Heat and Hydration: Policies and Procedures:

Hot temperatures and high humidity are a dangerous mix that contributes to illness and death each year. Our bodies are cooled primarily by losing heat through the skin and perspiration with evaporation. When our core body heat exceeds the amount we can get rid of the body’s natural defense fails and heat-related illness may develop.

Scientific evidence indicates the following factors may increase the risk associated with exercise in the heat. Although some factors can be optimized (e.g., heat acclimatization), others cannot (e.g., health problems). Regardless, these factors may help in developing a proactive approach to preventing exertional heat illnesses.

**Intrinsic factors include:**
- History of exertional heat illnesses
- Inadequate heat acclimatization
- Lower level of fitness status
- Higher percent body fat
- Dehydration or over-hydration
- Presence of a fever
- Presence of gastrointestinal illness
- Salt deficiency
- Skin condition (e.g., sunburn, skin rash, etc.)
- Ingestion of certain medications (e.g., antihistamines, diuretics, etc.) or dietary supplements (e.g., ephedra, etc.)
- Motivation to push oneself/warrior mentality
- Reluctance to report problems, issues, illness, etc.
- Pre-pubescence

**Extrinsic factors include:**
- Intense or prolonged exercise with minimal breaks
- High temperature, humidity, and sun exposure, as well as exposure to heat/humidity in preceding days
- Inappropriate work/rest ratios based on intensity, wet bulb globe temperature (WBGT), clothing, equipment, fitness and athlete's medical condition
- Lack of education and awareness of heat illnesses among coaches, athletes and medical staff
- No emergency plan to identify and treat exertional heat illnesses
- No access to shade during exercise or during rest breaks
- Duration and number of rest breaks is limited
- Minimal access to fluids before and during practice and rest breaks
- Delay in recognition of early warning signs

**General Considerations for Risk Reduction**
• Encourage proper education regarding heat illnesses (for athletes, coaches, parents, medical staff, etc.). Education about risk factors should focus on hydration needs, acclimatization, work/rest ratio, signs and symptoms of exertional heat illnesses, treatment, dietary supplements, nutritional issues and fitness status.
• Provide medical services onsite (e.g., certified athletic trainer [ATC], emergency medical technician [EMT], physician).
• Ensure pre-participation physical examination that includes specific questions regarding fluid intake, weight changes during activity, medication and supplement use and history of cramping/heat illnesses has been completed.
• Assure that onsite medical staff has authority to alter work/rest ratios, practice schedules, amount of equipment and withdrawal of individuals from participation based on environment and/or athlete’s medical condition.

The focus of the heat and Hydration Policy at Isidore Newman School consists of four key areas: **Dehydration, Heat Cramps, Heat Exhaustion and Exertional Heat Stroke**. We will exam factors contributing to the onset, recognition, treatment, and return to play considerations of each of these four conditions.

**DEHYDRATION**
**Factors Contributing to Onset of Condition**
When athletes do not replenish lost fluids, they become dehydrated. Mild dehydration (<2% body weight loss [BWL]) is often unavoidable because athletes cannot always replenish fluids at a rate equal to that being lost. Dehydration as minimal as 2% BWL can begin to hinder performance and thermoregulatory function.
Optimal hydration is the replacement of fluids and electrolytes in accordance with individual needs. Fluid intake should nearly approximate fluid losses. Athletes must personally establish and monitor fluid requirements and modify behavior to ensure optimal hydration status. Fluid intake beyond fluid needs for many hours also can be quite harmful.

**Recognition**
Indicators of dehydration include dry mouth, thirst, irritability, general discomfort, headache, apathy, weakness, dizziness, cramps, chills, vomiting, nausea, head or neck heat sensations, excessive fatigue and/or decreased performance.

**Treatment**
The following procedures are recommended if dehydration is suspected:
• Dehydrated athletes should move to a cool environment and rehydrate.
• Maintaining normal hydration (as indicated by baseline body weight) is critical to avoiding heat illnesses. (upper school football players will be assessed for their BWL during preseason two a day practices, extending to the point in the season in which the certified athletic trainer deems it safe to stop the daily assessments). If an athlete’s BWL is greater than 1% to 2% within a given day or on consecutive days, that athlete should return to normal hydration status before being allowed to
practice. (Remember that pre-exercise/event/participation examination body weight baseline measures may not accurately assess hydration status if post-practice body weight is being compared to a baseline that is measured in a dehydrated state. Urine specific gravity or urine color can help with this assessment if an athlete is suspected to be dehydrated at the time baseline measurements are taken.)

- Athletes should begin exercise sessions properly hydrated. Any fluid deficits should be replaced within 1 to 2 hours after exercise is complete.
- Given the nature of sweat and variability and timing of nutritional intake, hydrating with a sports drink containing carbohydrates and electrolytes (i.e., sodium and potassium) before and during exercise is optimal to replace losses and provide energy. Because athletes replace only about half of the fluid lost when drinking water, a flavored sports drink may promote an increase in the quantity of fluids consumed.
- Replacing lost sodium after exercise is best achieved by consuming food in combination with a rehydration beverage.
- Athletes should have convenient access to fluids throughout practice and be allowed to hydrate in addition to prescribed breaks. These factors can minimize dehydration and may maximize performance.
- A nauseated or vomiting athlete should seek medical attention to replace fluids via an intravenous line.

**Return-to-Play Considerations**

If the degree of dehydration is minor and the athlete is symptom free, continued participation is acceptable. The athlete must maintain hydration status and should receive periodic checks from onsite medical personnel.

**HEAT CRAMPS**

**Factors Contributing to Onset of Condition**

The etiology of muscle cramps is not well understood and there may be a number of causes. Heat cramps are often present in athletes who perform strenuous exercise in the heat. Conversely, cramps also occur in the absence of warm or hot conditions. Whether or not heat related, cramps tend to occur later in an activity, in conjunction with muscle fatigue and after fluid and electrolyte imbalances have reached a critical level. Dehydration, diet poor in minerals, and large losses of sodium and other electrolytes in sweat appear to increase the risk of severe, often whole-body, muscle cramps. Muscle cramps can largely be avoided with adequate conditioning, acclimatization, rehydration, electrolyte replacement and appropriate dietary practices.

**Recognition**

Most critical criteria for determination are (1) intense pain (not associated with acute muscle strain) and (2) persistent muscle contractions in working muscles during and after prolonged exercise and most often associated with exercise in heat. Other possible salient findings include (1) "salty sweaters" (those with high salt concentration in sweat), (2) high sweat rate, heavy sweating, (3) lack of heat acclimatization, (4) insufficient sodium intake (during meals and practice), (5) dehydration, thirsty, (6) irregular meals, (7) increased fatigue and (8) previous cramping history.

**Treatment**

The following procedures are recommended if heat cramps are suspected:
• Re-establish normal hydration status and replace some sodium losses with a sports drink or other sodium source.
• Some additional sodium may be needed (especially in those with a history of heat cramps) earlier in the activity (pre-cramps) and is best administered by dilution into a sports drink. For example, 1/2 g of sodium (equal to the amount of sodium found in 1/4 tsp of table salt) dissolved in about 1 L (approximately 32 oz) of a sports drink early in the exercise session provides ample fluids and sodium, and the flavor (while certainly saltier) is still very palatable.
• Light stretching, relaxation and massage of the involved muscle may help acute pain of a muscle cramp.

Return-to-Play Considerations
Athletes should be assessed to determine if they can perform at the level needed for successful participation. After an acute episode, diet, rehydration practices, electrolyte consumption, fitness status, level of acclimatization and use of dietary supplements should be reviewed and possibly modified to decrease risk of recurring heat cramps.

HEAT EXHAUSTION
Factors Contributing to Onset of Condition
Heat exhaustion is a moderate illness characterized by the inability to sustain adequate cardiac output, resulting from strenuous physical exercise and environmental heat stress. Inherent needs to maintain blood pressure and essential organ function, combined with a loss of fluid due to acute dehydration, create a challenge the body cannot meet, especially if intense exercise were to continue unabated.

Recognition
Most critical criteria for determination are (1) athlete has obvious difficulty continuing intense exercise in heat, (2) lack of severe hyperthermia (usually <104°F/40°C), although it would be expected to find mild hyperthermia at the time of the incident (more commonly, 100°-103°F/37.7°-39.4°C) and (3) lack of severe CNS dysfunction. If any CNS dysfunction (see symptoms listed under EHS) is present, it will be mild and symptoms will subside quickly with treatment and as activity is discontinued. Other possible salient findings include (1) physical fatigue, (2) dehydration and/or electrolyte depletion, (3) ataxia and coordination problems, syncope, dizziness, (4) profuse sweating, pallor, (5) headache, nausea, vomiting, diarrhea, (6) stomach/intestinal cramps, persistent muscle cramps and (7) rapid recovery with treatment.

Treatment
The following procedures are recommended if heat exhaustion is suspected:
• Remove athlete from play and immediately move to a shaded or air-conditioned area.
• Remove excess clothing and equipment.
• Have athlete lie comfortably with legs propped above heart level.
• If athlete is not nauseated, vomiting or experiencing any CNS dysfunction, rehydrate orally with chilled water or sports drink. If athlete is unable to take oral fluids, implement intravenous infusion of normal saline (physician or EMS).
• Monitor heart rate, blood pressure, respiratory rate, rectal temperature (if indicated) and CNS status.
• Transport to an emergency facility if rapid improvement is not noted with prescribed treatment.
Return-to-Play Considerations
The following guidelines are recommended for return-to-play after heat exhaustion:

• Athlete should be symptom free and fully hydrated.
• Recommend physician clearance or, at minimum, a discussion with supervising physician before return.
• Rule out underlying condition or illness that predisposed athlete for continued problems.
• Avoid intense practice in heat until at least the next day to ensure recovery from fatigue and dehydration. (In severe cases, intense practice in heat should be delayed for more than 1 day.)
• If underlying cause was lack of acclimatization and/or fitness level, correct this problem before athlete returns to full-intensity training in heat (especially in sports with equipment).

EXERTIONAL HEAT STROKE
Factors Contributing to Onset of Condition
Exertional heat stroke is a severe illness characterized by central nervous system (CNS) abnormalities and potentially tissue damage resulting from elevated body temperatures induced by strenuous physical exercise and increased environmental heat stress.

Recognition
The ability to rapidly and accurately assess core body temperature and CNS functioning is critical to the proper evaluation of EHS; axillary, oral and tympanic temperatures are not valid measures in individuals exercising in hot environments. Medical staff should be properly trained and equipped to assess core temperature via rectal thermometer when feasible. Most critical criteria for determination are (1) CNS dysfunction (altered consciousness, coma, convulsions, disorientation, irrational behavior, decreased mental acuity, irritability, emotional instability, confusion, hysteria, apathy) and (2) hyperthermic (rectal temperature usually >104°F/40°C) immediately post-incident. Other possible salient findings include (1) nausea, vomiting, diarrhea, (2) headache, dizziness, weakness, (3) hot and wet or dry skin (important to note that skin may be wet or dry at time of incident), (4) increased heart rate, decreased blood pressure, increased respiratory rate, (5) dehydration and (6) combativeness.

Treatment
Aggressive and immediate whole-body cooling is the key to optimizing treatment. The duration and degree of hyperthermia may determine adverse outcomes. If untreated, hyperthermia-induced physiological changes resulting in fatal consequences may occur within vital organ systems (e.g., muscle, heart, brain, liver, kidneys, etc.). Due to superior cooling rates, immediate whole-body cooling via cold water immersion is the best treatment for EHS and should be initiated within minutes post-incident. Provided that adequate emergency medical care is available onsite (i.e., ATC, EMT or physician), it is recommended to cool first via cold water immersion, then transport second. Cooling can be successfully verified by measuring rectal temperature. If onsite rapid cooling via cold water immersion is not an option or if other complications develop that would be considered life threatening (i.e., airway, breathing, circulation), immediate transport to the nearest medical facility is essential. The following procedures are recommended if EHS is suspected:
Immediately immerse athlete in tub of cold water (approximately 35°-58°F/1.67°-14.5°C), onsite if possible. Remove clothing/equipment. (Immersion therapy should when feasible include constant monitoring of core temperature by rectal thermistor [or thermometer].)

If immersion is not possible, transport immediately. Alternative cooling strategies should be implemented while waiting for and during transport. These strategies could include: spraying the body with cold water, fans, ice bags or ice over as much of the body as possible and/or cold towels (replace towels frequently).

Monitor airway, breathing, circulation, core temperature, and CNS status (cognitive, convulsions, orientation, consciousness, etc.) at all times.

Place an intravenous line using normal saline (if appropriate medical staff is available).

Cease aggressive cooling when core temperature reaches approximately 101°-102°F (38.3°-38.9°C); continue to monitor.

If rapid onsite cooling was administered and rectal temperature has reached approximately 101°-102°F (38.3°-38.9°C), transport athlete to medical facility for monitoring of possible organ system damage.

**Return-to-Play Considerations**

Physiological changes may occur after an episode of EHS. For example, the athlete's heat tolerance may be temporarily or permanently compromised. To ensure a safe return to full participation, a careful return-to-play strategy should be decided by the athlete's physician and implemented with the assistance of the ATC or other qualified health care professional. The following guidelines are recommended for return-to-play after EHS:

- Physician clearance is necessary before returning to exercise. The athlete should avoid all exercise until completely asymptomatic and all laboratory tests are normal.
- Severity of the incident should dictate the length of recovery time.

**Sport Specific Heat Hydration Policies at Isidore Newman School:**

**Varsity Football:**

- Full body immersion ice bath on stand-by for practices with heat index of over 95 degrees.
- Berger Family Fitness Center will be equipped with a cool station including but not limited to a circulating air fan, ice towels, and water bottles. Any athlete exhibiting signs or symptoms of heat related illness will be brought into the BFFC and evaluated and cooled while inside in the air conditioning. If symptoms persist or worsen, 911 will be called and an ice immersion will be initiated. All protective equipment shall be removed.
- Ice towels will be available during practices with heat index over 95 degrees, or as determined by the certified athletic trainer.
- Daily weight evaluations will be utilized until the point in the season in which the supervising certified athletic trainer deems prudent. Any student athlete that has a change of more than 2% in overall body weight may be held out of practice until that baseline weight is re-established. If a student athlete misses a weigh in they will be ineligible to participate in practice until it is performed.
Any student athlete exhibiting signs and symptoms of heat exhaustion will not return to on-field activity the day of the event, and may be held out until the certified athletic trainer deems prudent. He may at the discretion of the certified athletic trainer return to no heat stress environment activities such as weightlifting, or team meetings.

Coaches are responsible for having water available at practices unless arrangements have been made ahead of time with the certified athletic trainer.

**Hydration Guidelines and Recommendations:**

**Pre-Practice:**
- At least 17-20 ounces, 1-2 hours prior to practice
- At least 7-10 ounces, 10-20 minutes prior to practice
- Some form of carbohydrate (breads, cereal, granola bars, power bars) at least 30 minutes before practice.
- Avoid all caffeinated beverages

**During Practice:**
- At least 7-10 ounces every 10-20 minutes

**After Practice:**
- Aim to correct any fluid loss from practice
- Ideally completed within 2 hours of practice
- Drink an additional 25-50% within 4-6 hours of practice
- Gatorade/Sports Drinks/Water/Milk/Chocolate Milk are all good choices
- Remember 16 oz. of water equals one pound of body weight.

**References:**


Korey Stringer Institute University of Connecticut’s Neag School of Education: Preventing Sudden Death in Sports.