



## MUSTANG PUBLIC SCHOOLS

### Emergency Action Plan

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# Heat

During summer and early fall and late spring, high temperatures and high humidity are present. It is important that we make ourselves aware of the dangers of this situation to prevent heat exhaustion and/illness (See Heat Index). Daily measurements via Heat stress monitor, using the Kestrel 5400 thermometer/psl psychometric/WBGT is taken before each practice during periods of extreme heat and humidity.

### **Three Pillars of Exertional Heat Stroke Survival**

1. **Recognition:** Exertional heat stroke (EHS) is defined as a body temperature greater than 104°F in addition to signs of central nervous system (CNS) dysfunction (dizziness, collapse, loss of consciousness, confusion, mood changes etc.). Any athlete with signs of CNS dysfunction during intense exercise in the heat should be suspected to be suffering from EHS until a rectal temperature confirms or refutes this diagnosis. A rectal temperature is the only valid field option to assess internal body temperature in an exercising individual. Aural, oral, tympanic, axillary and forehead measurements have all been shown to be invalid for measuring body temperature in exercising individuals.
2. **Treatment:** Cold-water immersion should be used to cool any EHS patient due to its superior cooling capacity. To ensure survival, cooling tubs should be set up prior to any event involving exercise in the heat. This works best if the tubs are filled with water with ice available nearby. Tubs should be large enough to accommodate the full-immersion of a large individual. An individual with EHS should be cooled to 102°F or below within 30 minutes (using approved rectal thermometer for guidance). If this is followed, future problems and death may be avoided. If cooling is available on-site, the individual with EHS should be cooled prior to transportation to a hospital.
3. **Return-to-play:** An individual should refrain from exercise for at least 7 days following their EHS, and should schedule an appointment with their primary care physician for a follow-up evaluation within those first 7 days. A physician should be immediately contacted if an individual's condition worsens. Individuals should not exercise until clearance is obtained from their primary care physician and all lab results (e.g., blood work) are normal. Athletes who have sustained an EHS likely had a predisposing factor at the time of their injury. Predisposing factors should be identified and remediated before returning an athlete to activity. Once medical clearance has been made, a cautious gradual return to exercise should be followed.

At a minimum, the following return to exercise procedure should be implemented along with Physician clearance: 1) Exercise at a low intensity in a cool environment 2) Exercise at a higher intensity in a cool environment 3) Exercise at a low intensity in a warm environment 4) Exercise at a higher intensity in a warm environment

\*NOTE: An individual should only proceed to the next step after they are able to successfully complete the previous step. Steps are considered successful if one experiences no issues with performing the given exercise, or no symptoms (see below). Throughout the recovery process, one should monitor for residual signs and symptoms of EHS, which include: inability to tolerate heat, difficulty concentrating, dehydration (dark urine), muscle soreness, difficulty sleeping, increased heart rate, lethargy, headache,



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and/or amnesia. Report to the hospital if one observes: chest pain/tightness, blood in the urine/stool, severe muscle pain, numbness, severe abdominal pain/pain with bowel movements, and/or any abnormal physical signs and symptoms that warrant medical attention. If difficulty exercising in the heat persists, heat tolerance testing may be warranted.

1. If temperatures range from 80 degrees to 90 degrees, fatigue is possible with prolonged exposure.
2. Between 90 and 105 degrees, sunstroke, heat cramps, and heat exhaustion are possible.
3. When heat index climbs to 105 to 130 degrees sunstroke, heat cramps, and heat exhaustion are likely and heat stroke is possible with prolonged exposure.
4. At 130 degrees or higher sunstroke or heat stroke are highly likely with continued exposure to sun.
5. If heat index reaches >104\* extreme caution must be taken and Activities/practice(s) will be moved indoors, or postponed to a cooler part of the day (6-10 am, or 6-10 PM).

### **WBGT TEMPERATURE MONITORING**

A WBGT device is a measurement tool that uses ambient temperature, relative humidity, wind, and solar radiation from the sun to get a measure that can be used to monitor environmental conditions during exercise. Establishing WBGT guidelines that dictate modifications in activity (work:rest ratios, hydration breaks, equipment worn, length of practice) at given WBGT temperatures play a huge factor in helping to prevent EHS.

As environmental temperature and humidity increase, there is an increase in the heat stress that is placed on the exercising individual. Exercise in the heat causes athletes to rely on evaporation of sweat from the skin as the primary method of dissipating heat that is produced by the working muscles. As humidity increases, the ability to dissipate heat through evaporation is further hindered, thus causing the body to have an increased body temperature, which increases the risk of EHS.

Mustang Athletics will monitor and record daily WBGT during times of extreme conditions and provide communication/directions for practice and competition recommendations via remind101 texts alerts.

Mustang Athletics: @mhsathltcs

Mustang Athletic Training: @broncoatc



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Wet Bulb Globe Temperature (WBGT) from Temperature and Relative Humidity																																																		
		Temperature (°C)																																																
		20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50																		
Relative Humidity (%)	0	15	16	16	17	18	18	19	19	20	20	21	22	22	23	23	24	24	25	25	26	27	27	28	28	29	29	30	31	31	32	32																		
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100	24	26	27	28	29	31	32	33	35	36	38	39																																						

Note: This table is compiled from an approximate formula which only depends on temperature and humidity. The formula is valid for full sunshine and a light wind

Cat 3	Cat 2	Cat 1	Activity Guidelines
< 82.0°F <27.8°C	< 79.7°F <26.5°C	< 76.1°F <24.5°C	<b>Normal Activities – Provide at least three separate rest breaks each hour with a minimum duration of 3 min each during the workout.</b>
82.2 - 86.9°F 27.9-30.5°C	79.9 - 84.6°F 26.6-29.2°C	76.3 - 81.0°F 24.6-27.2°C	<b>Use discretion for intense or prolonged exercise; Provide at least three separate rest breaks each hour with a minimum duration of 4 min each.</b>
87.1 - 90.0°F 30.6-32.2°C	84.7 - 87.6°F 29.3-30.9°C	81.1 - 84.0°F 27.3-28.9°C	<b>Maximum practice time is 2 h. For Football: players are restricted to helmet, shoulder pads, and shorts during practice. If the WBGT rises to this level during practice, players may continue to work out wearing football pants without changing to shorts. For All Sports: Provide at least four separate rest breaks each hour with a minimum duration of 4 min each.</b>
90.1 - 91.9°F 32.2-33.3°C	87.8 - 89.6°F 31.0-32.0°C	84.2 - 86.0°F 29.0-30.0°C	<b>Maximum practice time is 1 h. For Football: No protective equipment may be worn during practice, and there may be no conditioning activities. For All Sports: There must be 20 min of rest breaks distributed throughout the hour of practice.</b>
≥ 92.1°F ≥ 33.4°C	≥ 89.8°F ≥32.1°C	≥ 86.2°F ≥30.1°C	<b>No outdoor workouts. Delay practice until a cooler WBGT is reached.</b>

**\*\*\*We are to follow category 3 WBGT data for our regional climate recommendations\*\*\***

**\*\*\*The above data is WBGT temps not heat index or ambient temperature\*\*\***

### RECOMMENDATIONS

- The National Athletic Trainers’ Association (NATA) advocates the following prevention, recognition, and treatment strategies for exertional heat illnesses. These recommendations are presented to help ATCs and other allied health providers maximize health, safety, and sport performance as they relate to these illnesses. Athletes’ individual responses to physiologic stimuli and environmental conditions vary widely.



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These recommendations do not guarantee full protection from heat-related illness but should decrease the risk during athletic participation. These recommendations should be considered by ATCs and allied health providers who work with athletes at risk for exertional heat illnesses to improve prevention strategies and ensure proper treatment.

- Many cases of exertional heat illness are preventable and can be successfully treated if such conditions are properly recognized and appropriate care is given in a timely manner. The main objective of the Inter-Association Task Force on Exertional Heat Illnesses Consensus Statement is to educate athletes, coaches, parents and medical staff alike on what can be done to avert dehydration, exertional heat stroke (EHS), heat exhaustion, heat cramps and exertional hyponatremia. Prevention Strategies: The Task Force committee recommends:
  - Providing medical services onsite at various events
  - Ensuring that pre-participation physical examinations have been completed, which include specific questions regarding fluid intake, weight changes during activity, medication and supplement use and history of cramping/heat illnesses
  - Assuring that medical staff have authority to alter work/rest ratios, practice schedules, amounts of equipment and withdrawal of individuals from participation in sports, based on heat conditions and/or athletes' medical conditions

### **Treatment Strategies for Exertional Heat Illnesses**

**DEHYDRATION:** When athletes do not replenish lost fluids, they become dehydrated. Signs and Symptoms:

- Dry mouth
- Thirst
- Being irritable or cranky
- Headache
- Seeming bored or disinterested
- Dizziness
- Cramps
- Excessive fatigue
- Not able to run as fast or play as well as usual

**Treatment:**

- Move the athlete to a cool environment and rehydrate.
- Maintain normal hydration (as indicated by baseline body weight).
- Begin exercise sessions properly hydrated. Any fluid deficits should be replaced within 1 to 2 hours after exercise is complete.
- Hydrating with a sports drink like Gatorade, which contains carbohydrates and electrolytes (sodium and potassium) before and during exercise is optimal to replace losses and provide energy.
- Hydrate throughout sports practice to minimize dehydration and maximize performance.
- Seek medical attention to replace fluids via an intravenous line if athlete is nauseated or vomiting

**Return-to-Play Considerations:**

- If degree of dehydration is minor and the athlete is symptom free, continued participation is acceptable



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**EXERTIONAL HEAT STROKE:** 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. Signs and Symptoms:

- Increase in core body temperature, usually above 104°F/40°C (rectal temperature) when athlete falls ill
- Central nervous system dysfunction, such as altered consciousness, seizures, confusion, emotional instability, irrational behavior or decreased mental acuity
  - Nausea, vomiting or diarrhea
  - Headache, dizziness or weakness
  - Hot and wet or dry skin
  - Increased heart rate, decreased blood pressure or fast breathing
  - Dehydration
  - 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 (muscle, heart, brain, etc.). Due to superior cooling rates, immediate whole-body cooling (cold water immersion), is the best treatment for EHS and should be initiated within minutes post-incident. It is recommended to cool first and transport second if onsite rapid cooling and adequate medical supervision are available.

**Return-to-Play Considerations:**

- The athlete's physician should devise a careful return-to-play strategy that can be implemented with the assistance of a qualified health care professional.

**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. Signs and Symptoms:

- Athlete finds it hard or impossible to keep playing
- Loss of coordination, dizziness or fainting
- Dehydration
- Profuse sweating or pale skin
- Headache, nausea, vomiting or diarrhea
- Stomach/intestinal cramps or persistent muscle cramps

**Treatment:**

- Remove the athlete from play and immediately move to a shaded or air-conditioned area.
- Remove excess clothing and equipment.
- Cool athlete until rectal temperature is approximately 101°F (38.3°C)
- Have athlete lie comfortably with legs propped above heart level.
- If an athlete is not nauseated, vomiting or experiencing any CNS dysfunction, rehydrate orally with chilled water or sports drinks. If the athlete is unable to take oral fluids, implement intravenous infusion of normal saline.
- Monitor heart rate, blood pressure, respiratory rate, core temperature and CNS status.
- Transport to an emergency facility if rapid improvement is not noted with prescribed treatment.

**Return-to-Play Considerations:**



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- Athletes should be symptom free and fully hydrated; recommend physician clearance; rule out underlying conditions that predisposed him/her for continuing problems; and avoid intense practice in heat until at least the next day.

**HEAT CRAMPS:** Muscle cramps are not well understood. 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, which is common in ice hockey players. Signs and Symptoms:

- Intense pain (not associated with pulling or straining a muscle)
- Persistent muscle contractions that continue during and after exercise

**Treatment:**

- Reestablish normal hydration status and replace some sodium losses with a sports drink or water
- Some additional sodium may be needed (especially in those with a history of heat cramps) earlier in the activity.
- 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.

**EXERTIONAL HYPONATREMIA:** When an athlete's blood sodium levels decrease, either due to overhydration or inadequate sodium intake, or both, medical complications can result in cerebral and/or pulmonary edema. This tends to occur during warm/hot weather activities. Hyponatremia may be completely avoided if fluid consumption during activity does not exceed fluid losses. Signs and Symptoms:

- Excessive fluid consumption before, during and after exercising (weight gain during activity)
- Increasing headache
- Nausea, vomiting (often repetitive)
- Swelling of extremities (hands and feet)

**Treatment:**

- If blood sodium levels cannot be determined onsite, hold off on rehydrating the athlete (may worsen condition) and transport immediately to a medical facility.
- The delivery of sodium, certain diuretics or intravenous solutions may be necessary. All will be monitored in the emergency department to ensure no complications develop.

**Return-to-Play Considerations:**

- Physician clearance is strongly recommended in all cases. Prevent & Treat Heat Illness



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#### Heat Index guidelines

<b>Heat Index under 95°</b>	<b>All sports:</b> <ul style="list-style-type: none"> <li>● Provide ample amounts of water. This means water should always be available and athletes should take in as much water as they desire.</li> <li>● Optional water breaks every 30 minutes for 10 minutes duration.</li> <li>● Ice-down towels for cooling</li> <li>● Watch/monitor athletes carefully for necessary action</li> </ul>
<b>Heat Index 95° to 99°</b>	<b>All sports:</b> <ul style="list-style-type: none"> <li>● Provide ample amounts of water. This means water should always be available and athletes should take in as much water as they desire.</li> <li>● Mandatory water breaks every 30 minutes for 10 minutes duration.</li> <li>● Ice-down towels for cooling</li> <li>● Watch/monitor athletes carefully for necessary action</li> </ul> <b>Contact sports:</b> <ul style="list-style-type: none"> <li>● <u>Helmets and other possible equipment removed</u> if not involved in contact</li> </ul> Reduce time of outside activity. Consider postponing practice to later in the day Re-check temperature and humidity every 30 minutes to monitor for increased Heat Index
<b>Heat index 100° to 104°</b>	<b>All sports:</b> <ul style="list-style-type: none"> <li>● Provide ample amounts of water. This means water should always be available and athletes should take in as much water as they desire.</li> <li>● Mandatory water breaks every 30 minutes for 10 minutes duration.</li> <li>● Ice-down towels for cooling</li> <li>● Watch/monitor athletes carefully for necessary action</li> <li>● Alter uniform by removing items if possible</li> <li>● Reduce time of outside activity as well as indoor activity if air conditioning unavailable</li> <li>● Postpone practice later in the day if possible</li> </ul> Contact sports and activities with additional equipment <ul style="list-style-type: none"> <li>● Helmets and other possible equipment removed if not involved in contact or necessary for safety. If necessary for safety, suspend activity.</li> </ul> Re-check temperature and humidity every 30 minutes to monitor for increased Heat Index
<b>Heat index above 104°</b>	<b>All sports:</b> <ul style="list-style-type: none"> <li>● Stop all outside activities in practice and/or play, and stop all inside activity if air conditioning is unavailable.</li> </ul>



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<b>Work/Rest and Water Consumption Table</b> <i>Applies to average sized, heat-acclimated soldier wearing BDU, hot weather. (See TB MED 507 for further guidance.)</i>							
Easy Work		Moderate Work		Hard Work			
<ul style="list-style-type: none"> <li>• Weapon Maintenance</li> <li>• Walking Hard Surface at 2.5 mph, &lt; 30 lb Load</li> <li>• Marksmanship Training</li> <li>• Drill and Ceremony</li> <li>• Manual of Arms</li> </ul>		<ul style="list-style-type: none"> <li>• Walking Loose Sand at 2.5 mph, No Load</li> <li>• Walking Hard Surface at 3.5 mph, &lt; 40 lb Load</li> <li>• Calisthenics</li> <li>• Patrolling</li> <li>• Individual Movement Techniques, i.e., Low Crawl or High Crawl</li> <li>• Defensive Position Construction</li> </ul>		<ul style="list-style-type: none"> <li>• Walking Hard Surface at 3.5 mph, ≥ 40 lb Load</li> <li>• Walking Loose Sand at 2.5 mph with Load</li> <li>• Field Assaults</li> </ul>		<ul style="list-style-type: none"> <li>• The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hrs of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/hr) and exposure to full sun or full shade (± ¼ qt/hr).</li> <li>• <b>NL</b> = no limit to work time per hr.</li> <li>• <b>Rest</b> = minimal physical activity (sitting or standing) accomplished in shade if possible.</li> <li>• <b>CAUTION: Hourly fluid intake should not exceed 1½ qts.</b></li> <li>• <b>Daily fluid intake should not exceed 12 qts.</b></li> <li>• If wearing body armor, add 5°F to WBGT index in humid climates.</li> <li>• If doing Easy Work and wearing NBC (MOPP 4) clothing, add 10°F to WBGT index.</li> <li>• If doing Moderate or Hard Work and wearing NBC (MOPP 4) clothing, add 20°F to WBGT index.</li> </ul>	
Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work	
		Work/Rest (min)	Water Intake (qt/hr)	Work/Rest (min)	Water Intake (qt/hr)	Work/Rest (min)	Water Intake (qt/hr)
1	78° - 81.9°	NL	½	NL	½	40/20 min	¾
2 (GREEN)	82° - 84.9°	NL	¾	50/10 min	¾	30/30 min	1
3 (YELLOW)	85° - 87.9°	NL	¾	40/20 min	¾	30/30 min	1
4 (RED)	88° - 89.9°	NL	¾	30/30 min	¾	20/40 min	1
5 (BLACK)	> 90°	50/10 min	1	20/40 min	1	10/50 min	1

For additional copies, contact: U.S. Army Center for Health Promotion and Preventive Medicine Health Information Operations Division at (800) 222-9698 or CHPPM - Health Information Operations@apg.amedd.army.mil. For electronic versions, see <http://chppm-www.apgea.army.mil/heat>. Local reproduction is authorized. June 2004

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Readmore: <http://www.momsteam.com/health-safety/hydration-safety/when-too-hot-for-sports-depends-on-heat-index#ix2> ABHnFYW

- <http://www.nata.org/jat/readers/archives/44.3/attr-44-03-332.pdf>.
- [www.nata.org](http://www.nata.org)
- <http://www.nata.org/health-issues/heat-acclimatization>
- <https://ksi.uconn.edu/prevention/wet-bulb-globe-temperature-monitoring/>
- <https://ksi.uconn.edu/prevention/automated-external-defibrillators/>
- <https://ksi.uconn.edu/emergency-conditions/lightning/>
- [https://www.osha.gov/dts/osta/otm/otm\\_iii/otm\\_iii\\_4.html](https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html)
- <https://www.earthnetworks.com/wet-bulb-globe-temperature/>