV/IO route is preferred.
- For IM/IN Ketamine use 50 mg/ml undiluted.
- For IV/IO Ketamine, mix 1 ml of 50 mg/ml with 4 ml of NS to make 10 mg/ml.

Ketamine (CLASS B, RQ CPL AND ABOVE)

- Ketamine is a “Dissociative” anesthetic that distorts perceptions of sight and sound and produces feelings of detachment or dissociation from environment and self.
- At lower doses, it provides potent analgesia and mild sedation.
- At higher doses, it provides dissociative anesthesia and moderate to deep sedation.
- It poses less risk of respiratory depression than morphine and fentanyl and has a very favorable safety profile.
- Ketamine may be a useful adjunct to reduce the amount of opioids required to provide effective pain relief and Ketamine can be added to patients who have received morphine or OTFC with incomplete pain control. However, patients must be closely monitored and have continuous pulse oximetry if both Ketamine and an opioid are administered concurrently as the risk of respiratory depression and/or loss of airway reflexes will be increased.
- End Points of Ketamine Administration:
    - Control of pain or any signs of sedation.
    - Signs of sedation include the development of a trance-like state (open eyes and unresponsive) or nystagmus (rhythmic back-and-forth movement of the eyes).
- Transient laryngospasm is a rare complication (0.3%) associated with administering Ketamine at sedative doses. The incidence at lower analgesic doses is unknown, but likely less. If it is suspected, the first step is to simply reposition the airway to rule out a malpositioned airway as the cause of respiratory distress. If this fails, bag-valve-mask ventilation should be administered until the laryngospasm has resolved. If this does not result in adequate ventilation, refer to Protocol 2.1 Airway.
- Observe for increased secretions and be prepared to suction.
- Naloxone does not reliably reverse the effects of Ketamine.
- Eye injury is considered a relative contraindication to the use of Ketamine. However, the risk of additional damage to the eye from Ketamine is low and it SHOULD BE USED even if there is an eye injury and the casualty is in shock or respiratory distress or at significant risk for either.

8.15 Pain Management continued

- "Emergence/Recovery Reaction":
    - If a patient is inadvertently sedated, there is a risk (up to 30%) of a "recovery reaction".
    - While usually mild, on the rare occasion, reactions can be pronounced and include hallucinations (pleasant and unpleasant), delirium, excitation, and physical combativeness.
    - If the reaction is judged to be clinically significant such that medical intervention is warranted, treat with Midazolam 2mg IV/IO/IM q10min to a maximum of 4 doses until the patient is no longer a danger to themselves or others.
    - Recovery reaction following Ketamine administration is treated with up to 4 doses of Midazolam 2mg, vs 2 doses recommended in the management of "aggressive patients" per Protocol 4.4 Hostile/Violent Patient. This variance is intentional and based on a more conservative approach in hostile/violent patients where a range of etiologies are possible (e.g. Head injury; Hypoglycemia; etc). In Ketamine administration, it is most plausible that aggression and agitation are caused by recovery reaction.

SECTION 8: REFERENCES/ABBREVIATIONS

8.16 Common Medical Abbreviations

1°	Primary, First Degree	Jt	Joint
2°	Secondary, Second Degree	JVD	Jugular Vein Distension
<; ≤	Less Than; Less Than Or Equal To	LOC	Level Of Consciousness
>; ≥	Greater Than; Greater Than Or Equal To	M	Male
≅	Approximately Equal To	MI	Myocardial Infarction
$\bar{A}$	Before	Min	Minute(s)
Abd	Abdomen	MOA	Months Of Age
		N&V	Nausea & Vomiting
APE	Acute Pulmonary Edema	NAD	No Acute Distress, No Apparent Distress
ASAP	As Soon As Possible	NKA	No Known Allergies
BSA	Body Surface Area	NKDA	No Known Drug Allergies
$\overline{C}$	With	NYD	Not Yet Diagnosed
CA	Cancer	P	After
CC	Chief Complaint	Prn	As Needed
C/O	Complaining Of	PR	Per Rectum
Cl	Clear	Q	Every
CHF	Congestive Heart Failure	Qh	Every Hour
CVA	Cerebrovascular Accident, Costo-Vertebral Angle	Q2h	Every 2 Hours
Cx	Chest	QID	4 Times A Day
$D_{10}W$	Dextrose 10% Water	Rx	Prescribed For
Dx	Diagnosis	$\overline{S}$	Without
D/C	Discontinue	S/S	Signs And Symptoms
EP	Emergency Physician	SL	Sublingual
ET	Endotracheal	Sx	Seizure
ETOH	Alcohol	SOB	Shortness Of Breath
F	Female	TID	Three Times A Day
Fx	Fracture	T	Temperature
Gtt	Drop	Tx	Transport Or Treatment
GU	Genitourinary	Yr	Years Of Age
H/A	Headache	↓	Decreased
H&P	History And Physical Exam	↑	Increased
HTN	Hypertension	Ø	No, None, Null
Hx	History	TOC	Tactical Operations Centre
MA	Mortuary Affairs	NIS	National Investigation Service