The California State University

Student Activities Heat Illness Prevention

Resource Guide

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Background

Introduction

The California State University (CSU) campuses engage students in a variety of ways that include outdoor activities. This engagement may include camps, clinics, course work, sports clubs, research, field trips, field activities and various other outdoor activities. The CSU strives to offer safe and enjoyable educational environments for our students as they engage in these activities. In support of that goal, the CSU is committed to protecting students as they participate in CSU academic and organized programs.

Purpose and Scope

Purpose: The purpose of the Student Activities Heat Illness Prevention Resource Guide is to develop a process for assessing environmental risk factors for heat illness during student activities in order to prevent heat illness. These guidelines apply to University, Club and Auxiliary sponsored, approved or authorized activities, which may take place on campus or off campus.

Scope: This program shall be applicable to all student activities where students are participating in University sponsored events, as well as auxiliary operations, which may have outdoor environmental risk factors for heat illness. This includes but may not be limited to Police, Parking, Facilities Management, Campus Recreation and Wellness, Student Life, Sports Clubs, Special Events, Academic Colleges, Children's Center, Housing, Support Services, and Orientation Services.

Note: This Guide is not designed to replace the employee based Heat Illness Prevention Plan as outlined in the California Code of Regulations (CCR) Title 8, § 3395. This Guide is to assist campuses in recognizing possible environmental risk factors for heat illness as students engage in various campus outdoor activities.

Note: This Guide is not designed to replace Heat Illness requirements as outlined in National Collegiate Athletic Association (NCAA) or the National Athletic Trainers Association (NATA)

Definitions

Acclimatization: Temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within seven to fourteen days of regular activity in the heat.

Environmental risk factors for heat illness: Activity conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, activity severity and duration, protective clothing and personal protective equipment.

Heat illness: A serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat rash, heat cramps, heat exhaustion, and heat stroke.

Personal risk factor for heat illness: Factors such as an individual's age, degree of acclimatization, health, water consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.

Preventative recovery period: A period, at least five minutes, used to recover from the heat in order to prevent further heat illness.

Shade: Blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning. Shade may be provided by any natural or artificial means that does not expose participant to unsafe or unhealthy conditions and that does not deter or discourage access or use.

Temperature: Means the dry bulb temperature in degrees Fahrenheit obtainable by using a thermometer to measure the outdoor temperature in an area where there is no shade. While the temperature measurement should be taken in an area with full sunlight, the bulb or sensor of the thermometer should be shielded while taking the measurement, e.g., with the hand or some other object, from direct contact by sunlight.

WetBulb Globe Temperature (WBGT): The WetBulb Globe Temperature (WBGT) is a measure of the heat stress in direct sunlight, which takes into account: temperature, humidity, wind speed, sun angle and cloud cover (solar radiation). This differs from the heat index, which takes into consideration temperature and humidity and is calculated for shady areas. If activities take place in direct sunlight, this is a good element to monitor.

Responsibilities

Academic Leadership

Campus academic leadership is to assist in identifying courses/activities where students may engage in outdoor activities with environmental risk factors for heat illness. Upon identification, faculty and leadership of said programs should be informed of their need to attend Heat Illness Prevention training and the requirement to evaluate and address risk factors regarding possible heat exposure.

Student Club Leadership

Student club leadership is to assist in identifying courses/activities where students may engage in outdoor activities with environmental risk factors for heat illness. Upon identification, these leaders shall be informed of their need to attend Heat Illness Prevention training and the requirement to evaluate and address risk factors regarding possible heat exposure.

Special Event Coordinators

Special Event Coordinators should assist in identifying events where students may engage in outdoor activities with environmental risk factors for heat illness. Upon identification, these Coordinators shall be informed of their need to attend Heat Illness Prevention training and the requirement to evaluate and address risk factors regarding possible heat exposure.

Faculty, Instructors, Sports Club Coaches, and Supervisors

All those who are responsible for supervising students with possible heat exposure are responsible for the following:

1. Identifying and maintain records of students who will to engage in outdoor activities where potential heat illness could occur.
2. Provide identified students training on heat illness prevention and comply with all appropriate procedures.
3. Evaluate weather conditions as to environmental risk factors for heat illness when activity is to take place.
4. Ensure that adequate water and shade are available when environmental risk factors for heat illness are present.
5. Complete any applicable heat illness prevention training.
6. Ensure the supervisor's daily checklist is completed when required under this plan.
7. Maintain all associated records as required.
8. Call 911 or designated campus emergency number for emergency medical services when necessary.

Students

9. Complete University Heat Illness Awareness training and adhere to the guidance provided in the training.
10. Drink adequate amounts of hydrating fluids when the environmental risk factors for heat illness are present
11. Inform faculty/coach/coordinator/supervisor if shade and/or water is inadequate
12. Access shade to recover from heat related symptoms
13. Report symptoms of heat related illness promptly to faculty/coach/coordinator/supervisor
14. Call 911 or dedicated campus emergency number for emergency medical services when necessary

Environmental health and Safety

The Environment, Health, and Safety Office is responsible for providing annual training to all potentially affected employees and supervisors on the risks and prevention of heat illness, including how to recognize symptoms, and respond when they appear.

Risk Factors and Types of Heat Illness

Potential Risk Factors

Intensity of activity	This is the leading factor that can increase the core body temperature higher and faster than any other
Environmental Conditions	Heat and humidity combine for a high wet-bulb globe temperature that can quickly raise the heat stress of the body
Duration and frequency of activity	Minimize multiple activity sessions during the same day and allow at least three hours of recovery between sessions
Dehydration	Fluids should be readily available and so used to aid the body's ability to regulate itself and reduce the impact of heat stress
Nutritional supplements	Nutritional supplements may contain stimulants and/or can cause a negative impact on hydration levels and/or increase metabolism and heat production.
Medication/drugs	Certain medications and drugs have similar effects as some nutritional supplements.
Medical conditions	Examples include illness with fever, gastrointestinal illness, previous heat illness.
Acclimatization/ fitness level	Lack of acclimation to the heat or poor conditioning
Clothing	Dark clothing absorbs heat. Moisture wicking-type material helps dissipate heat
Protective Equipment	Heavy and bulky protective equipment may interfere with sweat evaporation and increase heat retention
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, exercise fatigue, fainting, confusion verbal disturbances and others

*modified from NCAA Sports Medicine Handbook (2014-2015) p.43

Heat Illness

Heat Rash – Heat rash occurs when sweat ducts become clogged and the sweat cannot get to the surface of the skin. Instead, it becomes trapped beneath the skin's surface causing a mild inflammation or rash.

Symptoms:

- Looks like a red cluster of pimples or small blisters
- Most likely to occur on the neck and upper chest, in the groin, under the breasts, and elbow creases.

Heat Cramps – Heat cramps usually affect people who sweat a lot during strenuous activity. This sweating depletes the salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps can also be a symptom of heat exhaustion.

Symptoms:

- Muscle pain or spasms usually in the abdomen, arms, or legs.

Heat Exhaustion – Heat exhaustion is the body's response to an excessive loss of water and salt, usually through excessive sweating. Individuals most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Symptoms:

- Heavy sweating
- Extreme weakness or fatigue
- Dizziness
- Nausea
- Clammy moist skin
- Pale or flushed complexion
- Muscle cramps
- Slightly elevated body temperature
- Fast and shallow breathing

Heat Stroke – Heat Stroke is the most serious form of heat illness and is considered a medical emergency. Heat stroke may occur, but not always, as a progression from milder heat –related illnesses such as heat cramps, heat syncope, and heat exhaustion. Heat stroke can kill or cause damage to the brain or other internal organs.

Symptoms:

- Throbbing headache
- Lack of sweating despite the heat.
- Red, hot, and dry skin.
- Nausea and vomiting.
- Rapid heartbeat, which may be either strong or weak.
- Behavioral changes such as confusion, disorientation, or staggering.
- Very high body temperature
- Seizures
- Unconsciousness

Program Components

Monitoring Current Weather Conditions

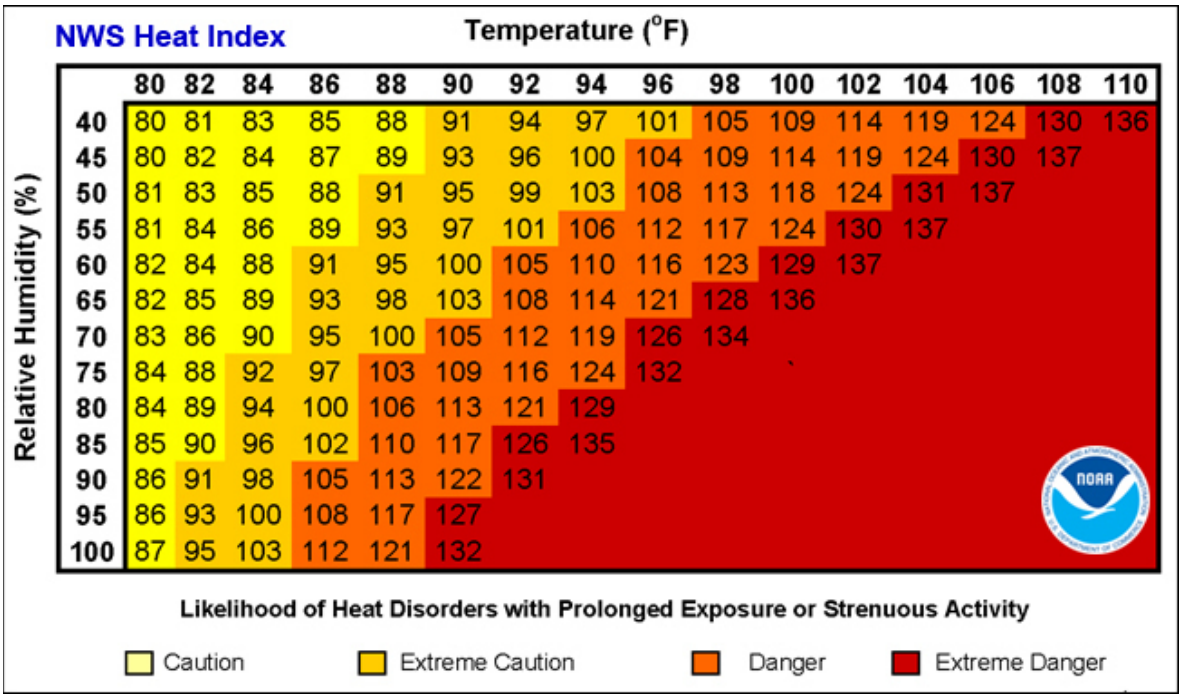
All faculty/coaches/coordinators/ supervisors identified under the scope of this program are expected to check current weather conditions as well as forecasted conditions for the current day regarding temperatures and relative humidity. Two tools to assist in assessing the potential for heat stress include the National Weather Service's Heat Index and Wet Bulb Globe Temperature Guidelines. .

The National Weather Services provides a Heat Index, which is a measurement of how hot it really feels when relative humidity is factored in with the actual air temperature. The two heat index charts below may be used as guidelines. Additionally, the National Weather Service provides an online Heat Index Calculator that may be used by applying the Dew Point Temperature or the Relative Humidity

Link to HEAT INDEX CALCULATOR

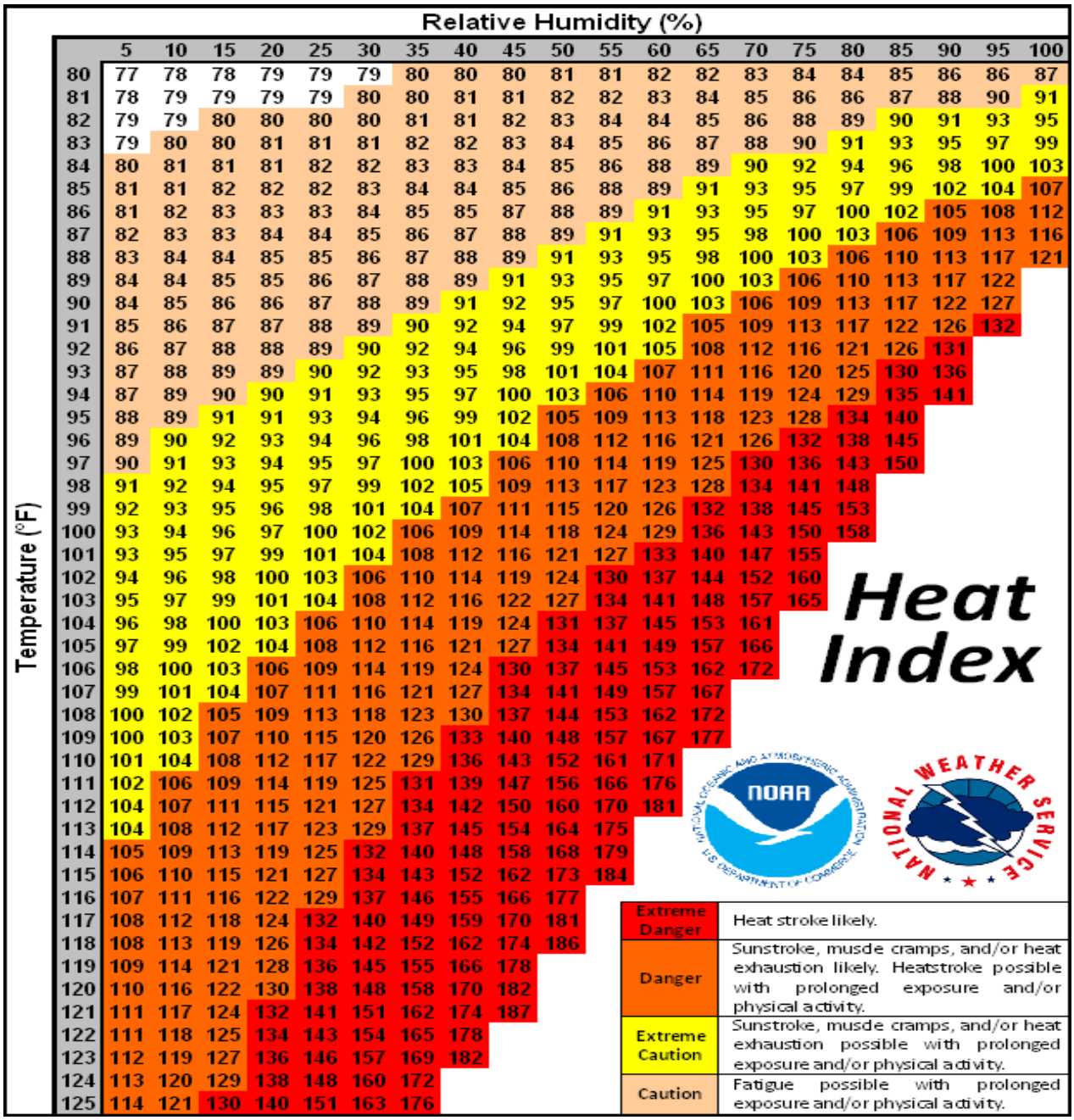
It is important to note that the Heat Index values were established for shady, light wind conditions, but exposure to full sunshine can increase the heat index values by up to 15^0 F. For this reason, Wet Bulb Globe Temperature may be used in lieu of the Heat Index.

Heat Index Chart



*copied from National Weather Services, Heat Forecast Tools

Heat Index Chart – Dry Heat



Temperature (°F) \ Relative Humidity (%)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
80	77	78	78	79	79	79	80	80	80	81	81	82	82	83	84	84	85	86	86	87
81	78	79	79	79	79	80	80	81	81	82	82	83	84	85	86	86	87	88	90	91
82	79	79	80	80	80	80	81	81	82	83	84	84	85	86	88	89	90	91	93	95
83	79	80	80	81	81	81	82	82	83	84	85	86	87	88	90	91	93	95	97	99
84	80	81	81	81	82	82	83	83	84	85	86	88	89	90	92	94	96	98	100	103
85	81	81	82	82	82	83	84	84	85	86	88	89	91	93	95	97	99	102	104	107
86	81	82	83	83	83	84	85	85	87	88	89	91	93	95	97	100	102	105	108	112
87	82	83	83	84	84	85	86	87	88	89	91	93	95	98	100	103	106	109	113	116
88	83	84	84	85	85	86	87	88	89	91	93	95	98	100	103	106	110	113	117	121
89	84	84	85	85	86	87	88	89	91	93	95	97	100	103	106	110	113	117	122	
90	84	85	86	86	87	88	89	91	92	95	97	100	103	106	109	113	117	122	127	
91	85	86	87	87	88	89	90	92	94	97	99	102	105	109	113	117	122	126	132	
92	86	87	88	88	89	90	92	94	96	99	101	105	108	112	116	121	126	131		
93	87	88	89	89	90	92	93	95	98	101	104	107	111	116	120	125	130	136		
94	87	89	90	90	91	93	95	97	100	103	106	110	114	119	124	129	135	141		
95	88	89	91	91	93	94	96	99	102	105	109	113	118	123	128	134	140			
96	89	90	92	93	94	96	98	101	104	108	112	116	121	126	132	138	145			
97	90	91	93	94	95	97	100	103	106	110	114	119	125	130	136	143	150			
98	91	92	94	95	97	99	102	105	109	113	117	123	128	134	141	148				
99	92	93	95	96	98	101	104	107	111	115	120	126	132	138	145	153				
100	93	94	96	97	100	102	106	109	114	118	124	129	136	143	150	158				
101	93	95	97	99	101	104	108	112	116	121	127	133	140	147	155					
102	94	96	98	100	103	106	110	114	119	124	130	137	144	152	160					
103	95	97	99	101	104	108	112	116	122	127	134	141	148	157	165					
104	96	98	100	103	106	110	114	119	124	131	137	145	153	161						
105	97	99	102	104	108	112	116	121	127	134	141	149	157	166						
106	98	100	103	106	109	114	119	124	130	137	145	153	162	172						
107	99	101	104	107	111	116	121	127	134	141	149	157	167							
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109	100	103	107	110	115	120	126	133	140	148	157	167	177							
110	101	104	108	112	117	122	129	136	143	152	161	171								
111	102	106	109	114	119	125	131	139	147	156	166	176								
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113	104	108	112	117	123	129	137	145	154	164	175									
114	105	109	113	119	125	132	140	148	158	168	179									
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116	107	111	116	122	129	137	146	155	166	177										
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119	109	114	121	128	136	145	155	166	178											
120	110	116	122	130	138	148	158	170	182											
121	111	117	124	132	141	151	162	174	187											
122	111	118	125	134	143	154	165	178												
123	112	119	127	136	146	157	169	182												
124	113	120	129	138	148	160	172													
125	114	121	130	140	151	163	176													

*copied from National Weather Services, Heat Forecast Tools

Wet Bulb Globe Temperature (WBGT) Guidelines

WBGT Reading	Level	Activity Modifications
Under 82.0^{0}F (27.8^{0}C)	Normal	Normal activities
82.0^0 F – 86.9^0 F (27.8^{0}C-30.5^{0}C)	Mild	Use discretion for intensity or prolonged exercise. Watch at-risk individuals carefully. Provide 2-3 separate rest breaks per hour of minimum duration of 5 minutes each
87.0^{0}F-89.9^{0}F (30.5^{0}C -32.2^{0}C	Moderative	Maximum activity time is 2 hours. Provide 3-4 separate rest breaks per hour of minimum duration of 5 minutes each. Heavy clothing or equipment should be removed during rest breaks.
90.0^{0}F -92.1^{0}F (32.2^{0}C-33.3^{0}C	Severe	Maximum activity time is 1 hour. There should be 20 minutes of rest breaks provided during the hour of activity. Heavy clothing or equipment should be removed during activity.
Over 92.1^{0}F (33.4^{0}C)	Extreme	All outdoor activities should be cancelled.

*modified from National Athletic Trainers' Association Position Statement: Exertional Heat Illness p.10

Provision of Water

When environmental risk factors for heat illness are present, students should have access to potable water provided in sufficient quantity at the beginning of the activity to provide one quart per student per hour for drinking for the entire activity. Students may begin the activity with smaller quantities of water if effective procedures for replenishment of water during the activity have been implemented. The water shall be located as close as practical to the area where the students are engaged. Water should be sufficiently cool, pure, fresh, and free of charge. The nearest access to potable water should be as close as practicable. Usually this should mean that water should be reachable within a 2 1/2 minute walk, but in no case more than 1/4-mile or a five-minute walk away, whichever is shorter.

Faculty/coaches/coordinator/supervisor should never limit the amount of fluid consumed by the student and should also encourage students to drink frequently. Students should be made to understand that thirst is not an effective indicator of a person's need for water.

Access to Shade

Faculty/coaches/coordinators/supervisors are responsible to ensure that students have access to a shaded area. Shaded areas should be large enough to accommodate the students engaged in the activity and allow students to sit in the shade without touching each other.

The nearest shaded area should be as close as practicable. Usually this should mean that shade should be reachable within a 2 1/2 minute walk, but in no case more than 1/4-mile or a five-minute walk away, whichever is shorter.

Canopies, umbrellas or other temporary structures may be used to provide shade, provided they block direct sunlight. Trees and dense vines can provide shade if the canopy of the trees is sufficiently dense to provide substantially complete blockage of direct sunlight. Areas shaded by artificial or mechanical means, such as by a pop-up canopy as opposed to a tree, should provide means for students to avoid contact with bare soil.

The interior of a vehicle may be used to provide shade if the vehicle is air-conditioned and the air conditioner is operating.

If the National Weather Service, as of 5 p.m. the previous day, forecasts the temperature to be over 80 degrees Fahrenheit, shade structures should be available at the beginning of the activity and present throughout the day. Regardless of predicted temperatures, faculty/coaches/coordinators/supervisors should always have the capability to provide shade promptly if a student requests it. If the temperature exceeds 80^0F, shade should actually be present regardless of the previous day's predicted temperature high.

Acclimatization

Students may become acclimatized to higher temperatures. Heat acclimatization requires a gradual increase of daily heat exposure for seven to fourteen days. Gradually increase the length of exposure each day until an appropriate schedule adapted to the required activity level for the environment is achieved. This will allow the student to acclimate to conditions of heat while reducing the risk of heat illness.

It should be noted that students new to the activity are among those most at risk of suffering the consequences of inadequate acclimatization. Supervisors with new students should be extra-vigilant in monitoring those individuals during the 14-day acclimatization period, and respond immediately to signs and symptoms of possible heat illness.

Preventative Cool-down Rest Periods

The purpose of the recovery period is prevention of heat illness. The faculty/coach/coordinator/ supervisor is required to provide access to shade for students who believe they need a preventive recovery period from the effects of heat and for any who exhibit indications of heat illness.

Access to shade should be allowed at all times, and students should be allowed and encouraged cool-down rest in the shade when they feel they need to protect themselves from overheating. Students who need a recovery period shall be monitored for symptoms and allowed to recover for no less than 5 minutes before being instructed to return to the activity.

The preventive recovery period is not a substitute for medical treatment. If a student exhibits signs or reports, symptoms of heat illness while taking a preventative cool-down rest or during a preventative cool-down rest period, the faculty/coaches/coordinators/supervisor shall provide appropriate first aid or emergency response.

Emergency Procedures

If a student has any symptoms of heat illness, first-aid procedures such as applying cooling measures, creating shade, calling 911 etc. should be initiated without delay. Common early signs and symptoms of heat illness include headache, muscle cramps, and unusual fatigue. However, progression to more serious illness can be rapid, and can include loss of consciousness, seizures, mental confusion, unusual behavior, nausea or vomiting, hot dry skin, or unusually profuse sweating.

Any student exhibiting any of the above-mentioned symptoms requires immediate attention. Students exhibiting symptoms of severe heat illness should be attended to by emergency services by calling 911 or dedicated campus emergency number. No student with symptoms of possible serious heat illness should be left unattended or sent home without medical assessment and authorization.

Faculty/coaches/coordinators/supervisors should be able to provide clear and precise directions to the activity site and should carry cell phones or other means of communication to ensure that emergency services can be called.

Training

Completion of training should be documented and training records should be maintained in accordance CSU's Records Retention and Disposition policy.

Faculty/Instructors/Sports Club Coaches/Supervisors

Faculty/instructors, sports club coaches/supervisors training should consist of the following:

1. The heat illness training required for all employees.
2. The procedures the faculty/coach/coordinator/supervisor is to follow to implement the Heat Illness Prevention Plan.
3. The procedures the supervisor is to follow when a student exhibits signs or symptoms of heat illness, including emergency response procedures.
4. How to monitor weather reports and respond to hot weather advisories.

Student

Student training should consist of the following:

1. The environmental and personal risk factors for heat illness, as well as the added burden of heat load on the body caused by exertion, clothing, and equipment.
2. The responsibilities and procedures to provide water, shade, rest breaks, and medical treatment without fear of reprisal.
3. The importance of consumption of water, up to four cups per hour, when the activity environment is hot and the student is more likely to sweat more than usual.
4. The concept, importance, and methods of acclimatization.
5. The different types of heat illness, the common signs and symptoms of heat illness. Proper procedures for the different types of heat illness and that heat illness can progress quickly from mild symptoms and signs to serious and life threating illness.
6. The importance of students to immediately reporting signs and symptoms of heat illness in themselves or other students.
7. The procedures for responding to signs or symptoms of heat illness and how to notify the appropriate faculty/coach/supervisor or emergency medical services.

Records

All records pertaining to training, checklists, site assessments, and the like shall be maintained by the host department. Such records should be retained and accessible upon request and should be held in accordance CSU's Records Retention and Disposition policy.

Resources

National Athletics Trainers' Assocation Postion Statement: Exetional Heat Illness

National Collegiate Athletic Association Prevention of Heat Illness

National Collegiate Athletics Association Sports Medicine Handbook 2014-15

National Weather Tools Heat Forecast Tools