



Environmental Emergencies

- Heat Exposure
- Drowning
- Lightning Strikes



Heat Exposure



Heat Exposure

- Heat Cramps
- Heat Syncope
- Heat Exhaustion
- Heatstroke



Heat Exposure

- ***Risk Factors***
- Age
- Preexisting Conditions
- Medications
- Environment Conditions



Heat Cramps

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Heat Cramps

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- Most often seen in younger people in good physical condition
- Develops as a result of salt depletion, dehydration and muscle fatigue



Heat Cramps – Signs and Symptoms

- Cramping in lower extremities or abdomen
- Tachycardia
- Pale and sweaty
- Nausea
- Normal Temperature
- Alert and oriented



Heat Cramps – Treatment



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- IV fluid replacement and antiemetics may be needed if the patient is nauseated.



Heat Syncope – Signs and Symptoms

- Orthostatic syncopal or near syncopal episode as a result of peripheral vasodilation and dependent pooling of blood
- Often seen in individuals not used to hotter temperatures
- Symptoms develop upon standing from a seating or lying down position or when standing for long periods of time.
- Dehydration and electrolyte depletion



Heat Syncope - Treatment

- Place patient supine
 - Fluid replacement with balanced electrolyte solution
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- *Always consider differential diagnosis



Heat Exhaustion

- Water or Sodium Depleted Heat Exhaustion

Heat Exhaustion

- Water or Sodium Depleted Heat Exhaustion
- Water Depleted
- Often seen in the geriatric population. Mobility limitations, medications, decreased thirst sensitivity, decreased temperature sensitivity contribute to development of heat exhaustion.
- Can develop in athletes and physically demanding jobs.

Heat Exhaustion

- Water or Sodium Depleted Heat Exhaustion
- Sodium Depleted

Results from a combination of dehydration and significant sodium loss through profuse sweating.

Heat Exhaustion – Signs and Symptoms

- Headache
- Fatigue
- Weakness
- Dizziness
- Nausea and Vomiting
- Cramping
- Profuse sweating with pale clammy skin
- Tachycardia
- Hypertension
- Rapid Shallow Respirations

Sometimes referred to as Summer Flu.



Heat Exhaustion - Treatment



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- Apply cardiac monitor and consider antiemetics.

Heatstroke

* True Medical Emergency *

- 10% Fatality rate in patients who received treatment
- 30% - 80% Fatality rate if left untreated
- Characterized by elevated core body temperature (above 104 F) and altered mental status. Results from a failure of the body's heat regulation systems.



Heatstroke

- Classic\Passive Heatstroke
 - Often occurs during heatwaves
 - Extremes of age
 - Limited mobility
 - Chronic illnesses, certain medications and alcoholism increase susceptibility
- Exertional Heatstroke
 - Results from exertion on hot, humid conditions
 - Often seen in younger age groups
 - High humidity (+ 75%) inhibits heat dissipation by evaporation and the body temperature continues to rise unchecked.



Heatstroke – Signs and Symptoms

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- Tachycardia



Heatstroke – Signs and Symptoms

- Neuroleptic Malignant Syndrome
- Hyperthermia caused by medications such as antipsychotics and medications that block dopamine receptors. Presents with S\S of heatstroke as well as muscle rigidity and AMS.

Heatstroke – Treatment

- Move the patient to a cooler environment, remove excess clothing and begin RAPID cooling
- *Rapid Cooling*
- Total or partial submersion in cold or ice water is most effective but not readily available prehospital.
- Pack pulse points with cold packs
- Mist or spray skin with water and fan the patient continuously
- Large bore IV and infusion of cold Normal Saline and monitor for pulmonary edema.
- Attach cardiac monitor as dysrhythmias are common due to severe electrolyte imbalances and assess CBG.
- Rapid Transport



Drowning

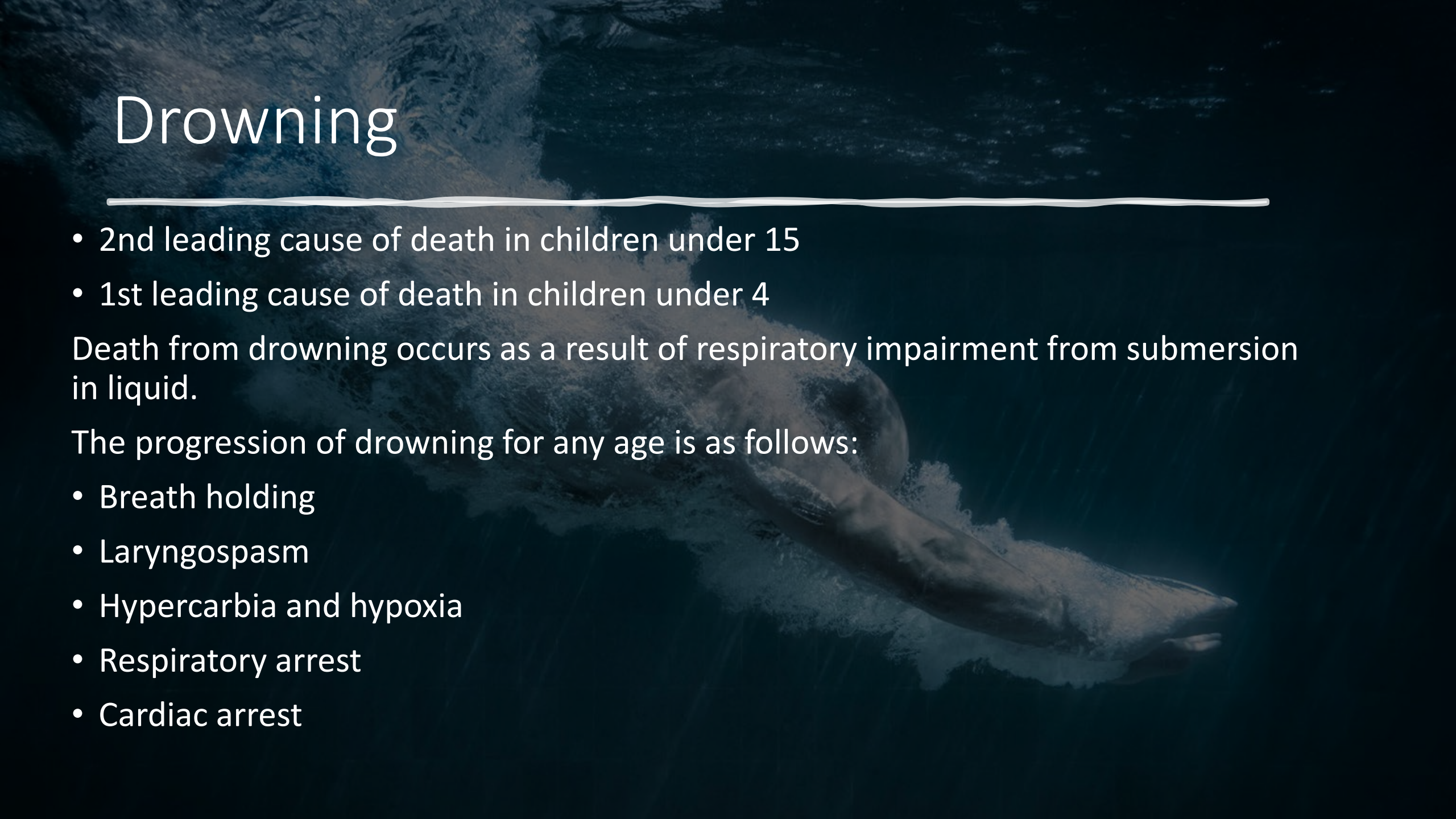
Drowning

- 2nd leading cause of death in children under 15
- 1st leading cause of death in children under 4

Death from drowning occurs as a result of respiratory impairment from submersion in liquid.

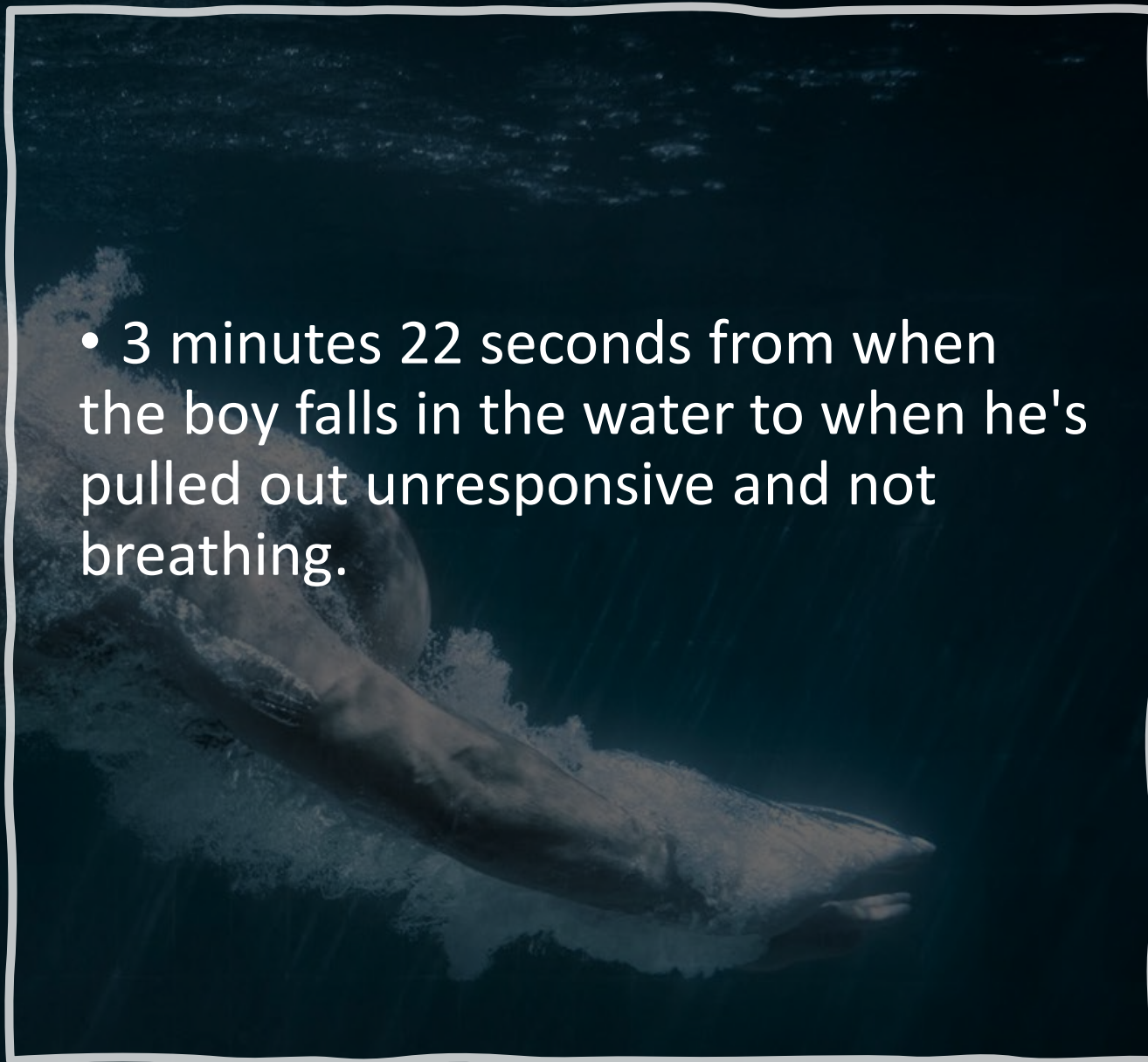
The progression of drowning for any age is as follows:

- Breath holding
- Laryngospasm
- Hypercarbia and hypoxia
- Respiratory arrest
- Cardiac arrest



Dramatic
pool rescue
caught on
camera -
YouTube

- 3 minutes 22 seconds from when the boy falls in the water to when he's pulled out unresponsive and not breathing.



Mechanics of Drowning

Breath Holding

- Age and physical health dependent
- Temperature of the water
- Level of panic

Laryngospasm

- Water in the pharynx and laryngeal area can trigger muscle spasm and close off the vocal cords. While this prevents water from entering the lungs it also prevents breathing leading to asphyxia.

Mechanics of Drowning

Aspiration

- If the vocal cords do not close or the spasm stops once the patient is unresponsive water enters the lungs washing away surfactant.

Hypercarbia and Hypoxia

- Reduced lung compliance and gas exchange causes a buildup of CO_2 and lack of O_2 .
- Acute lung injury occurs

Respiratory and Cardiac Arrest

- Loss of surfactant, lung injury and alveolar collapse lead to Resp. Arrest and tissue ischemia. Cardiac ischemia and dysrhythmias occur followed by cardiac arrest.

Drowning Resuscitation

Scene Safety

- Why did this person unable to get out of the water?
- Will rescuers be exposed to the same threat or dangerous conditions?

Airway

- Cardiac arrest is most often a direct result of respiratory arrest. Securing the airway and restoring ventilation should be our priority.
- Protect the C-Spine as well as the situation allows especially if you suspect traumatic injury but do not delay extrication.
- In-the-water rescue breathing may be indicated. Follow local protocols.

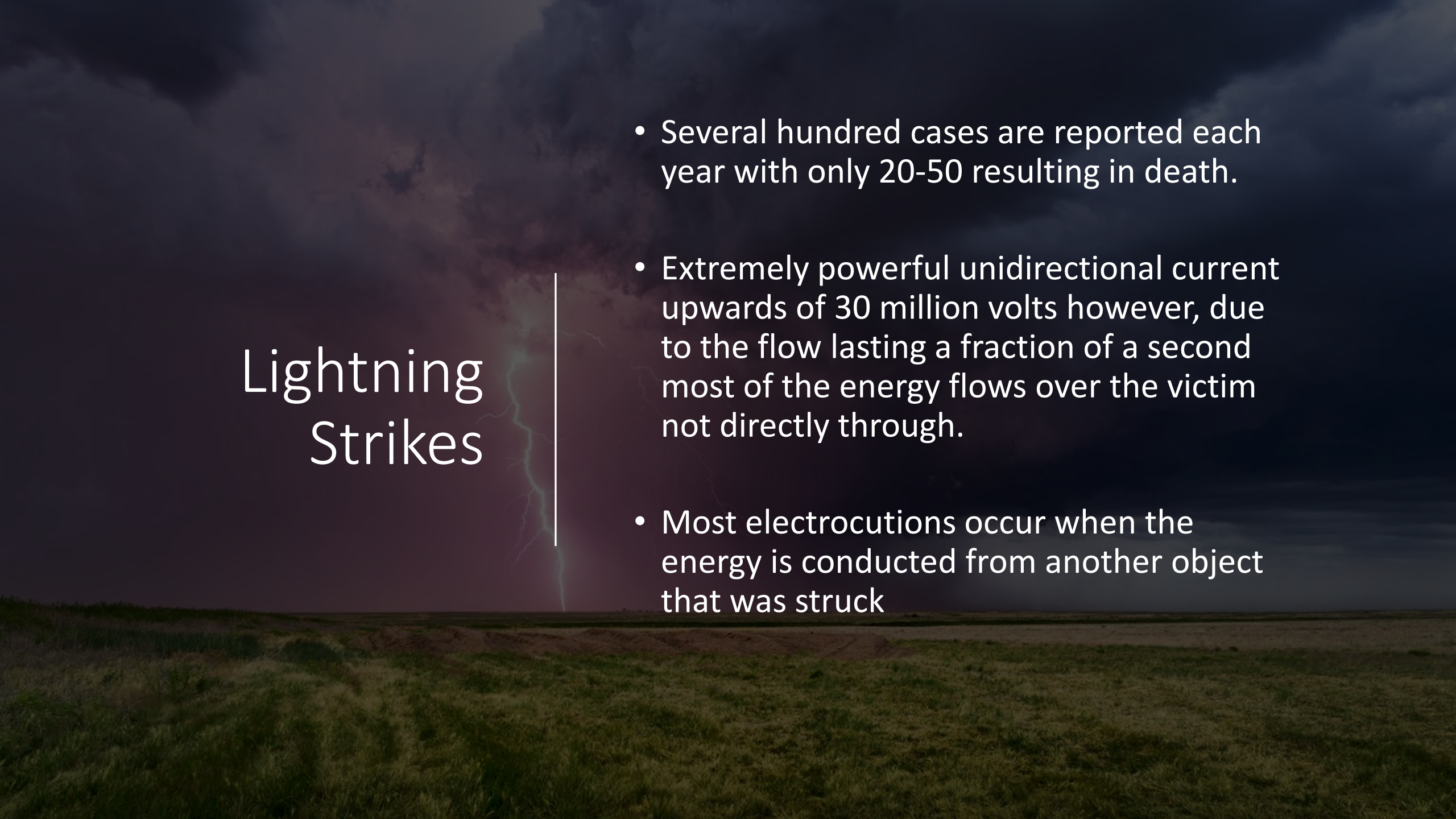
Drowning Resuscitation

Compressions and Ventilations

- Begin CPR once the patient is on a stable firm surface once pulselessness and apnea are confirmed.
- Assess for and treat any additional life threats.
- Respiratory distress in both responsive and unresponsive should be treated aggressively with high flow O2 and assisted ventilations if needed.

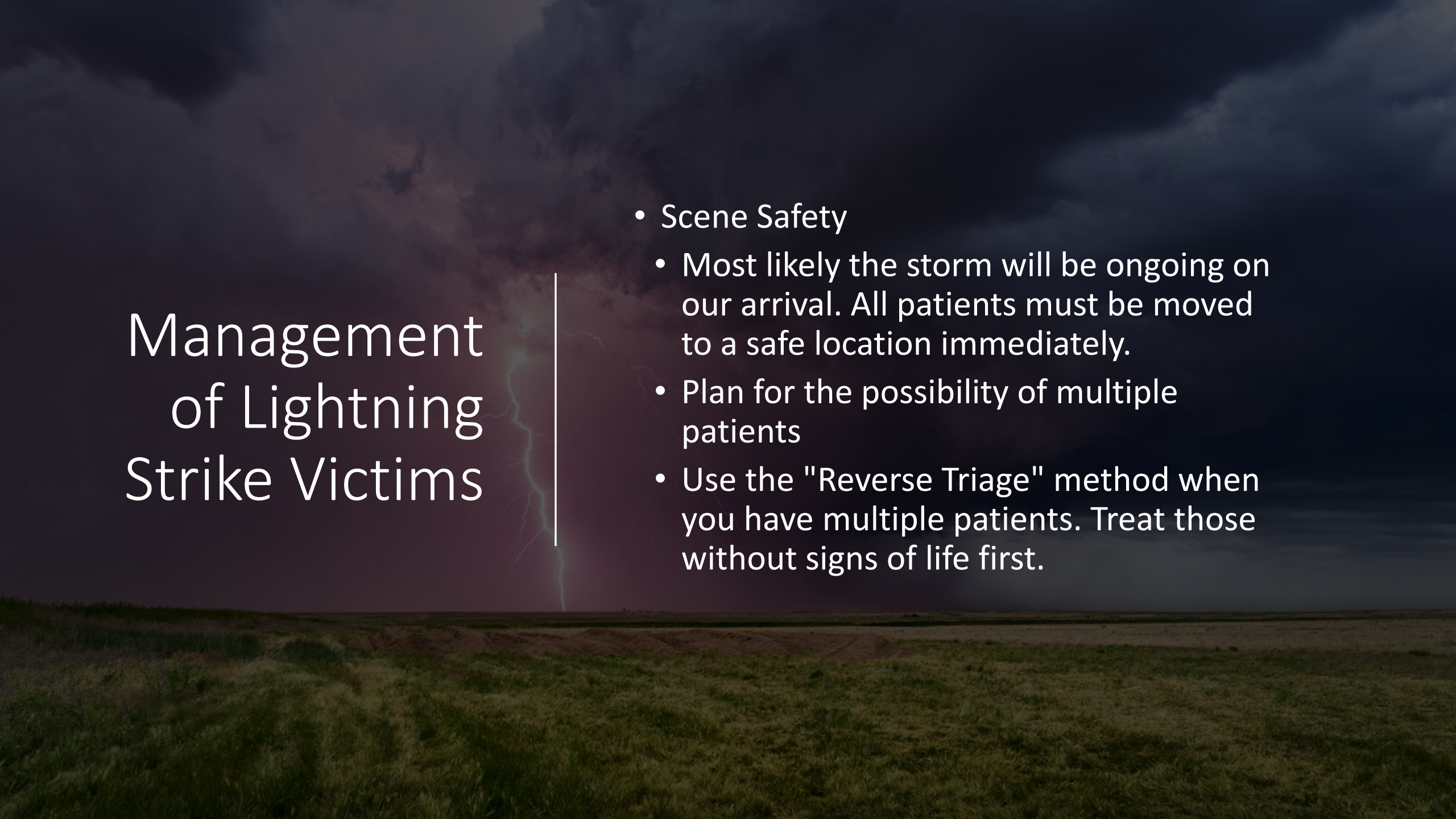
Drowning Resuscitation Tips

- Oxygenation and ventilation should be your primary focus.
- Only the chest needs to be dry for defib pad placement.
- DO NOT perform abdominal thrust in an effort to clear water.
- Have suction ready in the likely event of vomit and to clear water from the airway.
- Utilize PEEP when available to open collapsed alveoli and push fluid from the lungs.
- Initial ventilations may require more force than normal.



Lightning Strikes

- Several hundred cases are reported each year with only 20-50 resulting in death.
- Extremely powerful unidirectional current upwards of 30 million volts however, due to the flow lasting a fraction of a second most of the energy flows over the victim not directly through.
- Most electrocutions occur when the energy is conducted from another object that was struck

A dramatic landscape photograph of a grassy field under a dark, stormy sky. A bright lightning bolt is visible in the distance, striking the ground. The overall mood is ominous and urgent.

Management of Lightning Strike Victims

- Scene Safety
 - Most likely the storm will be ongoing on our arrival. All patients must be moved to a safe location immediately.
 - Plan for the possibility of multiple patients
 - Use the "Reverse Triage" method when you have multiple patients. Treat those without signs of life first.

Management of Lightning Strike Victims

- Treat those in full arrest first. The initial strike causes full arrest from widespread depolarization. Cardiac activity may resume spontaneously but respirations will not.
- Injury patterns often resemble blast injuries more than high voltage injuries.
- Expect multisystem involvement including spinal injury.

Management of Lightning Strike Victims

Cardiac

- Massive depolarization causes asystole. Aggressive and continued CPR is indicated.
- Treat any change in rhythm that occurs.

Respiratory

- Persistent apnea is common and can cause secondary cardiac arrest if not managed.
- Apply high flow O2 and assist ventilations as needed.

Nervous

- The shock to the system can overload the CNS and cause tingling, loss of sensation or paralysis.

Management of Lightning Strike Victims

Renal

- Muscle damage can occur triggering the release of myoglobin and risk of acute injury to the kidneys.
- Establish large bore IV and administer LR wide open.
- Consider transport to a facility with dialysis capabilities.

Burns and Trauma

- Assess and treat any burns.
- Hollow organs and eardrums are more likely to sustain damage.
- Assess for other trauma such as fractures, soft tissue injury and protect C-Spine.

A dramatic landscape photograph of a grassy field under a dark, stormy sky. A bright lightning bolt strikes the ground in the distance, and a thin white vertical line is positioned to the right of the text.

Management of Lightning Strike Victims