Mass Sporting Event: Sports Medicine

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Objectives of the talk

- Involved more with your community
- Tool & Tips and Fun Facts
- Enhance your skillset and increase awareness of how to handle mass event medical care
- Self-awareness of your strengths as a clinician and organizer.

OUTLINE

1. PREPARATION OF THE EVENT
2. Swim
3. Bike
4. Run

PREPARATION

1. Course set up
2. Resources
3. Staff
4. Yourself
Medical Tents

- Swim
  - South Side Main Medical
  - North Side Warming
- Transition
  - Men’s and Women’s Change Tent
- Main Medical
  - Finish
  - 72 bed MASH unit
  - Teams comprised of 3-4 staff per 6 bed section
  - Evaluation/oral support/IV support/Meds/Istat
  - 2 ALS ambulances and PM staff

The Medical tent serves a large role in the Ironman and thus organization of the medical team is important and takes shape nearly 5 months before each race every year.

Physicians, Nurses, PA/NP, ATC/PT, Students

Swim: Main Swim Med/North/Transition
Main Med: Medical Teams of 3-5 in each bay
Transition: 2 Teams, Male/Female Change Tents

Medical Tent

Medical Tent Setup

Personnel

SHIFTS

- Swim Medical 5:30-9 am
  - South Main Tent (Swim Exit)
  - North Main Warming Tent
- Main Medical Setup 8-10 am
- Transition Medical 8-12:00 pm
- Transition Medical 12-5:30 pm
  - Men’s Tent: Women’s Tent
- Main/Run Medical 12-4 pm
- Main/Run Medical 4-8 pm
- Main/Run Medical 8-12:30 am
Drowning / Near-drowning
Swim-Induced Pulmonary Edema (SIPE)
Asthma
Hypothermia
Swim Combat / Exit Trauma
Anxiety
Corneal Abrasion

**SWIM**
- Drowning / Near-drowning
- Swim-Induced Pulmonary Edema (SIPE)
- Asthma
- Hypothermia
- Swim Combat / Exit Trauma
- Anxiety
- Corneal Abrasion

**S.I.P.E.**
Swimming Induced Pulmonary Edema
Secondary Causes
- Wetsuit compression, compression calf/arm
- Pre Race hydration
- Stimulants
- Cold Water-Dive Reflex

**Hypothermia**
- Compensatory Mechanisms:
  - Shivering (which occurs from 37 to 32 degrees)
  - Autonomic Nervous system (occurring from 37 to 32 degrees, includes bradycardia and vasoconstriction)
  - Extrapyramidal stimulation of skeletal muscles
  - Adaptive Behavioral responses
HYPOTHERMIA

TREATMENT

• Treatment: Focus on diminishing heat loss
• Use of heating devices. This includes heaters within the tents, warm baths
• Removal of wet clothes. Wet clothing leads to heat dissipation five times
• Cover and keep patient insulated. Aluminum foil blankets efficient than wool blankets
• Warm IV Fluids
• Serious hypothermia, follow Marine Corps Marathon Hypothermia algorithm

RUN

• Cardiac Arrest, Heat Stroke, and Exercise-Associated Hyponatremia.

BIKE

• Head Injury
• Fractures
• Road Rash
• Repetitive Motion
• Medical Issues

Steps to Approach the Collapsed Athlete

• Initial Evaluation/ C-A-B
  - Compressions-Airway-Breathing (check back of bib for Medical Information)
• Elevate the Legs
  - This will help any conscious athletes that are light-headed
• Assess Mental Status
  - AMS often presents with Heat Stroke and Exercise-Associated Hyponatremia
• Assess Volume Status
  - Fluids consumed, vomit/diarrhea, urinated during race, orthostatic pulse
• Fluid Replacement
  - Fluids w/electrolytes such as Sports Drink or Chicken broth
  - An IV may be started based on clinical judgment
• Continuous Monitoring
  - Any athlete needing to go to the hospital MUST be seen by the Medical Director
**Exercise Associated Collapse (EAC)**

- Heat Exhaustion- more common in warmer environments
- During race blood vessels maximally dilated in legs for cooling and delivery of O2 to working muscles
- Adrenaline released to regulate BP and maintain cardiac output
- When athlete stops pump action is lost and adrenaline no longer released
- Vessels remain dilated leading to pooling of blood in lower extremity

**TREATMENT**
- Have athlete continue “cool down” walk after race
- Lie the athlete down and elevate the legs
- If no nausea present offer PO fluids or possible IV

**Exercise-Associated Hyponatremia**

- Most common mechanism due to over-hydration
- Athletes can sweat 2-4 L/h with varying concentrations of Na, even Sports drinks are hypotonic with respect to serum.
- Trained athletes should have calculated fluid loss during exercise
- Risk factors for developing EAH
  - Finish under 4 hrs, inexperience, small stature, female gender**
- **Hyponatremia among Runners in the Boston Marathon**

- **Hallmark for EAH: AMS or unusual neurologic complaint**

- **Recognizing Hyponatremia**
  - Stage 1: dizziness, nausea, vomiting, headache (Na+ 130-135 mEq/L)
  - Stage 2: mental status changes (confusion, disorientation) (Na+ 125-130 mEq/L)
  - Stage 3: altered consciousness (delirium, seizures, coma) (Na+ <125 mEq/L)

**On Course Management EAH**

- **Stage 1**
  - If vitals stable, fluid restriction (4oz max) and observe until urination
  - Fluid replacement: add 3 salt packs (3/8 tsp-300 mg salt) to half cup (4oz) electrolyte drink, this will provide 1 g Na or a 3% saline solution.
  - Oral hypertonic saline pioneered by Arthur Siegel MD, Boston Marathon.
  - Add 4 bouillon cubes in 4 oz warm water for a 9% hypertonic saline solution.
  - Oral or IV 3% hypertonic saline has the same effect on brain osmoreceptors, shutting off the release of ADH.  Owen, B et al. Efficacy of Oral vs Intravenous Saline in Runners with Hyponatremia. Journal of Science and Med in Sport. 2013

**Volume Depletion**

- During exercise runners often sweat 2-4 L/Hr while maximally absorbing approximately 1 L (negative fluid balance)
- With as little as 3% loss of body weight a marathon runner performance is impaired
- Volume depletion leads to hyperthermia due to the limiting of blood shunted to the skin
- Runners present:
  - Hypotension, tachycardia, weight loss, decreased skin turgor, hypernatremia

**TREATMENT**

- Oral fluids such as sports drink or chicken broth
- IV NS, first w/500 ml bolus, then 500 ml over 30-60 min
- Any sign of AMS must have electrolytes drawn
**EAH**

- **Stage 2/Stage 3**
  - Give 3% oral saline solution, if can tolerate PO fluids
  - Many Stage 2 athletes will recover completely and be allowed to continue.
  - Consider transferring to ER
  - Transport via EMT/Paramedics, advise NO IV fluids until hyponatremia excluded. TKO line recommended.
  - ALL runners w/EAH must receive discharge from Medical director

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**Heat Stroke**

- With a core temp >104°F organ/brain cells begin to die
- Goal is Rapid cooling to < 104°F within 30 min
- Athlete presents w/CNS changes, altered cognition/behavior
- If oral reading >100.5°F, then rectal temp should be taken

- **Early Warning signs**
  - Irritability, confusion, apathy, belligerence, emotional instability, irrational behavior, giddiness, vomiting, numbness, tingling, collapse, seizures, coma
  - Paradoxical chills and goose bumps signal shutdown of peripheral circulation

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**“Cool First, Transport Second”**

- **Cool First**
  - Rapid cooling by placing athlete into ice-water submersion tub (immerse trunk, both arms and both legs) has 100% survival rate when athlete immersed within 10 min of collapse (key to maximal cooling is constant stirring of the ice)
  - May also cold water douse the body while patient lying on porous stretcher, while massaging major muscle groups w/ice bags
  - May also place wet ice towels over entire body, rotate w/cooler towels every 2 min
  - Check rectal temp/vitals/CNS status every few min
  - At athlete can be cooled from 108-110°F to 102°F within 15-30 min, average rate of cooling drop is 1°F every 3 min

- **Transport Second**
  - Once temp reaches 102°F, remove from immersion tub
  - Observe for 30-60 min to ensure drinking fluids, normal vitals, good cognition
  - Physicians recommended to follow up and evaluate patients w/sever hyperthermia
  - If rectal cannot be measured, cold water immersion for 10-15 min then transport to ER

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1. 10.9 million runners, 59 (mean [±SD] age, 42±13 years; 51 men) had cardiac arrest 0.54 per 100,000 participants; interval and among (men 0.90 per 100,000, women 0.16).
2. Cardiovascular disease accounted for the majority of cardiac arrests. The incidence rate was significantly higher during marathons (1.01 per 100,000) than during half-marathons.
3. Of the 59 cases of cardiac arrest, 42 (71 %) were fatal (incidence, 0.39 per 100,000).
4. Among the 31 cases with complete clinical data, initiation of bystander-administered cardiopulmonary resuscitation and an underlying diagnosis other than hypertrophic cardiomyopathy were the strongest predictors of survival.
**Exertional Rhabdomyolysis**

- Most important factor pre-disposing to this condition is hypovolemia
- Damage to skeletal muscle and release CK-MM, myoglobin and aldolase into circulation
- High levels of myoglobin can cause acute renal failure, DIC, lactic acidosis and cardiac dysrhythmias
- Symptoms
  - myalgias, muscular swelling, tenderness, dark colored urine, lower back or abdominal pain
- Risk Factors
  - Poor fitness level, high temp/humidity, sickle cell trait, viral illness, hx of myopathies, prior renal insufficiency
- TREATMENT
  - Fluid replacement, maintain good urine output, transport to Hospital

**Hypoglycemia**

- Check athlete for Hx of Diabetes
  - Exercise acts like regular insulin and this must be calculated
- In non-diabetics may occur due to complete depletion of glycogen stores
- Symptoms
  - Fatigue, dizziness, tachycardia, nausea, vomiting, impaired mental status
  - *Any of these symptoms a “finger stick” glucose should be checked
- TREATMENT (if glucose <55)
  - PO glucose if no nausea or vomiting
  - Bolus of D50 IV
  - ER transport for those who fail to respond or remain hypoglycemic

**GUT Science**

- Exercise=Sympathetic Nervous System
- Digestion= Parasympathetic Nervous System
- Athletes must train their guts to digest on the run
- Under ideal conditions the gut can process 1.5 L/hr
  - Many novice runners will over-feed or over-hydrate, and gut cannot handle this volume leading to nausea/vomit
- Symptoms
  - Diarrhea (possible osmotic diarrhea), nausea, vomit, abdominal pain
  - *Be cautious w/abdominal pain, during exercise 70% of splanchnic circulation is shunted to working muscles, this can result in ischemia and eventually necrosis of intestinal lining cells

**Respiratory Problems**

- 15% of general population and 40% athletes w/allergies will develop Exercise-Induced bronchospasm
  - If patient has true asthma, number rises to over 70%
- Common on days w/ increased pollutants such as smoke, dust, pollen
- TREATMENT
  - Replacing volume, administer breathing treatments w/inhaled bronchodilators
  - Albuterol is effective as rescue inhaler
**Treatment**
- Treatment is two fold: addressing metabolic issues and mechanical stretching of injured muscle.
- First begin IV and check serum sodium and magnesium.

**TREATMENT**
- EAH? Draw iSTAT
- 2-4 g Magnesium sulfate give slow IV push while watching reflexes and respirations
- Ativan 0.5 mg IM or IV
- 2-4 g Magnesium sulfate can be added to 1 L IV NS and run at 500-1,000 ml/hr
- Sickle cell trait can produce muscle ischemia and should be treated w/O2 and IV fluids, transport to ER
- Use of the Massage therapist may be helpful.

**Skin Care**
- Remember sunburned skin does not sweat well, SPF >30 should be used:
  - Avoid waterproof products which block pores and reduce sweating.
- Abrasions should be cleaned w/Hydrogen peroxide or Hibiclens
  - Betadine retards wound healing.
- Small, intact blisters that are minimally painful usually don’t need any treatment. Cover it with a small bandaid, and triple antibiotic ointment.
- Larger or painful blisters that are intact should be carefully drained, without removing the skin:
  - clean the skin over the blister with rubbing alcohol or soap and water.
  - sterilized needle or pin, puncture a small hole at the edge of the blister.
  - Drain the fluid with gentle pressure and apply a bandaid with some triple antibiotic ointment.
  - Keep it clean and dry for 2-3 days, changing the dressing daily. You may then begin to carefully trim away the dead skin. Use second skin, or blister pads for protection, until the new skin matures.

**HOME CARE**
- Stretch tight muscles, and ice sore tendons and joints.
- Anti-inflammatory medications, such as ibuprofen or naproxen may help speed recovery.
- Eat a light diet with foods that are easy to digest, such as pasta, rice, or potatoes. Adding some protein actually helps your muscles recovers faster.
- Drink plenty of fluids. It is a good idea to salt your food or use a Sports Drink to replace the electrolytes (such as sodium) you have lost. Avoid drinking large quantities of water.
SEEK MEDICAL ATTENTION IF YOU EXPERIENCE:

- Severe leg or calf pain not improved with elevation
- Abdominal pain with or without vomiting or diarrhea
- Persistent temperature over 100.5°F (37.8°C) orally
- Blood in vomit or stool (even dark red or black stool)
- Unusual weakness, dizziness or fainting
- Decreased urine output, bloody or very dark urine
- Unusual chest pain, muscle cramping or edema [puffiness]
- Coughing, trouble breathing, colored or bloody phlegm
- Severe headache, vision changes or confusion