

# Lightning or Lightning Strike Injury

## Aliases

Lightning burn

## Patient Care Goals

1. Identify patient(s) as lightning strike victim(s).
2. Move to safe area.
3. Initiate immediate resuscitation of cardiac arrest victim(s), within limits of mass casualty care, also known as "reverse triage."
4. Perform ECG cardiac monitoring during transport.
5. Treat associated traumatic injuries.

## Patient Presentation

1. Environment: Lightning strikes may happen in a variety of environmental conditions. Most commonly they occur in outdoor or wilderness circumstances:  
Golf courses, exposed mountains or ledges and farms or fields all present conditions that increase risk of lightning strike when hazardous meteorological conditions exist.
2. Injury: Lacking bystander observations or history, it is not always immediately apparent that the patient has been the victim of a lightning strike.
3. Subtle findings such as injury patterns might suggest lightning injury.

## Inclusion Criteria

Patients of all ages who have been the victim of lightning strike injury

## Exclusion Criteria

No recommendations

## Patient Management

### Assessment

1. Respiratory
  - a. Apnea
  - b. Agonal respirations
  - c. Respiratory paralysis
2. Cardiovascular
  - a. Dysrhythmias
  - b. Transient hypertension
3. Neurologic
  - a. Seizures
  - b. Confusion
  - c. Paralysis
  - d. Paraplegia
  - e. Vertigo or dizziness
  - f. Parasthesias
  - g. Amnesia
  - h. Memory deficits
  - i. Anxiety
  - j. Fixed or dilated pupils possible (autonomic dysfunction)
4. Skin
  - a. Ferning or fern-like superficial skin burn ("Lichtenberg figures")
  - b. Vascular instability may result in cool, mottled extremities
  - c. Numerous first and/or second degree burns
  - d. Third degree burns (less common)

5. Cardiopulmonary, as injury is a result of DC current:
  - a. Patient may be in full cardiopulmonary arrest
  - b. Patient may have only respiratory arrest
6. Neurologic
  - a. May have stroke-like findings as a result of neurologic insult
7. Other
  - a. May have secondary traumatic injury as a result of overpressurization, blast or missile injury
  - b. Fixed/dilated pupils may be a sign of neurologic insult, rather than a sign of death or impending death. Do not use as a solitary, independent sign of death for the purpose of discontinuing resuscitation in this patient population.

### **Treatment and Interventions**

1. Assure patent airway. If in respiratory arrest only, manage airway as appropriate.
2. If in cardiopulmonary arrest, treat per Cardiac Arrest guideline
3. Consider IV initiation [*AEMT*]. Avoid initiation through burned skin.
4. Monitor ECG. Be alert for potential arrhythmias. Consider 12-lead, when available.
5. Consider early pain management for burns or associated traumatic injury [see Pain Management guideline].

### **Patient Safety Considerations**

1. Recognize that repeat strike is a risk. Patient and rescuer safety are paramount.
2. Recognize that victims do not carry or discharge a current, so the patient is safe to touch and treat.

### **Notes and Educational Pearls Key Considerations**

- Lightning strike cardiopulmonary arrest patients have a high rate of successful resuscitation, if initiated early, in contrast to general cardiac arrest statistics.
- There may be multiple victims.
- **If multiple victims, cardiac arrest patients whose injury was witnessed or thought to be recent should be treated first and aggressively (reverse from traditional triage practices).**
  - **Patients suffering cardiac arrest from lightning strike initially suffer a combined cardiac and respiratory arrest.**
  - **Return of spontaneous circulation may precede resolution of respiratory arrest.**
  - **Patients may be successfully resuscitated if provided proper cardiac and respiratory support, highlighting the value of "reverse triage."**
- It may not be immediately apparent that the patient is a lightning strike victim.
- Injury pattern and secondary physical exam findings may be key in identifying patient as a victim of lightning strike.
- Lightning strike is a result of very high voltage, very short duration DC current exposure.

### **Pertinent Assessment Findings**

1. Presence of thermal or non-thermal burns
2. Evidence of trauma
3. Evidence of focal neurologic deficits

### **Quality Improvement**

#### **Associated NEMESIS Protocol(s) (eProtocol.01)**

- 9914209—Injury-Lightning/Lightning Strike

### **Key Documentation Elements**

- Initial airway status
- Initial cardiac rhythm

- Neurologic exam (initial and repeat)
- Associated or secondary injuries
- Pain scale documentation and pain management

## Performance Measures

- Cardiopulmonary issues addressed early and documented appropriately
- Patient transported to closest appropriate facility
- Pain scale documented and treated per guidelines (when appropriate)
- **EMS Compass® Measures** (for additional information, see [www.emscompass.org](http://www.emscompass.org))
  - *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

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