Behavioral Objectives

After reading this newsletter the learner will be able to:

1. Discuss population-specific risk factors, the incidence, and causes of injury related to heat stroke and near-drowning.

2. Describe emergency interventions and prevention strategies of near-drowning and heat stroke.

Water recreation and hot, humid weather pose considerable health threats for thousands of Americans yearly. An estimated 7,000 drowning and 90,000 near-drowning cases occur yearly in the United States. Factors associated with drowning and near-drowning include an inability to swim, diving injuries, and exhaustion. Adolescents, chiefly because of the risk-taking behaviors characteristic of this age-group, as well as young children, are most likely to drown or be near-drowning victims. Males comprise 80% of people who drown in the United States. Alcohol use, which alters awareness of the environment, increases risk taking behaviors, and promotes dehydration, is involved in more than half of all reported drowning and near-drowning incidents. Florida, Louisiana and Alabama are among the states having the highest rates of drowning and near-drowning.

Heat stroke, a body temperature of greater than 40 °C (105 °F), is a primary weather-related cause of death in the United States, claiming over 600 lives annually. Hyperthermia is a general term given to a variety of heat-related illnesses, including heat cramps, heat edema, heat syncope, heat exhaustion and heat stroke. Of these heat-related illnesses, only heat stroke is a true medical emergency, potentially causing brain damage or death.

This newsletter will discuss the two most common summer emergencies, heat stroke and near-drowning. Population-specific risk factors, the incidence, and causes of injury related to heat stroke and near-drowning will be discussed, as well as emergency interventions and prevention strategies.

Near-Drowning

Although near-drowning, recovery after underwater submersion without ventilation, can occur year-round, it's commonly associated with summertime water recreation.

Near drowning is defined as survival for at least 24 hours after submersion that caused a respiratory arrest. Efforts to save a person who has drowned shouldn't be abandoned prematurely; successful resuscitation with full neurologic recovery has occurred in near-drowning patients after prolonged submersion in cold water. This is possible because of a decrease in metabolic demands and the diving reflex (the body's self-preservation technique of slowing its major systems when submerged in water).

The most important consequence of prolonged submersion is hypoxia, which can cause transient or permanent neurologic damage or death. How long the victim is submerged, as well as the temperature and composition of the water, affects the duration of hypoxia and is a critical component in determining the victim’s outcome. Hypothermia may protect cerebral tissues from hypoxic damage by reducing the cerebral metabolic rate, so very cold water may have a protective effect. To prevent further heat loss in conscious patients with hypothermia, once they are removed from the water, wet clothing should be removed before they are wrapped in thick blankets.

Most near-drowning victims will aspirate small amounts of water. However, contaminants, such as chlorine, algae, microbes, sand, and mud, can exacerbate lung damage or cause pulmonary infection. And, the composition of that water, whether fresh or salt, is another key outcome factor. Fresh water aspiration causes a washout of surfactant from the lungs, whereas aspiration of salt water, a hypertonic fluid, pulls fluid from the vascular space into the alveoli, causing pulmonary edema. In both cases, alveolar ventilation is impaired and compounds hypoxia.

Events surrounding the submersion incident also affect patient outcome. Did the victim have a seizure, myocardial infarction, or stroke while in the water? Is there head or cervical spine trauma from diving into shallow water or bodysurfing? Are there other injuries, such as being hit by a boat propeller? These circumstances can complicate rescue and recovery.

Priorities when providing emergency care for a submerged victim are to get the person out of the water, without jeopardizing personal safety, and to call, or have someone else call 911. Using a flotation device, such as a raft, is useful to support and stabilize the victim’s spine while getting the victim out of the water. With diving accidents, neck injury should be suspected and the victim’s neck should be supported in a neutral position, without flexion or extension.
Once the victim is safely removed from the water, a quick assessment of airway, breathing and circulation should be performed. CPR may be necessary if the patient has suffered cardiac arrest. However, in the majority of cases the initial treatment for a near-drowning victim is rescue breathing. Ventilation should be started as soon as the victim’s airway is opened, either when the victim is in shallow water or out of the water. The Heimlich maneuver, subdiaphragmatic abdominal thrusts, should be used only if airway obstruction is confirmed. Oxygen, intubation, and vascular access are essential interventions when emergency personnel arrive.

Once the victim is transferred to an emergency care facility, is determination of the degree of hypothermia. The patient’s temperature should be taken rectally. If hypothermia is severe, between 90°F (32.2°C) and 86°F (30°C), extracorporeal warming - cardiopulmonary bypass, in which the patient’s blood is circulated through a re-warming device and then returned to the body, is considered the most effective measure to raise body temperature. With this intervention, body temperature is generally increased by 1–2 °C every 3-5 minutes. However, many hospitals are not equipped to offer this treatment. The patient may be transferred to a facility that has the capacity for extracorporeal warming. Depending on the severity of hypothermia, alternative measures such as administering warm oxygen or fluids into the body, as well as warming of the torso, may be appropriate.

At the hospital, gastric decompression with a nasogastric or orogastric tube is commonly performed to prevent aspiration of gastric contents. This intervention also can improve ventilatory function since abdominal distention can interfere with lung expansion. Continuous assessment of respiratory and neurologic status is also priority.

HEAT STROKE

Heat stroke is a true medical emergency, potentially causing brain damage or death. Fainting is often an early sign. Heat-related illnesses are more common when the temperature is above 95°F (35°C) and the humidity is greater than 80%. When a heat stroke victim's heat regulatory mechanisms become overtaxed and fail, they are unable to compensate for a critical elevation in body temperature. Normally, the body keeps cool by sweating and by sending blood close to the skin. With sweating, water evaporates from the skin. However, if the air is humid, it is harder for sweat to evaporate, making it difficult for the body to get rid of extra heat. And, as long as blood is flowing properly to the skin, extra heat from the core of the body is "pumped" to the skin and removed by sweat evaporation. But with extremely high temperatures, the body will try to keep blood away from the skin to maintain the right temperature in the core of the body.

Heat stroke is classified as classic or exertional. Classic heat stroke results from continuous exposure to high temperatures and humidity. Classic heat stroke most commonly affects the poor, who have no air-conditioning, as well as the elderly and infants.

These age-groups have poorer abilities to regulate body temperature and fluid balance. However, persons of any age with dehydration, burns - including severe sunburn, as well as fatigue, obesity, cardiovascular disease - particularly heart failure (CHF), febrile illness, mental impairment, and/or a history of seizures, are also at increased risk for heat stroke. The use of certain drugs, prescription or illegal, including anticholinergics, beta-adrenergic blockers, angiotensin-converting enzyme inhibitors, diuretics, amphetamines and cocaine, can also increase the risk for classic heat stroke.

Exertional heat stroke has a sudden onset and is precipitated by intense exertion in very hot and humid climates. Exertional heat stroke most commonly affects healthy adolescents and young and middle adults. Laborers who work outside, such as construction workers, roofers, and athletes, such as football players who practice in the summer months, are at particular risk for exertional heat stroke.

The patient with heat stroke presents with a history of heat exposure and/or exertion. An elevated body temperature, over 105°F (41°C), which may increase to as high 112°F, as well as hypotension, tachycardia and tachypnea, are key clinical findings. EKG changes, consistent with heart damage, commonly occur. The patient's skin is typically flushed and feels hot and dry, although some victims continue to perspire, especially with exertional heat stroke. The conscious victim may also complain of feeling chilled, nauseated or dizzy.

Without prompt treatment of heat stroke, organ systems, including cardiac, CNS and renal, fail and the victim dies. Heat stroke kills up to 80% of victims who aren’t treated promptly and/or correctly. In the field, community setting, after calling 911 and monitoring the ABCs (airway, breathing, and circulation), the first direct intervention is to cool the patient rapidly. As much of the victim’s clothing as practical should be removed and cool compresses, cold packs or washcloths, should be placed on the neck, forehead, groin, and under the axilla. Such compresses typically need to be changed often to maintain their coolness. If possible, the victim should be immersed in cool (not cold) water or sprayed with cool water. It is essential when cooling a heat stroke victim that shivering, which generates body heat and increases oxygen consumption, be avoided. The heat stroke victim should also be given nothing by mouth.

Non-intentional injuries, accidents, although often preventable, are the number one cause of permanent disability and death in adolescents, and are leading causes in adult and aging adult age-groups. Heat stroke and near-drowning emergencies are common non-intentional injuries affecting all age-groups in the summer months.
POPULATION/AGE-SPECIFIC EDUCATION POST TEST
GROWN UP...
Caring For Adolescents, Adults, and Aging Adults

August 2012

Competency: Demonstrates Age-Specific Competency by correctly answering 9 out of 10 questions related to Near-Drowning and Heat Stroke.

NEAR-DROWNING AND HEAT STROKE

1. Which of the following people are most at risk for becoming a near-drowning victim?
   a. An 80 year old, female, who lives in an assisted living facility in Michigan.
   b. A 22 year old, male, who is spending the day at the beach in Florida, drinking beer with his friends.
   c. A 30 year old, mother of two, who is supervising her two school-age children at a swim club.
   d. A 50 year old man who enjoys fishing with his grandson early in the mornings.

2. The first priority when providing emergency care for a near-drowning victim is to:
   a. get the person out of the water without jeopardizing personal safety.
   b. check for a pulse.
   c. immobilize the person’s body until help arrives.
   d. obtain a first aid kit, preferably one with emergency equipment.

3. If a near-drowning victim has a carotid pulse and an open airway, which of the following interventions should first be initiated at the scene?
   a. Perform the Heimlich maneuver until help arrives
   b. Start rescue breathing as soon as possible
   c. Begin chest compressions until another trained person joins you
   d. Keep the victim on his or her back, so any vomiting of water is observable

4. The most important consequence of near-drowning, which can cause neurologic damage, is:
   a. hypoxia.
   b. seizures.
   c. pulmonary infection.
   d. head injury.

5. Which of the following has the least impact on the near-drowning victim’s survival?
   a. The outside temperature and humidity
   b. The temperature of the water
   c. How long the person is submerged
   d. Whether the water is fresh or salt
6. Heat stroke most commonly occurs when the temperature is above 95° F and the humidity is greater than 80%.
   a. True
   b. False

7. Which of the following persons is most at risk for a classic heat stroke?
   a. 15 year old who runs 2 miles every morning to prepare for soccer tryouts.
   b. 24 year old college student working as a lifeguard at a local pool.
   c. 45 year old woman cutting her grass with a riding mower in the evening.
   d. 75 year old man who lives alone and has no fans or air-conditioning in his home.

8. During the summer, you are standing in line at an amusement park beside a woman who occasionally fans herself. What assessment would most lead you to suspect heat-stroke? The woman is:
   a. perspiring profusely and has generalized pallor.
   b. confused and has dry, flushed skin.
   c. complaining how tired and hungry she is.
   d. drinking a beer and laughing with her friend.

9. The treatment for a heat-stroke victim in the community, after 911 is called, is to:
   a. immerse the person in very cold water.
   b. have the patient drink at least a liter of cool liquid.
   c. place cool packs on the person’s neck, forehead and under arms.
   d. keep the person warm with a blanket until emergency help arrives.

10. Which of the following factors does NOT place a person, of any age, at particular risk for heat-stroke?
    a. Obesity
    b. History of gastric ulcer
    c. Dehydration
    d. Congestive heart failure