



# EMS for Children Newsletter

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**EMS for Children Program / NJ Office of EMS / NJ Department of Health and Senior Services**  
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## AND THE HEAT IS ON !!!

- BY KATHY LUTZ, MSN, CPNP-

Soccer, baseball, biking, swimming. Participating in sports helps keep children healthy.

As summer pushes into New Jersey and the temperatures rise, kids play outside for longer and longer periods of time. Infants, children and adolescents are at high risk for summer illnesses and injuries and more vulnerable to heat injuries. EMTs across the state are beginning to respond to an increasing number of calls for children (and adults) suffering from summer-specific illness and injuries - sports injuries, water-related accidents, and heat illnesses.



June 9, 2008: "Hundreds of students in NJ got a break from class on Monday as temperatures across the tri-state neared 100 degrees." WCBSTV.com "Two school districts in Cumberland County are sending students home early today because of the heat." *South Jersey News Online*

2007 was one of the 10 warmest years for the contiguous United States since national weather recordkeeping began in 1895, setting more than 2,500 records. The year included exceptional drought, wildfires, killer heat waves and floods. These record temperatures are part of a trend toward rising temperatures from global warming.



Humans are warm-blooded animals, maintaining a fairly constant temperature despite changes in environmental temperatures. The body generates heat as a result of constant internal chemical processes. A certain amount of this heat is needed to maintain normal body temperature. Heat that is not needed for temperature maintenance must be lost from the body. Heat is lost from the body by the processes of evaporation, radiation, conduction and convection.

### Inside this issue:

- And the Heat Is On pg.1
- NEWS pg.4
- Cardiac Deaths in Young Athletes pg.6
- Post Test pg.7

### 2009 EMSC Advisory Council

**Meeting Dates:**  
August 18, 2009  
November 17, 2009

**Meeting Location:**  
Health & Agriculture Bldg.  
HCC Conference Rm. - 6th Fl.  
Market & S. Warren Sts.  
Trenton, NJ 08611  
609-633-7777

**Meeting Time:**  
10:00 a.m. - 12:00 noon



Continued on page 2

Your skin is the largest organ in your body, functionally very simple and yet morphologically very complex. It serves many essential functions such as protection against trauma, sealing out the environment, transmission of perceptions (touch, pain, heat, cold), and maintenance of thermal balance by balancing heat loss to heat production. About 80% of heat transfer occurs through the skin. Exposed to heat, the body's internal temperature is controlled by sweating. The rest takes place through the mucous membranes of the respiratory, digestive and urinary tracts.

There are certain factors that interfere with this heat dissipation process and thus predispose individuals to the various forms of heat illness. High ambient temperature, high humidity, obesity, diabetes, alcoholism, certain drugs (beta-blockers, antihistamines, diuretics) and an impaired ability to sweat (cystic fibrosis, skin diseases, healed burns) can all interfere with the heat dissipation process. Additionally, rigorous activities, drug overdoses (cocaine, caffeine, methamphetamine, ecstasy) hyperthyroidism and agitated or tremulous states (Parkinson, psychosis, drug withdrawal - opiates and alcohol) can all increase internal heat production. Inside a parked car in hot weather, unventilated, hot living quarters and hot working conditions can all increase heat absorption. During times of extreme heat and humidity the body can't always keep up and will suffer from heat stress. Extreme heat can kill by pushing the human body beyond its limits.

Infants and young children have a greater ratio of surface area to body mass. They produce more metabolic heat for body mass during exercise than adults, perspire less and require a higher core body temperature to trigger sweating. Also, they take longer to acclimate to hot weather. The elderly do not adjust so well to sudden temperature changes and are more likely to have chronic medical conditions or take prescription medications that impair the body's ability to regulate temperature or inhibit perspiration. These issues make members of both groups more susceptible to heat-related illnesses.

Heat waves kill more Americans than any other type of natural disaster, not tornadoes and not hurricanes. Overall, heat and drought kill nearly 20% of all Americans who die because of a natural hazard, and another 19% die from severe summer weather. So every chance you get EDUCATE. Prevention is the best treatment for hyperthermia. There are things to do to

prevent the warm weather illnesses and injuries. Teach the kids - and their families - in your area how to properly prepare for their fun in the sun.

- ❖ Dress appropriately for the temperature. Young children and babies should be dressed lightly and not bundled in blankets.
- ❖ Try to stay out of the sun and humidity during the hottest time of the day. Stay in a cooled environment - and if there is no air conditioning try to stay in the lowest level of the house and keep the house shaded (close window blinds and curtains).
- ❖ Acclimate to hot weather workouts before practice actually begins. And avoid vigorous exercise in the heat.
- ❖ Wear protective gear specific to the sport - and make sure it's the right size too.
- ❖ Warm ups are important and so are cool down exercises.
- ❖ Make sure everyone drinks plenty of fluids before, during and after all practices and games/outdoor activities. Water is the single most important beverage anyone can drink to prevent heat injury.
- ❖ Take breaks.
- ❖ Eat lighter, balanced meals.
- ❖ Don't leave children in parked cars during hot weather.
- ❖ Keep track of how long a child has been outside. Don't let anyone overdo it.
- ❖ Don't forget the sunscreen and a hat (where possible) - and protect your eyes from direct sunlight.



## Sunburn

Sunburn is a very common heat injury caused by prolonged exposure of naked skin to the ultraviolet rays of the sun or a sun lamp. The result can be redness, tissue swelling and the tenderness associated with first-degree (superficial) burns or the necrosis and blistering of second-degree (partial thickness) burns.

Sunburned skin can be extremely sensitive and severe sunburn can be accompanied by nausea, chills, fever, tachycardia, headache and abdominal cramping. Dehydration may occur. Sunburn may lead to several complications, including fluid and electrolyte loss, systemic toxicity, infection of any ruptured blisters or even heat exhaustion.



## Heat Exhaustion

Heat exhaustion is a more serious heat illness. It is a common condition that usually occurs when a person exercises vigorously or works in a hot, humid place. It results when body fluids are lost through heavy sweating. Blood flow to the skin increases, causing blood flow to vital organs to decrease. This results in a mild form of shock. Onset is gradual, with initial complaints that include thirst, headache, dizziness, weakness, vertigo, nausea and muscle cramps. Body temperature is near normal; the skin is cool, damp and pale. Blood pressure may drop but usually returns to normal as the person is placed in a recumbent position.

## Heat Stroke

Heat stroke is a life-threatening failure of the body temperature control system. It usually occurs during or immediately after physical activity; especially in an unacclimated teenager who is exercising vigorously. The onset is rapid and includes headache, weakness, body temperature of 105° or higher and disorientation. There is little or no sweating. Unconsciousness and convulsions may occur if the body is not quickly cooled. Left untreated, death results from collapse of the circulatory system and damage to the central nervous system.

Comparing Heat Emergencies\*

	Heat Cramps	Heat Exhaustion	Heat Stroke
Onset		May be gradual	Rapid
Airway	Patent	Patent or slight compromise	Compromised
Breathing	Normal	May be rapid and shallow	Varies - deep & rapid, later shallow & slowing
Circulation	Normal heart rate or tachycardia. Normal BP	Weak pulse. Normal BP	Rapid & full pulse, later slowing. Low BP
Mental Status	Normal	Normal or mild confusion	Confusion, delirium, seizures
Temperature	Usually normal but may be slightly elevated	Usually slightly elevated	>105°F (40.5°C)
Skin	Cool, moist	Pale, cool, moist	Dry, hot, flushed skin as condition worsens
Muscle Cramping	Severe	May or may not be present	Absent
Pathophysiology	Sodium and water loss	Sodium and water loss, hypovolemia	Failure of heat-regulating mechanisms

\*Adapted from: Aehlert, Barbara: *Rapid Pediatric Emergency Care*. St. Louis, 2006, Mosby

## How Should You Treat These Emergencies?

### Heat Cramps

#### *BLS Procedure*

- Remove individual from the heat source - move them to a cooler place
- Rest the cramping muscles
- Monitor vital signs - including temperature
- If patient is conscious and alert, encourage a half glass of cool water every 15 minutes (Do not give fluids with alcohol or caffeine in them.)

#### *ALS Procedure*

- Maintain BLS continuum of care and contact Medical Control
- Monitor cardiac rhythm
- If heat cramps are severe or patient's level of consciousness is diminished, establish IV access and give a fluid bolus per local protocol

### Heat Exhaustion

#### *BLS Procedure*

- Remove extra clothing and loosen tight clothing
- Move the person to a cooler place
- Monitor vital signs - including temperature
- Ensure a patent airway
- If alert, rehydrate with cool water (Do not give fluids with alcohol or caffeine in them)
- Watch carefully for changes in his/her condition
- Have person lie down and elevate legs

#### *ALS Procedure*

- Maintain BSL continuum of care and contact Medical Control
- Monitor cardiac rhythm
- If necessary, establish IV access and give a fluid bolus per local protocol
- Monitor blood glucose level; treat hypoglycemia

### Heat Stroke

#### *BLS Procedure*

- Remove the person from hot environment
- Monitor and if necessary support airway, breathing, and circulation
- Transport immediately
- Begin cooling - Remove clothing and cover child in sheets soaked in tepid water with ice packs to the neck, armpits and groin area. Cool patient to 102°F, then dry patient
- Monitor vital signs every 5-10 minutes, including temperature

- Be alert for, and treat for, shock
- Be alert for seizures

#### *ALS Procedure*

- Maintain BLS continuum of care and contact Medical Control
- Monitor cardiac rhythm
- Establish IV access
- Give IV fluid bolus per local protocol

Sports injuries are inevitable during the summer months (and year-round actually). Sprains, strains and bone injuries occur all too frequently. A sprain is a traumatic stretching or partial tearing of one or more ligaments. Ligaments are the tough, fibrous tissues connecting two or more bones at a joint that prevent excessive movement of the joint. A strain is the resulting injury to muscles or tendons that sometimes occurs following excessive physical effort. There are also repetitive motion injuries, including stress fractures (ligament pulls off small pieces of bone) and tendonitis (inflammation of a tendon). Growing children and adolescents can also suffer growth plate injuries because the developing tissues at the ends of the long bones have yet to be replaced by solid bone. Long bones include the long bones of the fingers, the ulna, collarbone, hip, femur, tibia and fibula, plus the bones of the feet and ankles.

The best immediate treatment is RICE:

- Rest Reduce or stop using the injured area for 48 hours
- Ice Put an ice pack to the injured area for 20 minutes at a time, 4 to 8 times/day
- Compression Compression (elastic wrap, etc) may help to reduce swelling
- Elevation Keep the injured area elevated above the level of the heart

NJ Statewide Conference on EMS

Nov. 12-14, 2009

[www.njemsconference.com](http://www.njemsconference.com)



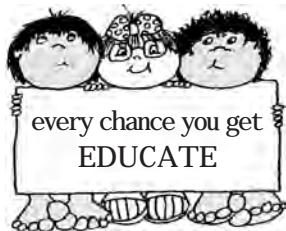
Last summer six New Jersey residents mistakenly drank Torch Lamp Oil, thinking it was apple juice. When accidentally taken by mouth such lamp oils enter the lungs causing pneumonia and death. Jugs containing lamp oils must be stored in a locked cabinet away from storage of food and drinks. Call the poison control center at 1-800-222-1222 for up-to-date emergency treatment advice as well as for prevention information.

## Concussion

In the United States, between 1.6 million and 3.8 million sports- and recreation-related traumatic brain injuries occur each year. Concussion is caused by a bump, blow, or jolt to the head that causes a sudden change in the momentum of the head resulting in mild-to-severe disruption in brain function. It can be a difficult and detailed process to reach an accurate diagnosis. The first question is always to ask if there was loss of consciousness and for how long. However, only about 10% of patients who actually sustain a concussion lose consciousness. You will also want to know about the mechanism of injury and a detailed description of the events that led to the injury. Where and how was the child hit? Was it contact induced? What hit the child? And where did it hit the head?

The symptoms of concussion are as varied as the patients. However, there are some red flags that signal a patient should be immediately transported to an Emergency Department. These include:

- Headaches that worsen
- Looks very drowsy or cannot be awakened
- Cannot recognize people or places
- Unusual behavior change
- Weakness or numbness in legs or arms
- Loss of consciousness
- Increasing irritability
- Increasing confusion
- Repeated vomiting
- Seizures
- Neck pain
- Slurred speech



The CDC offers a useful resource on concussion prevention, diagnosis and treatment including evaluation forms. It can be downloaded at [www.cdc.gov/ncipc/pub-rel/tbi\\_toolkit/toolkit.htm](http://www.cdc.gov/ncipc/pub-rel/tbi_toolkit/toolkit.htm)

## Water-Related Accidents

You're responding to an emergency at the lake or someone's backyard or a residential bathroom. Any one of these calls might lead you a drowning or near-drowning.

Drowning (death from suffocation/asphyxiation due to submersion in a liquid) is the third most common cause of accidental death in the United States, causing almost 8,000 deaths each year. But it is the second leading cause of pediatric accidental death and the #1 leading cause of accidental death in

1 to 4 year olds in New Jersey. It is estimated that 4 times as many people nearly drown (survival for at least 24 hours following the same circumstances as drowning).

Scene safety should be your #1 priority upon arrival at the scene of a drowning or near-drowning. This is essential as 1 in 9 drowning victims started as a rescuer. Personal Protective Equipment includes both a lifejacket and thermal protection.

The pathophysiology of drowning is panic → struggle → breath holding → hypoxemia/hypocapnia (low arterial carbon dioxide level) → voluntary breath holding is overcome. This leads to aspiration and swallowing of water, respiratory and metabolic acidosis and cardiovascular complications.

Near-drowning patients may initially present as either symptomatic or asymptomatic. Even when asymptomatic, they can develop complications later primarily because of pulmonary damage due to aspiration and/or aspiration pneumonia. Transportation to an Emergency Department is essential. We cannot overestimate the need for early and aggressive airway management and oxygen administration. Even asymptomatic patients should be evaluated in an Emergency Department and observed for 8 hours following the incident.

Many factors influence the outcome of resuscitation, including submersion time, water temperature, age and condition of the patient, water clarity, aspiration, initiation of immediate rescue breathing, CPR and oxygen plus prompt pre-hospital advanced cardiac life support. Remember-initial life support provided at the scene has the most impact on outcome. Treatment priorities should include airway, breathing and circulation with attention to C-spine as needed. Rescue breathing should be initiated as quickly as possible, even before removal from the water, if possible.

Drowning or near-drowning is what you probably think of first in connection with water-related accidents. However, there's also boating, water-skiing, wind surfing, jet-skiing and diving to name just a few more. These accidents can produce soft tissue injuries, fractured bones, airway obstruction and hypothermia. Medical problems such as heart attacks can cause or be caused by water-related accidents. Remember too that water-related accidents can happen far away from pools, lakes and the shore. Adults, as well as children, can drown in only a few inches of water in a bathtub, toilet or cleaning bucket.

## Learn To Look For These Problems in Water-Related Accidents

Airway Obstruction	Water in the lungs, foreign matter in the airway, swollen airway tissue
Cardiac Arrest	Related to respiratory arrest or occurs before a near-drowning
Heart Attack	Chest pains are NOT always due to muscle cramps because of swimming
Head & Neck Injuries	Found in boating, water-skiing, diving and swimming accidents
Internal Injuries	Be alert for musculoskeletal injuries, soft-tissue injuries and internal bleeding
Hypothermia	Water need not be very cold and one doesn't have to be in the water long for hypothermia to occur
Substance abuse	Alcohol and drug use are all too frequently associated with adolescent and young adult drownings

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E-mail us your pediatric questions and/or article ideas !!!  
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### Study Examines Cardiac Deaths in Young Athletes

- A new article in the Journal of Pediatrics, "Sudden Unexpected Death in Young Athletes: Reconsidering 'Hypertrophic Cardiomyopathy'" reexamines unexpected cardiac deaths in young athletes. Hypertrophic cardiomyopathy (HCM), a thickened heart muscle that makes it harder for the heart to pump blood, has traditionally been considered a major cause of sudden unexpected cardiac death in young athletes. Under the commonly accepted scenario, a young person with pre-existing, unsuspected HCM suffers sudden death as a result of the stress imposed on the heart by sports training. Preventive efforts involve using medical screening to detect the athlete with pre-existing disease. However, HCM might not be the true cause of these deaths. Based on certain epidemiological evidence, some of these deaths may not be related to a disease, but rather to heart muscle thickening because of sports training. Black males appear to be the athletes most at risk.

# POST TEST

1. All of the following increase internal heat production except
  - A. caffeine
  - B. sedentary activities
  - C. alcohol
  - D. hyperthyroidism
- 2 - 7 The various heat emergencies can be confused. Match each symptom to the correct medical problem. (answers may be used multiple times)
  - A. heat cramps
  - B. heat exhaustion
  - C. heat stroke
  - D. sunburn
2. Can cause redness and tenderness
3. Little or no sweating
4. Muscle pains and spasms
5. Gradual onset
6. May cause seizures
7. Skin pale and moist
8. Red flag symptoms of concussion that signal a patient should be transported to an Emergency Dept. include:
  - A. patient looks very drowsy
  - B. slurred speech
  - C. vomiting
  - D. all of the above
9. An asymptomatic near-drowning patient may develop complications later.
  - A. True
  - B. False
10. The largest organ in the body is:
  - A. heart
  - B. liver
  - C. skin
  - D. spleen
11. Water-related accidents can cause:
  - A. internal injuries
  - B. heat stroke
  - C. heart attack
  - D. both A & C
12. Hurricanes kill more people than any other natural disaster.
  - A. True
  - B. False

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Cut here  
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Please Print Clearly

Name: \_\_\_\_\_ EMT ID : \_\_\_\_\_

Address: \_\_\_\_\_

Town: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone Number: \_\_\_\_\_

E-Mail: \_\_\_\_\_

Answer sheets with incomplete, illegible or inaccurate information will be discarded. Do not send any other correspondence with the answer sheet. All answer sheets must be received prior to September 30, 2009.

Answer Sheet (#090237061) EMSC Newsletter Summer 2009  
1 (One) Elective CEU for NJ EMTs with a minimum score of 70%

1 (One) Professional Development Hour for NJ School Nurses with a minimum score of 70%

- Check this box if NJ EMT  
 Check this box if NJ School Nurse

Summer/Ilnesses/Injuries (circle correct answers)

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B      |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D | 11. A B C D |
| 4. A B C D | 8. A B C D | 12. A B     |

Complete and return only the answer sheet to:

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