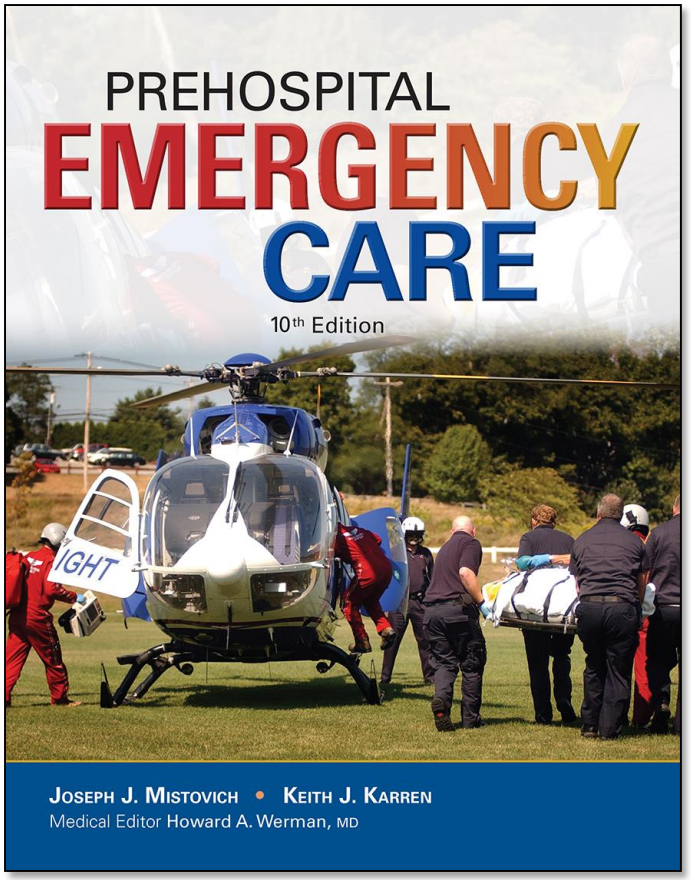
PREHOSPITAL EMERGENCY CARE

TENTH EDITION



CHAPTER 36

Multisystem Trauma and Trauma in Special Patient Populations

Learning Readiness

- EMS Education Standards, text p. 976

Learning Readiness Objectives

- Please refer to page 976 of your text to view the objectives for this chapter.

Learning Readiness
Key Terms

- Please refer to page 976 of your text to view the key terms for this chapter.

Setting the Stage

- Overview of Lesson Topics
  - Multisystem Trauma
  - Trauma in Special Patient Populations
  - Assessment-Based Approach: Multisystem Trauma and Trauma in Special Patient Populations

Case Study Introduction

Excited to hear the approach of the ice cream truck in his neighborhood, seven-year-old Russ Moffat runs into the street to look for it. He fails to see the car approaching from the opposite direction until it is too late, turning toward it at the last second. The bumper strikes Russ in the torso, throwing his head forward onto the hood, before throwing him down to the ground as the driver screeches to a halt.

Case Study

- How will Russ's age affect the type and distribution of his injuries?
- How might Russ's injuries present differently from the same injuries in an adult patient?
- What differences are required in the assessment and management of this patient, as compared to an adult?

Introduction

- The involvement of multiple body systems in trauma makes management of the trauma patient more challenging.
- There are special considerations in assessment and management of pediatric, geriatric, pregnant, and cognitively impaired trauma patients.

Multisystem Trauma

- Significant forces increase the risk for injuries to multiple systems.
- Morbidity and mortality are higher in patients with multisystem trauma.
- The risk of developing shock is higher with multisystem trauma.

continued on next slide

Multisystem Trauma

- The care for multisystem trauma patients depends on the systems involved.
- The definitive care is often surgery.

continued on next slide

Multisystem Trauma

- Golden principles of prehospital multisystem trauma care
  - Ensure the safety of the rescue personnel and patient.
  - Determine additional resources needed.
  - Understand kinematics.

continued on next slide

Multisystem Trauma

- Golden principles of prehospital multisystem trauma care
  - Identify and manage life threats.
  - Manage the airway while maintaining cervical spine stabilization.
  - Support ventilation and oxygenation.

continued on next slide

Multisystem Trauma

- Golden principles of prehospital multisystem trauma care
  - Control external hemorrhage and treat for shock.
  - Perform a secondary assessment and obtain a medical history.

continued on next slide

Multisystem Trauma

- Golden principles of prehospital multisystem trauma care
  - Splint musculoskeletal injuries and maintain spinal immobilization on a long spine board.
  - Make transport decisions.

Trauma in Pregnant Patients

- Trauma is the leading cause of death for pregnant patients.
- Mechanisms include abuse, falls, and motor vehicle collisions.

continued on next slide

Trauma in Pregnant Patients

- It is difficult to assess the fetus, so manage the mother aggressively.
- All pregnant trauma patients should be evaluated in the emergency department.

continued on next slide

Trauma in Pregnant Patients

- Anatomical and physiological considerations
  - The blood volume is increased by 50% in late pregnancy.
  - The heart rate increases by 10 to 15 bpm by the 3rd trimester.
  - The uterus becomes highly vascular.

continued on next slide

Trauma in Pregnant Patients

- Anatomical and physiological considerations
  - The diaphragm is elevated.
  - Pain perception in the abdomen is altered.
  - Decreased gastric motility and increased risk of vomiting.
  - The uterus and bladder are at greater risk of injury.

continued on next slide

Trauma in Pregnant Patients

- Anatomical and physiological considerations
  - Musculoskeletal changes and changes in the center of gravity increase the risk of falls.
  - In the 3rd trimester, fetal size can impair venous return when the mother is in a supine position.

continued on next slide

Trauma in Pregnant Patients

- Assessment considerations
  - 1% to 3% of minor traumas in pregnant women result in fetal loss.
  - The more severe the injury to the mother, the greater the chances of fetal injury.
  - Fetal death rates are nine times higher than maternal death rates following trauma

continued on next slide

Trauma in Pregnant Patients

- Assessment considerations
  - The most common problem caused by maternal trauma is uterine contractions that may progress into labor.

continued on next slide

Trauma in Pregnant Patients

- Abruptio placentae is premature separation of the placenta from the uterine wall.
  - It most commonly occurs with blunt trauma.
  - There may be abdominal pain and vaginal bleeding.
  - There is a high risk of fetal and maternal death.

continued on next slide

Trauma in Pregnant Patients

- Fetal and maternal outcomes from motor vehicle collisions are more favorable when the mother wears a seatbelt.
- Uterine rupture may occur as a result of motor vehicle trauma.

continued on next slide

Trauma in Pregnant Patients

- Fetal distress can be caused by hypoxia or hypovolemia, but signs of shock can be delayed or masked in pregnant patients.
- Attempt resuscitation of the pulseless pregnant trauma patient according to your protocol.

continued on next slide

Trauma in Pregnant Patients

- Management considerations
  - When spinal immobilization is required, tilt the spine board to the left to prevent supine hypotensive syndrome.

continued on next slide

Trauma in Pregnant Patients

- Management considerations
  - Airway and ventilation
    - Anticipate vomiting.
    - Assist inadequate ventilations.
    - Administer oxygen and maintain as high an SpO_2 as possible.
    - The fetus can be severely hypoxic before the mother shows signs of hypoxia.

continued on next slide

Trauma in Pregnant Patients

- Management considerations
  - Circulation
    - Check for major bleeding.
    - Absorb vaginal bleeding with a pad; do not pack the vagina.
    - Anticipate and treat for shock.

continued on next slide

Trauma in Pregnant Patients

- Management considerations
  - Assess for crowning.
  - Anticipate the need for additional resources if delivery is imminent.

continued on next slide

Trauma in Pregnant Patients

- Management considerations
  - Consider ALS intercept; notify the receiving facility.
  - The best management of the fetus is to anticipate and manage the mother's injuries.

Click on the intervention that is required to prevent supine hypotensive syndrome when managing a pregnant trauma patient.

A. Fill all voids beneath the patient's back with padding when immobilizing to a long backboard.

B. Administer oxygen at 15 lpm by nonrebreather mask to all pregnant trauma patients.

C. Tilt the long backboard to the patient's left once she is fully immobilized.

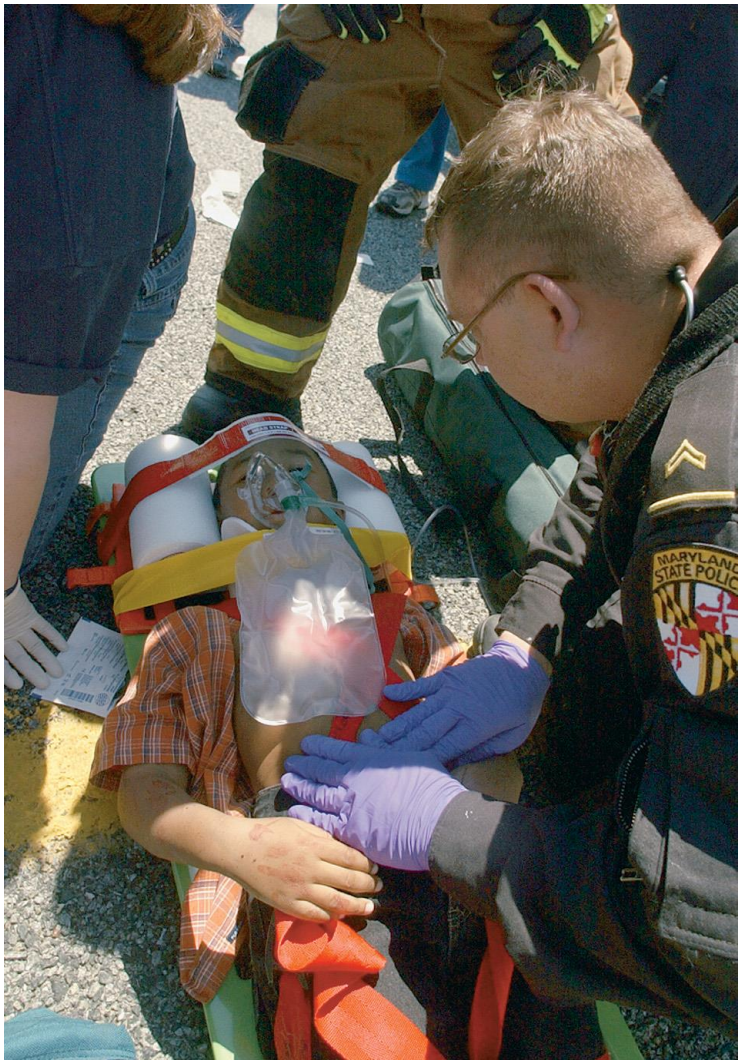
D. Transport the patient in semi-Fowler's position with the knees and hips flexed.

Trauma in Pediatric Patients

- Mechanisms include drowning, burns, falls, penetrating trauma, motor vehicle collisions, and pedestrian-vehicle collisions.

continued on next slide

Children are frequently victims of major and minor trauma. (© Mark C. Ide)



continued on next slide

Trauma in Pediatric Patients

- Half of all pediatric deaths are due to trauma.
- Motor vehicle collisions account for the majority or trauma, and almost half of trauma deaths.
- Improper car seat usage contributes to injury.

continued on next slide

Trauma in Pediatric Patients

- 25% to 35% of deaths are due to abuse.

continued on next slide

Trauma in Pediatric Patients

- Suspected abuse findings include:
  - Bruises or burns in unusual shapes and locations
  - An injury that doesn't seem to correlate with the cause provided
  - More injuries than usual for a child that same age
  - Multiple injuries in various healing stages

continued on next slide

Trauma in Pediatric Patients

- Calls involving pediatric patients can be difficult for EMS providers.
  - The event is stressful for family and bystanders.
  - Professional, competent, compassionate care is a must.

continued on next slide

Trauma in Pediatric Patients

- Anatomical and physiological considerations
  - Traumatic forces are more widely distributed in pediatric patients than in adults, making them more prone to multisystem trauma.
  - The body surface area is greater; patients can lose heat faster.

continued on next slide

Trauma in Pediatric Patients

- Anatomical and physiological considerations
  - Heavy head and weak neck muscles increase their risk of head and cervical spinal injuries
  - Internal organ placement makes them more susceptible to injuries to the spleen and liver.

continued on next slide

Trauma in Pediatric Patients

- Anatomical and physiological considerations
  - Greater chest wall flexibility can allow for injuries with few external signs of trauma.
  - Maintain a high index of suspicion that severe underlying trauma exists.

continued on next slide

Trauma in Pediatric Patients

- Anatomical and physiological considerations
  - Trauma to growth plates may impact the bones' normal growth.
  - Higher energy requirements and can lead to fatigue faster than in adults.

continued on next slide

Trauma in Pediatric Patients

- Assessment considerations
  - The Pediatric Assessment Triangle (PAT) helps with formation of a general impression.
  - PAT assesses appearance, work of breathing, and circulation to the skin.

continued on next slide

Trauma in Pediatric Patients

- Assessment considerations
  - The Pediatric Advanced Life Support (PALS) assessment is similar to PAT.
  - PALS assesses consciousness, breathing, and color.

continued on next slide

Trauma in Pediatric Patients

- Assessment considerations
  - Subtle changes in heart rate, blood pressure, and skin perfusion may indicate cardiorespiratory failure.
  - A slow heart rate may indicate hypoxia.

continued on next slide

Trauma in Pediatric Patients

- Assessment considerations
  - Assess a brachial pulse in patients over 1 year old.
  - Blood pressure is assessed in patients 3 or more years old.

continued on next slide

Trauma in Pediatric Patients

- Management considerations
  - In spinal immobilization, pad beneath the child who is less than 8 years of age from the shoulders to the hips to prevent neck flexion.
  - Open the airway and assess for any possible obstructions; gurgling or stridor indicate upper airway obstruction.

continued on next slide

Trauma in Pediatric Patients

- Management considerations
  - Assess breathing rate and tidal volume, assist inadequate ventilations.
  - Maintain an SpO_2 greater than or equal to 94%.
  - Assess circulation and control direct bleeding.

continued on next slide

Trauma in Pediatric Patients

- Management considerations
  - Manage hypovolemia and shock.
  - Prevent hypothermia.
  - Transport to an appropriate facility.
  - Continually reassess.

Trauma in Geriatric Patients

- Geriatric patients account for 10% to 14% of trauma patients.
- The risk of death and significant injury is greater than for younger patients.
- A number of physiological changes predispose the elderly to injuries.

continued on next slide

Trauma in Geriatric Patients

- Falls are the most common cause of injury.
- Many falls are the result of medical conditions.
- The most common injury associated with falls is fractures.

continued on next slide

Trauma in Geriatric Patients

- Anatomical and physiological considerations
  - Changes in the pulmonary, cardiovascular, neurological, and musculoskeletal systems occur with aging.
  - These changes make injury more likely and make it harder for the elderly patient to compensate when injury occurs.

continued on next slide

Trauma in Geriatric Patients

- Assessment considerations
  - Pre-existing medical conditions and medications affect the patient's outcome.
  - Altered mental status is a significant sign.
  - Be alert to airway obstruction from dentures and impaired cough reflex.

continued on next slide

Trauma in Geriatric Patients

- Assessment considerations
  - Chest wall injuries can quickly lead to respiratory failure.
  - Pre-existing hypertension can make detecting shock difficult.
  - Pelvic and hip fractures are common.

continued on next slide

Trauma in Geriatric Patients

- Management considerations
  - Use padding when spinal immobilization is necessary.
  - Maintain a clear airway, be prepared to suction.
  - Support ventilation as needed, maintain an SpO_2 greater than or equal to 94%.

continued on next slide

Trauma in Geriatric Patients

- Management considerations
  - Prevent hypothermia.
  - Splint fractures.
  - Provide rapid transportation to the closest appropriate facility.

Trauma in Cognitively Impaired Patients

- Cognitively impaired patients are more prone to trauma.
- Conditions include dementia, autism, brain injuries, stroke, Alzheimer's disease, and Down syndrome.
- Cognitive impairments can affect assessment and management.

continued on next slide

A Down syndrome patient may have a mild-to-moderate developmental impairment. You may have to rely on a parent or other caregiver to help reassure the patient and to provide information about the patient's history.

continued on next slide

Trauma in Cognitively Impaired Patients

- Anatomical and physiological considerations
  - Physiological changes can accompany some forms of cognitive impairment, depending on the underlying cause.

continued on next slide

Trauma in Cognitively Impaired Patients

- Assessment considerations
  - History and consent may be difficult to obtain.
    - First attempt to get information from the patient.
    - Rely on others for information, if necessary.
  - Patients may be confused, upset, and uncooperative.

continued on next slide

Trauma in Cognitively Impaired Patients

- Assessment considerations
  - Pain perception may be altered.
  - Gain information through the trauma assessment; reassess frequently.
  - Maintain a high index of suspicion that impairment resulted from injury, rather than being related to the pre-existing condition.

continued on next slide

Trauma in Cognitively Impaired Patients

- Management considerations
  - Involve the caregivers to increase cooperation.
  - Err on the side of caution, treat as if the patient has a head injury.

Assessment-Based Approach

- Scene size-up
  - Assess the mechanism of injury; suspect injury of more than one body system.
  - Identify whether the patient belongs to any special patient populations.
  - Do not assume altered mental status is due to a pre-existing condition.

continued on next slide

Assessment-Based Approach

- Primary assessment
  - Suspect spinal injury, provide in-line stabilization.
  - Assess the mental status.
  - Establish an airway using a jaw-thrust maneuver.
  - Anticipate vomiting, be prepared to suction.

continued on next slide

Assessment-Based Approach

- Primary assessment
  - Provide oxygen for adequately breathing patients.
  - Provide positive pressure ventilation if breathing is inadequate.
  - For bradycardic pediatric patients, assist ventilations.

continued on next slide

Assessment-Based Approach

- Primary assessment
  - For pregnant patients, maintain an SpO_2 of 100%, if possible.
  - Look for and control external bleeding.

continued on next slide

Assessment-Based Approach

- Secondary assessment
  - Perform a rapid secondary assessment.
  - Anticipate altered reactions to pain among special patient populations.
  - Obtain vital signs and a history.

continued on next slide

Assessment-Based Approach

- Questions to consider in the history
  - When and how did the incident occur?
  - What is the chief complaint?
  - Are there any signs or symptoms associated with the trauma?
  - Is the patient pregnant? If so, how far along is she? Is there any vaginal bleeding or crowning?

continued on next slide

Assessment-Based Approach

- Questions to consider in the history
  - How old is the patient?
  - Does the patient take any medications? Is the patient allergic to anything?
  - What is the patient's medical history? Is there a history of previous trauma or a cognitive impairment?

continued on next slide

Assessment-Based Approach

- Emergency medical care
  - Use Standard Precautions.
  - Establish and maintain in-line spinal stabilization.
    - For third-trimester pregnancy, tilt the backboard to the left.
    - For children younger than 8 years old, pad from the shoulders to the hips.
    - For the elderly, pad voids beneath the back.

continued on next slide

Assessment-Based Approach

- Emergency medical care
  - Maintain a patient airway, and adequate breathing and oxygenation.
    - Use a jaw-thrust maneuver.
    - Be prepared to suction.
    - Administer oxygen.

continued on next slide

Assessment-Based Approach

- Emergency medical care
  - Monitor the airway, breathing, pulse, and mental status for deterioration.
  - Control bleeding.
  - Treat for shock.

continued on next slide

Assessment-Based Approach

- Emergency medical care
  - Identify and treat other injuries.
  - Transport immediately.
    - Notify the receiving facility.
    - Consider requesting ALS.
  - Reassess vital signs every 5 minutes.

Case Study Conclusion

EMTs arrive and, as they approach to apply in-line stabilization to the spine and open the airway, they note a pale patient who appears unresponsive, and who has labored breathing.

continued on next slide

Case Study Conclusion

One EMT uses a jaw-thrust maneuver to open the airway, as another completes the primary assessment. The EMTs insert an oropharyngeal airway and begin assisting ventilations and administering supplemental oxygen.

Russ has several superficial abrasions and minor lacerations, but no major external bleeding.

continued on next slide

Case Study Conclusion

The EMTs perform a rapid secondary assessment, and immobilize the spine, padding from the shoulders to the hips to maintain the neck in neutral alignment.

The EMTs are transporting within six minutes of arriving, and immediately notify the receiving facility.

continued on next slide

Case Study Conclusion

En route, they continue management of the airway and breathing, and keep Russ warm, as well as obtaining baseline vital signs.

Russ is stabilized at a Level III trauma center, and then flown to a children's hospital for further management. Although he faces months of rehabilitation, the quick action of the EMTs provided him with the best opportunity for a full recovery.

Lesson Summary

- Suspect multisystem trauma in any patient who has been subjected to a significant external force.
- Use the golden principles of trauma care to manage patients with multisystem trauma.

continued on next slide

Lesson Summary

- Special populations of patients require additional assessment and management considerations.
- The EMT must incorporate knowledge of the special needs of these patients into the care provided.