Most exertional heat illnesses are preventable with proper awareness and execution of few simple preventive measures. The following defines the different types, signs and symptoms and guidelines for preventing and treating heat illness at Catawba College. These guidelines are based on the practices of the Catawba College Athletic Training Department and the NATA Position Statement: Exertional Heat Illnesses & Fluid Replacement. To provide the safest environment possible to all Catawba College athletes, it is imperative that everyone in the athletic department understand and be able to manage environments where potential heat illness may occur.

**PREVENTION**

**Hydration** – During times of warm and hot weather, it is important that athletes maintain hydration. It has been shown that less than 2% loss of body weight can reduce the capacity for exercise in an individual. Athletes preparing to train in the heat must hydrate themselves before, during, and after competition with water and when available sodium and electrolyte-containing drinks such as Gatorade. Unlimited water will be available to athletes at all practices and competitions. During times of practicing in high risk temperatures, water and rest breaks should be given more frequently and practice times and intensity should be adjusted accordingly.

*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.
- Encourage athletes to carry a bottle of water with him/her to drink out between practices and lightly salt food to taste at meals.
- Encourage to get “rest” during the rest periods between practices and at night

**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.**

Additionally, urine color charts are posted in the bathroom areas of the team locker rooms to assist the student athletes in checking their hydration levels.
**Acclimatization** – Should be done with gradual increase of practice length and intensity over a 10-14 day period. Practices should build up to training 1-2 hours under similar conditions they will be competing. Also protective, heat retaining and or bulky equipment worn for the involved sport should be gradually introduced during the pre-season periods.

**Weight Records** – Weigh-in charts will be posted prior to the fall pre-season beginning for Football and M/W Soccer. The other varsity sports will utilize weight charts as deemed necessary by the attending certified athletic trainer. Athletes utilizing weight charts are to weigh in before the first practice of each day and weigh out following the final practice of each day. Athletes that have lost greater than 5% of their body weight without recovering that weight lost will be monitored closely and can be withheld from activity at the discretion of the attending certified athletic trainer.

**Temperature** – In the case of extreme heat, the certified athletic trainer will obtain a temperature reading using a Wet Bulb Globe Temperature (WBGT) device (either electronic, web-based or via the sling psychrometer) and/or assess the Heat Index and make the appropriate recommendations to the coach in-charge. The following guidelines will be used based on those readings:

<table>
<thead>
<tr>
<th>WBGT Reading</th>
<th>Risk Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65 °F</td>
<td>Green/Low</td>
<td>Low but may exist on the basis of risk factors</td>
</tr>
<tr>
<td>65-73 °F</td>
<td>Yellow/Moderate</td>
<td>Level increases as event progresses through the day.</td>
</tr>
<tr>
<td>73-82 °F</td>
<td>Red/High</td>
<td>At-risk athletes should be withheld from participation or very closely monitored. Everyone must be aware of injury potential and preventive measures should be instituted as deemed necessary.</td>
</tr>
<tr>
<td>&gt;82 °F</td>
<td>Black/Extreme</td>
<td>Consider rescheduling event/practice or delaying practice/event until safer conditions prevail; if the event must take place, be on high alert. Take steps to reduce risk factors (e.g., more and longer rest breaks, reduced practice time, reduced exercise intensity, access to shade, minimal clothing and equipment, cold tub at practice site, etc.).</td>
</tr>
</tbody>
</table>

The WBGT can be measured with a WBGT meter. The calculation for the determination of WBGT is:

$$WBGT = .7 \text{(Wet Bulb Temperature)} + .2 \text{(Black Globe Temperature)} + .1 \text{(Dry Bulb Temperature)}.$$  

*When no BGT is available to use:*  

$$WBGT = .7(Wet \text{ Bulb Temp}) + .3(Dry \text{ Bulb Temp})$$

**NOAA’s National Weather Service Heat Index Scale**

- Heat Index < 80 safe for normal activity (GREEN)
- Heat Index 80-90 is a Yellow Zone – Caution as fatigue is possible
- Heat Index 90-103 is Extreme Caution – heat cramps and heat exhaustion is possible
- Heat Index 104-124 is Red Zone – sunstroke, heat cramps and heat exhaustion likely
- Heat Index 125> is Black Zone - sunstroke, heat cramps and heat exhaustion likely with continued exposure

*The athletic training staff shall have the authority to alter, limit or halt practices and athletic activity as needed due to the Heat Index and WBGT readings in order to maintain athlete health and safety.*
Recognition

Dehydration – An athlete can begin becoming dehydrated before they begin to feel thirst. It is important that the athlete hydrate themselves before, during, and after competition. It is also important that dehydration is recognized early on.

Signs and symptoms of dehydration:
- Thirst
- Vomiting and/or diarrhea
- General discomfort
- Nausea
- Flushed skin
- Heat sensations on head or neck
- Weariness
- Chills
- Cramps
- Decreased performance
- Dizziness
- Headache
- Dyspnea
- Dark yellow colored urine

Heat Cramps – The first stage of heat illness is heat cramping. It can be caused by dehydration, electrolyte imbalance, or fatigue.

Signs and symptoms of heat cramps include:
- Acute, painful, and involuntary muscle contraction
- Dehydration
- Sweating
- Fatigue
- Thirst

Heat Syncope – The second stage of heat illness is heat syncope, or orthostatic dizziness. It usually occurs in the first 5 days of acclimatization after standing for long periods of time, immediate cessation of activity, or standing quickly after resting or being seated.

Signs and symptoms of heat syncope include:
- Dehydration
- Fatigue
- Tunnel vision
- Pale or sweaty skin
- Decreased pulse
- Dizziness
- Light headedness
- Fainting
Heat Exhaustion – The third stage of heat illness is heat exhaustion or the inability to continue exercise. Depending on the severity, heat exhaustion may be difficult to differentiate between heat stroke.

*Signs and symptoms of heat exhaustion include:*

- Body temperature normal or elevated 102 to 104 °F
- Thirst or Dehydration
- Dizziness
- Lightheadedness
- Fainting
- Headache
- Rapid, shallow breathing
- Nausea and/or Diarrhea
- Decreased urine output
- Persistent muscle cramps
- Paleness
- Profuse sweating
- Chills
- Cool, clammy skin
- Intestinal cramps
- Weakness
- Hyperventilation
- Vomiting
- Tachycardia

Exertional Heat Stroke – The final and most severe stage of heat illness is heat stroke. This occurs when the core temperature of the body becomes greater than 104 °F and is associated with organ system failure. This is life threatening and can be fatal unless recognized and treated promptly.

*Signs and symptoms of exertional heat stroke include:*

- CNS changes
- Dizziness
- Drowsiness
- Irrational behavior
- Confusion
- Irritability
- Emotional instability
- Dry mouth or Thirst
- Apathy
- Aggressiveness
- Delirium/Hysteria
- Disorientation
- Staggering
- Seizures
- Loss of Consciousness
- Coma
- Dehydration
- Weakness
- Hot and wet or dry skin
- Cessation of sweating
- Headache
- Tachycardia
- Hypotension
- Hyperventilation
- Vomiting
- Diarrh
Exertional Hyponatremia – Hyponatremia is a rare condition caused by decreased sodium in the body and over-hydration.

Signs and symptoms of exertional hyponatremia:

- Core Temperature <104°F
- Nausea
- Vomiting
- Swelling of the extremities
- Progressive headache
- Confusion
- Significant mental compromise
- Lethargy
- Altered consciousness
- Apathy
- Pulmonary edema
- Cerebral edema
- Seizures
- Coma

Treatment

Heat cramps – Activity should be stopped and athlete will be given water and if available sodium-containing fluids such as Pickle Juice, Pedialyte, or Gatorade. The certified athletic trainer or athletic training student can begin mild stretching and massage of the muscle spasms while the athlete is lying down. The involved muscle or body part may also have ice bags applied to the area. Activity may be resumed at the discretion of the certified athletic trainer.

Heat syncope – Activity should be stopped and athlete will be given water and if available sodium-containing fluids. Athlete should be placed in a shaded, cool area and allowed to lie down. Ice packs can be given to the athlete to help cool down. The athlete may also upon waking be placed next to a mister unit, placed in a cold tub for immersion or a cold shower. The athlete will be held out the remainder of the day and further activity may be resumed at the discretion of the certified athletic trainer and/or team physician.

Heat exhaustion – Activity should be stopped and athlete will be given water and if available sodium-containing fluids. Athlete should be taken to a shaded, cool area and have excess clothing and equipment removed. The athlete will be cooled with the Versa-Mister, cold towels, ice bags, or cold water tub immersion as necessary. The certified athletic trainer and/or athletic training student will assess cognitive function and vital signs. If necessary, the athlete will be referred to the team physician, an urgent care facility and/or emergency room or Rowan Regional Medical Center. Activity may be resumed at the discretion of the certified athletic trainer and/or team physician if contacted. In the event the event is deemed to be a mild case of heat exhaustion and EMS is not activated – IV replacement therapy if available can be performed on-campus to supplement hydration needs.
**Exertional heat stroke** – Activity must be stopped immediately and the emergency response system initiated. The certified athletic trainer and/or athletic training student will assess cognitive function and vital signs. The athlete must be rapidly cooled immediately by removing excess clothing and equipment and immersed into a cold water tub. The water will be stirred and the athlete supported in the tub by either the certified athletic trainer and/or athletic training student. Emergency oxygen and other life support measures may be applied as deemed necessary. The athlete will be transported to the Rowan Regional Medical Center emergency room with ice packs and/or cold towels to ensure continued cooling. Activity may be resumed at the direction of the team physician due to the concern of prolonged impaired thermoregulation and CNS dysfunction.

**Exertional Hyponatremia** – Activity must be stopped immediately and the emergency response system initiated. The athlete can be given sodium-containing fluids only.

**INTRAVENOUS (IV) FLUID REPLACEMENT:** (IVF – Intravenous Fluid)

In certain instances an athlete may receive intravenous fluid replacement therapy to combat dehydration or associated heat illnesses. In the absence of the Team Physician, if the attending certified athletic trainer determines that an athlete may be suffering from mild dehydration or an associated heat illness, he/she will make every effort to contact the Team Physician and/or Student Health Center to arrange for treatment to be administered either on-campus or through the closest hospital emergency room/urgent care center.

**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 athletic trainer and/or team physician and/or the medical staff in the campus student health center, IVF replacement may be utilized.

**IVF Guidelines:**

1. As noted above, 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 of >5% of body weight in a 24 hour span
   - Loss of postural tone (syncope or pre-syncpe)
   - Dizziness
   - Increase of heart rate 20 bpm from supine to standing
   - Orthostatic drop of blood pressure 20mm or greater from supine to standing
   - Urine with specific gravity equal to or greater than 1.030
   - Urine with positive ketones
   - Diarrhea or vomiting > 12-24 hours
   - Heat related muscle cramping.
2. The athlete can be referred to the Team Physician, team physician’s designee, local urgent care center and/or the Campus Student Health Center for further medical evaluation. It is solely the decision of the Team Physician and/or designee and/or the medical personnel in the Student Health Center to administer IVF.

3. An intravenous catheter, tubing and fluids (Normal Saline 0.9%) will be administered and connected utilizing sterile technique.

4. The student-athlete will remain under the direct supervision and care of the attending medical provider throughout the entire duration of the administration of IVF. Blood pressure and pulse will be monitored as deemed necessary by the attending medical provider.

5. Once adequate hydration has been achieved, the attending medical personnel 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.

6. If the attending medical provider is unable to establish intravenous access, the student-athlete may be referred to the Rowan Regional Medical Center or a local urgent care center for said fluid administration or if there is no improvement after receiving 1-2L of IVF replacement.

7. Following IVF administration, the involved student athlete will be withheld from activity for at a minimum of 24 hours. Additionally the student athlete must weigh within 2 lbs of his/her initial base-line body weight and BP/HR must be wnl. A graded return to play will be utilized for student-athletes needing IV fluid replacement.

Team Physician: _________________________________ Date: _______________

* This protocol on exercising in heat has been developed in accordance with the NATA Fluid Replacement Position Statement, the NATA Exertional Heat Illnesses Position Statement, the Inter-Association Task Force on Exertional Heat Illnesses Consensus Statement and the Associate Team Physician for Catawba College.