Beating the Heat: Prevention and Treatment of Heat Illness

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THE QUEEN'S MEDICAL CENTER
SPORTS MEDICINE

Objectives

- Define the spectrum of heat illness
- Describe preferred techniques to diagnose and treat heat illness
- Define return to play guidelines
- Review the 7 fundamentals of heat acclimatization and heat illness prevention

Korey Stringer

- July 30, 2001: Vomited several times and needed cart off field after practice
- July 31, 2001: Vikings pre-season practice
- Heat index 110°F
- He had completed the practice, full pads, full contact.
- He walked on his own to an air-conditioned facility after practice and collapsed.
- EMS arrived within 5 minutes
- ED: core temp 108.8°F, unresponsive, multi-organ failure
- Died Aug 1, 2001 at 1:50am of heart failure

Eraste Autin

- 6 Days earlier, 18 yr old freshman Eraste Autin from Univ of Florida died from EHS on July 25, 2001
- Disoriented and collapsed while jogging back to locker room after pre-season summer conditioning practice
- 88F, 72% humidity, heat index 102F (typical Hawaii weather)
- He had been at 9 other pre-season conditioning practices
- 18th high school or college football player death from EHS since 1995
- National Center for Catastrophic Sports Injury Research reported 35 high school football players died from EHS between 1995 - 2010

Pee Dee football player dies after practice

Posted: 07.31.2011 at 5:07 PM | Updated: 08.01.2011 at 11:40 AM

Read more: Local, State, Sports, News, High School, Football, Player, Darlington County, Heat Death, Tyquan Xavier Brantley

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DARLINGTON (WACH, WPDE, AP) -- Darlington County Coroner J.T. Hardee says 14-year-old Tyquan Xavier Brantley collapsed and died after a morning football practice.

Brantley was a rising ninth grade student at Lamar High School. Public Information Officer Audrey Childers said as Brantley was leaving the football field for the day he collapsed. The coaches called 911 immediately.

"We are heartbroken at this terrible tragedy," said Dr. Rainey Knight, School District Superintendent. "Our deepest condolences and prayers go out to Tyquan's family, classmates, and coaches."

Childers added the football players practiced in helmets but no pads for just over an hour Saturday morning and the players had water at the fields. Students who practice in the summer are given frequent cooling breaks.

Two Georgia Teens Die During Football Training Camp

Published August 03, 2011 / NewsCore

Print

COLUMBIA COUNTY, Fla. -- A 16-year-old Georgia boy was found dead at a high school football camp in Florida's Columbia County on Tuesday, WJXT-TV reported.

Hours later, another 16-year-old Georgia high school football player died in an Atlanta hospital, a week after being admitted suffering what doctors believe was heat exhaustion, WSB-TV reported.

Donteria Searcy was found unresponsive in his cabin at about 11:15 a.m. Tuesday, after Fitzgerald (Ga.) High School's football team had finished their morning workout at O'Leno State Park, where they are holding a summer training camp.

Searcy was taken to a nearby hospital, but attempts to resuscitate him were unsuccessful.

An autopsy will be carried out to determine the cause of death, but police do not suspect foul play.

In Atlanta, Locust Grove High School football team player Forrest Jones died around 9:30 p.m. Tuesday. He was admitted to a

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High School Football Player Dies; Sixth Athlete Death This Summer

Al Smith Jr., a 15-year-old sophomore, fell ill and then fainted Tuesday during his second day of practice with the junior varsity team at Eisenhower H.S. in Houston. (ABC News)

Martin Lawrence

- August 22, 1999: Attempting to lose weight for a movie role
- Jogging at 11:30am in 8 layers of heavy clothing and wool cap for 1 hour in Los Angeles summer heat
- Found unconscious on his doorstep
- ED: 107°F
- Cooled with ice, fans, cold IVF.
- 3 days in a coma, ventilator, kidney failure.

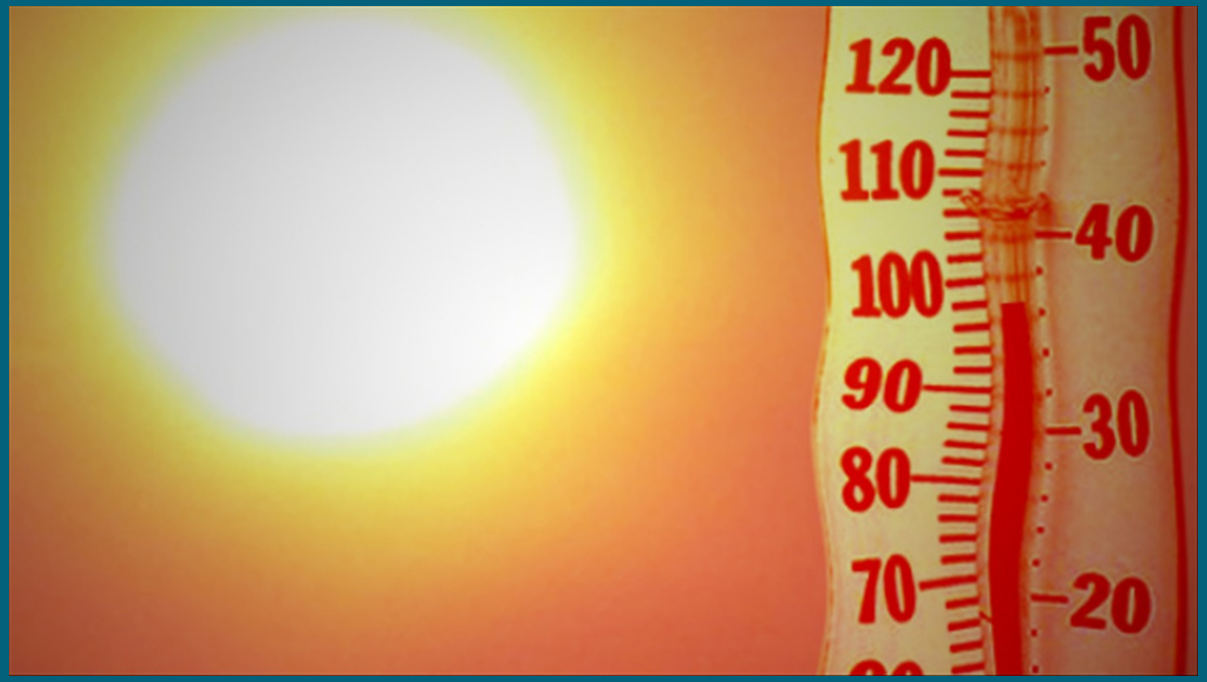
Why are we talking about this?

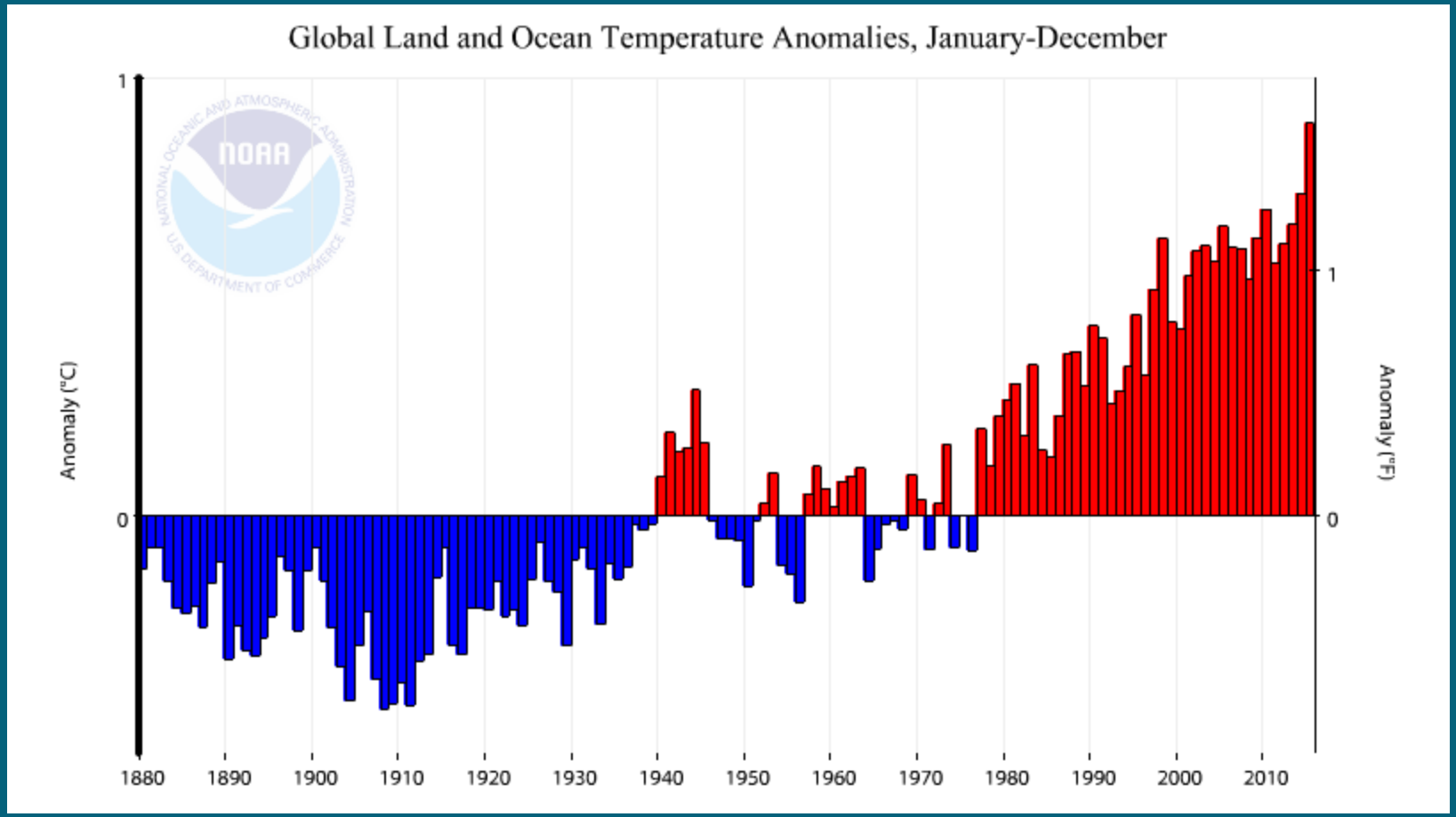
- Exertional heat illness (EHS) is entirely preventable
- 100% success rate if immediate cooling initiated in first 10 minutes after collapse
- It is one of the top 3 reasons for sudden death in sports.

- Exertional heat stroke is THE LEADING CAUSE OF PREVENTABLE DEATH IN HIGH SCHOOL ATHLETICS!

Heat Factors

- Temperature
- Humidity
- Wind
- Time of day





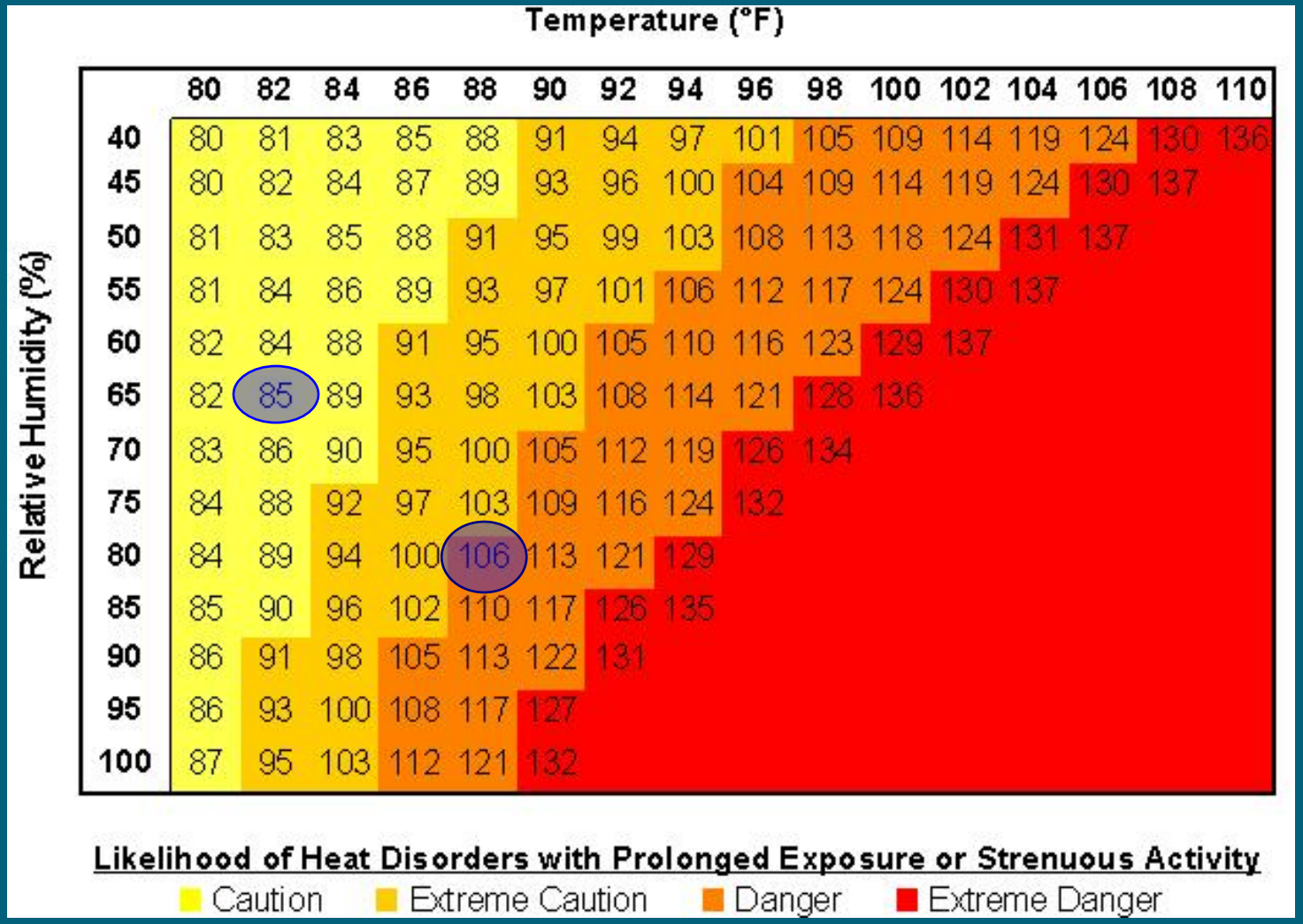
https://www.ncdc.noaa.gov/cag/time-series/global/globe/land_ocean/ytd/12/1880-2015

HONOLULU

- Avg. annual temp: 77.2°F
  - Avg range: 65.4°F - 88.7°F (max. 92°F)
- Avg. annual humidity: 66%
  - Avg range: 51% - 79% (max. 90%)

- Climate Change in Hawaii:
  - By 2100: avg daily temp ⬆ 2.5 - 6°F (EPA, 2014)

Heat Index


Temperature (°F)
Relative Humidity (%)
80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110
40 80 81 83 85 88 91 94 97 101 105 109 114 119 124 130 136
45 80 82 84 87 89 93 96 100 104 109 114 119 124 130 137
50 81 83 85 88 91 95 99 103 108 113 118 124 131 137
55 81 84 86 89 93 97 101 106 112 117 124 130 137
60 82 84 88 91 95 100 105 110 116 123 129 137
65 82 85 89 93 98 103 108 114 121 128 136
70 83 86 90 95 100 105 112 119 126 134
75 84 88 92 97 103 109 116 124 132
80 84 89 94 100 106 113 121 129
85 85 90 96 102 110 117 126 135
90 86 91 98 105 113 122 131
95 86 93 100 108 117 127
100 87 95 103 112 121 132
Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity
Caution
Extreme Caution
Danger
Extreme Danger

Types of Heat Stroke

- Classic
  - Extreme ages
  - May have underlying medical conditions
  - Environmental exposure without ability to escape

- **Exertional**
  - Typically previously healthy
  - Heavy exercise during high temperature and humidity
  - Athletes & military

Classic case of heat stroke:

- Otherwise healthy athlete
- Intense exercise
- Hot and humid day
- Confused
- Agitated and irritable
- Pale
- Sweat-soaked

COMMON MISTAKE #1

Assuming that heat stroke will be visibly obvious.

By the time it is, it is an emergency.

Definition of Exertional Heat Stroke

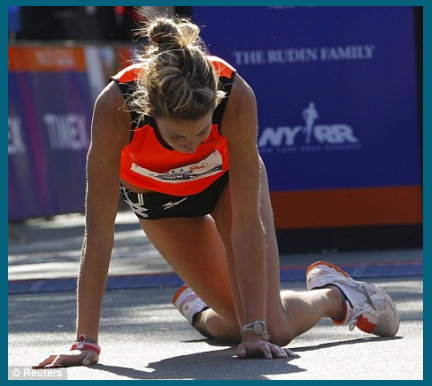
- Very high core body temperature > 104°F (40º C)
- Central Nervous System symptoms – May have lucid / clear interval
  - Seizure; vomiting/diarrhea; delirium; unusual behavior; hallucinations; irritability; unsteadiness; lack of coordination; slow, slurred, disordered speech; collapse; coma
- Pale +/- sweating
- Rapid pulse, rapid breathing
- Low blood pressure
- Multiple organ failure; heart failure

Diagnosis & Treatment of Exertional Heat Stroke

- Rectal temp is gold standard for diagnosis.
  - Core body temp must be lowered to <102°F (<39°C) ASAP.
  - Goal is within 30 minutes of collapse
- Cold-water immersion (CWI) with ice water is fastest cooling method.
  - Ice water temp = 35°-59°F
  - Cool within 20-30 minutes

Defining other forms of heat illness

- **Heat Exhaustion**
  - Sweaty, pale
  - Headache, dizzy, weak, chills, cramps, nausea/vomiting, diarrhea
  - May have elevated temp but < 104°F
  - Most common type of heat illness



This can rapidly progress to heat stroke

How to treat heat exhaustion

- Move to shaded or air-conditioned area
- Remove excess clothing and gear
- Lie on back, legs elevated above heart
- Monitor athlete: vital signs and CNS signs
- Cooling measures (ice immersion, ice towels, ice bags, fans)
- Provide oral fluids
- Typical return to sports = 1-2 days later

Treating Heat Exhaustion

Defining other forms of heat illness

- **Heat Cramps**
  - Painful spasms of skeletal muscles
    - Each lasts 1-3 minutes, total duration 6-8 hrs.
  - Commonly legs, arms, abdomen
  - Body water loss
  - Large sweat sodium loss
  - Exercise-induced muscle fatigue

How to treat heat cramps

- Rest
- Prolonged gentle stretching
- Drink fluids with sodium/electrolytes
- Eat food with salt
- Return to sports as soon as tolerated
- Prevention: maintain prior hydration and salt balance and good conditioning

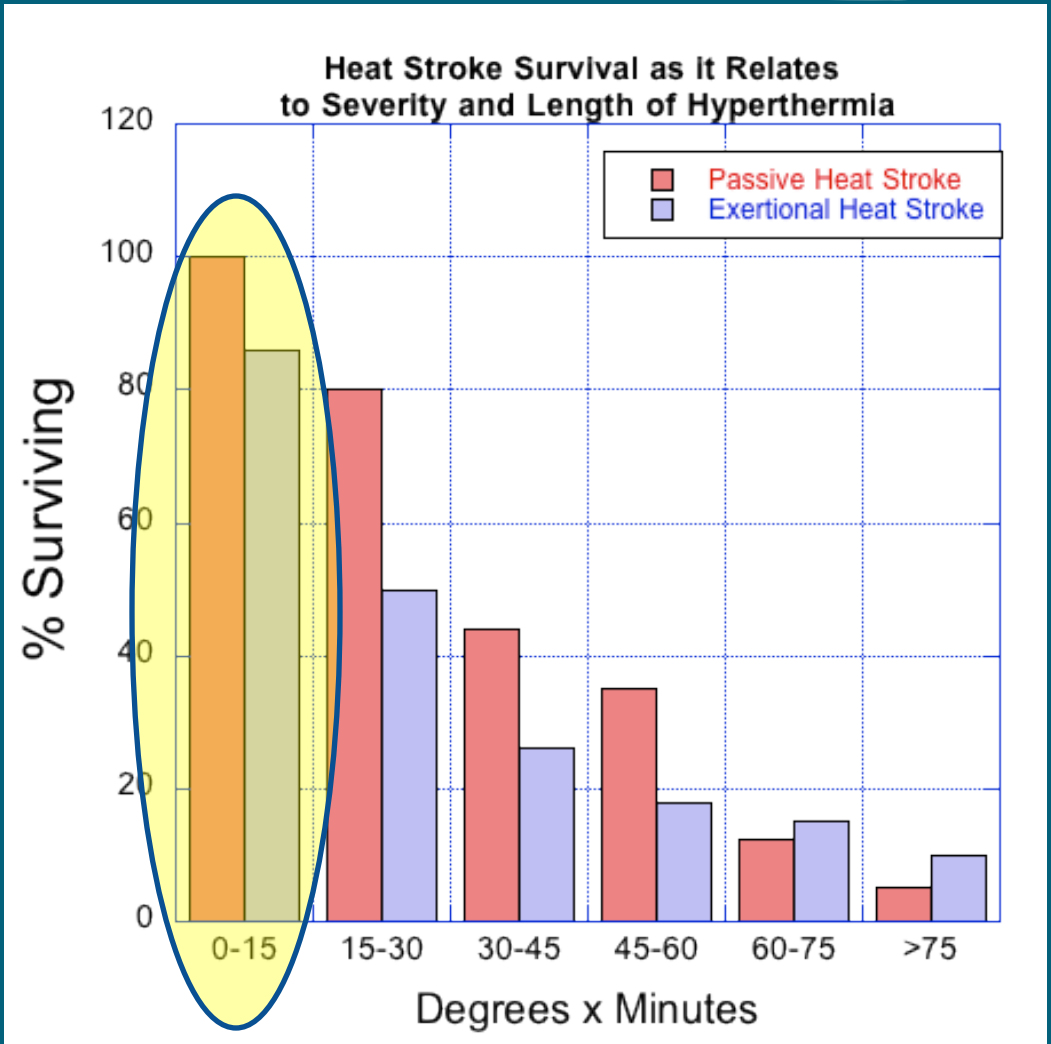
Cool first, transport second

How to Treat a Heat Stroke Athlete

1. Place athlete in ice bath – Keep head above water.
2. Alert your local EMS / call 9-1-1
3. Stir the water vigorously
4. Continuously monitor vital signs and CNS function
   - Pulse, Breathing, Responsiveness
5. Continue cooling the athlete until a rectal thermometer reads 102ºF or less
   - Athlete is now safe for transport by EMS

If an ice bath is not available:

1. Call 9-1-1 and activate EMS.
2. Move the athlete to a shaded or air-conditioned area.
3. Remove athlete's equipment and clothing.
4. Cool their torso by covering them in ice bags from the neck and shoulders to the hips and groin.
5. Place ice towels on their head – keep face clear.
6. Aim fan at their body.



Casa et al. *Medicine and Science in Sports and Exercise*, 2010;42(7):1-7.
(redrawn from Hubbard et al, *J Applied Physiology* 42: 809-816, 1977)

Return to Sport after Heat Stroke

- Period of rest with no activity for at least 7 days
- Athlete has no remaining symptoms
- Normal blood enzyme levels – recheck at 1 wk interval
  - Labs to confirm normal organ function

- Gradual increase in activity over 2-4 weeks or more:
  - Duration
  - Intensity
  - Heat exposure – start cool

COMMON MISTAKE #2

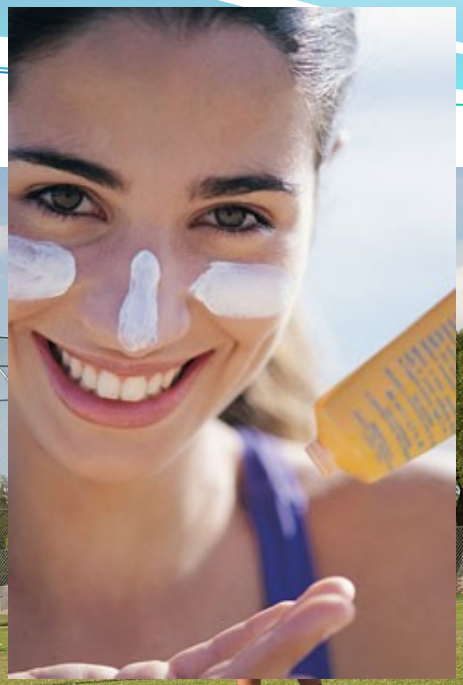
Hydration alone can prevent heat stroke.

Risk Factors – MANY!!!

- Obesity
- Poor fitness (Day #1 or #2 of practice)
- Clothing / Equipment
- Dehydration
- No acclimatization
- Heat / Humidity
- Sunburn
- Prescription amphetamines (pseudophedrine)
- Dietary supplements (creatine)
- Prior heat stress (day after hot, exhausting workout)
- Overenthusiasm / warrior mentality

COMMON MISTAKE #3

It is ok to punish athletes who misbehave or perform poorly with excessive extra sprints or by withholding water or rest breaks.




Gatorade


CREATINE
MICRONIZED
100% PURE PHARMACEUTICAL GRADE
CLINICALLY PROVEN
MUSCLE HYDRATOR
FAST ABSORPTION
300
grams

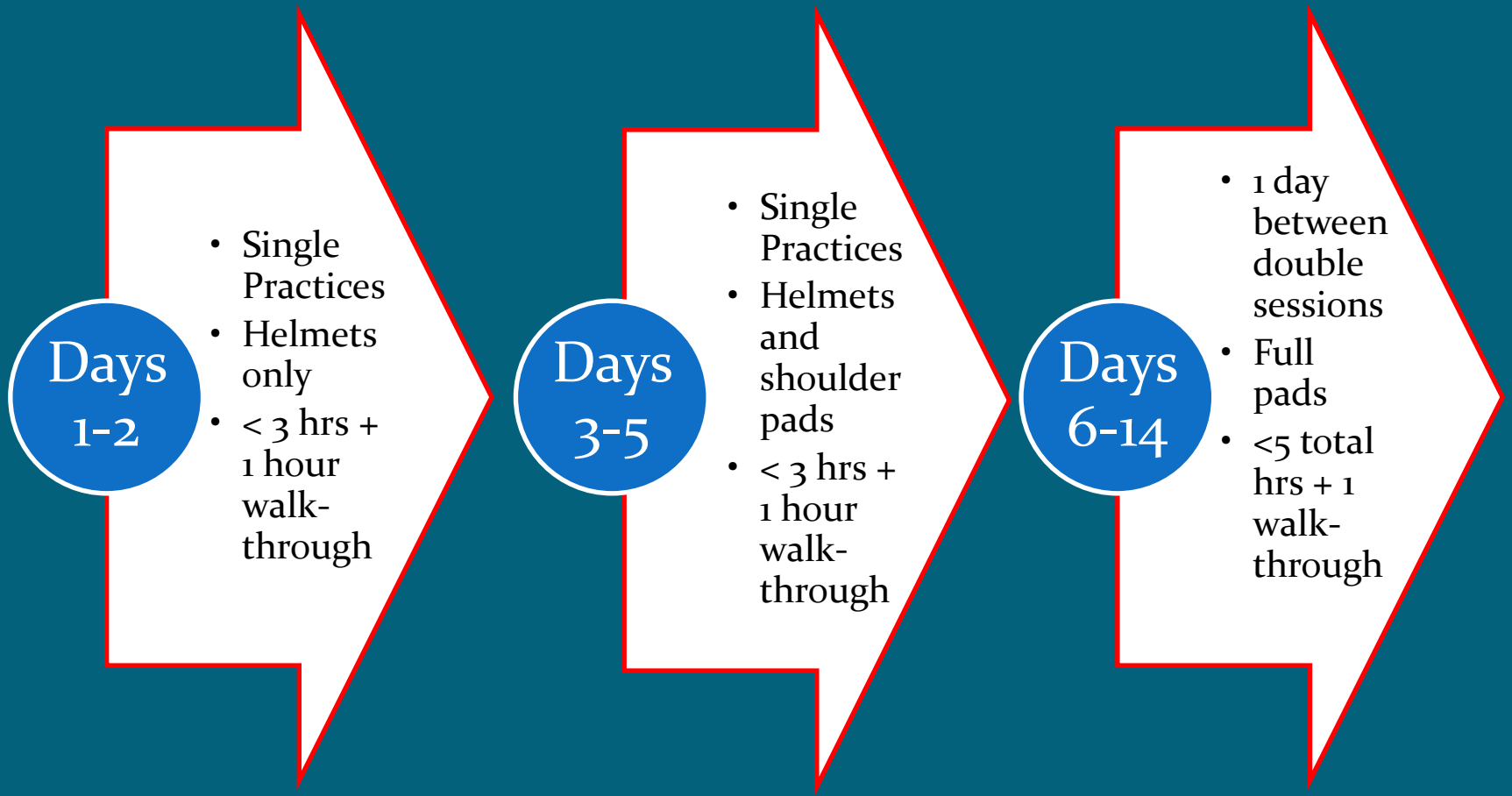
How to prevent EHS

- Gradual increase in training over 4-8 weeks
- 10-14 days of heat acclimatization
- Practice during cooler hours (early AM / late PM)
- Brief exposure to heat
- Never withhold hydration or punish with prolonged strenuous exercise
- No exercise if ill (fever, respiratory, vomiting, diarrhea)
- Monitor and recognize early warning signs: incoherence, belligerent, irrational or bizarre behavior, or poor competitive posture

How to prevent EHS

- Breathable lightweight clothing, no helmets / gear
- Boxers, wrestlers, MMA: no running in plastic “sweat suits”; no restriction of hydration
- Adequate sleep and rest
- Proper hydration and nutrition (pre/during/post)
- Avoid supplements (ephedrine, stimulants, antihistamines); no alcohol consumption
- Use sunscreen and breathable hats
- Take rest breaks in shade

Heat Acclimatization Guidelines: High Schools



Secondary School Guidelines

Preseason Heat-Acclimatization Guidelines for Secondary School Athletics. *Journal of Athletic Training*. 2009;44(3):332-333.

The 7 Fundamentals

National Federation of State High School Associations, 2014

1. Begin slowly and gradually progress.

- An athlete cannot be “conditioned” in a period of only 2 to 3 weeks
- Begin with shorter, less intense practices with less gear

2. Consider each athlete’s individual level of conditioning and medical status.

- Athletes begin the season at different levels of physical fitness and risks for exertional heat illness

The 7 Fundamentals (cont.)

3. Adjust practices and training if there is a change in the weather

- Be prepared to adjust for warmer, more humid weather
- Decrease intensity of activity
- Increase frequency & duration of rest breaks
- Reduce uniforms & equipment
- Continue to closely monitor players
- Switch practice times to earlier morning, later afternoon

4. Start practices and training activities adequately hydrated

The 7 Fundamentals (cont.)

5. Recognize <u>early</u> signs of developing exertional heat illness.

- ***Promptly*** stop activity for affected players and treat accordingly.
- Do not delay first aid!

6. Recognize more <u>serious</u> signs of exertional heat-related distress.

- Immediately stop activity
- Call 9-1-1 & activate the emergency medical system.
- Begin on-site rapid cooling immediately.

7. Develop an emergency action plan with clearly defined, written and practiced protocols.

Conclusions

- Heat stroke is a medical emergency.
- Early recognition and rapid treatment saves lives.
- Cool first, transport second.
- Prevention: acclimatization, hydration, pacing, cooling, and vigilance.

GREAT RESOURCE!!!

Korey Stringer Institute

http://ksi.uconn.edu/

- Korey Damont Stringer
- 1974-2001
- All-American offensive tackle: Ohio State University
- Minnesota Vikings: All Pro 2001
- Founded by wife Kelci at UConn 2011

Parents' and Coaches' Guide to Dehydration and Other Heat Illnesses in Children

These guidelines were developed to help parents and coaches increase the safety and performance of children who play sports in hot weather. Children who play sports or are physically active in hot weather can be at risk for heat illnesses. The good news is heat illnesses can be prevented and successfully treated.

Children sweat less than adults. This makes it harder for children to cool off. Parents and coaches must make sure that children take it slow to be sure they can get used to the heat and humidity gradually.

There are other reasons why a child may become ill from a heat illness. Those who have a low level of fitness, who are sick, or who have suffered from dehydration or heat illness in the past should be closely watched. A medical professional such as a certified athletic trainer (ATC) should be on site to monitor the health and safety of all participants during games and practice, especially when it is very hot and humid.

Dehydration

Children get dehydrated if they do not replace body fluids lost by sweating. Being even a little dehydrated can make a child feel bad and play less effectively. Dehydration also puts children at risk for more dangerous heat illnesses.

Signs and Symptoms

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

Treatment

- Move child to a shaded or air-conditioned area.
- Give him or her fluids to drink.

"When can I play again?"
A child may be active again as soon as he or she is symptom-free. However, it's important to continue to watch the child.

National SAFE KIDS Campaign

National Athletic Trainers' Association
Health Care for Life & Sport

Tips for Parents

- Before your child starts playing a sport, he or she should have a physical examination that includes specific questions about any history of heat illness.
- Tell your child's coach about any history of heat illness.
- Make sure your child is properly hydrated before he or she heads out the door to practice or a game. Give your children their own water bottles.
- Make sure your child's coach has your emergency contact numbers.
- Check that your child's league/team has an emergency action plan.

Tips for Coaches

- Be aware of temperature and humidity levels. Change practice length, intensity and equipment use as the levels rise.
- It should be easy for children to drink fluids during practice, and you should remind them to drink regularly. Fluid breaks should be scheduled for all practices and become more frequent as the heat and humidity levels rise.
- Every athletic organization should have an emergency action plan for obtaining emergency medical services if needed.
- Always have contact information for parents available.

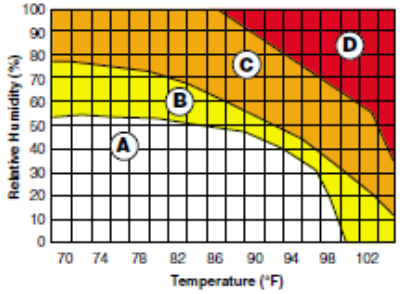
Activity Guidelines

Fluid breaks should be scheduled for all practices and become more frequent as the heat and humidity levels rise.

Add 5°F to the temperature between 10:00 a.m. and 4:00 p.m. from mid-May to mid-September on bright, sunny days.

A. Children should receive a 5-10 minute rest and fluid break after every 25 to 30 minutes of activity.

B. Children should receive a 5-10 minute rest and fluid break after every 20 to 25 minutes of activity. Children should be in shorts and t-shirts (with helmet and shoulder pads only, not full equipment, if worn for activity).



C. Children should receive a 5-10 minute rest and fluid break after every 15 to 20 minutes of activity. Children should be in shorts and t-shirts only (with all protective equipment removed, if worn for activity).

D. Cancel or postpone all outdoor practices/games. Practice may be held in an air-conditioned space.

This document was adapted from: *Inter-Association task force on exertional heat illnesses consensus statement.* June 2003. National Athletic Trainers' Association. The full document can be obtained at www.nata.org/industryresources/heatillnessconsensusstatement.pdf.

http://www.nata.org/sites/default/files/Heat-Illness-Parent-Coach-Guide.pdf

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THANK YOU!

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