6/15/2018

Sideline Emergency Management

Benjamin Oshlag, MD, CAQSM
Assistant Professor of Emergency Medicine
Assistant Professor of Sports Medicine
Columbia University Medical Center

NewYork-Presbyterian

Columbia University
Department of Orthopedic Surgery
College of Physicians & Surgeons

Disclosures

Nothing to disclose

NewYork-Presbyterian

Columbia University
Department of Orthopedic Surgery

67

Dental Trauma

Fracture

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

68

Dental Trauma

Intrusion

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

69

Dental Trauma

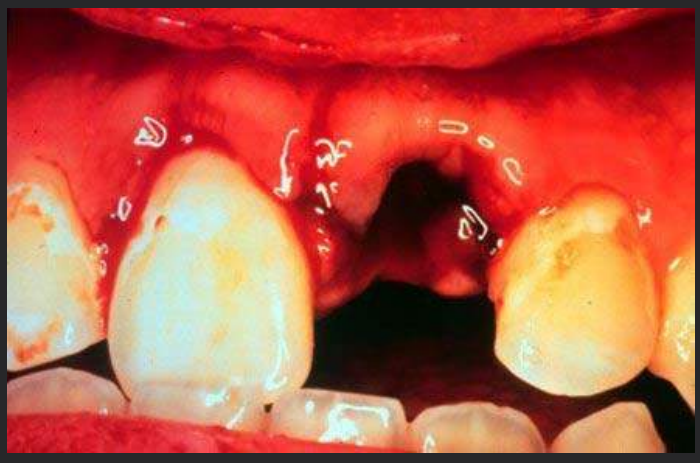
Extrusion

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

70

Dental Trauma



Avulsion

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

71

What do I do with the avulsed tooth??

- Primary or secondary tooth?
- Best prognosis if tooth is replanted immediately
- If unable to replanted within 5 minutes, store in:
  - Viaspan
  - Hank's Balanced Salt Solution
  - Cold Milk
    - NOT flavored milk!
  - Saliva (in the mouth/cheek)
    - Careful not to swallow!
  - Physiologic saline
  - Water
    - Damaging to ligament healing, but better than dry storage
- Risk of loosing tooth increases after 20 minutes, likely nonviable after 1 hour of dry time

http://www.aapd.org/media/policies_guidelines/g_trauma.pdf

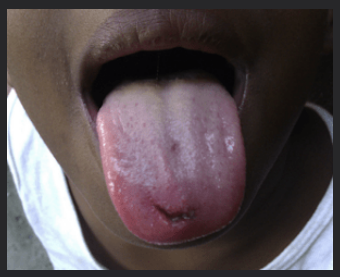
NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

72

Mouth Lacerations

- **Inside mouth generally ok**
  - Exception: large/gaping tongue lacerations
- **Lip lacerations need careful repair if crossing the vermillion border**



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

73

Facial Trauma Summary

Red flags

- Eyes
  - Vision loss or double vision
  - Abnormal or painful eye movements
  - Irregular pupil
- Nose
  - Uncontrolled bleeding
  - Septal hematoma?
- Mouth
  - Lip lacerations crossing border
  - Large tongue lacerations
- Teeth
  - Avulsed or displaced
    - Transport in best available medium

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

74

Facial Trauma Summary

Ok to play

- Eyes
  - Subconjunctival hemorrhage (painless!)
- Nose
  - Nasal deformity/swelling
- Mouth
  - Small inner lip/gum lacerations
- Teeth
  - Small chips not involving dentin or pulp
  - Primary teeth

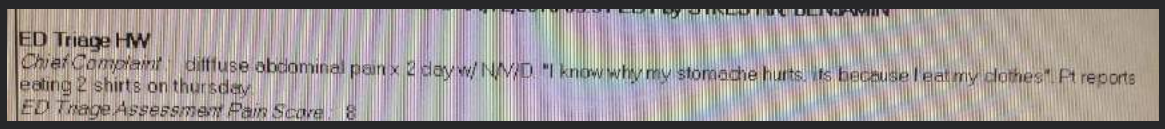
NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

75

What Else Needs to go to the ER?

- **Cardiac**
- **Respiratory**
- **Head, neck, and face injuries**
- **Abdominal trauma**
- **Extremity Injuries**
- **Environmental Illness/Injury**


ED Triage HW
Chief Complaint: diffuse abdominal pain x 2 days w/ N/V/D. "I know why my stomache hurts, its because I eat my clothes". Pt reports eating 2 shirts on thursday.
ED Triage Assessment Pain Score: 8

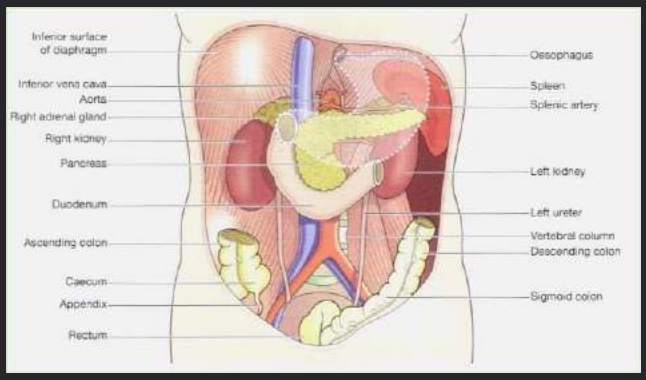
NewYork-Presbyterian | Columbia University Department of Orthopaedic Surgery

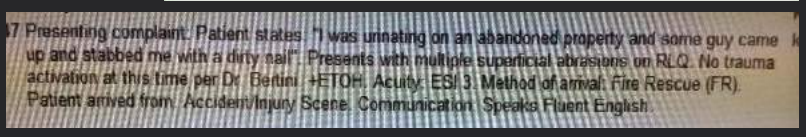
76

Abdominal and pelvic injuries

Blunt trauma

- **Organs at risk**
  - Liver, spleen, bladder, intestines, kidneys, pancreas
- **Internal bleeding**
  - Vital signs
  - FAST exam?
  - Hematuria?
- **Hollow viscous injury**
- **Pelvic ring fractures**
  - Pelvic binder?



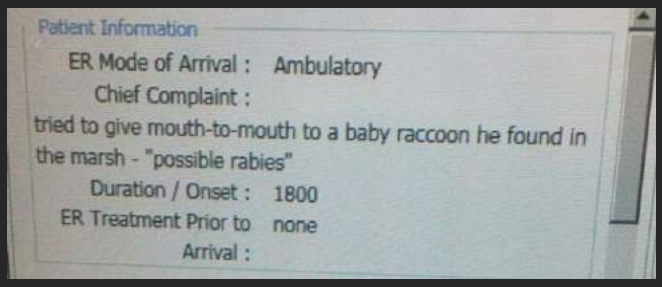

Presenting complaint: Patient states: "I was urinating on an abandoned property and some guy came up and stabbed me with a dirty nail". Presents with multiple superficial abrasions on RLQ. No trauma activation at this time per Dr. Bertini. +ETOH. Acuity: ESI 3. Method of arrival: Fire Rescue (FR). Patient arrived from: Accident/Injury Scene. Communication: Speaks Fluent English.

NewYork-Presbyterian | Columbia University Department of Orthopaedic Surgery

77

What Else Needs to go to the ER?

- Cardiac
- Respiratory
- Head, neck, and face injuries
- Abdominal trauma
- Extremity Injuries
- Environmental Illness/Injury



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

78

Extremity injuries

Fractures and dislocations

- **What can I reduce on the field?**
  - Shoulders, elbows, knees/patellas, ankles, fingers/toes
  - Check neurovascular exam, if compromised, increased urgency
  - Ok to try once, stop if resistance or other difficulty
  - No pulse but can't reduce? Good luck!
- **Don't reduce hips!**
- **Splinting for transport**

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

79

What Else Needs to go to the ER?

- **Cardiac**
- **Respiratory**
- **Head, neck, and face injuries**
- **Abdominal trauma**
- **Extremity Injuries**
- **Environmental Illness/Injury**

05 54 Presenting complaint:. mk14

03 Presenting complaint: Patient states: HE NEEDS PANTS; DENIES MEDICAL COMPLAINT; PT GIVEN SCRUB BOTTOMS. mk14

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

80

Environmental Emergencies

- Heat
  - Exertional heat illness
  - Heat Exhaustion
  - Heat Stroke
- Cold
  - Hypothermia
  - Frostbite
- Altitude
- Weather

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Environmental Emergencies

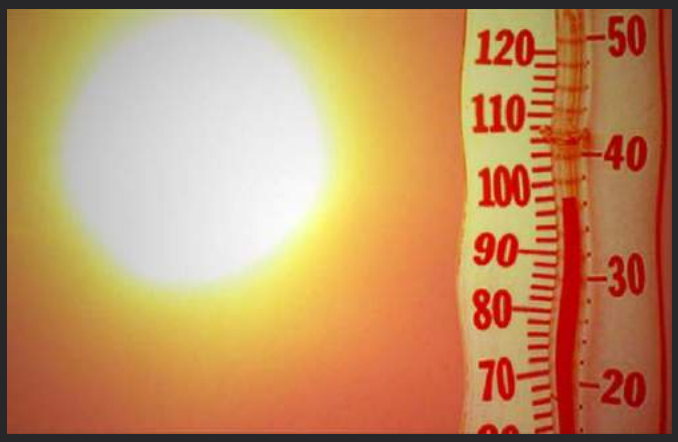
Temperature

- **Hot**
- Cold

Altitude

- High
- Low

Weather



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

(Exertional) Heat Illness - EHI

Spectrum of conditions ranging from minor disturbances in thermoregulation to exertional heat stroke with multi-organ system failure

Heat Cramps
Heat Exhaustion
Heat Stroke

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Heat Illness

EHI: Highest incidence in American football

4.42 cases/100,000 athlete exposures

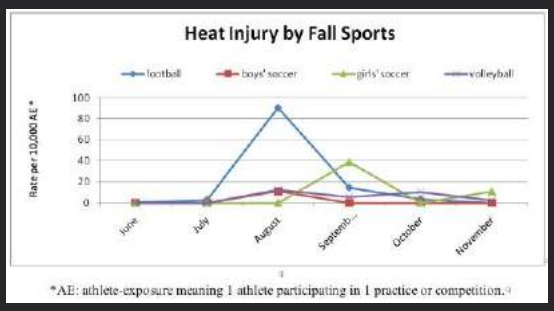
- Rate 11.4 times that in all other sports combined

35 deaths from EHS during 1995 – 2010

- 6 deaths in summer 2011 alone

College football: One death from 2003 – 2011 during August practices

- Low rate attributed to heat acclimatization policies put in place in May, 2003



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

EHI Risk Factors

Strenuous exercise in high temp and humidity

Lack of acclimatization

Obesity - Low surface area/weight ratio

Dehydration

Medicines/Supplements

Previous history of heat illness

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

EHI Prevention

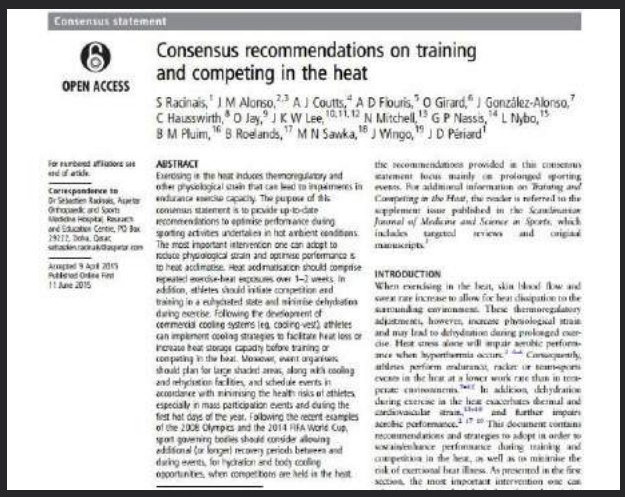
Acclimatization

Proper clothing

Medication adjustment

Activity modification

Prehydration and hydration



Consensus statement

OPEN ACCESS

Consensus recommendations on training and competing in the heat

S Racinais,[1] J M Alonso,[2,3] A J Coutts,[4] A D Flouris,[5] O Girard,[6] J González-Alonso,[7] C Hausswirth,[8] D Jay,[9] J K W Lee,[10,11,12] N Mitchell,[13] G P Nassis,[14] L Nybo,[15] B M Pluim,[16] B Roelands,[17] M N Sawka,[18] J Wingo,[19] J D Périard[1]

ABSTRACT

Exercising in the heat induces thermoregulatory and other physiological strain that can lead to impairments in endurance exercise capacity. The purpose of this consensus statement is to provide up-to-date recommendations to optimise performance during sporting activities undertaken in hot ambient conditions. The most important intervention one can adopt to reduce physiological strain and optimise performance is to heat acclimatise. Heat acclimatisation should comprise repeated exercise-heat exposures over 1–2 weeks. In addition, athletes should initiate competition and training in a euhydrated state and minimise dehydration during exercise. Following the development of commercial cooling systems (eg, cooling vest), athletes can implement cooling strategies to facilitate heat loss or increase heat storage capacity before training or competing in the heat. Moreover, event organisers should plan for large shaded areas, along with cooling and rehydration facilities, and schedule events in accordance with minimising the health risks of athletes, especially in mass participation events and during the first hot days of the year. Following the recent examples of the 2008 Olympics and the 2014 FIFA World Cup, sport governing bodies should consider allowing additional (or longer) recovery periods between and during events, for hydration and body cooling opportunities, when competitions are held in the heat.

the recommendations provided in this consensus statement focus mainly on prolonged sporting events. For additional information on *Training and Competing in the Heat*, the reader is referred to the supplement issue published in the *Scandinavian Journal of Medicine and Science in Sports*, which includes targeted reviews and original manuscripts.[1]

INTRODUCTION

When exercising in the heat, skin blood flow and sweat rate increase to allow for heat dissipation to the surrounding environment. These thermoregulatory adjustments, however, increase physiological strain and may lead to dehydration during prolonged exercise. Heat stress alone will impair aerobic performance when hyperthermia occurs.[2–4] Consequently, athletes performing endurance, racket or team-sports events in the heat at a lower work rate than in temperate environments.[5–11] In addition, dehydration during exercise in the heat exacerbates thermal and cardiovascular strain,[12–14] and further impairs aerobic performance.[2 15–18] This document contains recommendations and strategies to adopt in order to sustain/enhance performance during training and competition in the heat, as well as to minimise the risk of exertional heat illness. As presented in the first section, the most important intervention one can

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Heat Cramps

Exercise Associated Muscle Cramps (EAMC)

- Misnomer: Heat not shown to directly trigger cramps
- Occurs more commonly in the heat but can occur in swimmers, ice hockey players, etc
- Significance lies in athletes' inability to perform

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Heat Cramps

Predisposing Factors

- Heavy Sweating
- Salty Sweaters
- Insufficient sodium intake
- Dehydration
- Lack of acclimatization
- Pre-activity fatigue
- History of EAMC
- Neuromuscular fatigue
- Extreme environmental conditions

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Exercise Associated Muscle Cramps

Management: Hydrate!

- Studies generally show oral fluid (when in same volume) has similar or advantageous benefits compared with IV. (D. Casa; Curr. SM Reports; July/August 08)
- Burgeron study to avert cramps with oral bolus of high-salt solution (3 tsp salt in 20 oz. Gatorade over 5-10 minutes, 7000mg Na^+)
- Time constraints, nausea, placebo effect considerations for IV use

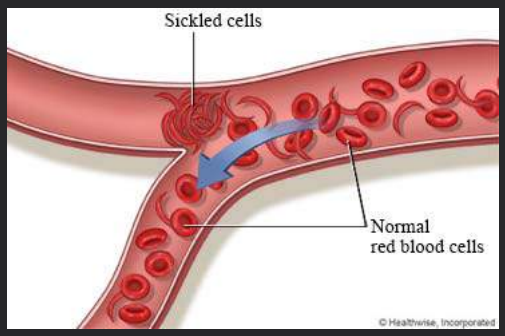
NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Exercise Associate Muscle Cramps

Persistent or systemic cramping, or severe pain with no obvious muscle cramping should raise concern for other problems

- Exertional hyponatremia
- Sickle cell crisis
- Rhabdomyolysis



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

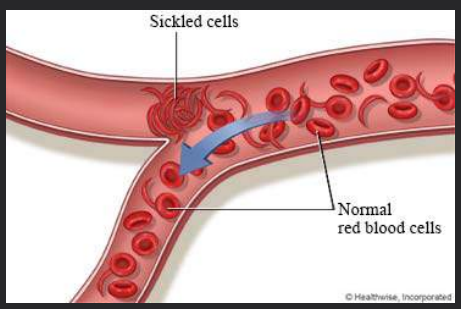
SCT and Sickling vs. Exercise Associated Muscle Cramps

SCT associated with several cases of exertional sudden death and severe rhabdomyolysis

Brief periods of intense exercise characterized by intense pain

Distinguished from EAMC by lack of spasm

- Suggests possibility of acute muscle ischemia



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Heat Exhaustion

Inability to maintain adequate cardiac output due to strenuous physical exercise and environmental heat stress

- Often collapse **during** exercise
- Temp elevation is only mild
- CNS is **not affected**
- Dehydration may be present but **is not required** for the diagnosis

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Heat Exhaustion Treatment

Move to shaded or cool area

Athlete supine with feet elevated

Remove equipment and excess clothing

Cool athlete until rectal temp is 101

- Mode of cooling less important for heat exhaustion than heat stroke

Oral or IV hydration

Transport if no rapid improvement

NewYork-Presbyterian

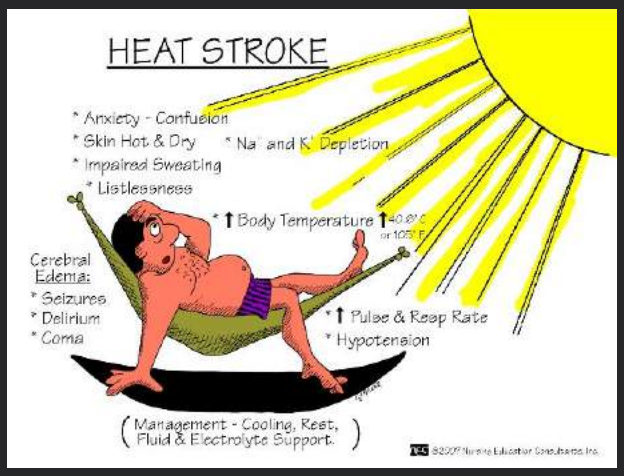
Columbia University Department of Orthopaedic Surgery

Exertional Heat Stroke

Multisystem illness characterized by CNS dysfunction (encephalopathy), additional organ and tissue damage (kidneys, liver, muscle) in association with high body temperatures

Diagnostic Criteria:

- **Core temp above 104°F** measured immediately following activity
- **CNS dysfunction**



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Exertional Heat Stroke

CNS dysfunction: variable symptoms

- Disorientation
- Headache
- Irrational behavior
- Irritability
- Emotional instability
- Confusion
- Altered consciousness
- Coma
- Seizure

Frequently also GI symptoms

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Collapsed Athlete

TABLE 3. Telltale features among common nontrauma causes of on-field collapse.

Sickling	Cardiac	Heat Stroke	Asthma
Weakness > pain	No cramping	Fuzzy thinking	Usually known asthma
Slumps to ground	Falls suddenly	Bizarre behavior	Prior episodes, poor control
Can talk at first	Unconscious	Incoherent	Breathless, may wheeze or not
Muscles "normal"	Limp or seizing	Can be in coma	Gasping, panicky, on hands/knees
Temp < 103°F	Temp irrelevant	Temp often > 106°F	Auscultate: moving little air
Can occur early	No warning	Usually occurs late	Usually occurs after sprinting

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Exertional Heat Stroke

Management

- Severity of heat illness may not be readily apparent during initial presentation
- Morbidity and mortality are directly related to the **duration** of core temperature elevation
- **Rapid cooling** is paramount
- Maintain a **high index of suspicion** with athletes with temps greater than 104 F and concerning symptoms but no clear signs of end organ damage

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Exertional Heat Stroke

Management:

- Initial Assessment: ABCs
- Secondary Assessment: Vital signs, rectal temp, blood glucose, serum sodium

If cooling measures are readily available and no other emergent treatment needed, it is best to cool first and transport second

Once cooled to 102°F (39°C), the patient is rapidly transported to the ED

Exertional Heat Stroke

Rectal thermometer not available?

- Assume heat until proven otherwise
- Cool until the athlete begins to shiver
- Treat with cold water immersion for 15 – 20 minutes
  - Will cool most athletes 3 – 4°C
  - Cooling rate: 0.15-0.20°C per minute
    - 1°C every 5 minutes

Cooling Methods

Evaporation: Vaporization from skin and respiratory tract

- Primary means of heat dissipation for exercising athletes in hot environments (sweat)

Radiation: Transfer of energy through electromagnetic heat waves (minimal)

Convection: Transfer of heat to a gas or liquid in motion (fans)

Conduction: Direct heat transfer via contact

- Primary method of on-site cooling (ice bath)

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Cooling Methods

Common On Site Measures:

- Cold water immersion – on the field or in the training room
  - Ice bath at 35 – 60°F
- Ice/wet towel rotation
- High flow cold water dousing
- Ice packing

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

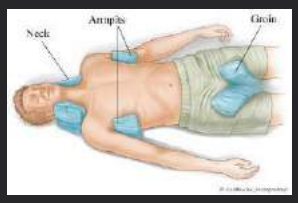
Cooling Measures

Cold shower

Move to shade and apply cold wet towels to entire body surface – replace once no longer cool or every 2-3 minutes

If ice is available but no tub, use a tarp or sheet filled with ice and roll athlete in the sheet (ice burrito)

No role for NSAIDs or Acetaminophen



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Ice Burr-ito

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Cooling Measures

Best Method? Limited evidence…

- Evaporative cooling
  - Complex and labor-intensive (spray, fans)
  - Fastest (0.3°C/min)
  - Seldom used, esp in field
- Immersion
  - Easier if available
  - Remains preferred method
  - Can hinder managing other complications (airway, seizure, cardiac arrest, IV access)
  - Slower than evaporative (0.15-0.20°C/min)
- Ice packing
  - Axilla, Groin, near large vessels
  - Simple to implement, slow to cool (0.02-0.03°C/min)

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Misconceptions

Athletes stop sweating when they develop EHS

- Almost always sweating profusely at the time of collapse

Athletes must be dehydrated to develop EHS

- Dehydration is a risk but not a pre-requisite

Lucid mental status rules out EHS

- Most athletes with impending EHS appear lucid initially only to progress to more severe disease

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Misconceptions

Shivering delays cooling

- Shivering seldom occurs when an hyperthermic athlete is placed in a cold water bath
- Rapid cooling still occurs even if shivering occurs

Peripheral vasoconstriction delays cooling

- Vasoconstriction may occur during cold water immersion but it has little impact compared to the large conductive and convective thermal transfer that rapidly cools the body.

Environmental Emergencies

Temperature

- Hot
- **Cold**

Altitude

- High
- Low

Weather

The stickmen face a horrible choice

Hypothermia

Definition

- Core temp < 35°C

Risk factors

- Age extremes
- Weather
- Intoxicants
- Trauma

Hypothermia Chart

If the Water Temp. (F) is...	Exhaustion or Unconsciousness	Expected Time of Survival is...
32.5	Under 15 Min.	Under 15-45 Min.
32.5-40.0	15-30 Min.	30-90 Min.
40-50	30-60 Min.	1-3 Hr.
50-60	1-2 Hr.	1-6 Hr.
60-70	2-7 Hr.	2-40 Hr.
70-80	3-12 Hr.	3-Indefinitely
over 80	Indefinitely	

NewYork-Presbyterian | Columbia University Department of Orthopaedic Surgery

Stages of Hypothermia

Above 35°C (>95°F)

- Shivering thermogenesis and gluconeogenesis
- Vasoconstriction, tachycardia

35°C (95°F)

- Poikilothermia; body will cool to ambient temperature

33°C (91°F)

- Ataxia, apathy, tachypnea, CNS depression

32°C (90°F)

- Stupor
- Shivering stops
- Will need active core rewarming

NewYork-Presbyterian | Columbia University Department of Orthopaedic Surgery

Stages of Hypothermia

Stage	Core Temperature	Axillary Temperature	Signs & Symptoms [6, 7, 8]
Mild	32-35°C	30.5-35°C	Alert Vigorous shivering.
Moderate	30-32°C	28.5-32°C	Reduced level of consciousness Shivering diminishes Loss of fine motor control Loss of coordination Blue lips - Cyanosis
	28-30°C	26.5-30°C	Shivering Stops Fixed dilated pupils
Severe	25-28°C	23.5-28°C	Unconscious Shivering has stopped Rigid muscles Appears Dead Potential arrhythmias
	20-25°C	18.5-25°C	Cardiac Arrest
Profound	<20°C	<18.5°C	No detectable vital signs

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Stages of Hypothermia

28°C (82°F)

- Decreased ventricular fibrillation threshold
- Hypoventilation

14°C (57°F)

- Lowest adult accidental hypothermia survival

9°C (48°F)

- Lowest therapeutic survival

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Emergency Care

Rewarming

Arrhythmias

- Increased risk of ventricular fibrillation
  - Can be induced by stimulating patient
- Defibrillation likely futile < 30°C
- Most non v-fib arrhythmias correct with rewarming alone

CPR

- Not possible if chest is frozen

"They're not dead until they're warm and dead"

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Rewarming Methods

Passive External

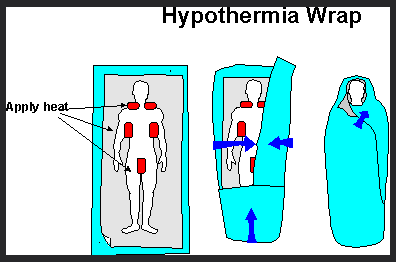
- Remove from cold environment
- Remove wet clothing
- Blankets, dry coverings

Active External

- Heat packs to neck, axillae, groin, abdomen
  - Caution not to cause burns
- Caution with external stimulation

Active Internal

- Warm, humidified oxygen
- Warm PO fluids
- Warm IV fluids (microwave ok!)
- ECMO
- Thoracic lavage



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Hypothermia – Treatment

Mild

- Passive external rewarming

Moderate

- Active core rewarming
- +/- Active external rewarming

Severe

- Active core rewarming

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Frostbite

Mechanism

- Freezing
- Hypoxia
- Inflammatory mediators

Types

- Superficial
  - Normal skin color, large clear blisters, intact sensation
- Deep
  - Small, dark/blood-filled blisters, cyanosis, hard skin

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

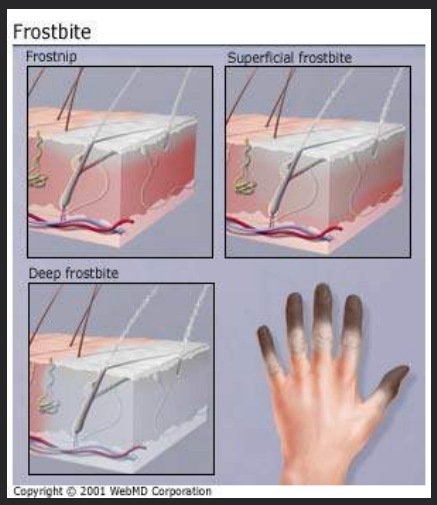
Frostbite – Treatment

Treatment

- Treat hypothermia first
- **No direct rewarming if possibility of refreezing**
- Rewarm in 104-108°F water
- Debride blisters
- Aloe/wound care
- Splint and transport
- Ibuprofen, tetanus, PCN

Frostnip

- Formation of superficial ice crystals without underlying tissue damage



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Environmental Emergencies

Temperature

- Hot
- Cold

Altitude

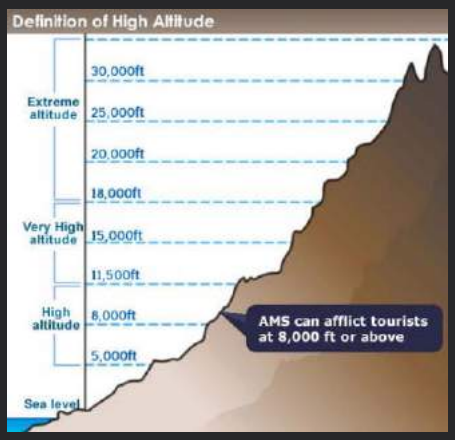
- **High**
- Low

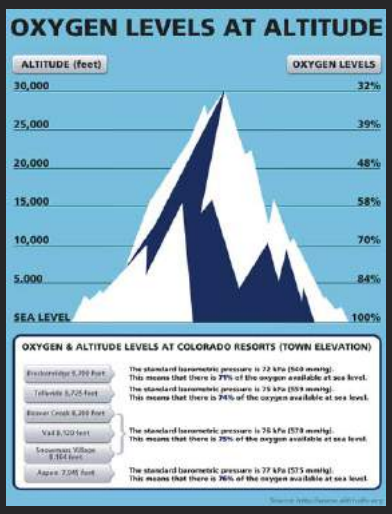
Weather

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Altitude Sickness





NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Altitude Sickness

Signs & Symptoms

- Headache
- Nausea/vomiting
- Fatigue
- Dizziness
- Insomnia

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Altitude Sickness

Epidemiology

- Rapid ascent over 8,000 feet
- Loss of 10% VO2 max for every 3,281 ft over 5,000
- Risk Factors:
  - Rate of ascent
  - Highest altitude
  - Sleeping altitude
  - Length of altitude exposure
  - Level of exertion

NewYork-Presbyterian | Columbia University Department of Orthopaedic Surgery

Altitude Sickness

Progression

- High altitude headache (HAH)
- Acute Mountain Sickness (AMS)
  - HAH + at least 1 of
    - Nausea/Vomiting
    - Fatigue
    - Dizziness
    - Insomnia
- HACE/HAPE

NewYork-Presbyterian | Columbia University Department of Orthopaedic Surgery

Altitude Sickness

Treatment

- Descend
- Oxygen
- Hyperbaric tents
  - "Gamov Bag"
- Medications
  - Acetazolamide (125-250mg BID)
  - Dexamethasone (4mg PO or IM q6)
  - Nifedipine (HAPE)
    - 10mg once then 30mg XR BID
  - Symptomatic treatment
    - NSAIDs, antiemetics
- DESCEND!

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Environmental Dangers

Temperature

- Hot
- Cold

Altitude

- High
- Low

Weather

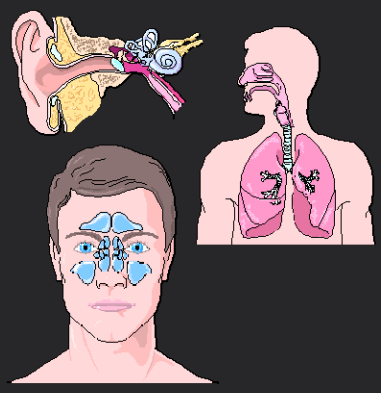
NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Diving Illness

Barotrauma

- Eyes (mask squeeze)
- Ears
- Sinuses
- Lungs
  - Risk if unable to fully exhale
- Arterial gas embolism
  - Possible increased risk with PFO (2.5-5x risk)



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Diving Illness

Decompression Sickness

- Bubbles!
- Type I
  - Nonsystemic/musculoskeletal
  - Joint pain, rash, itching
  - 95% present within 6 hours of surfacing
- Type II
  - Neurologic, vestibular, and pulmonary symptoms
    - Headache, malaise, paresthesias, weakness
    - Vertigo, nausea, vomiting, hearing loss
    - Cough, chest pain, shortness of breath
  - 50% symptomatic in first hour, 90% by 6 hours
- 2-3 cases per 10,000 dives

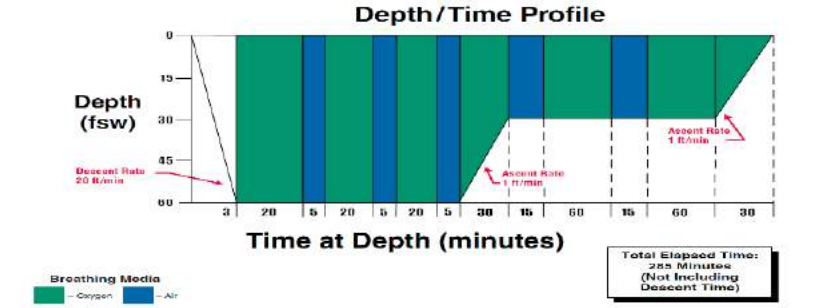
NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Diving Illness

Treatment

- Hydration
- 100% oxygen
- **Recompression**
- Limit altitude if long distance transfer



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

Environmental Emergencies

Temperature

- Hot
- Cold

Altitude

- High
- Low

Weather

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

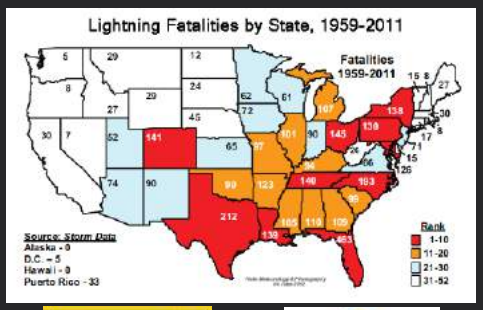
Lightning

400 strikes/year in US (10% fatal)

Golf courses and ball fields most common

NFHS Policy

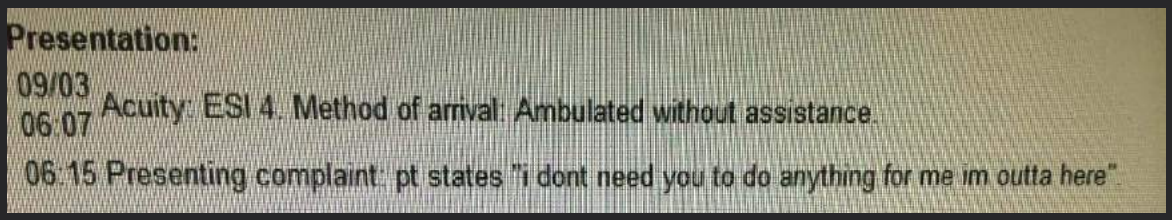
- On-site Monitoring
- 30 mile/30 min. rule
- **Appropriate** shelter



Summary

- ABCs first
- Early CPR and defibrillation save lives
- Ventilation is the most important part of airway management
- Practice, practice, practice!
- Beware altered mental status, neurologic deficits, and persistent vomiting
- On-field reduction attempts ok for everything but hip
- Eyes: look for abnormal vision, eye movements, and anatomy
- Teeth: transport avulsed teeth in best available medium
- Cool overheated patients before transport
- Start rewarming if they will stay warm; not dead until warm and dead

Conclusion



NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

130

References

Guidelines 2000 for Cardiovasular Resuscitation and Emergency Cardiovascular Care. Circulation 102 (suppl)8. August 22, 2000.

Valenzuela, T, Roe D, et al, "Outcomes of Rapid Defibrillation by Security Officers After Cardiac Arrest in Casinos", NEJM, Vol 343 No 17, Oct 2000

Park, G, Song, K, et al, "Timely bystander CPR improves outcomes despite longer EMS times", American Journal of Emergency Medicine, 2017

Maron, B, Gohman, T, et al, "Clinical Profile and Spectrum of Commotio Cordis", JAMA, 2002; 287:1142-1146

Racinais, S, Alonso JM, et al, "Consensus recommendations on training and competing in the heat", *****

Maron, B, Haas, T, et al, "Incidence and Causes of Sudden Death in U.S. College Athletes", Journal of American College of Cardiology, Vol 63, Issue 16, April 2014

http://www.aapd.org/media/policies_guidelines/g_trauma.pdf

Wasfy, M, Hutter, A, Weiner, R, "Sudden Cardiac Death in Athletes", DeBakey Cardiovascular Journal, Apr-Jun 2016

Harmon, K, Asif, I, et al "Incidence, Etiology, and Comparative Frequency of Sudden Cardiac Death in NCAA Athletes: A Decade in Review", Circulation, May 2015

Harmon KG, Drezner JA, Wilson MG, Sharma S. Incidence of sudden cardiac death in athletes: a state-of-the-art review. Br J Sports Med. 2014 Aug;48(15):1185–92

Michaleff, Z, Maher, C, et al, "Accuracy of the Canadian C-spine rule and NEXUS to screen for clinically important cervical spine injury in patients following blunt trauma: a systematic review", CMAJ, Nov 2012; 184(16): E867–E87

Steill, I, Clement, C, et al, "The Canadian C-Spine Rule versus the NEXUS Low-Risk Criteria in Patients with Trauma", NEJM, 2003;349:2510-8

NewYork-Presbyterian

Columbia University Department of Orthopaedic Surgery

131

Questions?

AMAZING THINGS ARE HAPPENING HERE

blo2108@cumc.columbia.edu

NewYork-Presbyterian

Columbia University
Department of Orthopedic Surgery
College of Physicians & Surgeons