Common Summertime Emergencies - Part I

By: James L. Holly, MD

The old southern standard declares, "Summertime and the living is easy...". And, so it is. Children are out of school. Families are vacationing. Beaches, recreational areas, camp sites and lakes are brimming with people. But, in all of this fun, danger can lurk in the most innocent warm-weather pursuits. Summer also brings hot, humid weather; thunderstorms; and other hazards.

Heat Stroke

Rising temperatures bring heat-related illnesses such as heat cramps, heat fainting (syncope), heat exhaustion, and heat stroke. Of these, only heat stroke is a true medical emergency. Heat-related illnesses are more common when the temperature is above 95 degrees F and the humidity is greater than 80%. Other risk factors for heat related health problems include:

- the very young and
- the elderly,
- dehydration,
- fatigue or sleep deprivation,
- obesity,
- cardiovascular disease,
- fever,
- muscular exertion,
- mental impairment,
- history of seizures,
- burns (including sunburn), and
- the use of certain drags, including anticholinergics, beta-adrenergic blockers, angiotensin-converting enzyme inhibitors, diuretics, cocaine, and amphetamines.

When a heat stroke victim's heat regulatory mechanisms become overtaxed and fail, they can't compensate for a critical elevation in body temperature, which may exceed 105 degrees F. Without prompt treatment, organ systems fail and the victim dies. Heat stroke kills up to 80% of victims who aren't treated appropriately.
Someone with heat stroke has an elevated body temperature (above 105 degrees F), mental status changes caused by thermal injury to the brain including anxiety, confusion, bizarre behavior, loss of coordination, hallucinations, agitation, seizures, and coma. Heat stroke victims also exhibit low blood pressure, rapid heart beat and rapid breathing. The patient's skin will probably feel hot and dry, although some victims continue to perspire.

The first priority is to cool the patient rapidly. Remove as much of his clothing as practical and place cold packs on his neck, chest, abdomen, and groin; soak the person in cool (not cold) water; or fan him while spraying water on his skin. Don't immerse him in very cold water; shivering generates body heat and increases oxygen consumption. Because he's at risk for choking, don't give anything by mouth. Maintain and monitor the ABCs (airway, breathing, and circulation). While all of this is being done, call for an ambulance and get the patient to the hospital quickly.

Near-drowning

Although near drowning -- recovery after submersion and near suffocation (asphyxiation) in water -- can occur year-round, it's commonly associated with summertime water sports. The typical victim is a child or teenager. In most cases of near drowning, the victim breathes water into the lungs (aspiration). In 10% to 20% of cases, the victim suffocates without breathing water into the lungs, after laryngospasm causes the closing off of the opening to the lungs at the glottis. Contaminants such as chemicals, algae, microbes, sand, and mud can worsen lung damage or cause pulmonary infection.

Other effects depend on whether the victim aspirates fresh or salt water. Fresh water aspiration causes a washout of a chemical which helps keep the lungs open (surfactant). This destabilizing the small air pockets through which oxygen is exchanged with the blood (alveoli), which increases airway resistance and the "work of breathing". Aspiration of salt water, a fluid more concentrated than body fluids, creates a pressure gradient that pulls protein-rich fluid from the blood vessels into the alveoli. In both cases, alveolar ventilation is impaired, and compounds oxygen deficient in the body (hypoxia).

The outcome for victims of near drowning is closely linked to:

- the amount of time the victim was submerged,
- the degree of hypoxic central nervous system damage,
- the victim's age,
- the presence of illnesses or injuries, and
- water temperature.

Low body temperature (hypothermia) may protect the brain from low-oxygen damage by reducing the brain's metabolic rate. Very cold water's protective effect is especially beneficial for children. Children also have a more pronounced diving reflex -- a physiologic response to asphyxia in which a reduction in cardiac output, and constriction
of arteries can reduce myocardial oxygen consumption and enhance blood flow to the heart and brain.

Events surrounding the submersion incident also play a role. Did the victim have a seizure, myocardial infarction, or stroke while in the water, leading to the near drowning? Did he sustain head or cervical spine trauma from diving into shallow water or bodysurfing? These circumstances can complicate rescue and recovery.

The first priority when providing emergency care for a submerged victim is to get him out of the water safely, without jeopardizing other lives. Consider your own swimming ability and limitations as well as any environmental or natural hazards before attempting a rescue. Have someone call 911, and if you're not a good swimmer, don't attempt a rescue in deep water.

Take a flotation device, such as a raft or board, with you so that once you've reached the victim, you can stabilize his spine while you get him out of the water. If you suspect the victim has low body temperature, handle him gently to prevent a fatal heart irregularity called ventricular fibrillation.

Once the victim is safely removed from the water, begin airway interventions such as rescue breathing and cardiopulmonary resuscitation (CPR), if necessary. Don't use rapid compression maneuver to the abdomen (a sub diaphragmatic abdominal thrust) to clear the airway of aspirated water: Most victims don't aspirate much water, and any they do aspirate is rapidly absorbed from the lungs into the circulation. Use an abdominal thrust only if you suspect the airway is obstructed.

The best treatment for near drowning is prevention. Teach parents to continuously supervise children who are in or near water. Also remind everyone about these basic safety measures:

- Don't drink alcoholic beverages while in or around water.
- Never swim alone.
- Don't dive into shallow water or into any unknown depth of water.
- Keep appropriate water rescue and flotation devices, including life jackets, available on boats and around water.

**Lightning Strikes**

Lightning strikes can occur year-round and they kill more than 80 people a year in the United States. The typically victim is male between the ages of 15 and 44. Most lightning-related injuries occur in the summer, when thunderstorms are common and more people are outdoors.

Besides directly striking a victim, lightning can kill by splashing or side flashing off a nearby strike area or by traveling through the ground ("step voltage"). Only 30% of victims die, but 74% of survivors suffer permanent disabilities.
Lightning often causes the heart to stop beating (asystole) or a fatal heart irregularity (ventricular fibrillation). Brain injury is another serious direct consequence of lightning strike. Central nervous system effects may include an immediate but temporary paralysis that can persist for minutes to hours, loss of consciousness, amnesia, confusion or disorientation, photophobia, and seizures. Intracranial hemorrhage and brain swelling can also occur. Possible long-term effects include fatigue, subtle cognitive impairments, and posttraumatic stress disorder.

Lightning's powerful effect on the body puts victims at risk for the entire spectrum of multi-system trauma. However, the full extent of injury may not be evident until thorough monitoring and diagnostic evaluation can be performed in the hospital, and some deficits may not be apparent until later. Your initial care should include immobilizing the spine until fractures are ruled out, supporting the ABCs, and providing advanced life support.

Remember, victims of lightning strike aren't electrically charged and pose no danger to the rescuer. However, the storm can continue to threaten anyone who's exposed to the weather. Protect yourself and others first, so you can help the victim. If you're dealing with more than one lightning-strike victim, give priority to victims in cardiopulmonary arrest. Begin CPR immediately.

Lightning also produces burn injuries, although most are superficial and heal without incident. Always look for entrance and exit wounds. Other possible complications include ruptured ear drums, blindness, cataracts, and retinal detachment.

Next week, we'll deal with other summertime emergencies such as insect and snake bites and some general principles on how to keep safe in the summer.

Remember, it's your life and it's your health.