

Primary Health Care Initiatives (PHCI) Project  
Contract No. 278-C-00-99-00059-00  
Abt. Associates Inc.

## **HEAT RELATED ILLNESS**

### **LEARNING OBJECTIVES**

1. Recognize conditions that increase the risk of heat-related illnesses
2. Describe and diagnose the different types of heat-related illnesses
3. Develop an effective treatment plan
4. Comprehensive understanding of heat stroke, the most serious of heat-related illnesses
5. Communicate to the patient and family necessary steps for prevention of heat-related illnesses

### **TEACHING STRATEGIES**

1. Limit didactic presentation of material; focus on discussion of variable presentation of heat related illness
2. Use case studies to stimulate discussion
3. Ask participants to present cases of heat injury they have known or treated, and discuss precipitating factors and treatment

### **MATERIALS AND EQUIPMENT NEEDED**

- White board and markers
- Flipchart and markers for small group discussions
- Overhead projector for transparencies

### **LEARNING POINTS**

1. Prevalence, preventability and mortality of heat-related illnesses
  - Mortality of heat stroke between 10% and 75%, depending on treatment and time of intervention
2. Risk factors for heat illness and pathophysiology
  - Physical conditions
    - Fever, dehydration
    - Uncontrolled diabetes
    - Cardiac disease
    - Hyperthyroidism
  - Older age
    - Decreased vasodilation
    - Decreased thirst response
    - Decreased cardiac output
  - Increased body mass (Obesity, large musculature)
    - More heat generated for same level activity
    - Decreased sweat glands

- Younger age
    - Decreased ability to sweat
    - More heat produced for same level activity
  - Additional factors
    - Living in upper floors
    - Lack of access to cooling
    - Heavy clothing
  - Medications
    - Antihypertensives (diuretics, B-blockers)
    - Antihistamines
    - Laxatives
    - Thyroid medications
    - Tricyclic antidepressants (imipramine, amitriptylene)
3. Types of Heat-Related Illnesses
- Heat Edema
    - Mildest form of heat-related illness, occurs when swelling develops in dependent areas of unacclimatized persons during hot summer months.
    - May improve with periodic exercise of elevation of legs.
  - Heat Cramps
    - Painful spasms of skeletal muscles of the arms, legs of abdomen. Predisposing factors include lack of acclimatization, salt depletion and use of diuretic medications.
    - May be a warning sign of impending heat exhaustion.
    - Treated with oral sodium replacement, e.g. 1 tsp salt per 1L of water, or IV saline infusion
  - Heat Exhaustion
    - Occurs when a person experiences excess sweating in a hot humid environment, causing volume depletion. Core body temperatures may rise above 38.0°C but lower than 40.5°.
    - Symptoms include profuse sweating, malaise, headache, dizziness, anorexia, nausea, vomiting, vertigo, chills, muscle or general weakness, tachycardia and hypotension, visual disturbances and cutaneous flushing.
    - Major neurologic symptoms are absent. Patient is generally not confused, irritable, or unconscious
    - Treatment is rest in a cool area, oral rehydration, and leg elevation. May need more rapid cooling or IV rehydration if not significantly improved in 2-3 hours.
  - Heat Stroke
    - Characterized by a body temperature of at least 40.5°C and acute mental status changes such as confusion, irritability, or coma
    - Differential diagnosis: hyperthyroid storm, pheochromocytoma, CNS system injury, severe infection or sepsis, anticholinergic (insecticide) poisoning, illegal drug use, and neuroleptic malignant syndrome
4. Evaluation of Heat Stroke
- History

- Especially neurologic symptoms, medical history, medications, illicit drug use
  - Physical Exam
    - Core body temperature, skin exam, neurologic exam, mental status changes, evidence of bleeding disorder (DIC)
  - Medical Investigation
    - Consider chest X-ray, EKG, cardiac enzymes, Hgb and WBC, fibrinogen, liver function, lactate, urinalysis, calcium, phosphorous, glucose
- 5. Emergency Management of Heat Stroke
  - External Cooling – cold, moist towels over body, pack in cold water
  - Internal Cooling – cold NG lavage, cold IV fluids, cold rectal enema
  - Respiratory and Cardiac status – watch for possible cardiac or respiratory arrest, monitor vital signs frequently
  - Fluids – cold Ringers Lactate IV to maintain blood pressure
- 6. Complications and Prognosis of Heat Stroke
  - Permanent brain damage
  - Disseminated intravascular coagulation
  - Hepatic injury
  - Cardiac arrhythmias
  - Renal failure (secondary to rhabdomyolysis – muscle injury)

### **PREVENTION ISSUES AND HEALTH EDUCATION MESSAGES**

- Increase awareness of risk of heat illness
- Environment
  - Stay in shade and cooler environments
  - Loose fitting, light colored clothing
  - Avoid helmets if possible
  - Avoid hottest part of day for strenuous work
- Acclimatization – gradual exposure to hot environment
- Hydration
  - Proper hydration involves ingestion of up 500 ml. before exercise, then 250 ml. every 20 minutes during exercise.
  - Thirst is an unreliable indicator of dehydration

### **CRITICAL ELEMENTS FOR REFERRAL**

- Heat stroke
- Heat syncope or heat exhaustion with mental status changes
- Heat exhaustion that does not improve with typical treatment in 2-3 hours

### **CASES STUDIES**

#### **Number One**

Ahmad is a 45 year old shepherd responsible for a flock of 45 sheep and goats. He is strong, but had started taking hydrochlorothiazide for hypertension 2 months previously. He was herding in a wadi one summer day when the reported temperature

was 42 C., and had to repeatedly run after several sheep who were climbing the walls of the wadi. Suddenly he noticed severe pain in his legs, especially his lower legs, that became worse when he sat down.

1. What is the most likely form of heat illness affecting Ahmad?
2. What is the cause of this illness?
3. What is appropriate treatment for Ahmad?

### **Number Two**

Shareefa is a 32 year old woman who was walking to her camp from the road on a day when the temperature was 43 C.. She had been suffering from diarrhea the previous two days, and was neither hungry nor thirsty. The camp was 3 km. away. After 35 minutes of walking, she became very hot, tired, weak, and began vomiting. She could not continue but only wanted to lay down. Her companions ran to get a truck and brought her to the health center. There, she was very tired and weak, but was conscious, and knew where she was. Her oral temperature was 38.5 C.

1. What is the most likely form of heat illness affecting Shareefa?
2. What is the cause of this illness?
3. What is appropriate treatment for Shareefa?

### **CRITICAL ELEMENTS FOR EVALUATION OF COMPETENCE**

- Correctly identify different types of heat-related illnesses
- Appropriate management of most heat-related illnesses
- Determining the diagnosis of heat stroke as a medical emergency
- Knowledge of need for referral
- Appropriate patient education regarding prevention and signs of heat-related illnesses