NCAA® GUIDELINE 2c

Prevention of Heat Illness

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Practice or competition in hot and/or humid environmental conditions poses special problems for student-athletes. Heat stress and resulting heat illness is a primary concern in these conditions. Although deaths from heat illness are rare, exertional heat stroke (EHS) is the third-leading cause of on-the-field sudden death in athletes. There have been more deaths from heat stroke in the last five-year block (2005-2009) than any other five-year block during the past 35 years. Constant surveillance and education are necessary to prevent heat-related problems. The following practices should be observed:

1. An initial complete medical history and physical evaluation, followed by the completion of a yearly health-status questionnaire before practice begins, is required, per Bylaw 17.1.5. A history of previous heat illnesses, sickle cell trait and the type and duration of training activities for the previous month, should also be considered.

2. Prevention of heat illness begins with gradual acclimatization to environmental conditions. Student-athletes should gradually increase exposure to hot and/or humid environmental conditions during a minimum period of 10 to 14 days. Each exposure should involve a gradual increase in the intensity and duration of exercise and equipment worn until the exercise is comparable to that likely to occur in competition. When environmental conditions are extreme, training or competition should be held during a cooler time of day. Hydration should be maintained during training and acclimatization sessions.

3. Clothing and protective equipment, such as helmets, shoulder pads and shin guards, increase heat stress by interfering with the evaporation of sweat and inhibiting other pathways needed for heat loss. Dark-colored clothing increases the body's absorption of solar radiation, while moisture wicking-type clothing helps with the body's ability to dissipate heat. Frequent rest periods should be scheduled so that the gear and clothing can be removed and/or loosened to allow heat dissipation. During the acclimatization process, it may be advisable to use a minimum of protective gear and clothing and to practice in T-shirts, shorts, socks and shoes. Rubberized suits should not be worn.

4. To identify heat stress conditions, regular measurements of environmental conditions are recommended. The wet-bulb globe temperature (WBGT), which includes the measurement of wet-bulb temperature (humidity), dry-bulb temperature (ambient temperature) and globe temperature (radiant heat), assesses the potential impact of environmental heat stress. A WBGT higher than 82 degrees Fahrenheit (28 degrees Celsius) suggests that careful control



of all activity should be undertaken. Additional precautions should be taken when wearing protective equipment (see reference No. 6). The American College of Sports Medicine has recently (2007) revised its guidelines for conducting athletic activities in the heat (see reference No. 1).

5. EHS has the greatest potential of occurrence at the start of preseason practices and with the introduction of protective equipment during practice sessions. The inclusion of multiple practice sessions during the same day may also increase the risk of EHS. Ninety-six percent of all heat illnesses in football occur in August.

6. Hydration status also may influence the occurrence of EHS, therefore fluid replacement should be readily available. Student-athletes should be encouraged to drink frequently throughout a practice session. They should drink two cups or more of water and/or sports drink in the hour before practice or competition, and continue drinking during activity (every 15 to 20 minutes). For activities up to two hours in duration, most weight loss represents water loss, and that fluid loss should be replaced as soon as possible. After activity, the student-athlete should rehydrate with a volume that exceeds the amount lost during the activity. In general, 16-24 ounces of fluid should be replaced for every pound lost. Urine volume and color can be used to assess general hydration. If output is plentiful and the color is "pale yellow or straw-colored," the student-athlete is not dehydrated. As the urine color gets darker, this could represent dehydration of the student-athlete. Water and sport drinks are appropriate for hydration and rehydration during exercise in the heat. Sport drinks should contain carbohydrates and electrolytes to enhance fluid consumption. In addition, the carbohydrates provide energy and help maintain immune and cognitive function.

7. During the preseason period or periods of high environmental stress, the student-athletes' weight should be recorded before and after every workout, practice and competition. This procedure can detect progressive dehydration and loss of body fluids. Those who lose five percent of their body weight or more should be evaluated medically and their activity restricted until rehydration has occurred. For prevention, the routine measurement of pre- and post-exercise body weights is useful for determining sweat rates and customizing fluid replacement programs.

8. Some student-athletes may be more susceptible to heat illness. Susceptible individuals include those with: sickle cell trait, inadequate acclimatization or aerobic fitness, excess body fat, a history of heat illness, a febrile condition, inadequate rehydration, and those who regularly push themselves to capacity. Also, substances with a diuretic effect or that act as stimulants may increase risk of heat illness. These substances may be found in some prescription and over-the-counter drugs, nutritional supplements and foods.

9. Student-athletes should be educated on the signs and symptoms of EHS, such as: elevated core temperature, weakness, cramping, rapid and weak pulse, pale or flushed skin, excessive fatigue, nausea, unsteadiness, disturbance of vision, mental confusion and incoherency. If heat stroke is suspected, prompt emergency treatment is recommended. When training in hot and/or humid conditions, student-athletes should train with a partner or be under observation by a coach or athletic trainer.

First aid for heat illness

Heat exhaustion—Heat exhaustion is a moderate illness characterized by the inability to sustain adequate cardiac output, resulting from strenuous physical exercise and environmental heat stress. Symptoms usually include profound weakness and exhaustion, and often dizziness, syncope, muscle cramps, nausea and a core temperature below 104 degrees Fahrenheit with excessive sweating and flushed appearance. First aid should include removal from activity, taking off all equipment and placing the student-athlete in a cool, shaded environment. Fluids should be given orally. Core temperature and vital signs should be serially assessed. The student-athlete should be cooled by ice immersion and ice towels, and use of IV fluid replacement should be determined by a physician. Although rapid recovery is typical, student-athletes should not be allowed to practice or compete for the remainder of that day.

Exertional Heatstroke—Heatstroke is a medical emergency. Medical care should be obtained at once; a delay in treatment can be fatal. This condition is characterized by a very high body temperature (104 degrees Fahrenheit or greater) and the student-athlete likely will still be sweating profusely at the time of collapse, but may have hot, dry skin, which indicates failure of the primary temperature-regulating mechanism

(sweating), and CNS dysfunction (e.g., altered consciousness, seizure, coma). First aid includes activation of the emergency action plan, assessment of core temperature/vital signs and immediate cooling of the body with cold water immersion. Another method for cooling includes using cold, wet ice towels on a rotating basis. Student-athletes who incur heatstroke should be hospitalized and monitored carefully. The NATA's Inter-Association Task Force recommends, "cool first, transport second" in these situations (see reference No. 7).

Athletes presenting with any of these signs and symptoms should be referred to a health-care professional and basic steps taken while awaiting such medical care. Many other potentially life-threatening conditions can present as a heat illness and emphasis should be placed on proper medical diagnosis.

POTENTIAL RISK FACTORS

As identified throughout Guideline 2c, the following are potential risk factors associated with heat illness:

1. Intensity of exercise. This is the leading factor that can increase core body temperature higher and faster than any other.

2. Environmental conditions. Heat and humidity combine for a high wet-bulb globe temperature that can quickly raise the heat stress on the body.

3. Duration and frequency of exercise. Minimize multiple practice sessions during the same day and allow at least three hours of recovery between sessions.

4. Dehydration. Fluids should be readily available and consumed to aid in the body's ability to regulate itself and reduce the impact of heat stress.

5. Nutritional supplements. Nutritional supplements may contain stimulants, such as ephedrine, ma huang or high levels of caffeine.* These substances can have a negative impact on hydration levels and/or increase metabolism and heat production. They are of particular concern in people with underlying medical conditions such as sickle cell trait, hypertension, asthma and thyroid dysfunction.

6. Medication/drugs. Certain medications and drugs have similar effects as nutritional supplements. These substances may be ingested through over-the-counter or prescription medications, recreational drugs, or consumed in food. Examples include antihistamines, decongestants, certain asthma medications, Ritalin, diuretics and alcohol.

7. Medical conditions. Examples include illness with fever, gastro-intestinal illness, previous heat illness, obesity or sickle cell trait.

8. Acclimatization/fitness level. Lack of acclimatization to the heat or poor conditioning.

9. Clothing. Dark clothing absorbs heat. Moisture wicking-type material helps dissipate heat.

10. Protective equipment. Helmets, shoulder pads, chest protectors, and thigh and leg pads interfere with sweat evaporation and increase heat retention.

11. Limited knowledge of heat illness. Signs and symptoms can include elevated core temperature, pale or flushed skin, profound weakness, muscle cramping, rapid weak pulse, nausea, dizziness, excessive fatigue, fainting, confusion, visual disturbances and others.

*NOTE: Stimulant drugs such as amphetamines, ecstasy, ephedrine and caffeine are on the NCAA banned substance list and may be known by other names. A complete list of banned drug classes can be found on the NCAA website at NCAA.org/health-safety.

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