

Blast Injuries

Aliases

None noted

Patient Care Goals

1. Maintain patient and provider safety by identifying ongoing threats at the scene of an explosion.
2. Identify multi-system injuries which may result from a blast, including possible toxic contamination.
3. Prioritize treatment of multi-system injuries to minimize patient morbidity.

Patient Presentation

Inclusion Criteria

1. Patients exposed to explosive force. Injuries may include any or all of the following:
 - a. Blunt trauma
 - b. Penetrating trauma
 - c. Burns
 - d. Pressure-related injuries (barotrauma)
 - e. Toxic chemical contamination

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Hemorrhage Control
 - a. Assess for and stop severe hemorrhage [see Extremity Trauma/External Hemorrhage Management guideline].
2. Airway
 - a. Assess airway patency.
 - b. Consider possible thermal or chemical burns to airway.
3. Breathing
 - a. Evaluate adequacy of respiratory effort, oxygenation, quality of lung sounds, and chest wall integrity.
 - b. Consider possible pneumothorax or tension pneumothorax (as a result of penetrating, blunt trauma or barotrauma).
4. Circulation
 - a. Look for evidence of external hemorrhage.
 - b. Assess BP, pulse, skin color/character, and distal capillary refill for signs of shock.
5. Disability: Tympanic membrane perforation resulting in deafness which may complicate the evaluation of their mental status and their ability to follow commands
 - a. Assess patient responsiveness (AVPU) and level of consciousness (GCS)
 - b. Assess pupils.
 - c. Assess gross motor movement and sensation of extremities.
6. Exposure
 - a. Perform rapid evaluation of entire skin surface, including back (log roll), to identify blunt or penetrating injuries.

Treatment and Interventions

1. Hemorrhage control:
 - a. Control any severe external hemorrhage [see Extremity Trauma/External Hemorrhage Management guideline].

2. Airway:
 - a. Secure airway, utilizing airway maneuvers, airway adjuncts, non-visualized airways, or endotracheal tube **[PARA]** [see Airway Management guideline].
 - b. If thermal or chemical burn to airway is suspected, early airway control is vital.
3. Breathing:
 - a. Administer oxygen as appropriate for dyspnea or distress with a target of achieving greater than 93% saturation for most acutely ill patients.
Assist respirations as needed.
 - b. Cover any open chest wounds with semi-occlusive dressing.
 - c. If patient has evidence of tension pneumothorax, perform needle decompression **[PARA]**.
4. Circulation:
 - a. Establish IV access with two large bore IVs or IOs. [AEMT]
 - i. Administer NS or LR, per the General Trauma Management guideline.
 - ii. If patient is burned, administer NS or LR per the Burns guideline.
 - iii. Consider use of warmed IVF if available
5. Disability:
 - a. If evidence of head injury, treat per the Head Injury guideline.
 - b. Apply spinal precautions per the Spinal Care guideline.
 - c. Monitor GCS during transport to assess for changes.
6. Exposure:
 - a. Keep patient warm to prevent hypothermia.

Patient Safety Considerations

1. Ensuring scene safety is especially important at the scene of an explosion.
 - a. Consider possibility of subsequent explosions, structural safety, possible toxic chemical contamination, the presence of noxious gasses, and other hazards.
 - b. In a possible terrorist event, consider the possibility of secondary explosive devices.
2. Remove patient from the scene as soon as is practical and safe.
3. If the patient has sustained burns (thermal, chemical, or airway), consider transport to specialized burn center.

Notes and Educational Pearls Key Considerations

- Scene safety is of paramount importance when responding to an explosion or blast injury.
- Patients sustaining blast injury: Be prepared to address complex, multi-system injuries including: blunt and penetrating trauma, shrapnel, barotrauma, burns, and toxic chemical exposure. Aggressive pain management may be required.
- Patients sustaining airway injury, particularly airway burns: Employ early and aggressive airway management.
- IV fluid resuscitation: Minimize in patients without signs of shock.
- Injuries due to barotrauma
 - Tension pneumothorax
 - Hypotension or other signs of shock associated with decreased or absent breath sounds, jugular venous distension, and/or tracheal deviation
 - Tympanic membrane perforation resulting in deafness which may complicate the evaluation of their mental status and their ability to follow commands
- Transport: Primary transport to a trauma or burn center is preferable, whenever possible.

Pertinent Assessment Findings

1. Evidence of multi-system trauma, especially:
 - a. Airway injury or burn
 - b. Barotrauma to lungs
 - c. Toxic chemical contamination

Quality Improvement

Associated NEMESIS Protocol(s) (eProtocol.01)

9914045—Exposure-Explosive/Blast Injury

Key Documentation Elements

- Airway status and intervention
- Breathing status:
- Quality of breath sounds (equal bilaterally)
- Adequacy of respiratory effort
- Oxygenation
- Documentation of burns, including Total Burn Surface Area (TBSA) [see Burns guideline]
- Documentation of possible toxic chemical contamination

Performance Measures

- Airway assessment and early and aggressive management
- Appropriate IV fluid management
- Transport to trauma or burn center

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 NEMESIS 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. Explosions and Blast Injuries; A Primer for Clinicians. CDC.gov.
www.cdc.gov/masstrauma/preparedness/primer.pdf. Accessed August 27, 2017.