General Trauma Management

Aliases

None noted

Patient Care Goals

1. Rapid assessment and management of life-threatening injuries
2. Recognition of when to rapidly transport
3. Transport to the appropriate level of trauma care.
4. Safe movement of patient to prevent worsening injury severity.

Patient Presentation

Inclusion Criteria

1. Patients of all ages who have sustained an injury as a result of mechanical trauma, including:
    a. Blunt injury
    b. Penetrating injury
    c. Blast
    d. Burns

Exclusion Criteria

Not an acute traumatic injury

Patient Management

Initial Assessment

1. Primary survey (Use **MARCH** algorithm)
    a. Massive hemorrhage
        a. Initial visual and body sweep to assess for penetrating wounds and severe life-threatening hemorrhage [See Extremity Trauma/External Hemorrhage Management Guideline].
    b. Airway
        a. Assess airway patency by asking the patient to talk to assess stridor and ease of air movement.
        b. Look for injuries that may lead to airway obstruction including unstable facial fractures, expanding neck hematoma, blood or vomitus in the airway, facial burns/inhalation injury.
        c. Evaluate mental status for ability to protect airway (patients with a GCS less than or equal to 8 are likely to require airway protection).
    c. Respiratory/Breathing
        a. Assess respiratory rate and pattern.
        b. Assess for tracheal deviation
        c. Assess symmetry of chest wall movement.
        d. Listen bilaterally on lateral chest wall for breath sounds.
    d. Circulation
        a. Assess blood pressure and heart rate.
        b. Look for signs of hemorrhagic shock (these include tachycardia, hypotension, pale, cool clammy skin, capillary refill ***greater than*** 2 seconds).
    e. Head injury/Hypothermia
        a. Perform initial neurologic status assessment of GCS/AVPU (Alert, Verbal, Painful, Unconscious) and pupillary size and responsiveness [See Head Injury Guideline].
        b. Assess for gross motor movement of extremities.
        c. Evaluate for clinical signs of traumatic brain injury with herniation including:
            i. Unequal pupils.
            ii. Lateralizing motor signs

iii. Posturing

d. Prevent hypothermia.

Immediate Treatment and Interventions

1. Massive or exsanguinating hemorrhage control.
    1. First stop severe external and extremity hemorrhage with **extremity tourniquets [EMR]** or appropriate wound packing with **hemostatic gauze [EMR].**
    2. Be sure to roll patient and examine the back as well.
    3. Utilize **junctional tourniquets** if needed and available for junctional area hemorrhage **[EMR-O]**
2. Airway
    1. If impending airway obstruction or altered mental status resulting in inability to maintain airway patency, immediately ensure patent airway. [See Airway Management Guideline]
    2. Consider airway adjuncts as appropriate avoiding nasal airway adjuncts in patents with oral or other facial injuries. [See Airway Management Guideline]
3. Respiratory/Breathing
    1. If absent or diminished breath sounds in a hypotensive trauma patient, especially those with chest trauma and/or tracheal deviation, consider tension pneumothorax and perform needle decompression of side without breath sounds or side opposite tracheal deviation [PARA]; may need second or third needle decompression on same side if there is a rush of air but patient again has symptoms
    2. For open chest wound, place **semi-occlusive dressing [EMR].**
    3. Monitor **oxygen** saturation (SpO2) and, if indicated, provide supplemental oxygen to maintain SPO2 greater than 94% and respiratory support if needed [See Respiratory Section]
4. Circulation
    1. If pelvis is unstable and patient is hypotensive, place commercial pelvic binder to stabilize pelvis [EMR]
    2. Establish IV access ***[AEMT].***
    3. Normal saline fluid resuscitation ***[AEMT]***
        i. Adults
            1. If SBP greater than 90 mmHg, no IV fluids required.
            2. If SBP less than 90 mmHg or HR greater than 120 BPM, initiate resuscitation:
                a. Administer 500 mL bolus of IV fluid[AEMT], repeat as needed for persistent signs and symptoms of shock.
                    i. If signs and symptoms of shock persist after a total of 2 L crystalloid bolus, contact online medical direction.
                b. Blood products are recommended if available [PARA].
                c. Trauma resuscitation target SBP 90 mmHg (palpable radial pulse or alert mental status).
                d. Reassess SBP after bolus given.
            3. Head injury: target SBP greater than110 mmHg. Hypotension should be avoided to maintain cerebral perfusion
        ii. Pediatrics
            1. If child demonstrates tachycardia for age with signs of poor perfusion (low BP; greater than 2-second capillary refill; altered mental status; hypoxia; weak pulses; pallor; or mottled, cool skin), give Normal Saline/Lactated Ringers 20ml/kg and reassess.
            2. Target normal BP for age [see Appendix VIII – Abnormal Vital Signs].
    4. If availble: Consider unmatched blood products **[PARA]** for traumatic hypovolemia; per Administration of Blood Products Guideline
        i. Continue Blood Products initiated at sending facility
    5. Consider **Tranexamic Acid [PARA]** for patients with multi-system injuries (not isolated head injuries) who:
        i. Have ongoing hemorrhage, strong clinical suspicion of hemorrhage (systolic blood

pressure less than 90 mmHg and/or heart rate greater than 110 beats per minute), or high risk for hemorrhage based on mechanism and are within 3 hours of injury.
    1. **Tranexamic Acid [PARA] Dosing**
        a. **Adult: 2g IV/IO over 10-20 minutes (preferred dosing)**
        b. **Pediatrics: 15mg/kg IV/IO (max 1g) over 10 minutes followed by 2mg/kg/hr IV/IO (max 125mg/hr) for 8 hours**
5. Disability/Head/Hypothermia
    1. If clinical signs of traumatic brain injury [See Head Injury Guideline]
    2. Avoid/treat hypothermia
        i. Remove wet clothing
        ii. Cover patient to warm and/or prevent further heat loss
6. **NOTE**: Patients with major hemorrhage, hemodynamic instability, penetrating torso trauma, or signs of traumatic brain injury often require rapid surgical intervention. Minimize scene time (goal is under 10 minutes) and initiate rapid transport.
7. Repeat primary assessment or secondary assessment should be conducted en route to the trauma center
8. Decisions regarding transport destinations should be based on the National Guideline for the Field Triage of Injured Patients

Secondary Assessment, Treatment, and Interventions

1. Assessment
    a. Obtain medical history from patient or family including:
        i. Allergies
        ii. Medications
        iii. Past medical and surgical history
        iv. Last Meal
        v. Events leading up to the injury
    b. Secondary survey: Head to toe physical exam
        i. Head/Face
            1. Palpate head and scalp and face and evaluate for soft tissue injury or bony crepitus indicating injury to skull or facial bones
            2. Assess for globe injury and subjective change in vision
            3. See Facial/Dental Trauma Guideline
        ii. Neck
            1. Check for:
                a. Contusions.
                b. Abrasions.
                c. Hematomas.
                d. JVD.
                e. Tracheal deviation.
            2. Palpate for crepitus.
            3. Conduct a spinal assessment per the Spinal Care guideline.
        iii. Chest
            1. Palpate for instability or crepitus.
            2. Listen to breath sounds.
            3. Inspect for penetrating or soft tissue injuries.
        iv. Abdomen
            1. Palpate for tenderness.
            2. Inspect for penetrating or soft tissue injuries.
            3. Cover eviscerated abdominal contents with moist dressings
        v. Pelvis
            1. Inspect for penetrating or soft tissue injuries.
            2. Palpate once for instability by applying medial pressure on the iliac crests bilaterally.
        vi. Back
            1. Maintain spinal alignment. Refer to Spinal Care guideline.

2. Inspect for penetrating or soft tissue injuries.

vii. Neurologic status assessment:
1. Perform serial assessment of mental status.
2. Perform gross exam of motor strength and sensation in all four extremities.

viii. Extremities
1. Assess for fracture or deformity. See Extremity Trauma/External Hemorrhage Management guideline
2. Assess peripheral pulses/capillary refill.

c. Additional treatment considerations:
i. Maintain spine precautions per the Spinal Care guideline.
ii. Splint obvious extremity fractures per the Extremity Trauma/External Hemorrhage Management guideline.
iii. Provide pain medication per the Pain Management guideline.

Patient Safety Considerations

1. Manage life-threatening injuries identified on primary survey immediately, with rapid transport to a trauma center. Perform secondary survey enroute.
2. Monitor patient for deterioration over time with serial vital signs and repeat neurologic status assessment.
   a. Patients with compensated shock may not manifest hypotension until severe blood loss has occurred.
   b. Patients with traumatic brain injury may deteriorate as intracranial swelling and hemorrhage increase.
3. Anticipate potential for progressive airway compromise in patients with trauma to head and neck.

Notes and Educational Pearls Key Considerations

- Optimal trauma care requires a structured approach to the patient, emphasizing MARCH (Massive hemorrhage, Airway,
  Respiratory/Breathing, Circulation, Head injury/Hypothermia)
- Target scene time less than 10 minutes for unstable patients or those likely to need surgical intervention.
- Frequent reassessment of the patient is important.
  - If patient develops difficulty with ventilation, reassess breath sounds for development of tension pneumothorax.
  - If extremity hemorrhage is controlled with pressure dressing or tourniquet, reassess for evidence of continued hemorrhage.
  - If mental status declines, reassess ABCs and repeat neurologic status assessment.
  - Use structured communication tool for patient handoff to higher level care such as ATMIST
    - Age
    - Time of incident or onset of symptoms
    - Mechanism
    - Injuries noted
    - Symptoms/Signs
    - Treatments provided

Traumatic Arrest: Withholding Resuscitative Efforts

Resuscitative efforts should be withheld for trauma patients with the following:

1. Decapitation
2. Hemicorpectomy
3. Signs of rigor mortis or dependent lividity
4. Blunt trauma: apneic, pulseless, no organized cardiac activity on monitor

Traumatic Arrest: Termination of Resuscitative Efforts

- Adult and Pediatric: Resuscitative efforts may be terminated in patients with traumatic arrest who have no return of spontaneous circulation after 30 minutes of resuscitative efforts, including airway management; treatment for possible tension pneumothorax; fluid bolus; and minimally interrupted CPR.
- Contact Medical Consultation if above criteria are met to discuss termination of resuscitation efforts

Quality Improvement

Associated NEMSIS Protocol(s) (eProtocol.01)

9914207—General Trauma Management

Key Documentation Elements

- Mechanism of injury
- Primary and secondary survey
- Serial vital signs and neurologic status assessments
- Scene time
- Procedures performed and patient response
- Documentation of efforts to control life threatening bleeding sources
- Documentation of blood glucose
- Documentation of patient temperature and efforts to prevent hypothermia

Performance Measures

- Monitor scene time for unstable patients
- Monitor appropriateness of procedures
- Monitor appropriate airway management

EMS Compass® Measures *(for additional information, see www.emscompass.org*

- *PEDS-03: Documentation of estimated weight in kilograms.* Frequency that weight or length-based estimate are documented in kilograms
- *Trauma-01: Pain assessment of injured patients.* Recognizing that pain is undertreated in injured patients, it is important to assess whether a patient is experiencing pain
- *Trauma-02: Pain re-assessment of injured patients.* Recognizing that pain is undertreated in injured patients, it is important to assess whether a patient is experiencing pain
- *Trauma-04: Trauma patients transported to trauma center.* Trauma patients meeting Step 1 or 2* or 3** of the *CDC Guidelines for Field Triage of Injured Patients* are transported to a trauma center

- Any value documented in NEMSIS eInjury.03—Trauma Center Criteria
- * 8 of 14 values under eInjury.04—Vehicular, Pedestrian, or Other Injury Risk Factor match Step 3, the remaining 6 value options match Step 4

References

1. American College of Surgeons Committee on Trauma; American College of Emergency Physicians Pediatric Emergency Medicine Committee; National Association of EMS Physicians; American Academy of Pediatrics Committee on Pediatric Emergency Medicine, Fallat ME. Withholding or termination of resuscitation in pediatric out-of-hospital traumatic cardiopulmonary arrest. *Pediatrics.* 2014;133(4):e1104.Bickell WH, Wall MJ Jr., Pepe PE, et al. Immediate versus delayed fluid resuscitation for hypotensive patients with penetrating torso injuries. *N Engl J Med.* 1994;331:1105-9.

2. Cullinane DC, Schiller HJ, Zielinski MD, et al. Eastern Association for the Surgery of Trauma practice management guidelines for hemorrhage in pelvic fracture – update and systematic review. *J Trauma.* 2011;71(6):1850-68.
3. *Guidelines for the Field Triage of Injured Patients: Recommendations of the National Expert Panel on Field Triage*, *2011*. Washington, DC: Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report; 2012;61(RR01):1- 20.
4. Harris T, Rhys Thomas G, Brohi K. Early fluid resuscitation in severe trauma. *BMJ.* 2012;345:e5752.
5. Millin M, Galvagno SM, Khandker SR, et al. Withholding and termination of resuscitation of adult cardiopulmonary arrest secondary to trauma: Resource document to the joint NAEMSP-ACS (COT) position statements. *J Trauma Acute Care Surg.* 2013;75(3):459-67.
6. Morrison C, Carrick M, Norman M, et al. Hypotensive resuscitation strategy reduces transfusion requirements and sever postoperative coagulopathy in trauma patients with hemorrhagic shock: preliminary results of a randomized controlled trial. *J Trauma.* 2011;70(3):652-63.
7. *Prehospital Trauma Life Support, 8th Edition*. Burlington, MA: Jones & Bartlett; 2016.
8. Truhlar A, Deakin C, Soar J, et al. European resuscitation council guidelines for resuscitation 2015: section 4. Cardiac arrest in special circumstances. *Resuscitation.* 2015;95:148-201.