



The Dangers of Summertime

*Important information to keep
you and your patients safe.*

Stephanie Malchak, AEMT-P



It's time for outdoor activities!

- For many, summer means fun in the sun.
- Kids are out of school.
- Adults are on vacation.



Because most sports and recreational activities are seen as healthy and fun.....

They are often considered dangerous or risky, even though they can be.



It's all fun and games until....

- Millions of children take up sports in their backyard or at the park.
- These activities help develop youths' muscles and coordination, but they can also result in injury.
- Young athletes are more susceptible to injury because their bones, muscles, tendons and ligaments are still growing.



The National SAFE KIDS Campaign study.....

- Study on unintentional injury and death for children under 14 years of age found nearly half of childhood deaths occur between May and August, with a spike in those rates in July.
- Reason? Children are out of school, spend more time outside and are not supervised as closely as at other times of the year.

A decorative vertical bar on the left side of the slide, featuring a colorful triangle (blue, purple, green) at the top and a pattern of small, overlapping squares in various colors (green, blue, purple) below it.

Study cont'd.....

- Approx 3 million children will be rushed to the ED this summer alone for various injuries, and ED physicians think of summertime as “trauma season”.
- 42 percent of all unintentional injury-related deaths occur during the summer months.



Sports with the most injuries

- Basketball leads the American Academy of Orthopedic Surgeons “Top 10” list of popular summer recreational activities with the most injuries.
- In 2001, 1.6 million injuries related to basketball were medically treated.



Cont'd...

- Some of the 5.5 million injuries are sprains and strains, cuts and bruises, fractures and dislocations; others require long-term medical care.
- Among the “Top 10” sports, the total cost is \$84.7 billion in medical, legal and other expenses.



The “Top 10” Sports and their Injuries

- Basketball – 1,633,905
- Bicycles – 1,498,252
- Baseball – 492,832
- Soccer – 477,647
- Softball – 406,381
- Trampolines – 246,875
- Inline Skating – 233,806
- Horseback Riding – 196,260
- Weightlifting – 189,942
- Volleyball – 187,391



Ones that are not forgotten....

- Golf-related injuries - 131,975
- Tennis-related injuries – 78,102



It's too HOT to wear a helmet!

- Estimated about 3 million head injuries related to consumer products were treated in the ED.
- About 440,000 of these were injuries such as concussions and skull fractures.



Head Injuries

- **All-terrain vehicles**... 12,000 head injuries (14% hospitalization)
- **Bicycles**... 169,000 head injuries (6% hospitalization)
- **Horseback riding**... 8,000 head injuries (27% hospitalization)
- *1 out of 10 bicyclists wear helmets*
- *3/4ths of ATV drivers with head injuries were not wearing helmets*

A vertical decorative bar on the left side of the slide, featuring a colorful, abstract pattern of green, blue, and purple. At the top of this bar is a 3D-style triangle with a blue-to-purple gradient and a shadow.

Submersion Injuries (Near Drowning)



Background

- Drowning is defined as death secondary to asphyxia while immersed in a liquid, usually water, or within 24 hours of submersion.
- The classic image of a victim helplessly gasping and thrashing in the water rarely is reported.
- A more ominous scenario of a motionless individual floating in the water or quietly disappearing beneath the surface is more typical.

A vertical decorative bar on the left side of the slide, featuring a colorful, abstract pattern of green, blue, and purple. At the top of this bar is a large, semi-transparent triangle with a gradient from blue to purple.

Background cont'd...

- Near drowning connotes an immersion episode of sufficient severity to warrant medical attention that may lead to morbidity and death.



Pathophysiology

- The principal physiologic consequence of immersion injury is prolonged hypoxemia.
- After initial gasping, and possible aspiration, immersion stimulates hyperventilation, followed by voluntary apnea and a variable degree and duration of laryngospasm. This leads to hypoxemia.
- Depending on the degree of hypoxemia and resultant acidosis, the patient may develop cardiac arrest and central nervous system ischemia.



Pathophysiology cont'd...

- Asphyxia leads to relaxation of the airway, which permits the lungs to fill with water in many individuals.
(“wet drowning”)
- Approximately 10-20% of individuals maintain tight laryngospasm until cardiac arrest occurs and inspiratory efforts have ceased. These victims do not aspirate any fluid.
(“dry drowning”)

A vertical decorative bar on the left side of the slide, featuring a colorful triangle pointing right at the top, with a gradient of colors including blue, purple, green, and yellow.

Pathophysiology cont'd...

- In young children suddenly immersed in cold water, the mammalian diving reflex may occur and produce apnea, bradycardia, and vasoconstriction of nonessential vascular beds with shunting of blood to the coronary and cerebral circulation.



Pathophysiology cont'd...

- The target organ of submersion injury is the lung. Injury to other symptoms is largely secondary to hypoxia and ischemic acidosis.
- Additional CNS insult may result from concomitant head or spinal cord injury.
- Fluid aspirated into the lungs produces vagally mediated pulmonary vasoconstriction and hypertension.
- Fresh water moves rapidly across the alveolar-capillary membrane into the microcirculation.



Pathophysiology cont'd...

- Surfactant is destroyed, producing alveolar instability, atelectasis, and decreased compliance with marked ventilation/perfusion mismatching.
- As much as 75% of blood flow may circulate through hypoventilated lungs.

A decorative vertical bar on the left side of the slide, featuring a colorful triangle (blue, purple, green) pointing right. The bar has a gradient background with various colors.

Pathophysiology cont'd...

- In salt water near drowning, surfactant washout occurs, and protein-rich fluid exudates rapidly into the alveoli and pulmonary interstitium.
- Compliance is reduced, alveolar-capillary basement membrane is damaged directly, and shunting occurs. This results in rapid induction of serious hypoxia.
- Fluid-induced bronchospasm also may contribute to hypoxia.



Pathophysiology cont'd...

- In a minor percentage of patients, aspiration of vomitus, sand, silt, and sewage may result in occlusion of bronchi, bronchospasm, pneumonia, abscess formation, and inflammatory damages to alveolar capillary membranes.
- Postobstructive pulmonary edema following laryngeal spasm and hypoxic neuronal injury with resultant neurogenic pulmonary edema also may play roles.



Frequency

- In the US: Drowning deaths number more than 6500 per year.
- Despite preventive measures, drowning is second only to MVA's as the most common cause of injury and death in children aged 1 month to 14 years.
- Preschool-aged boys are at greatest risk of submersion injury.
- Residential swimming pools are the most common submersion site in this age group.



Frequency cont'd...

- An additional 1200 reported immersion deaths are boating related, 500 are motor vehicle associated, and 1000 reported drownings are of undermined etiology.
- Scuba diving accounts for an estimated 700-800 deaths per year (etiologies include inadequate experience/training, exhaustion, panic, carelessness, and barotrauma).



Morbidity and Mortality

- Due primarily to laryngospasm and pulmonary injury, resulting hypoxemia, and its effects on the brain and other organ systems.
- Prevention is as important as any measures that can be taken after the fact.
- A high risk of death exists secondary to the development of adult respiratory distress syndrome (ARDS), which has been termed postimmersion syndrome or secondary drowning. Morbidity is due to neurologic insult, as well as to multiple organ system failure.



Morbidity and Mortality cont'd..

- Adult mortality rate is difficult to quantify because of poor reporting and inconsistent record keeping.
- 35% of immersion episodes in children are fatal; 33% result in some degree of neurologic impairment, 11% in severe neurologic sequelae.
- Male to female ratios are approximately 5:1 for non-boat-related drownings.
- Only in bathtub incidents do girls predominate in incidence.
- Peak ages: <4 years of age and 15-24 years.



History

- Typical incidents involve a toddler left unattended temporarily or under the supervision of an older sibling, an adolescent found floating in the water, or a victim diving and not resurfacing.
- The submersion time, water temperature, water tonicity, symptoms, associated injuries (ESPECIALLY CERVICAL SPINE AND HEAD **HINT, HINT**), type of rescue, and response to initial resuscitation are all relevant factors.

A vertical decorative bar on the left side of the slide, featuring a colorful triangle pointing right at the top, with a gradient of colors including blue, purple, green, and yellow.

History cont'd...

- Thermal conduction of water is 25-30 times that of air. The temp. of thermally neutral water, in which a nude individual's heat production balances heat loss, is 33 degrees C.
- Physical exertion increases heat loss secondary to convection/conduction up to 30-50% faster.



History cont'd...

- A significant risk of hypothermia usually develops in water temperatures less than 25 degrees C, which is the temperature found in most US natural waters during the majority of the year.
- Other important historical factors include the following:
 - Shortness of breath/difficulty breathing/cessation of breathing
 - Persistent cough
 - Possible aspiration of foreign material
 - Level of consc at presentation, hx. Of loss of consc.
 - Vomiting
 - Coincident alcohol or drug abuse
 - Pertinent PMHX, seizure disorder, diabetes, psych hx., severe arthritis, or neuromuscular disorder.



Physical

- A victim of a submersion incident may be classified initially into 1 of the following 4 groups:
- **Asymptomatic**
- **Symptomatic**
 - Altered VS
 - Anxious appearance
 - Tachypnea, dyspnea, or hypoxia
 - Metabolic acidosis
 - Altered level of consc., neurologic deficit
- **CPR**
 - Apnea
 - Asystole, VT/VF, bradycardia
 - Immersion syndrome
- **Obviously dead**
 - **Normothermic with asystole**
 - **Apnea**
 - **Rigor mortis**
 - **Dependent lividity**
 - **No apparent CNS function**



Causes

- Bathtub drowning is most common in children younger than 1 year.
- A majority of these victims drown during a brief (<5min) lapse in adult supervision.
- Bathtub and pail drownings may represent child abuse; carefully examine the child for other evidence of injury.



Causes cont'd...

- In the preschool-aged children, drownings occur most commonly to residential swimming pools.
- Many residential pools have no physical barrier between the pool and home.
- Open gates are involved in up to 70% of drownings in cases involving fenced-in pools.



Causes cont'd...

- Young adults typically drown in ponds, lakes, rivers and oceans.
- Cervical spine injuries and head trauma, which result from diving into water that may be shallow or contain rocks and other hazards, have been implicated.
- Alcohol and, to a lesser extent, other recreational drugs are implicated in many cases.



Causes cont'd...

- Consider underlying disease/illness in all age groups:
 - Seizure disorder
 - AMI or syncopal episode
 - Poor neuromuscular control
 - Major depression/suicide
 - Anxiety/panic disorder
 - Diabetes, hypoglycemia

A vertical decorative bar on the left side of the slide, featuring a colorful, abstract pattern of green, blue, and purple. A large, semi-transparent triangle with a gradient from blue to purple is positioned at the top left, partially overlapping the bar and the title.

Water sports hazards

- Poor judgment and substance abuse (alcohol and other recreational drugs in conjunction with boat operation.
- Cervical spine injury and head trauma associated with surfing, water skiing, and jet skiing.
- Scuba diving accidents and other injuries (ie. Bites, stings, and lacerations)



Prehospital Care

- Maintain c-spine immobilization.
- Management of the ABC's, with particular attention to securing the earliest possible airway and providing oxygenation and ventilation.
- Check for foreign material and vomit in the airway.
- Meet up with ALS enroute



Heat Emergencies

A vertical decorative bar on the left side of the slide, featuring a colorful, abstract pattern of green, blue, and purple. At the top of this bar is a large, semi-transparent triangle with a gradient from blue to purple.

General Information

- While most people can tolerate the heat, small children, the elderly and those in poor health cannot.
- Particularly the elderly – suffer the most from heat injuries.



Cont'd.....

- BUT, even healthy individuals can suffer from the extreme temperature.
- How many times have we seen our fellow medics or firefighters complain of muscle cramps, headache, fatigue, nausea, or even collapse at a scene after overexerting themselves?



Physiology

- The body's optimal core temperature is 37 degrees C (98.6 F)
- When that temp. is higher or lower, the body works to throw off or generate heat to maintain its core temperature.



Physiology cont'd...

- During physical activity, the body can produce more than 10 times the heat it produces during rest.
- When the ambient temperature is higher than the body's temperature, it will absorb that heat.



Physiology cont'd...

- Hyperthermia results when the body's core temperature is raised above 40.5 degrees C (105 F)

A vertical decorative bar on the left side of the slide, featuring a colorful, abstract pattern of green, blue, and purple. At the top of this bar is a large, semi-transparent triangle with a gradient from blue to purple.

Physiology cont'd...

- When the body's temperature is raised above normal, blood vessels dilate to move blood outward. The body then uses four processes to eliminate excess heat:
 - Convection
 - Radiation
 - Conduction
 - Evaporation



What are these?

- **Convection** – when a breeze moves across your skin, it picks up heat and moves it away.
- **Radiation** – excess body heat radiates into the surrounding atmosphere.
- **Conduction** – the skin touches something that allows heat to dissipate into it
- **Evaporation** – sweat forms on the skin, allowing convection a better chance to work.



Physiology cont'd...

- As the body moves blood away from the internal organs, the heart works harder to maintain blood flow.
- As blood flows away from the brain, its temperature will increase, resulting in the symptoms most often seen with heat injuries.
- As fluids are lost through sweating, vital electrolytes are taken away from the musculature and dehydration develops.



Physiology cont'd...

- When the body can no longer maintain its core temperature, potentially deadly heat stroke can occur within 15 minutes.
- Many elderly people are already taking vasodilators, which only increases their susceptibility to hyperthermia.
- Small children and infants have a much lower blood volume than adults so it doesn't take very long at all for them to develop serious heat injuries.



Vehicles get HOT!!!

- Many people and pets stay in vehicles unattended....but is very dangerous during the summertime.
- Per the National SAFE KIDS Campaign, “When the outside temperature is 83 degrees Fahrenheit, and your window is down 2 inches, the temperature inside your car can **reach 109 degrees Fahrenheit in 15 minutes.**”



The Car Interior....

- The color of a car's interior can make a difference. If the outside temp. is 79 degrees F., the inside car temperature can soar to extreme levels.
- WHITE – 135 degrees F (*potential Temp.*)
- RED – 154 degrees F
- BLUE/GREEN – 165 degrees F
- BLACK – 192 degrees F
- *Skin that touches a car seat surface over 150 degrees F can severely burned in 1 second.*

A decorative vertical bar on the left side of the slide, featuring a colorful triangle (blue, purple, green) at the top and a blurred, multi-colored background below. The triangle is a gradient of blue, purple, and green, pointing to the right.

Heat Cramps

- Usually the first sign of heat injury is heat cramps. The body has been trying to maintain its core temperature by moving fluids to the periphery.
- A person suffering from heat cramps has lost enough fluids through evaporation-sweating – that they begin to suffer the resulting lack of fluids and electrolytes.



Heat Cramps

- A patient suffering from heat cramps will still be hydrated enough for their skin to be moist. They may complain of some or all of the following:
 - Abdominal cramps
 - Nausea and vomiting
 - Tingling in the hands and/or feet
 - Muscle cramps – ranging from discomfort to incapacitating pain
 - Rapid pulse rate
 - Slight hypotension



Heat Exhaustion

- Characterized by the same symptoms as heat cramps, it may present in the same manner, except patients sweat profusely. Other symptoms that characterize heat exhaustion are:
 - Syncope
 - Altered mental status (confusion or disorientation)
 - Slight temperature elevation
 - Flu-like symptoms
 - Headache
 - Fatigue
 - Dizziness
 - Abdominal cramping (with or without N/V)



Heat Stroke

- The most severe and life-threatening heat injury
- Beyond heat cramps and heat exhaustion, the body can no longer regulate its temperature.
- The body has basically sweated itself into dehydration – or the ambient humidity may be too high for the patient to sweat.
- Once this and other cooling mechanisms shut down, the body's core temperature rises dramatically, reaching life-threatening levels.



Heat Stroke

- An altered mental status is usually the first sign that something is wrong; or the patient will be unconscious and unresponsive to stimulus. Other symptoms may include:
- Tremors or seizures
- Rapid pulse rate
- Rapid breathing
- Hot dry skin (sweaty if caught early)

A vertical decorative bar on the left side of the slide, featuring a colorful, pixelated pattern in shades of green, blue, and purple. At the top of this bar is a 3D-style triangle pointing to the right, with a blue-to-purple gradient and a shadow effect.

NYS DOH Statewide BLS Adult and Pediatric Protocol for Heat Emergencies

A vertical decorative bar on the left side of the slide, featuring a colorful, abstract pattern of green, blue, and purple. At the top of this bar is a small, 3D-style triangle with a blue-to-purple gradient.

Susquehanna Regional EMS ALS Protocol for Heat Emergencies