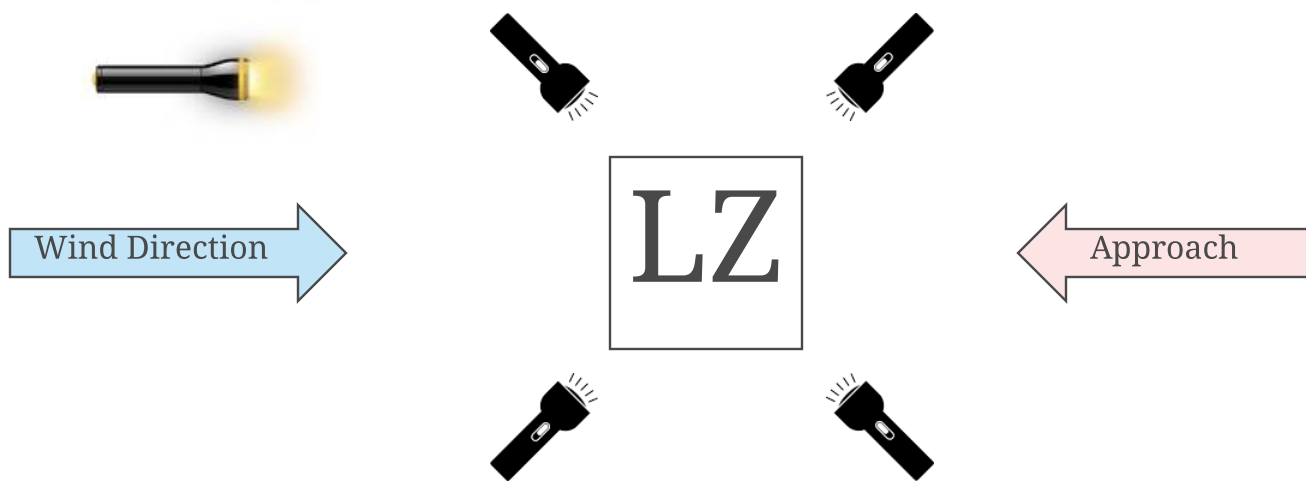


Minimum Landing Zone (LZ) Area #1



Aircraft Arrival

- Identify Scene and LZ Incident Command
- Establish radio communications prior to landing
- State Fire or State EMS are the default radio frequencies
- Advise pilot of terrain conditions, vertical obstructions, and wind direction
- Secure LZ and identify personnel to guard tail rotor guards
- Notify pilot if patient is packaged and ready for hot load.

Operating Around Helicopter

- Approach aircraft with crew escort only
- Approach aircraft 90 degrees to door only
- Avoid tail boom and rotor at all times
- Eye and ear protection should be worn
- Do not carry anything above shoulder height
- Secure all loose medical and personnel equipment
- Spotlights, headlights, and/or hand-held lights should not be pointed directly at the helicopter.

Minimum Landing Zone (LZ) Area #2

Terrain:

- Flat, firm, free of debris
- Consider dust and snow
- LZ should be downwind of accident scene
- Free of vehicles and people
- Any markers must be able to withstand 60 mph winds
- Approach path only from down slope of aircraft

Vertical Obstructions:

- Mark towers, antennas, poles, tall trees with vehicle
- Check the wind, helicopter must land and take off into the wind
- Ideal = clear approach and departure angle 8:1 (200' to 25' vertical obstruction)

Wires:

- Electrical and utility wires are greatest single hazard to helicopters
- Search LZ area for wires
- Mark all wires, high-tension lines, guide wires with vehicles
- Notify pilot of all wires in proximity to landing zone

Lighting:

- Never shine light directly at aircraft
- All emergency lights on until aircraft overhead
- Shut down vehicle strobes and white lights when aircraft on approach
- Keep working lights on minimum

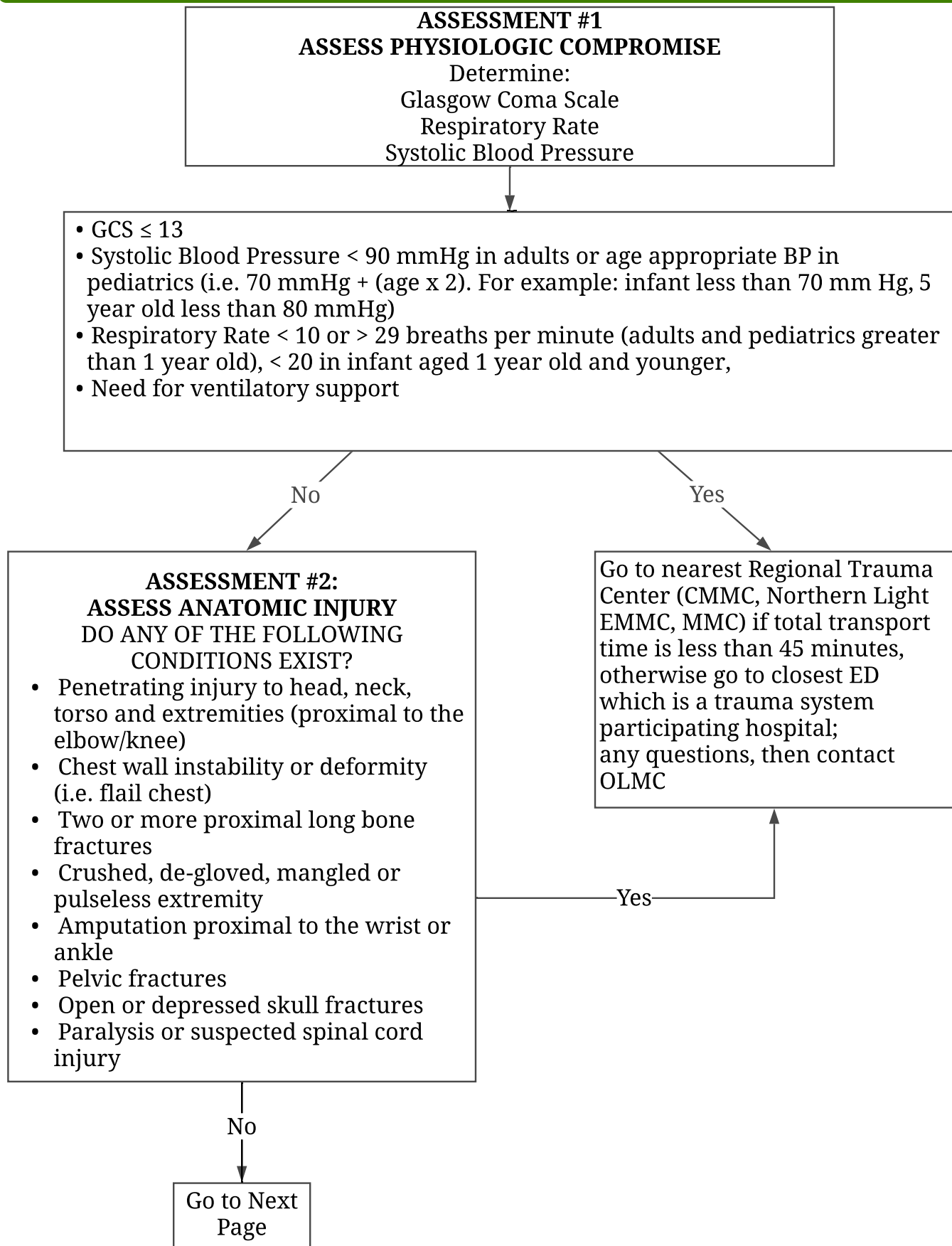
Aircraft Departure

- Keep LZ clear for at least 5 minutes after helicopter departure
- In case of emergency the helicopter may have to return to LZ
- Keep communications open with pilot

REMEMBER - EVERYONE IS RESPONSIBLE FOR SAFETY

Trauma Triage #1

(Patient with Blunt or Penetrating Trauma)



Trauma Triage #2

(Patient with Blunt or Penetrating Trauma)

ASSESSMENT #3

ASSESS MECHANISM OF INJURY AND EVIDENCE OF HIGH ENERGY IMPACT

1. Falls
 - a. Adults: > 20 feet (one story is equal to 10 feet)
 - b. Children: > 10 feet or 2-3 times the height of the child
2. High Risk Automobile Crash
 - a. Intrusion, including roof: > 12 inches occupant compartment, > 18 inches any compartment
 - b. Death in same passenger compartment
 - c. Ejection (partial or complete) from the automobile
 - d. Vehicle telemetry data consistent with high risk injury
3. Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact
4. Pedestrian thrown or run over by vehicle
5. Motorcycle crash greater than 20 mph

No

Yes

ASSESSMENT #4

ASSESS SPECIAL PATIENT OR SYSTEM CONSIDERATIONS

Older Adults

- Risk of injury/death increases after age 55 years
- SBP < 110 may represent shock after age 65 years
- Low impact mechanisms (i.e. ground level falls) might result in severe injury

Children

- Should be triaged preferentially to a pediatric capable trauma center

Anticoagulant and bleeding disorders

- Patients with head injury are at high risk for rapid deterioration

Burns

- Without other trauma mechanism: triage to burn facility
- With trauma mechanism: triage to trauma center

Pregnancy > 20 weeks

EMS Clinician Judgment

Consider transport to nearest Regional Trauma Center (CMMC, Northern Light EMMC, MMC) if total transport time is less than 45 minutes vs. transport to the closest ED, which is a trauma system participating hospital; any questions, then contact OLMC

Yes

No

Transport to Trauma System Participating Hospital

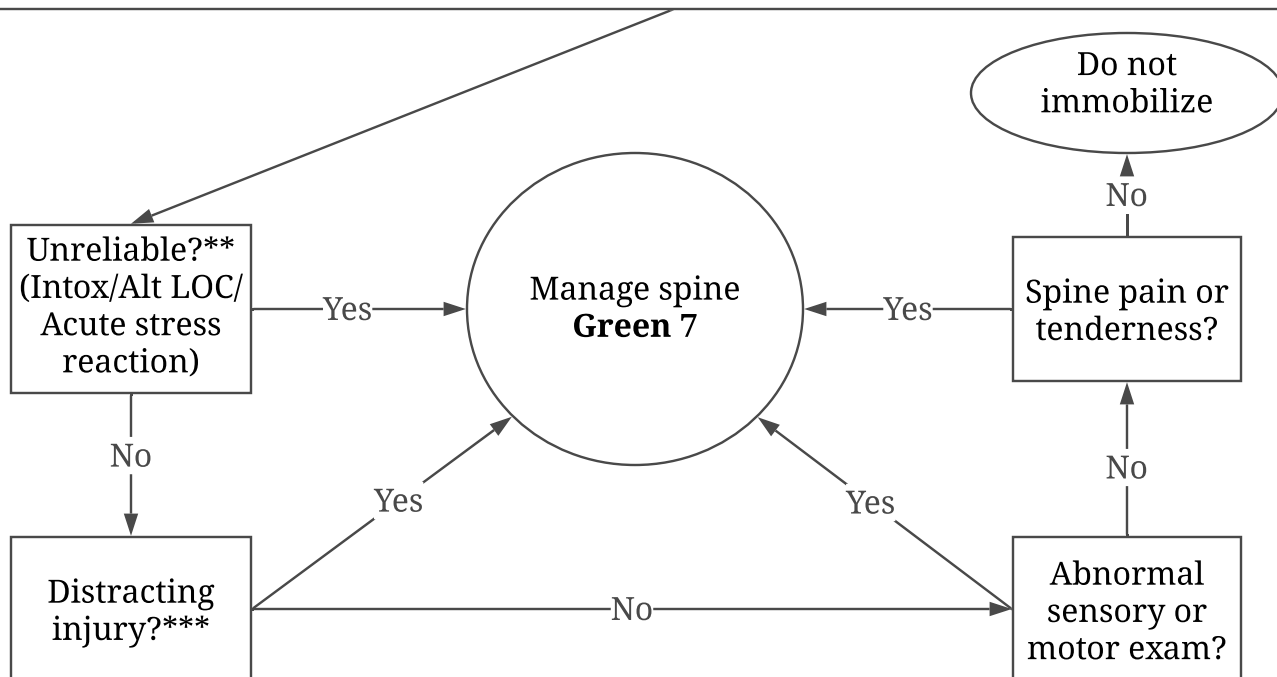
Trauma Triage #3 (Patient with Blunt or Penetrating Trauma)

1. OLMC considers patient transport to Regional Trauma Center (RTC) using the following guidelines:
 - a. If patient would best be served by RTC and transport time less than 45 minutes, then OLMC may direct you to the RTC
 - b. If patient requires RTC but transport time greater than 45 minutes or patient requires life saving interventions, patient to go to the closest ED
2. If upon arrival to ED:
 - a. Facility is not an RTC and
 - b. Patient continues to satisfy criteria of Assessments #1 and #2, and
 - c. Patient can be stabilized for further transport, then the sending ED clinician should follow the regional/state trauma plan

If prehospital clinicians are unable to definitively manage the airway, maintain breathing or support circulation, begin transport to most accessible hospital and simultaneously request ALS intercept or tiered response.

Spine Assessment

Suspected spinal injury - Based on complaint and mechanism of injury (* For High Risk Mechanisms of Injury in Pediatrics, see below)



* High risk mechanisms of injury in the pediatric population include, but are not limited to, the following: motor vehicle collisions, recreational vehicles (all-terrain vehicles and snowmobiles), axial loading, substantial torso injuries, and falls greater than 10 feet.



** Clearance of the spine requires the patient to be calm, cooperative, sober, and alert. Note that the smell of alcohol on the breath is not necessarily the same thing as intoxication; a single beer can be detected on the breath, but does not necessarily cause significant intoxication. The real question is not about the presence or absence of any alcohol, etc.; it is whether or not the patient and the exam are reliable.

*** Distracting injury includes any injury that produces clinically apparent pain that might distract the patient from the pain of a spine injury. The real question is not about the presence or absence of any other injuries, it is whether or not the patient and the exam are reliable.

Remember that patients can fracture the spine at any level, not just the C-spine. If a fracture at another level of the spine is suspected, the *entire* spine must be immobilized, including the cervical spine. Patients with thoracic or lumbar fractures will commonly have associated cervical spine injuries.

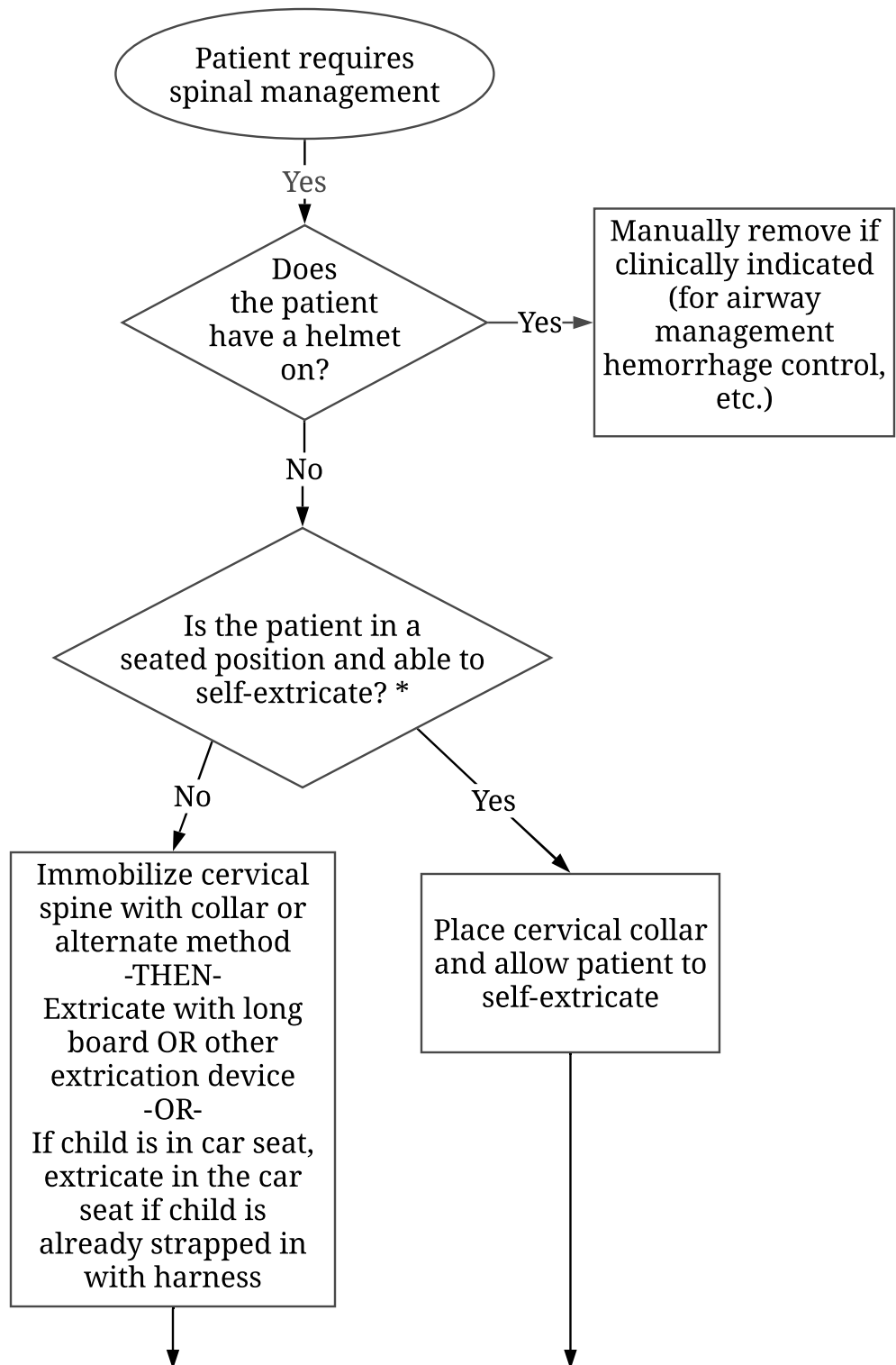
Spine Management #1

* Patients are able to self-extricate from a motor vehicle or seated position to an EMS stretcher when **all** of the following conditions are met:

1. Able to reliably follow commands including instructions to maintain neutral spine position
2. Without injury that would preclude patient from ambulating
3. The patient ambulates as *little* as possible. Ultimately the EMS stretcher should be in close proximity to the patient

Patients in the lying position should be moved to the EMS stretcher by scoop/long board or other similar device.

Only patients in a seated position (i.e. a vehicle) are candidates for self-extrication. Proper methods of self-extrication limit patient movement as much as possible. For instance, patient movement should be limited to standing and pivoting to the stretcher. Please use caution when considering self-extrication and recognize that some vehicles are difficult to self-extricate from. Use judgment when considering self-extrication, recalling the goal of minimizing spine movement. If, in your judgment, self-extrication would lead to more spine motion than an alternate method of extrication, proceed with the alternate method.



Once patient is on the EMS stretcher, remove the long board UNLESS safe transport requires the use of a long board (see PEARLS). Transfer patient to appropriate hospital based on trauma triage decisions. If patient is in a car seat, see Pediatric Transportation protocol, **Pink 11**.

Spine Management #2

PEARLS for Spine Management

Role of Backboards - While the MDPB is attempting to limit the use of backboards, prehospital and hospital clinicians should recognize that there remain circumstances in which use of a backboard is appropriate. Backboards should be utilized to extricate patients from vehicles or other situations when they are unable to extricate themselves (critical patients, patients with lower extremity injuries, severe head injuries, etc.). In most instances, once on the EMS stretcher, the backboard is redundant and can be removed. However, in some settings, it may be appropriate for the backboard to remain. Those settings include, but are not limited to the following:

1. Cases in which the backboard is being utilized as an element of the splinting strategy (such as multiple long bone fractures)
2. Cases in which the patient is at risk for vomiting but unable to protect their own airway (such as intoxication, head injury, etc.) and may need to be turned to the side for airway protection during transport.
3. Cases in which the patient is unresponsive or agitated (i.e. head injury)
4. Cases in which removal of the backboard would otherwise delay transport to definitive care in a critical patient

Preferred Position - The preferred position for all patients with spine management is flat and supine. There are two circumstances under which raising the head of the bed should be considered:

- a. Patients in respiratory distress. Populations at risk for developing respiratory distress when laying flat include the elderly with underlying lung disease, patients with morbid obesity and late-term pregnant patients
- b. Patient with suspected severe head trauma

Under these circumstances, consider raising the head of the bed to no more than 30 degrees

Inter-Facility Transport - Long backboards do not have a role in the transport of patients between hospitals EVEN IF SPINE INJURY IS DIAGNOSED. Use of long boards during inter-facility transport is associated with increased pain and potential for pressure sores and ulcers. Patients should instead be managed with a cervical collar (if appropriate) and firmly secured to the EMS stretcher. If a sending facility has placed the patient on a long board or requests use of a long board, EMS clinicians should discuss the option of foregoing backboard use with the sending physician. If a back board is used, it must be padded adequately to maximize patient comfort.

Penetrating Injury - The incidence of incomplete, unstable spine injury in penetrating trauma is low. Spine immobilization on a backboard is associated with an increased risk of death in patients with penetrating injuries to the neck, especially gun shot wounds, due to unrecognized hemorrhage and airway compromise. Spine immobilization does not appear to prevent progression of neurologic injury in cases of penetrating cervical trauma and may negatively affect patients with vascular and airway injuries. Penetrating trauma such as a gunshot wound or stab wound should not be immobilized on a long board and should instead be secured firmly to the EMS stretcher. Emphasis should be on airway and breathing management, treatment of shock, and rapid transport to a Level 1 or 2 Trauma Center.

Special Patient Populations

- Caution should be exercised in older patients (i.e. 65 years and older) and in very young patients (i.e. less than 3 years of age), as spinal assessment may be less sensitive in discerning spinal fractures in these populations. However, age alone should not be a factor in decision-making for prehospital spinal care, rather the patient's ability to reliably provide a history should be considered.
- In children using a booster seat or lap/shoulder belt during a motor vehicle collision, consider allowing the patient to self-extricate him/herself after applying a cervical collar, if needed. For the infant or toddler who is already strapped in a car seat with a built-in harness, extricate the child while strapped in his/her car seat.
- Children who do not require spinal immobilization or lying flat may be safely transported when restrained in an age-appropriate car seat. Children who do require spinal immobilization or lying flat should be directly secured to the stretcher.

Helmet Use - Padding should be applied, if necessary, to maintain neutral cervical spine positioning depending on the type of sports helmet and presence or absence of shoulder pads.

Management - In patients who have suffered a potential spinal injury and need to be moved onto or off of a backboard, consider using the lift and slide technique rather than the log roll technique, when feasible.

Chest Trauma

EMT

1. O₂, as appropriate
2. Assist ventilations (PPV), if needed
3. Request ALS, if available
4. Impaled Objects
 - a. Secure in place with bulky dressings
5. Open chest wound
 - a. Cover with thick, bulky dressing (i.e. abd pad or bulky trauma dressing) and secure in place
 - i. Monitor for persistent air leak and add additional dressings or consider occlusive dressing and one-way valve, if needed
6. Flail segment with paradoxical movement and respiratory distress
 - a. Consider PPV
 - b. Consider applying non-circumferential splint
7. If available, and so trained, consider 12 lead ECG

ADVANCED EMT

8. IV en route
9. If shock present, perform fluid bolus
10. Cardiac monitor and consider ECG
11. Request Paramedic, if available

PARAMEDIC

12. For presumed tension pneumothorax, perform chest decompression

NOTE: Chest decompression will be performed on the involved side using a Maine EMS-approved device. Chest decompression should be preferentially performed at the fourth or fifth intercostal space on the anterior axillary line. The second or third intercostal space on the mid-clavicular line may be used, if necessary.

PEARLS for Chest Trauma

- The fourth to fifth intercostal space on the anterior axillary line is preferred to the second or third intercostal space on the mid-clavicular line because of significant failure rates of the mid-clavicular approach (24-54% failure rate at the mid-clavicular line vs. 8-22% of the time for anterior axillary approach). This is, in part, due to a larger average depth to the thoracic cavity at the mid-clavicular line vs the anterior axillary line.
- All needle decompressions are at risk of kinking/clotting or not reaching the thoracic cavity. Patients undergoing needle decompression should be monitored for change in symptoms after the procedure. If concern for needle decompression failure arises, repeat the procedure and continue monitoring. If the initial procedure site was the mid-clavicular line, consider repeating at the anterior axillary line.

Head Trauma, #1

Definition: Prehospital identification of moderate to severe Traumatic Brain Injury (TBI): Any patient with physical trauma and a mechanism consistent with the *potential* to have induced a brain injury and:

- Any injured patient with **loss of consciousness**, especially those with a **GCS less than 15** or **decreased level of consciousness, decreased responsiveness, or any deterioration of mental status**. Please recall, GCS may be difficult to obtain or interpret in young children or infants. Focus on the child's level of consciousness, decreased responsiveness or mental status change
- OR
- Any multisystem trauma **requiring BVM** (or advanced airway/ventilation)
- OR
- Any **post-traumatic seizures**

Continuously monitor and re-evaluate every 3-5 minutes, including:

1. Continuous O2 saturation via pulse oximetry
2. Systolic blood pressure
3. Continuous quantitative end-tidal CO2 (ETCO2) monitoring for ALL patients requiring advanced airway management

EMT

1. Consider immobilizing the spine if indicated per **Green 7**
2. If not in shock, elevate head of bed to 30 degrees while maintaining spinal immobilization, if necessary

Management of Airway/Oxygenation

3. Place continuous high-flow O2 via non-rebreather mask on *all* potential TBI cases
4. Identify and treat any episode of hypoxia (O2 saturation less than 90% and/or any evidence of cyanosis).
5. If high-flow O2 fails to correct hypoxia, treat per Airway Algorithm, **Blue 3**
6. Continue to monitor/re-evaluate every 3-5 minutes

- **PEARL:** A **single** oxygen saturation less than 90% is independently associated with at least a doubling of mortality.

Management of Ventilation

7. If there is evidence of hypoventilation despite high-flow O2, see **Blue 3**, Airway Algorithm
8. Target ventilation rates (from the National TBI Guidelines):
 - a. PEDIATRIC age 0-2 years: 1 breath every 2-3 seconds (25 breaths per minute)
 - b. PEDIATRIC age 3-14 years: 1 breath every 3 seconds (20 breaths per minute)
 - c. Adolescents/Adults age 15+: 1 breath every 6 seconds (10 breaths per minute)



Continued

Head Trauma, #2

Continued from Previous Page

E

- **PEARL:** Hyperventilation is independently associated with at least a doubling of mortality. Some studies have shown that even moderate hyperventilation can increase the risk of dying by six times. Evidence has shown repeatedly that inadvertent hyperventilation occurs if not meticulously prevented by using adjuncts to assist deterrence, no matter the experience of the EMS clinician. Adjuncts including Pressure-Controlled Bags (PCBs), Ventilation Rate Timers (VRTs), and ETCO₂ monitoring during advanced airway management should be used, if available.
- Hypoventilation is defined as ineffective respiratory rate, shallow or irregular respirations, or periods of apnea.

Management of Hypoglycemia

9. Check for hypoglycemia in patients with any alteration of mental status. Refer to **Gold 6** for treatment

Advanced EMT/Paramedic Management of Airway/Oxygenation

10. If airway compromise or hypoxia persists after above interventions, proceed with standard step wise airway management per **Blue 3**.

Management of Ventilation

11. If advanced airway, goal ETCO₂ levels are between 35 and 45 mmHg (target = 40 mmHg)

A P

- **PEARL:** This TBI guideline does not encourage any hyperventilation (as was encouraged in previous protocol updates) for impending cerebral herniation for the following reasons:
 - There is no evidence that hyperventilation improves patient outcomes
 - There is evidence that even mild hyperventilation harms TBI patients, even those with severe head injury

Management of Hypotension/Blood Pressure

12. In patients with any *potential* for TBI, immediately initiate IV access to ensure maintenance of SBP
13. PEDIATRICS - GOAL SBP defined below:
- a. Hypotension is defined as SBP below the 5th percentile for age, estimated using the following guide:
 - i. Age 0-10: 70 mmHg + (age x 2)
 - ii. Age greater than 10: 90 mmHg (same as adolescents and adults)



Continued

Head Trauma, #3

Continued from Previous Page

- iii. "Rules of Thumb" to remember:
1. Infant = 70 mmHg
 2. 5 year old = 80 mmHg
 3. 10 years and older = 90 mmHg
- b. For SBP below goal for age, give 20 ml/kg IV bolus every 5 minutes until age-based goal SBP for age is achieved
14. ADOLESCENTS and ADULTS - Goal SBP = greater than 90 mmHg
- a. Initiate fluid resuscitation with an initial bolus of 1 liter for any SBP measurement less than 90 mmHg
 - b. Continue IV fluid administration at a rate and volume sufficient to maintain SBP greater than 90 mmHg



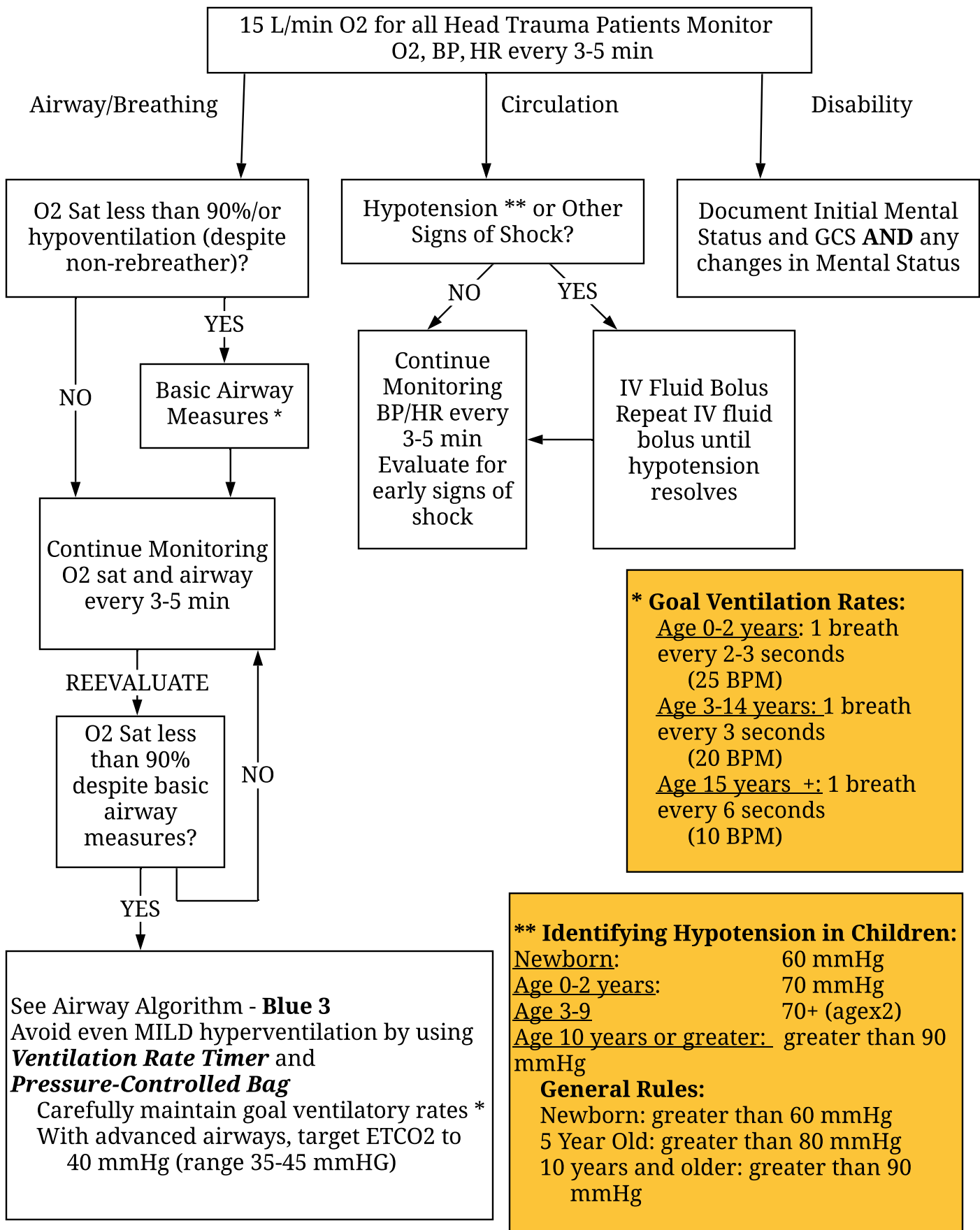
PEARLS for Management of Hypotension/Blood Pressure

- A single episode of SBP <90 mmHG is independently associated with at least a doubling of mortality. Repeated episodes of hypotension can increase the risk of dying by as much as *eight* times. Hypotension kills neurons!
- In the context of Head Trauma, do not allow permissive hypotension below 90 mmHG (in adults) and do not wait for the patient to become hypotensive. If the SBP is dropping, or if there are any other signs of compensated shock such as increasing heart rate with decreasing SBP, begin aggressive treatment before the patient becomes hypotensive.
- In TBI, treatment of acute hypertension is **NOT** recommended.
- IV fluids should be restricted to a minimal "keep open" rate in patients with, SBP \geq 100 mmHg (infants/young children) SBP \geq 130 mmHg (older children/adolescents), and SBP \geq 140 mmHg in adults.

15. For Nausea and Vomiting, refer to **Gold 20. Please Note:** IV Ondansetron is preferred in patients with moderate to severe head injuries or if the EMS clinician has any concerns regarding the patient's ability to tolerate orals or manage their airway independently.

Continued

Head Trauma, #4



Hemorrhage

EMT

1. Ascertain all sites of bleeding and control with direct pressure and elevation
2. If life-threatening bleeding is on extremity and uncontrolled with direct pressure, consider applying a Maine EMS-approved tourniquet
 - a. Tourniquets should be applied proximally on the affected limb for the following reasons:
 - i. Injuries are commonly more proximal than anticipated, and
 - ii. Double-bone structures in both the forearm and the lower leg effectively splint the arteries and prevent tourniquets from working properly
 - b. Tourniquets should be as tight as possible
 - i. Due to associated pain, request ALS, if available
 - c. If hemorrhage continues after application of the tourniquet, ensure the tourniquet is applied as tightly as possible. If hemorrhage continues, consider placement of a second tourniquet, proximal to the first. Experience has shown applying two tourniquets greatly reduces the incidence of hemorrhage, especially in injuries to the lower extremity
3. If life-threatening bleeding is not controlled by the above or is located in an area not amenable to placement of a tourniquet, consider applying a Maine EMS-approved hemostatic agent by packing the agent in the wound and applying/maintaining pressure over the agent for a minimum of 5 minutes. Check for ongoing bleeding. If bleeding has stopped, bandage appropriately; if bleeding continues, reapply pressure for a minimum of 5 minutes. If bleeding continues after the second period of pressure, remove the initial hemostatic agent and repeat with a new hemostatic agent. Remember, for these agents to have maximal effectiveness, they must be packed inside the wound as close to the bleeding source as possible
4. Treat for shock, if indicated, and manage airway as appropriate
5. If amputation, rinse severed part briefly and gently with sterile saline to remove debris
 - a. Wrap severed part in sterile gauze, moisten with sterile saline (do not soak), place in a water-tight container. Place container on ice (do not use dry ice). Do not put part directly on ice. If necessary, use ice packs to provide some level of cooling
6. Request Paramedic if bleeding cannot be controlled, patient demonstrates signs or symptoms of shock, or the patient requires pain management due to tourniquet placement

ADVANCED EMT /PARAMEDIC

7. IV en route (refer to Hemorrhagic Shock protocol, **Green 16**).
8. Cardiac monitor

Hemorrhagic Shock #1

If history of illness or mechanism of injury consistent with signs/symptoms of shock (elevated pulse, elevated respiratory rate, cool/pale skin, altered LOC, anxiety, sweating or lowered BP) then transport as soon and as efficiently as possible.

If the cause of the shock is NOT related to hemorrhage, consider the following protocols:

Anaphylaxis, refer to the Anaphylaxis protocol, **Gold 1**

Cardiogenic, refer to the Cardiogenic Shock protocol, **Red 22**

Tension Pneumothorax, refer to the Chest Trauma protocol, **Green 10**

Medical Shock, refer to the Medical Shock protocol, **Gold 14**

E EMT

1. Control bleeding, refer to Hemorrhage protocol, **Green 15**
2. Manage airway, as appropriate; see **Blue 3**
3. If patient is in third trimester of pregnancy:
 - a. Place patient on left lateral recumbent side and re-evaluate
 - b. If shock is secondary to trauma, immobilize patient on a spinal board before placing in left or right lateral recumbent position (manually displace uterus to the left or right if tilting the board is not possible)
4. If the cause of hypovolemic shock is felt to be secondary to acute unstable pelvic fracture, the EMT, AEMT, or Paramedic may consider using a Maine EMS-approved pelvic stabilization device. If Maine EMS-approved pelvic binder is not available, consider immobilization with a sheet wrap.
5. Request ALS

ADVANCED EMT/PARAMEDIC

6. IV en route
7. Cardiac monitor
8. If shock present (see below table), perform fluid bolus according to the following guidelines:
 - a. **Pediatrics** – establish IV access and perform 20 mL/kg fluid bolus. Repeat, as needed, within 15-30 min
 - b. Uncontrolled bleeding: for suspected internal bleeding or uncontrolled bleeding, fluid bolus to maintain age appropriate target systolic BP (90 mmHg in adults)
 - c. Suspected TBI/CNS injury: fluid bolus to maintain BP *greater than* 90 mmHg
 - d. Current evidence suggests there may be a benefit from use of Lactated Ringers in critically ill patients with shock. Consider using Lactated Ringers preferentially, if available.



A P

-
9. Contact OLMC if patient is older than 65 years of age for fluid bolus order
 10. Contact OLMC if blood pressure remains less than 90 systolic after fluid boluses
-



Continued

Hemorrhagic Shock #2

Continued from Previous Page

PARAMEDIC

11. In patients with either penetrating/blunt trauma **OR** post-partum hemorrhage **AND:**

- a. are greater than or equal to 16 years of age, and
- b. are hemodynamically unstable as evidenced by tachycardia, hypotension or other evidence of shock, and
- c. who are less than 180 minutes (3 hours) from the time of injury/hemorrhage, consider:
 - i. Tranexamic acid (TXA) 1 gr IV mixed in 250 ml of NS over 10 minutes

P

1. **NOTE:** Discuss the use of TXA in patients on anticoagulation with OLMC before providing medication* (see Pearls)



2. **NOTE: CONTRAINDICATIONS** for tranexamic acid (TXA) include:

- **Isolated** head injury (multi-trauma patients with hemorrhagic shock **SHOULD** receive TXA regardless of head injury),
- Patients younger than 16 years old
- Patients greater than 24 wks pregnant (or pregnant with fundus above umbilicus) suffering hemorrhagic shock due to trauma,
- Patients with known hypercoagulable states,
- The patient is more than 180 minutes (3 hours) from the time of injury,
- Patients with hemorrhage due to GI bleeding

PEARLS for the use of TXA:

Tranexamic acid is a lysine analogue that competitively binds to plasminogen therefore interrupting interactions with fibrin and preventing fibrinolysis or clot break down. Patients in hemorrhagic shock from either blunt or penetrating trauma may benefit from Tranexamic acid (TXA). TXA must be provided as soon as possible, preferably within 1 hour of injury and absolutely before 3 hours from injury.

Please ensure that receiving hospital staff:

1. Know the **time of injury**,
2. Are aware that the patient **received TXA**,
3. Are aware of the **1 gram dose** as the patient may need to be re-dosed upon arrival, and
4. **Flag the IV line** that the patient received TXA through with a labeled piece of tape as some medications and blood products should not be provided through the same line.

*Additionally, discuss the use of TXA in patients on anticoagulants as these patients may require anticoagulation reversal and the combination of TXA and some of the reversal agents may have additive thrombotic effects. There are few adverse effects of this medication. TXA may cause hypotension if provided rapidly. The full dose should be provided over 10 minutes to prevent hypotension.

Continued

Hemorrhagic Shock #3

Additional PEARLS for Hemorrhagic Shock:

1) **TXA and GI Bleeding:** Recent evidence suggests patients with gastrointestinal bleeding **SHOULD NOT** receive tranexamic acid. Patients with GI bleeding who received TXA had no improvement in mortality but did suffer increased morbidity, including increased venous thromboembolic events.

2) **TXA and Isolated Head Injury:** The role of TXA in isolated head injury remains controversial with conflicting evidence in the medical literature. The most recent evidence suggests an association between prehospital TXA and increased mortality in patients with isolated severe brain injury. In an effort to maintain the upmost patient safety and promote the best possible patient outcomes, **isolated** head trauma remains a contraindication for TXA in the 2021 protocols. As a reminder, multi-trauma patients with hemorrhagic shock **SHOULD** receive TXA regardless of head injury.

Classification of Hemorrhagic Shock				
	Compensated Shock	Mild Shock	Moderate Shock	Severe Shock
Blood Loss	<15% (1000 mL)	15-30% (1000-1500 mL)	30-40% (1500-2000 mL)	>40% (> 2000 mL)
Pulse	Normal	Elevated (>100)	Elevated (>120)	Elevated (>140)
Blood Pressure	Normal	Orthostatic Change	Marked Decrease	Profound Decrease
Cap Refill	Normal	May be Delayed	Usually Delayed	Always Delayed
Respiration	Normal	Mild Increase	Moderate Tachypnea	Marked Tachypnea and Respiratory Collapse
Mental Status	Normal or Agitated	Agitated	Confused	Lethargic/Obtunded

Burn #1

EMT

1. Remove burned clothing and/or jewelry, unless adhered to patient
2. O₂, as appropriate
3. Give highest priority to airway problems and major trauma
4. Manage shock, if present
5. Cover burn with dry dressing, sterile sheet, or commercially prepared dry dressing
6. Request ALS where there is a possibility of respiratory compromise, shock, burns greater than 10% BSA or need for pain medication

ADVANCED EMT

7. Venous access en-route, IV/IO
8. Cardiac Monitor (avoid placing leads on burned skin)
9. If shock present, perform fluid bolus
10. If shock NOT present, deliver fluid boluses as follows
 - a. $0.25 \times \text{wt (kg)} \times \% \text{BSA} = \text{mL/hr}$ (this represents the patient's fluid requirement each hour for the first 8 hours after the burn)

PARAMEDIC

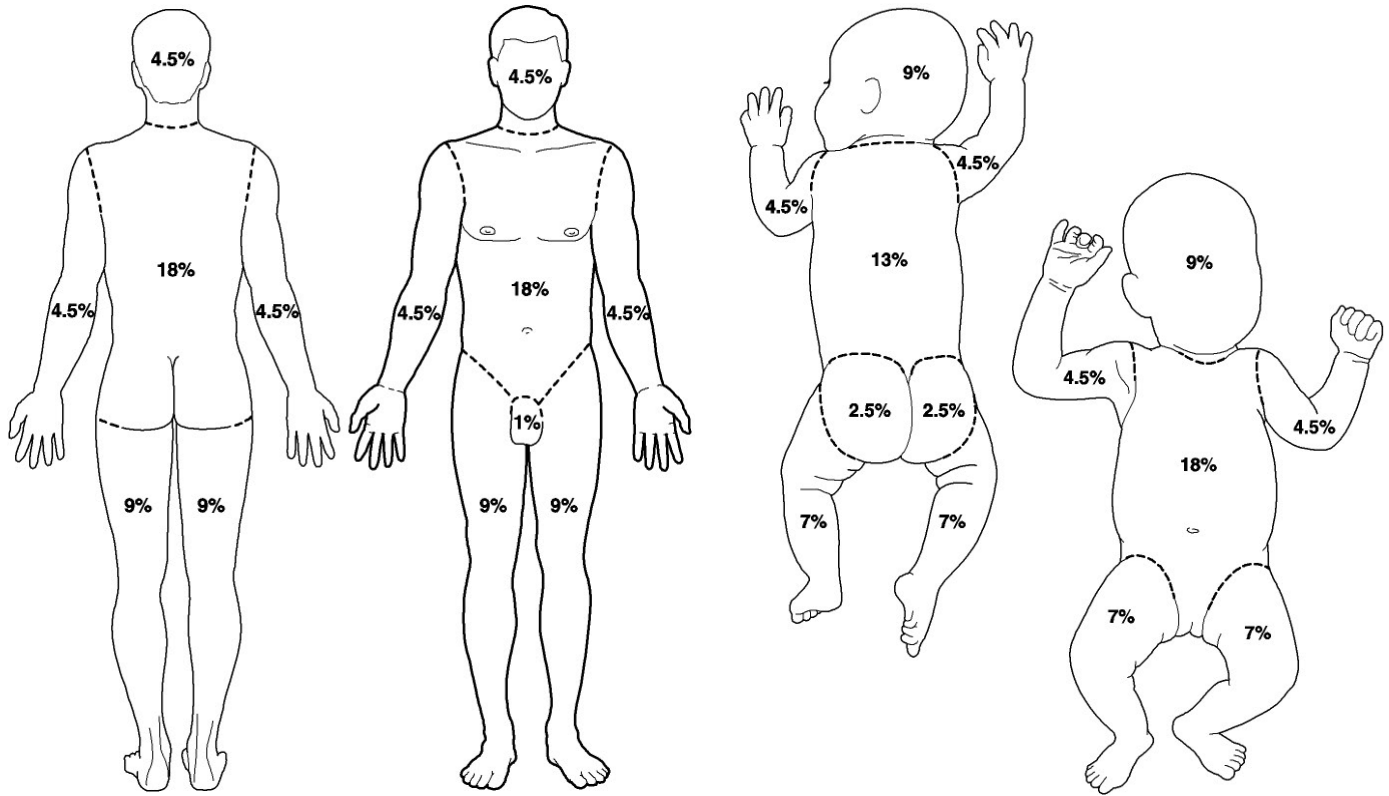
11. For pain control, refer to the Universal Pain Management protocol, **Green 21**

PEARLS for Burn Management

- Only second (partial thickness) and third (full thickness) degree burns are counted when calculating burn surface area. Do not include first degree burns (superficial thickness).
- Errors are made in burn surface area calculation when an entire limb is counted despite only partial involvement. Consider using the patient's hand size (palm PLUS fingers = 1% BSA) to estimate 1% body surface area.
- Clean, dry dressings are adequate for covering all burns, regardless of size.
- It is preferable to establish IV access in non-burned tissue, but, if necessary, burned tissue may be used as a site for IV access.

Burn #2

Rule of 9's Estimation of Burned Body Surface (Percent)



Remember: The patient's hand (palm PLUS fingers) is about 1% of the patient's body surface area.

Universal Pain Management #1

Patient Inclusion Criteria

Adult and pediatric patients who are experiencing pain either from a traumatic injury or with non-traumatic chest, abdominal, or flank pain. Contact OLMC for any other painful conditions including but not limited to back pain, headache, and non-traumatic extremity pain.

Patient Exclusion Criteria

Change in baseline mental status or head injury with change in mental status from baseline.

For suspected cardiac chest pain, refer to Chest Pain - Suspected Cardiac Origin protocol, **Red 2**

EMT

1. Verbal reassurance
2. Splinting as needed, provide in-line stabilization. Consider cold pack application in isolated extremity trauma if hypothermia/frostbite is not present
3. Evaluate pain using age appropriate pain scale
4. If pain not improved by above measures and no contraindications to oral medications exist, for patients 5 years and older AND 20 lbs/9.4 kg or over consider:
 - a. Acetaminophen chewable tab, 10 - 15 mg/kg rounded to the nearest 40 to 80 mg (may be chewed or swallowed whole). Max dose 1,000 mg.
 - b. NOTE: Acetaminophen is contraindicated for patients with known or suspected liver disease or for those who have received acetaminophen within the past 4 hours

Weight lbs/kgs	Acetaminophen Dose	Number of 80 mg Chew tabs
NOTE: Oral Acetaminophen is for children 5 years and older AND 20 lbs. and over		
20 – 26 lbs/9.4 – 12 kgs	160 mg	2 tab
27 – 32 lbs/12.1 - 14.7 kgs	200 mg	2.5 tab
32 – 38 lbs/14.8 - 17.3 kgs	240 mg	3 tab
38 - 44 lbs/17.4 – 20 kgs	280 mg	3.5 tab
44 – 50 lbs/20.1 - 22.7 kgs	320 mg	4 tab
50 – 56 lbs/22.8 - 25.3 kgs	360 mg	4.5 tab
56 – 65 lbs/25.4 - 29.3 kgs	400 mg	5 tab
65 – 76 lbs/29.4 - 34.7 kgs	480 mg	6 tab
76 – 89 lbs/34.8 - 40.3 kgs	560 mg	7 tab
89 – 120 lbs/40.4 – 55 kgs	640 mg	8 tab
121 lbs and up/ 55.1 kgs and up	960 mg	12 tab

5. Request ALS if needed for pain management or management of underlying injury

(Continued)

Universal Pain Management #2

Continued from Previous Page

ADVANCED EMT

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6. Consider IV access in preparation for additional pain management
7. Consider cardiac monitoring based on patient assessment or injury etiology
8. If contraindication to oral pain medications in patients **70 kg or greater**, consider acetaminophen **IV** 1000 mg (1 gram) **IV** once, undiluted, over 15 minutes.
9. If nausea/vomiting, refer to **Gold 20**, Nausea and Vomiting

PARAMEDIC

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10. If contraindication to oral pain medications in patients weighing **less than 70 kg** consider acetaminophen **IV** 12.5 mg/kg **IV** once up to 625 mg undiluted, over 15 minutes.
 - a. NOTE: doses of acetaminophen less than 1000 mg require infusion via pump
11. For stable patients continuing to suffer pain from trauma or other listed inclusion criteria, consider the use of any **ONE** of the following medications:
 - a. Fentanyl 1 mcg/kg **IV/IM/IN** with an initial MAX dose of 100 mcg.
 - i. For persistent traumatic pain, may repeat doses every 5-10 minutes at 0.5-1 mcg/kg (MAX dose 100 mcg) **IV/IM/IN** titrated to effect, with a cumulative MAX dose of 5 mcg/kg
 - ii. **NOTE:** Fentanyl may be ineffective in patients with underlying opioid use disorder
 - b. OR, Ketamine:
 - i. Ketamine 0.2 mg/kg **IV** to a MAX dose of 25 mg. Mix in 100 mL bag of saline and infuse over 10 minutes via a pump.
 1. Repeat in 15 minutes as needed for continued pain to a cumulative MAX dose of 1 mg/kg
 - ii. Ketamine 0.5 mg/kg **IN** to a MAX dose of 25 mg
 1. Repeat 0.25 mg/kg **IN** to a MAX dose of 25 mg in 15 minutes as needed for pain x 1
 - iii. **NOTE:** Ketamine is contraindicated in infants less than 3 months old and those with cardiogenic shock (or history of heart failure)
 - c. OR, 50% nitrous oxide/oxygen mixture self-administered **ONLY** until patient removes mask or pain is controlled i.e. a blended 50/50 mixture.
 - i. **NOTE :** Nitrous Oxide is contraindicated in suspected pneumothorax or bowel obstructions
12. Contact OLMC before using any analgesic (beyond acetaminophen) in:
 - i. Isolated trauma involving the head,
 - ii. Back pain,
 - iii. Non-traumatic extremity pain,
 - iv. Any patient with mental status changes,
 - v. Any patient with unstable vital signs (including SBP < 100 mmHg)
 - vi. Coincident drug use (including alcohol)



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Universal Pain Management #3

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13. Contact OLMC if desiring to switch from one type of analgesic to another (other than from acetaminophen), no matter the duration of time that has passed since dosing the initial agent. Adding one class of medications to another can have additive effects such as hypotension, bradypnea, depression of mental status, etc.



14. Transport in position of comfort and reassess pain, as indicated

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PEARLS for Pain Management:

1. Consider the potential for medical causes of trauma, especially in the elderly, lift assist patient, falls, and syncope. In such cases, refer to the appropriate protocol and monitor the patient as described.
2. Acute pain management is often considered to be a “ladder” process; that is, start at the bottom rung and increase the “strength” AND risk of interventions in a step wise fashion similar to climbing the rungs of a ladder. Therefore, it is expected that all clinicians, regardless of license level, will manage patients in the step wise fashion to the maximum scope of practice of their licenses.
3. **Pearls for acetaminophen:** Patients with underlying liver disease or those who have taken acetaminophen within the last 4 hours should NOT receive acetaminophen. Acetaminophen IV comes in a glass container and requires vented IV tubing. Acetaminophen should be administered, undiluted, over 15 minutes.
4. **Pearls for fentanyl:** Fentanyl may be considered the first line analgesic after acetaminophen. Adverse effects include bradypnea and hypotension.
5. **Pearls for ketamine:** Ketamine may be preferential for patients with a history of opioid intolerance or opioid use disorder. Ketamine must be infused slowly to reduce the incidence of complications including hypotension, bradypnea, and laryngospasm.

(Continued)

Universal Pain Management #4

Continued from Previous Page

Pediatric considerations:

Have the patient rate his/her pain from 0-10, or on an another appropriate pain scale:

- Ages less than 4 years, use FLACC Scale
- Ages 4-12 years, use Wong Baker "Faces" Scale
- Avoid coaching the patient; simply ask him/her to rate his/her pain on a scale from 0-10, where 0 is no pain at all, and 10 is the worst pain ever experienced by the patient

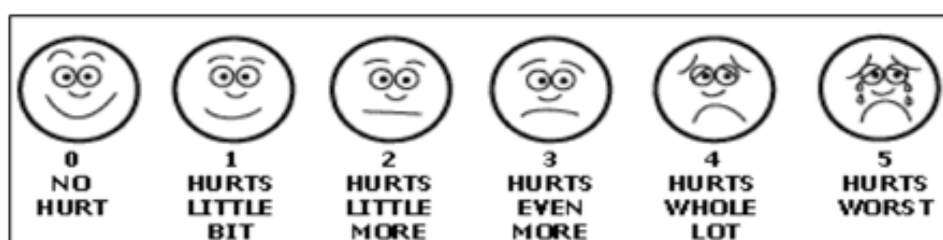


The FLACC Behavioral Pain Assessment Scale

The FLACC Behavioral Pain Assessment Scale			
Categories	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant frown, clenched jaw, quivering chin
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs; frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to; distractable	Difficult to console or comfort

Wong-Baker "Faces" Scale

The faces correspond to the numeric values from 0-5. The scale can be documented with the numeric value or the textual pain description



Termination of Resuscitation For Traumatic Cardiac Arrest

Inclusion Criteria: Cardiac arrest from blunt or penetrating trauma in **adult** and **pediatric** patients.

Exclusion Criteria: (Patients for whom this protocol does not apply):
Patients whose presentation is consistent with a medical cause of cardiac arrest, refer to Cardiac Arrest protocol, **Red 8**
Hypothermic Patients, refer to Hypothermia protocol, **Yellow 11**
Drowning patients, refer to Drowning/Submersion Injuries protocol, **Yellow 15**

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EMT/ADVANCED EMT/ PARAMEDIC

1. Do not initiate cardiac arrest resuscitation if any of the following exist:
 - a. Injuries incompatible with life
 - b. Evidence of significant time lapse since pulselessness
 - i. Dependent lividity, rigor mortis, or decomposition
2. CONSIDER resuscitation and transport ONLY if, transporting in a safe and prudent manner, you can deliver the patient to a hospital within 15 minutes of the TIME OF ARREST
3. If unable to meet these transport guidelines, DO NOT initiate resuscitation in trauma patients who are apneic and pulseless
4. If resuscitation initiated, manage massive hemorrhage per Hemorrhage Protocol **Green 15** and airway per Airway Management Algorithm, **Blue 3**

A P

ADVANCED EMT/ PARAMEDIC

5. If resuscitation initiated, consider rapid fluid bolus

PARAMEDIC

6. If resuscitation initiated, consider early bilateral needle decompression of the chest to alleviate tension pneumothorax (Chest Trauma protocol, **Green 10**)

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Crush Injury

E A P

EMT/ADVANCED EMT/ PARAMEDIC

1. If severe hemorrhage is present, refer to Hemorrhage Protocol, **Green 15**
2. Administer high-flow oxygen to maintain O₂ sat between 94-99%
3. Manage airway as appropriate, see **Blue 3**

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ADVANCED EMT/PARAMEDIC

4. Intravenous access should be established with Normal Saline initial bolus of 10-15 mL/kg (prior to extrication if possible)

PARAMEDIC

5. For significant crush injuries or prolonged entrapped extremity, consider sodium bicarbonate 1 mEq/kg (max dose of 50 mEq) **IV** bolus over 5 minutes
6. Attach ECG monitor. Obtain/interpret 12-Lead ECG, if available. Carefully monitor for hyperkalemia or dysrhythmias before and immediately after release of pressure and during transport
7. For pain control, consider analgesics; refer to Universal Pain Management protocol, **Green 21**
8. Consider the following post extrication:
 - a. Continued resuscitation with Normal Saline
 - i. **Adult:** 500-1000 mL/hr
 - ii. **Pediatric:** 10 mL/kg/hr
 - b. If ECG suggestive of hyperkalemia, see Hyperkalemia Protocol (**Red 26**)

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PEARLS for Crush Injury:

Treat suspension trauma as prolonged entrapment and follow crush injury protocols as above

Facial/Dental Injury

EMT/ADVANCED EMT/ PARAMEDIC

1. Administer oxygen, as appropriate, with a target of achieving 94-99% saturation
2. **Avulsed tooth:**
 - a. Avoid touching the root of the avulsed tooth. Do not wipe off tooth
 - b. Pick up at crown end. If dirty, rinse off under cold water for 10 seconds
 - c. Place tooth in milk or saline as the storage medium. Alternatively, a cooperative patient can hold tooth in mouth using own saliva as storage medium
3. **Unstable Mandible Injury:**
 - a. Expect patient cannot spit/swallow effectively and have suction readily available.
 - b. Preferentially transport sitting up with emesis basin/suction available (in the absence of a suspected spinal injury, see Spinal Management Protocol, **Green 7**)
4. **Epistaxis:**
 - a. Squeeze nose (or have patient do so) for 10 – 15 minutes, continuously.
5. **Nose/Ear Avulsion:**
 - a. Recover tissue if it does not waste scene time
 - b. Transport with avulsed tissue wrapped in dry sterile gauze in a plastic bag placed on ice
 - c. Severe ear and nose lacerations can be addressed with a protective, moist sterile dressing

ADVANCED EMT/PARAMEDIC

6. IV access, as needed, for fluid or medication administration

PARAMEDIC

7. Pain medication as per Universal Pain Management protocol, **Green 21**

E A P

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Ophthalmology

EMT/ADVANCED EMT

1. Flush eye with sterile saline or clean water source continuously (*for chemical exposure*)
2. Assist patient with removal of contact lenses
3. Assess gross visual acuity
4. For thermal exposure, apply cool saline gauze compress to both eyes
5. For impaled object, secure object and patch both eyes and keep patient supine
6. For puncture wound, place protective shields over both eyes and keep patient supine.
7. **For eye trauma:**
 - a. Place eye shield for any significant eye trauma
 - b. If globe is avulsed, do not put back into socket: cover with moist saline dressings and then place cup over it

ADVANCED EMT/PARAMEDIC

8. For penetrating or blunt eye trauma, if patient experiences nausea, refer to Nausea and Vomiting protocol, **Gold 20**

PARAMEDIC

9. If **no** penetrating eye trauma and if the patient has no allergy to local anesthetics: Administer 2 drops tetracaine ophthalmologic drops every 5 minutes as needed to affected eye to facilitate eye flushing.
10. To facilitate flushing, the Paramedic may use a Morgan lens, if trained to do so

Pearls for eye injuries

- Normal or near normal vision does not r/o significant eye injury
- Chemical and thermal burns to the face may have concomitant respiratory injury
- Vomiting increases intraocular pressure and should be avoided in patients with eye injury.
- Tetracaine is to be provided by the Paramedic clinician only and not provided to the patient for ongoing use

Open Fractures

Definition of Open Fracture: Suspected fracture with associated extensive tissue damage, wound, and/or visible bone.

EMT

1. Assess for other life threatening injuries and manage as indicated
2. In patients who are otherwise stable, gross contamination (such as leaves or gravel) should be removed if possible.
3. Cover open fractures with moist, sterile dressing
4. Splint the fractured extremity in the anatomic position if possible and the position of comfort if not able to splint in the anatomic position.
5. Request ALS, if available, for pain control and consideration of antibiotics

ADVANCED EMT

6. Place IV
7. Consider pain control. Refer to Universal Pain Management, **Green 21**
8. Request ALS, if available, for additional pain control and consideration of antibiotics

PARAMEDIC

9. Ceftriaxone, per dosing recommendations listed below:
 - a. For patients 12 years and older: Ceftriaxone 2 grams IV in 50 -100 ml of NS or D5W over at least 10 minutes
 - b. For patients less than 12 years old:
Ceftriaxone 75 mg/kg IV (max dose 2 grams) in 50 -100 ml of NS or D5W over 10 minutes
 - c. **NOTE:** ceftriaxone is CONTRAINDICATED in patients with history of allergy or anaphylaxis to penicillins or cephalosporins
10. Notify receiving hospital if patients received antibiotics.
 - a. If patient DID receive antibiotics, notify hospital WHEN antibiotics were initiated
 - b. If patient DID NOT receive antibiotics, notify hospital WHY antibiotics were withheld



Pearls for Open Fractures

- Examples of Penicillins include: penicillin, amoxicillin, augmentin, piperacillin (Zosyn), ampicillin (Unasyn)
- Examples of Cephalosporins include: cefazolin (Ancef), Cefdinir, cefuroxime (Ceftin or Zinacef), cefadroxil (Duricef), cephalixin (Keflex). cefepime (Maxipime), ceftriaxone (Rocephin)
- Contact OLMC for questions regarding the patient's allergies