Environmental Emergencies & Secondary School EAPs

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Environmental Concerns
Common Sense Forecasting

GARY'S
WEATHER FORECASTING STONE

CONDITION
Stone is Wet
Stone is Dry
Shadow on Ground
White on Top
Can't See Stone
Swinging Stone
Stone Jumping Up & Down
Stone Gone

FORECAST
Rain
Not Raining
Sunny
Snowing
Foggy
Windy
Earthquake
Tornado

FLIGHTSEEING
What is Dangerous?

Heat:

- High ambient temperature, low humidity? > 90 degrees?
- High humidity, low ambient temperature?
- High ambient temperature, high humidity?
- Low ambient temperature, low humidity? 80 - 89 degrees

Cold:

- Dry cold, no wind?
- Cold and windy?
What is Dangerous?

Rain:
- Approaching storm?
- Drizzle?
- Downpour?

Lightning:
- Glowing sky, no bolt?
- Bolt off in the distance?
- Bolt within reaching distance?

Wind:
- Breezy?
- Gusts?
Announcements
National Weather Service (NWS)

**Watch**

Conditions are right for dangerous weather. Watch out for what the weather could do and be ready to act.

**Warning**

Dangerous weather is threatening the area. For severe thunderstorms, tornadoes and flash floods, a warning means the event is occurring. A hurricane warning means either evacuate or move to safe shelter.
Warm / Hot Weather Emergencies
Support From Professional Organizations

NATA Position Stands
- Fluid Replacement (2000)
- Preventing Sudden Death (2012)

NATA Official Statements
- Youth Football & Heat-related Illnesses (2005)

NATA Consensus Statements
Support From Professional Organizations

NFHS


Position Statement and Recommendations for Hydration to Minimize the Risk for Dehydration and Heat Illness (2011)


OSHA Heat Campaign Website
Support From Professional Organizations

**NCAA**
- Health Guidelines for the Start of Football Practice (2012)

**USA Football**
- Website Educational Articles
Exertional Heat Stroke is Non-Discriminatory

It can occur regardless of male/female, football/field hockey, varsity/freshmen, outdoors/indoors.
Highest Incidence for EHS

- HS Football Practice / Conditioning
- Collegiate Conditioning
Contributors to EHS

- Vigorous activity in hot-humid environment
- Lack of heat acclimatization
- Poor physical fitness
- Dehydration
- Sleep deprivation
- Fever or illness
- Warrior mentality
- High pressure to perform
- Heavy equipment/uniform
EHS Diagnosis

- CNS dysfunction
- Core body temperature > 40°C / 104°F
- Weakness
- **Hot and wet skin**
- Tachycardia: 100-120 bpm
- Hypotension
- Hyperventilation
- Vomiting
- Diarrhea
- Sweating

- Altered mental status
- Dizziness
- Irrational behavior
- Irritability
- Headache
- Inability to walk
- Loss of balance / muscle function
- Collapse
- Seizures
- Coma
- Death
Myths

*EHS can only occur when ambient temperatures reach 100 degrees F.*

Conditions most commonly occur during the hot summer months; however, EHS can happen at any time and in the absence of high environmental temperatures. Exercise intensity and environmental conditions are the primary factors associated with EHS.
Prevention

Wet Bulb Globe Index

Air Temperature
Relative Humidity
Radiant Heat
Air Movement
Prevention

How Hot is Too Hot?

A WBGT of 82 degrees F creates high risk of EHS, giving reason to alter practice.
Myths

An athlete must be severely dehydrated for EHS to occur.

While dehydration may predispose an athlete to, or exacerbate an EHS, dehydration does not always have to be present. EHS can occur in as little as 20 minutes after the beginning of exercise before severe fluid loss is prominent.
Prevention

**Fluids**

Every 15 minutes, drink 7-10 oz (200 – 300 ml) water/sports drink.

After exercise, drink to replace weight loss, approximately 20-24 oz/lb of body weight.

Dehydration occurs with weight loss 2% of body weight or more.
National Center for Catastrophic Sports Injury

Started in 1982

Director: Frederick Mueller, PhD
Medical Director: Robert Cantu, MD

“...heat stroke is the most prevalent of the indirect injuries”. (NCCSI 2007)
Recent Research

Exertional heat illness may be a precursor to cardiac, sickle cell, asthmatic deaths and hyponatremia.
Hyponatremia

A condition in which the amount of sodium in the blood is lower than normal

**Signs & Symptoms:**
- Respiratory difficulties
- Excessive urination
- Pitting edema in extremities
# Heat Stroke Fatalities
## 1979 - 2009

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Projection 2010 - 2014

Totals over 30 deaths
Greater than any 5 year block the last 40 years
3 times the 5 year block average for deaths since 1975

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Body Temperature Issues

Typical ending-practice body temperature in the heat = 38.8 to 40 degrees C (102 – 104 F).

Typical rate of cooling in a non-air conditioned environment = 0.02 degrees C / minute.

180 minutes provides a 3.6 degrees C drop (3 hours).
Thermal Injury Risk Recommendations

82 degrees F WBGT: Extreme High Risk for hyperthermia. No competition. Cancellation should be considered.

73 to 82 degrees F WBGT: High Risk for hyperthermia. Heat sensitive participants should withdraw. Consider slowing pace or intensity of play.

65 to 73 degrees F WBGT: Moderate Risk for hyperthermia. Heat sensitive participants should slow pace.
Immediate Treatment

Performed in order, these 2 methods will save a life for those suffering exertional heat stroke.

# 1 Rapid Cooling

# 2 Transport
Cold Weather Emergencies
Cold weather is defined as any temperature that can negatively affect the body's regulatory system. These do not have to be freezing temperatures.
Support From Professional Organizations

Cold illnesses is not supported as well as heat illnesses.

NATA - Environmental Cold Issues (2008)


USA Football Website Educational Articles
The “Nipple Test”
Environmental Factors

Rain

Sleet

Snow

Fog

Humidity

Wind
Personal Factors

- **Clothing**
  - Dry vs Wet

- **Exposed Skin**
  - Extremities
  - Ears, Nose

- **Duration of Activity**
Temperature or Wind Chill between $50^\circ F - 40^\circ F$

The human body’s mechanisms of heat retention are significantly less efficient than it’s ability to dissipate heat.

Exposure to 30 – 50 degree temperatures under wet and windy conditions can be equivalent to sub-zero temperatures with no wind or moisture.

Chilblain
Temperature or Wind Chill between 39\(^\circ\)F - 30\(^\circ\)F

No modifications for practice but, a warning should be given to coaches and athletes.

Observe athletes who are at a higher risk of sustaining a cold related issue.

Frostnip
Temperature or Wind Chill
From 29°F - 20°F

Initiate practice modifications.

Start warm-ups indoors.

Outside participation should be limited to 45 minutes.

Practice should be designed with minimal “down time,” keep athletes moving and structure workouts that will not result in heavy sweating followed by resting.

Hats and gloves are required for every athlete.

Cool down inside.

Frostbite
Temperature or Wind Chill Below 20°F

Cold Weather Termination

Temperature or Wind Chill below 20°F

All outside practices and games should be postponed.
Cold Threat

During the day, temperature may be moderate and sun shining. As sun sets and temperature begins to fall (coupled w/exhaustion, dehydration and wet clothing associated w/physical activity), the risk of cold-related pathology can increase.
Signs and Symptoms

Mild Hypothermia
Shivering, cold sensation, goose bumps, cold hands

Moderate
Intense shivering, muscle incoordination, slow and labored movements, mild confusion, difficulty speaking, signs of depression, withdrawn

Severe
Shivering stops, exposed skin is bluish and puffy, inability to walk, poor muscle coordination, muscle rigidity, decrease in pulse and respiration rate, unconsciousness

Skin
Red, White, Blue, Hard, Dry, Waxy
Cold Injury Risk Recommendations

- **< 50 degrees F:** Hypothermia can occur post-event. Cover up or change into dry clothes.

- **< 40 degrees F:** Wind and/or wet conditions increase risk of hypothermia. Cover exposed areas.

- **< 32 degrees F:** Risk of frostbite. Modify or postpone activities.
Immediate Treatment

- Remove athlete from the cold environment.
- Replace wet clothing with dry clothing and blankets.
- Give warm fluids.
- Use warm water immersion tub.
- ER transport.
Lightening Emergencies
Lightning Emergencies

In 1997, the National Lightning Detection Network recorded 27,000,000 cloud-to-ground lightning strikes in the US.

Annually, it causes 100 deaths and 400 injuries.

¾ of all casualties occur between May and September.

4/5 of casualties between 10:00 am – 7:00 pm.
Support From Professional Organizations

NATA
- Lightning Safety for Athletics and Recreation (2000)
- Updated Position Statement (2013)

NCAA

NFHS
- Guidelines on Handling Contests During Lightning Disturbances (2010)
Lightning Facts

The average lightning stroke is 5 – 6 miles long.

The average thunderstorm is 6 – 10 miles wide and moves at a rate of 25 mph.
Lightning Facts

Once the leading edge of a thunderstorm approaches to within 10 miles, immediate risk due to possibility of lightning strokes coming from over hanging anvil cloud. This is the reason many deaths and injuries occur with clear skies overhead.

The sudden wind is the result of down drafts and usually extends less than 3 miles from the storm’s leading edge. By the time you feel the wind, the storm can be less than 3 miles away!
Safe and Dry?

Just because you aren’t getting wet, doesn’t necessarily mean you are safe from lightning.
Man Killed by Bolt From Clear Blue Sky

Island Beach State Park, July 1, 2001

A bolt of lightning came out of a blue sky Saturday, striking two beachgoers who were tossing around a football.

**Hot, Sunny Day**

*The two were enjoying the hot, sunny day when the lightning hit. It was a wild bolt thrown out by a storm a few miles off shore.* Anthony Gigi, a National Weather Service meteorologist in Mount Holly, said lightning can strike even when skies are clear. "If you're close enough to hear thunder, then you're close enough to be struck by lightning," Gigi told The Sunday Asbury Park Press of Neptune. "That's pretty much the rule of thumb we follow."

‘It Sounded Like a Bomb’

At the time of the lightning strike, the park administrator was nearby in a patrol vehicle. "I thought it was an explosion. It sounded like a bomb" said park superintendent William Vibbert. "Then I saw Steven on the ground."
A flash to bang count of 30 seconds or less should be used as a **minimal** determinant to determine when to suspend activities.

**30 seconds**  
(30/5 = 6 miles away)

Waiting 30 minutes or longer after the last flash of lightning or sound of thunder is recommended before activities are resumed.
Lightning Concerns

Failure to know how lightning strikes
- 50% Ground current
- 30% Side Flash
- 15% upward leader

Failure to have enough safe locations for spectators and participants.

YouTube: “Lightning Strike Ends HS Football Friday the 13th”. 
Lightning Safety Strategies

Reaching Safe Harbor

Sturdy Buildings
Fieldhouse
Library
School
Gym
Buses
Vehicles (hard top)
Lightning Safety Strategies

Inappropriate Shelters

Any open areas
Press box
Garage
Tents
Dugouts
Trees
Lightning Safety Strategies

Monitor local weather forecasts
Designate a weather watcher
Establish a chain of command
Suspend the use of land-line telephones and electronics (television, video games, etc...)
Plumbing (showers, indoor pools)
Near open windows
Immediate Treatment

Provide a quick assessment of the area

People lying on the ground
  No risk of electrical transmission from victim(s)
  Check CAB
  Reach safe harbor
  Call EMS
  Perform necessary first aid
Wind

It’s usually not a factor unless coupled with the cold weather.

There are no published Safety Statements for Athletics.

It increases with an approaching thunderstorm.

Forces are unidirectional (straight line) as opposed to circular (tornadoes/cyclones).
Dangerous Wind

- Hurricane
- Tornado
- Tsunami

Usually comes with warning
Occurs during season transition
Athletics events cancelled
The Emergency Action Plan: Are YOU Ready to Roll?
The Triple “E” Approach

Evaluate the Situation

Establish a Plan

Execute When Needed
Event Staff Meeting

Agenda

Who monitors the weather?
Who pushes the button?
How is the announcement made to teams/spectators?
Where is safe harbor?
How are victims removed from the field of play?
Who contacts EMS?
Who opens the access gates?
Who notifies police, administrators, parents?
Who corrals the spectators?
Where are the closest AEDs?

Yearly Review and Practice
EAP Administrative Issues

Obvious Concerns
Safety of athletes and athletic staff

Overlooked Concerns
Safety of band, spectators, elderly and physically disabled
Location of Event

EMS Accessibility

Are access roads open?
Are gates unlocked?
Can a driving path to the field be established?
Large Event EAP

Hot Weather

Indoor Air Conditioned Area
Cold Water
Electrolyte Fluids
Ice
Fans
Wet Towels
Cooling/Misting Station
Cold Water Immersion Tubs
Large Event EAP

Cold Weather

Indoor Warming Area
Water
Warm fluids
Heat Packs
Blankets
Additional Clothing
Space Heaters
Summary

The Big 5:

Weather Monitoring Equipment
Effective Communication
Transportation
Safe Shelter
Review
How Do You Get to Carnegie Hall?

Practice, Practice, Practice !!!