Fluid Replacement Guidelines and Exertional Heat Illnesses

The following document on fluid replacement, rehydration, and exertional heat illnesses has been developed in accordance with the NATA Fluid Replacement Position Statement, the NATA Exertional Heat Illnesses Position Statement, and the Department of Sports Medicine’s Mission Statement to provide quality healthcare services and assure the well-being of each student-athlete.

RATIONALE OF FLUID REPLACEMENT:

Student-athletes who are exposed to prolonged practices and competitions in an excessively hot and humid environment may be deprived of essential fluids, carbohydrates, and electrolytes that ultimately lead to dehydration and potential heat illness.

It has been demonstrated that dehydration of just 1-2% of body weight can alter physiological function and negatively influence an athlete’s performance. Athletes who are not properly hydrated prior to the start of practice or competition can begin to notice the signs of dehydration in just one hour or sooner of exercise. Dehydration has been identified as an increased risk factor for athletes developing heat-related illness such as heat cramps, heat exhaustion, and the potentially life-threatening heat stroke.

SIGNS AND SYMPTOMS OF DEHYDRATION:

Staff athletic trainers, graduate assistant athletic trainers, and athletic training students all need to be aware of the signs and symptoms of dehydration to properly recognize and intervene on behalf of the student-athlete.

Signed and Symptoms are:

1. Thirst
2. Irritability
3. General discomfort
4. Headache
5. Weakness
6. Dizziness
7. Nausea
8. Cramps
9. Chills
10. Vomiting
11. Head or neck heat sensations
12. Decreased performance

REHYDRATION GUIDELINES:
The Sports Medicine Staff has developed the following rehydration guidelines based on national accepted criteria. The Sports Medicine Department Staff will assist in promoting the consumption of beverages. All beverages will be provided onsite when requested or as deemed necessary.

**Prior to Exercise:**
- All athletes should be encouraged to drink 17 to 20 fluid ounces of water or sports beverage 2-3 hours before exercise.
- Ten to twenty minutes before the beginning of practice or competition, athletes should be encouraged to drink an additional 7-10 fluid ounces of water or sports beverage.

**During Exercise:**
- Encourage athletes to drink early and often
- Drink 7-10 fluid ounces or sports drink every 10-20 minutes.
- It is important to stress to the athletes to drink prior to becoming thirsty. An athlete who is thirsty may already be in the early stages of dehydration.

**After Exercise:**
- Encourage athletes to replace any fluid loss due to sweating within 2 hours from the end of exercise. This rehydration should include water, carbohydrates, and electrolytes to allow the immediate return of physiologic function.
- Encourage them to drink 20-24 fluid ounces for every pound of weight lost.

**Sport beverages should ideally contain a carbohydrate level of no more than 8%. A higher carbohydrate level can retard fluid absorption and cause stomach problems.**

**Fruit juices, carbohydrate gels, and carbonated beverages should not be recommended as the sole rehydration beverage of choice. Beverages containing caffeine, alcohol, or carbonation should be avoided and discouraged due to their diuretic effects and decreased fluid retention.**

**WEIGHT LOSS/GAIN GUIDELINES:**

It is recommended that all athletes exercising in hot and humid environments as well as those sports such as wrestling with closely regulated weight classes be weighed in prior to and after practice or competition. By weighing in, a determination can be made of the percentage body weight lost due to sweating and the amount of rehydration that must occur prior to the next practice session. Furthermore, athletes should be weighed preferably in the nude, in clean/dry undergarments, or wearing the same amount of clothing pre-and post-practice. The percentage of weight lost between practice sessions will be used as one factor to determine if an athlete can safely continue to practice. Athletes should ideally have their pre-exercise body weight remain relatively consistent.
• A 2% body weight difference should be noted by the athletic trainer and that athlete should be closely monitored for any signs or symptoms of dehydration.
• An athlete with greater than 2% body weight loss should not be allowed to return to practice until proper fluid replacement has taken place.

**INTRAVENOUS (IV) FLUID REPLACEMENT:**

In certain instances an athlete may receive intravenous fluid replacement therapy to combat dehydration or associated heat illnesses. This form of treatment will be conducted at the discretion of the nearest hospital emergency room. The attending certified athletic trainer determines that an athlete may be suffering from dehydration or associated heat illness, he/she will make every effort to arrange for treatment to be administered through the closest hospital emergency room. For more details concerning IV Fluid Replacement, refer to the IV Fluid Replacement Policy.

**DEFINITION OF HEAT ILLNESS:**

Heat illness if closely associated with physical activity and its occurrence increases with a rise in temperature and relative humidity. It is usually classified in three categories: heat cramps, heat exhaustion, and heat stroke. Although most often occurring in hot, humid weather, heat illness can also occur with the absence of both heat and/or humidity.

**Exercise-Associated Muscle (Heat) Cramps:**

• Occurs during or after intense exercise as an acute, painful, and involuntary muscle contraction
• Causes may include dehydration, electrolyte imbalances, neuromuscular fatigue, or a combination of factors.
• *Signs and Symptoms:* dehydration, thirst, sweating, transient muscle cramps, fatigue.

**Exercise (Heat) Exhaustion:**

• Occurs most frequently in hot, humid conditions and causes an inability to continue exercise.
• May be caused by dehydration, heavy sweating, sodium loss, and energy depletion.
• *Signs and Symptoms:* pallor, persistent muscle cramps, urge to defecate, weakness, fainting, nausea, decreased urine-output, cool and clammy skin, anorexia, diarrhea, body temp between 97-104°F.

**Exertional Heat Stroke:**

• Occurs when core temperature is elevated (usually greater than 104°F) with associated signs of organ system failure due to hyperthermia and physical activity.
Caused by an overwhelmed temperature regulation system due to excessive endogenous heat production or inhibited heat loss due to environmental conditions.

*Signs and Symptoms:* tachycardia, hypotension, sweating (although skin may be wet or dry), hyperventilation, altered mental status, vomiting, diarrhea, seizures, coma, CNS changes

*Life-threatening condition that can be fatal unless promptly recognized and treated.*

**PREVENTION OF HEAT ILLNESS GUIDELINES:**

- All pre-participation examinations will identify student-athletes who may be predisposed to heat illness or have a history of heat illness.
- The Sports Medicine Department Staff will be onsite at most practices and competitions to assist in providing hydration and access to further cooling supplies. The staff will be aware of the signs and symptoms of heat illness to properly recognize and intervene on behalf of the student-athlete.
- The certified athletic trainer will also help educate athletes and coaches regarding the necessary time needed to have student-athletes adapt to their environment. Acclimatization should be a gradual progression. Well-acclimatized athletes should be able to train 1 to 2 hours under the same heat conditions that will be present for their event.
- In addition, the certified athletic trainer should know how to use a wet-bulb globe temperature (WBGT) and/or a sling psychrometer, decipher the corresponding temperature graphs for these instruments, and base the level of physical activity upon the gathered information. This will be used as one of the factors in determining any risk of heat illness associated with relevant environmental conditions.

**TREATMENT OF HEAT ILLNESS:**

The Sports Medicine Department will treat heat illness by recognizing its signs and symptoms, understanding the causes of heat illness, and taking the necessary measures to ensure an efficient and safe recovery for the student-athlete.

**Exercise-Associated Muscle (Heat) Cramps:**

- The student-athlete should stop activity, replace lost fluids (containing sodium), and begin mild stretching and massage of the muscle spasm.
- Instruct the student-athlete to lie down, as this may allow blood flow to be distributed more rapidly to cramping leg muscles.

**Exercise (Heat) Exhaustion:**

- Assess cognitive function and vital signs, taking body-core temperature if possible.
- Transport the athletes to a cool and/or shaded environment, remove excess clothing, start fluid replacement, and cool the
student-athlete with fans, ice towels, or ice bags (placed in armpits, neck, and groin).
• The student-athlete should be referred to the team physician and/or the emergency room of the closest hospital if in the judgment of the attending certified athletic trainer symptoms warrant further immediate attention.

**Exertional Heat Stroke:**

• Activate the emergency medical system.
• Assess cognitive function and vital signs, measuring rectal temperature if feasible to differentiate between heat exhaustion and heat stroke (heat stroke is 104°F or higher).
• Lower the body-core temperature as quickly as possible by removing excess clothing and immersing the body into a tub of cool water (35 - 59°F) while checking temperature every 5 to 10 minutes. Remove athlete from water if temperature reaches 101 to 102°F to prevent overcooling.
• Continue using cooling methods mentioned for heat exhaustion while transporting to decrease body-core temperature.
• Maintain and monitor airway for breathing and circulation.

**RECOVERY OF HEAT ILLNESS:**

Athletes who experience a heat stroke may have impaired thermoregulation, persistent CNS dysfunction, and hepatic or renal insufficiency following recovery. Decreased heat tolerance has been shown to affect 15% to 20% of athletes experiencing a heat stroke-related collapse. Following recovery, the student-athlete’s activity should be restricted with a gradual return regulated by the Team Physician.

**Intravenous Fluids Replacement Policy**

The following policy on intravenous fluids (IVF) has been developed in accordance with the Department of Sports Medicine’s Mission Statement to provide quality healthcare services and assure the well-being of each student-athlete.

**Rationale:**

On occasion student-athletes will require fluid supplementation beyond that which can be administered by the preferred oral route. The may be because of the extent of fluid loss, development of medical complications or inability of the student-athlete to ingest sufficient quantities of oral fluids. In these situations, at the discretion of the Hospital Emergency Department, IVF may be utilized.

**IVF Guidelines:**

1. As outlined in the Fluid Replacement Guidelines, all staff athletic trainers, and athletic training students should be acquainted with the signs and symptoms of dehydration. Signs and Symptoms a student-athlete is unable to maintain his/her level of hydration as exhibited by:
- Weight loss > 5% of body weight
- Loss of postural tone (syncope or presyncope)
- Dizziness
- Unexplained elevations of heart rate
- Diarrhea or vomiting > 12-24 hours
- Heat related muscle cramping.

2. The athlete should be referred further medical evaluation. It is solely the decision of the Team Physician, hospital emergency room or athlete’s family physician to administer IVF.

3. The process and its alternatives will be discussed with the student-athlete and the athlete’s parent or guardian prior to establishing intravenous access.

4. An intravenous catheter, tubing and fluids will be inserted and connected utilizing sterile technique.

5. The student-athlete will remain under the direct supervision of the Team Physician, hospital emergency room staff or family physician throughout the entire duration of the administration of IVF.

6. Once adequate hydration has been achieved, the Team Physician hospital emergency room staff or family physician will assure that the catheter has been properly removed, adequate hemostasis at the insertion site achieved and the student-athlete has not developed any complications from this process.

This information is not intended to be, and should not be used as a substitute for appropriate medical care. If you have any doubt with regards to practice status consult a physician or athletic trainer immediately.