

## FIRST AID AND EMERGENCY MANAGEMENT OF SEVERE TRAUMA PATIENTS IN HOSPITAL SETTINGS

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<https://doi.org/10.5281/zenodo.15828241>

**Abstract.** Severe trauma is one of the leading causes of death worldwide, particularly in patients under the age of 45. Effective early management in the hospital setting is critical for improving survival rates and reducing long-term disability. This article provides an in-depth overview of first aid strategies and emergency clinical protocols applied to patients with life-threatening trauma, based on internationally accepted trauma care guidelines such as Advanced Trauma Life Support (ATLS) and Damage Control Resuscitation (DCR).

**Keywords:** permissive hypotension, damage control resuscitation (DCR), hemorrhage, thoracostomy, massive hemothorax.

### Introduction

Trauma patients frequently present with complex, multi-system injuries requiring immediate, coordinated care. Hospital-based trauma management begins upon arrival to the Emergency Department (ED) and is guided by structured evaluation systems. The goal is to stabilize vital functions, prevent secondary injury, and facilitate definitive care through surgery, critical care, or transfer.

### Pre-Hospital to Hospital Transition

Once a trauma patient arrives at the hospital:

- Pre-hospital handoff is conducted (using MIST: Mechanism of injury, Injuries, Signs & symptoms, Treatment).
- Trauma team activation should already be initiated.
- Immediate placement on a trauma stretcher with full spinal precautions is essential.

### Primary Survey (ABCDE Approach)

The shock room staff should have in-depth knowledge of the principles of advanced trauma life support (ATLS). The main objective of these trainings is to empower the shock room staff to quickly gather relevant information about the threatening risk and traumas of the patients. The efficiency of these training systems could enhance the productiveness of the shock room staff. While there are no evidences about the impact of these training systems on the overall mortality rate, Alshafi et al. reported that the death rate during the first hour of hospital reception decreased from 25% to zero. However, they cited that such standardized trainings could have a significant effect on the overall health of the patients. But unfortunately, there are not any high-quality statistical studies that have assessed the effect of training systems on the mortality rate of or other factors that affect the intensive traumatic patients.

The advanced trauma life support (ATLS) courses concentrate mostly on the simulations and practical exercises of the shock room processes. After initial consideration, all patients should be investigated in accordance with the steps defined as follows:

Conducted within the first minutes of patient arrival.

A – Airway Maintenance with Cervical Spine Protection

- Assess for airway obstruction, gurgling, or stridor.

- Perform jaw thrust without neck extension.
  - Use oropharyngeal or nasopharyngeal airways, and prepare for endotracheal intubation if necessary.
  - Maintain cervical immobilization using a hard collar and manual in-line stabilization.
- B – Breathing and Ventilation**
- Evaluate for asymmetry in chest movement, absent breath sounds, cyanosis.
  - Detect and manage immediately:
    - Tension pneumothorax – treat with needle decompression
    - Open pneumothorax – apply occlusive dressing
    - Massive hemothorax – chest tube thoracostomy
    - Administer 100% oxygen via non-rebreather mask or assist with mechanical ventilation.
- C – Circulation with Hemorrhage Control**
- Rapidly identify signs of shock: tachycardia, hypotension, cool skin, altered mental status.
  - Control external bleeding with direct pressure, pressure dressings, tourniquets.
  - Establish two large-bore IVs (16G or larger) and begin fluid resuscitation with warmed crystalloids or type O-negative blood if hemorrhagic shock is suspected.
    - Use massive transfusion protocol (MTP) if needed.
- D – Disability / Neurological Assessment**
- Conduct neurological evaluation using:
    - AVPU Scale: Alert, Voice, Pain, Unresponsive
    - Glasgow Coma Scale (GCS)
    - Check pupil size and reactivity.
    - Assume traumatic brain injury in any patient with altered consciousness.
- E – Exposure and Environmental Control**
- Fully expose the patient to inspect for hidden injuries.
  - Prevent hypothermia with warmed blankets, warmed IV fluids, and temperature-controlled environment.
    - Hypothermia worsens coagulopathy and acidosis (part of the “lethal triad”).

### **1. Emergency medicine department related challenges**

Unfortunately, there is not any special categorization for various kind of traumas like intensive trauma, severe traumatic injury, and multiple trauma. From an international point of view, patients with a medical score of 16 or higher for assessment of trauma severity are considered to be injured severely. Consequently, the recognition of existence of two or more distinct traumas which could threaten the health of patient are estimated as multiple trauma. Worldwide, high costs is spent for preserving the structures and permanent employment of medical care staffs for treating patients with intensive injuries. The interdisciplinary remedial guidelines which rely on scientific evidence could provide adequate knowledge about the sufficient structures and levels of effective staffing required in trauma centers for the primary treatment of severely injured patients.

The primary treatment of traumatic patients in the emergency medicine department is very important for the prospective purposes. The main link among the prehospital emergency medicine unit and the hospitalization unit is the shock room. The main specifications for

therapeutic procedure within the shock room are mainly based on grade A and B. Grade-A recommendations include the patterns of injury and the physiological parameters of the patient and grade B recommendation includes the mechanism of injury.

#### **Resuscitation Phase**

- Concurrent with the primary survey.
- Use Damage Control Resuscitation (DCR) principles:
- Permissive hypotension (SBP 80–90 mmHg) until bleeding is controlled
- Early use of blood products (1:1:1 ratio of RBCs, plasma, platelets)
- Minimize crystalloid use
- Reverse coagulopathy with tranexamic acid, calcium, etc.

#### **Secondary Survey**

Once the patient is stabilized:

- Perform a head-to-toe physical examination.
- Take a detailed history using the AMPLE mnemonic:
- A – Allergies
- M – Medications
- P – Past medical history
- L – Last meal
- E – Events leading to the injury

#### **Diagnostic tests:**

- Imaging: Chest and pelvic X-rays, FAST (Focused Assessment with Sonography for Trauma), CT scans
- Lab tests: CBC, blood type and crossmatch, coagulation profile, ABG, lactate levels

#### **Triage and Team Coordination**

- Patients are triaged based on injury severity and resource availability.
- Effective trauma care requires:
- Team leader coordination
- Defined roles (airway, circulation, documentation, medication)
- Clear communication using closed-loop feedback

#### **Definitive and Surgical Management**

- Depending on injuries, patients may require:
- Emergency surgery (e.g., laparotomy for internal bleeding)
- Orthopedic fixation for fractures
- Neurosurgical intervention for brain or spine trauma
- Principles of Damage Control Surgery (DCS):
- Abbreviated operations to control bleeding and contamination
- Followed by ICU stabilization and definitive repair later

#### **Intensive Care and Ongoing Monitoring**

Post-resuscitation care involves:

- Hemodynamic monitoring (arterial lines, central venous pressure)
- Mechanical ventilation and oxygenation
- Management of complications: sepsis, multi-organ failure, embolism

- Nutritional support, pain control, and psychological care

#### **Ethical Considerations and End-of-Life Decisions**

- In polytrauma or severe brain injury, ethical questions may arise regarding:
  - Aggressiveness of intervention
  - Futility of care
  - Involvement of family in decision-making
  - Organ donation discussions when applicable

#### **Conclusion**

Severe trauma is a time-critical emergency requiring rapid assessment, resuscitation, and coordinated multidisciplinary management. The hospital's response must be systematic and based on protocols like ATLS and DCR to improve patient survival and functional outcomes.

Continuous training, team communication, and resource preparedness are essential to achieve optimal trauma care.

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