Exercise Associated Collapse: Pearls and protocols for sports event coverage

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Exercise Associated Collapse (EAC)

Athletes who are unable to stand or walk unaided as a result of light-headedness, faintness, dizziness, or syncope.

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So what do you do?
BLS/ALS

Defibrillators
Masks
Paramedic access
ER Communication
Exercise Associated Postural Hypotension

Over 85% of EAC cases occur after event completion

Fully conscious
BP <100
HR <100

Trendelenburg position
Recovery within 90 minutes
Exercise Associated Postural Hypotension

- Trendelenburg Positioning 60-90 minutes
- Heart lower than pelvis and lower limbs
- Increases central blood volume and right atrial pressure
- Increases peripheral resistance
Exercise Associated Hyponatremia (EAH)

- $\text{Na}^+ < 135\, \text{mmol/L}$
- During or up to 24 hours post exercise
The sodium-potassium pump

Sodium ions (Na\(^+\)) are pumped out of the cell and potassium ions (K\(^+\)) are pumped into the cell.

The energy to drive the pump is released by hydrolysis of ATP.

Intracellular fluid with low concentration of Na\(^+\) and high concentration of K\(^+\)

Extracellular fluid with high concentration of Na\(^+\)
EAH

- Incidence up to 51% post race
- Mild - lightheaded, nausea
- Severe - HA, Vomiting, Confusion, Seizure
- May be life threatening
  - 14 related deaths since 1981
EAH (causes & risk factors)

- Excessive fluid (especially hypotonic)
- Event over 4 hours
- Inexperienced
- Inadequate training / slow running
- NSAIDS - water retention
EAH

- Water shifts intracellular
- Cellular edema against cranium
- IC pressure increases
EAH

- Treatment
  - Large endurance events - check Na+
  - Restrict oral fluids until urination
  - Hypertonic saline IV - 3%
  - 2-5mmol/L common
  - bolus and transfer in encephalopathic
• Transfer severe cases
• Start 3% NaCl
• Call the ER - CRUCIAL
EAH - Mild

- Based more on symptoms than exact Na+
- No hypo/iso until urination
- May give oral hypertonic solutions
- Watch until urination then discharge
- Have family/friend monitor for 24 hours
Prevention

SO YOU'RE TELLING ME

PEOPLE DIE IN YOUR COUNTRY FROM DRINKING TOO MUCH WATER?
Prevention

- Caution with drinking over thirst
- Sweat testing, urinary losses, practice in various conditions
Recommendations

- Mild/Mod dehydration is safe during a race for most athletes (3% body mass) with no performance deficits
- Drink when thirsty
- PRACTICE and take weight before and after
- Salt replacement has little to no effect when fluids are in excess
Pearls for Med team

- Stations 20 km apart in ironman and 5 km apart in marathon - most will have many more

- Consider mandatory weight stations at long ironman or ultra marathon events

- Athlete/Coach education

- Main issue: Don’t give oral/IV hypotonic fluids until you check a sodium

- Have 3% in med tents

- Talk to ER before and during

- Written protocols
Hyperthermia
When the rate of heat elimination is exceeded by the rate of heat gain, body temperature rises and heat illness will ensue*
Mild Heat Illness

- Fatigue, weakness, headache
- Cramping
- Rest, ICE, lie down, out of heat
Moderate Heat Illness (Heat Exhaustion)

- Headache, weakness, N/V, confusion, syncope
- Mild hypotension; increased HR
- Remove from heat, hydrate (IV if needed), cooling
Severe Heat Illness (Heatstroke)

- Rectal temp over 40 degrees celsius
- Inappropriate behavior, psychosis
- Hypotension, tachycardic, tachypnea
- RAPID cooling - rhabdo or ARF possible
- IV fluids
Medical Team Pearls

• Written and communicated protocols

• Immersion tanks/tarps ready and 3/4 full of water
  • need backup water source

• Ice bags ready to go next to baths

• Goal is to decrease temp to less than 104 within 30 minutes
Medical Team Pearls

• Only use rectal temp (only need to place once)

• Get down to 102 degrees for ER transfer

• When cooled within 10 minutes of collapse survival rate is 100%
Medical Team Pearls

- Water temp should be 60 or lower
- Continue to circulate/stir
- Hold head out of water; may add IV
- Cool first, then transport (at 102 degrees)
  - Rule of thumb: 1 degree every 3-5 minutes
Medical Team Pearls

- Do not remove monitor for 10 minutes after cooling as rebound hyperthermia is possible
Prevention

• Train, condition, acclimate (10-14 days)
• Hold events early whenever possible
• Light colored, moisture wicking clothing
• Pre-hydrating a few hours before
• Customize fluid replacement during training
Case 1

Covering a half marathon and an athlete collapses on their back at mile 9. He is alert and oriented with normal vitals. Complains of fatigue and lightheadedness. Has taken in about 24 ounces of gatorade.
Case 2

60 year old runner collapses in a marathon at mile 14. Not conscious.
30 year man begins to collapse a quarter mile from the marathon finish. He is helped across the finish by other runners and brought to the med tent. He is alert but confused. He says he is experienced and has 6 empty water bottles strapped onto his running belt and his clothes smell like lemon lime gatorade.
Case 4

40 year old man collapses in the middle of the marathon portion of a full ironman. He is barely conscious and is not saying much. Garbling nonsense. Temps have been in the 90’s with high humidity most of the day. One minute into talking to him he begins to seize.
Thank you!!!