Endurance Events Medical Coverage and Athletes Clearance

Leadville Trail 100
“The Race Across the Sky”

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Director of Primary Care Sports Medicine Fellowship
Do you have what it takes?
Yes, this is what compels a person to run...walk...crawl a hundred miles.

- The burning question in your soul, “Do I have what it takes?”
- If I can complete this race, then I can get through anything in life.
- Am I fit enough?
- Am I tough enough?

- Do I have what it takes?

The personality of the ultra-athlete

- There’s definitely a personality type associated with competitive athletes, especially endurance athletes.
- These people are achievement-oriented but often have unrealistic expectations;
- They’re perfectionistic, very type A; they’re self-critical. And they compensate through exercise.

The personality of the ultra-athlete

- If you can transfer the skills you learn being an athlete—dealing with pressure, being goal-oriented—to other aspects of your life and gain confidence elsewhere, that’s ideal.
- Here’s the problem, these folks need to find self-worth from other areas of life. Why?
  - Because family, work, injuries, an aging body—you name it—will inevitably get in the way of your fitness routine.

“Everyone has a plan, ‘till they get punched in the mouth”

Mike Tyson
Objectives
At the completion of this learning activity, you will be better able to:

- Recognize what motivates these athletes to run Ultras
- Better organize medical coverage for similar events
- Consider what can be done to NOT overwhelm local resources
- Appreciate and manage common injuries/illnesses including hyponatremia
Disclosure Statement

- **MuscleSound**: Inventor/part owner in software development company to quantify muscle glycogen content using Ultrasound.
- Neither, I nor any family member(s), have any relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition with this presentation.
Practice Gaps and Research Gaps

(List of gaps in quality evidence to support recommendations and patient-oriented outcomes)

*Top 3 Gaps and Recommendations*

- 1) Little objective data at this time for planning events, but the literature is growing.
- 2) Many of the recommendations have been extrapolated from Marathon Medicine literature, but the issues in Ultras are often much different.
- 3) Further research is needed that focuses on specific topics pertaining to events which last more than 12 hours and occur in remote wilderness with poor access.
Ultramarathon Running Events

- Ultramarathon participation has surged in popularity during the past decade with 70,000 participants worldwide yearly.
- Ultra refers to any foot race longer than the standard 26.2 mile marathon.
- Ultramarathon is gaining popularity among non-elite athletes.
- There are more than fifty 100 mile ultramarathon races in North America.

Ultramarathon Running Events

- Training has largely been based on expert advice in running literature or personal experience.
- Scientifically-based training and race day recommendations are lacking.
- Ultramarathon runners are usually a group of highly motivated, goal-oriented, and self-coached athletes who like to push their limits.
- The physical and psychological demands of ultramarathons are enormous.

Leadville

- The two mile high city
- About two hours west of Denver
- Began during gold rush 1860
- About 150 years of history
- Started with gold and silver rush
- Population of 40,000 in 1880
- As of the census of 2000, there were 2,821 people, 1,253 households, and 675 families residing in the city
Leadville 100

- Race co-founder Kenneth Chlouber

Events

- Leadville 100 Trail started in 1983
  - ~500 participants every year
  - >800 this year, 380 completed race
- Leadville 100 MBK was added in 1994
  - 1,200-1,400 participants every year (>5,000 enter lottery)
### Leadville Trail 100—2016 Race Schedule

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<tr>
<th>Race</th>
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<td>Leadville Trail 100 Run Training Camp</td>
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<td>Leadville Trail Heavy Half Marathon (15 miles)</td>
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<td>Silver King &amp; Silver Queen</td>
<td>July 9-10, 2016</td>
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<td>Leadville Trail 100 Mountain Bike Race</td>
<td>August 13, 2016</td>
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<td>LT100 10K Run</td>
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<td>Leadville Trail 100-Mile Run</td>
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<td>Leadman &amp; Leadwoman</td>
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LT 100 Run

- Race starts on Saturday at 4 AM
- Cut-off time is 30 hours
- Entire race above 10,000’
LT 100 Run Course Elevation
LT 100 Run

- Matt Carpenter holds the course record of 15 hours and 42 minutes in 2005 at age 41.
- In 2010, two men in their 70’s completed the race, one of them, age 71 beat me by over an hour (his 18th finish).
MTB 100

- Start Saturday morning at 6:30 AM
- 12 hours official cut-off time
- 9 hours cut-off for Large Buckle
- Continue recording time for those who finish <13 hrs
LT 100 MTB

- 90%+ dirt or double track dirt roads
- 7 mile climb to the 50 mile turnaround at Columbine Mine Aid Station at 12,600 ft
- Approximately 14,000’ elevation gain
- 65% finish the race
- Age range from 21-72
- All are insane
- Advanced to expert levels of ability
LT 100 MTB Course Elevation

http://www.leadvilletrail100.com/news/10-03-09/Animated_Video_of_the_LT_100_Race_Course.aspx
MBK 100
Lance Armstrong set a new course record of 6:28:50 in 2009
In 2010, Levi Leipheimer took 15 minutes off this record
In 2015, winner finally broke sub 6 hour mark
How Do You Plan Medical Coverage?

- More than fifty 100 mile ultramarathons in North America
- Much different than Marathon Medicine:
  - Average or runner – mid 40’s
  - Significantly more running experience
  - Longer training programs and better preparation
  - Extreme temperature changes
  - Remote conditions
  - Psychological demands
- That being said...


Medical Services at Ultra-Endurance Foot Races in Remote Environments: Medical Issues and Consensus Guidelines

Martin D. Hoffman, Andy Pasternak, Ian R. Rogers, Morteza Khodaei, John C. Hill, David A. Townes, Bernd Volker Scheer, Brian J. Krabak, Patrick Basset, Grant S. Lipman

Included in Consensus Statement

- Types of Events
- Unique Medical issues
- Pre-Race planning
- Feasible level of medical support
- Legal issues
- Organizing resources
- Development of medical guidelines and protocols

- Considerations and Controversies
- Runner Education
- Medical Clearance
- National/International injury registry
- Tracking participants
- Point-of-care blood work
- Use of weight scales
- IV Hydration, O2 and potential disqualification
- Ultramarathoner’s attitude and motivation

“Common Ultramarathon Injuries and Illnesses: Race Day Management”


• Musculoskeletal Injuries
  • Anterior knee pain, ITB, MTSS, Stress Fractures, Compartment syndrome, Exercise-associated muscle cramps, sesamoid stress injuries, Meniscal injuries, Plantar Fasciitis, Achilles, Post tib, peroneal, ant tib tendinopathies

• GI Problems

• Environmental Illness
  • Altitude illness: AMS, HAPE, HACE,
  • Heat related illness: Edema, sunburn, syncope, exhaustion, EHS
  • Cold Injuries: Hypothermia, Frostnip, frostbite
“Common Ultramarathon Injuries and Illnesses: Race Day Management”

  - Exertional Rhabdomyolysis
  - Exertional Asymptomatic Hyponatremia (EAH)
    - The most serious medical problem in endurance events
    - Only drink when you are thirsty
    - Monitor weight to avoid weight gain
    - Goal is to loose 2% of body weight by finish line
    - Salt replacement???
  - Respiratory Illness
  - Dermatologic problems
  - Exercise-Related Pain
    - Pain is your friend- Avoid all NSAIDS
“Common Ultramarathon Injuries and Illnesses: Race Day Management”


- Take Home Points:
  - Medical coverage for these events is challenging and requires hours of preparation and planning
  - Medical Directors and Volunteers need to be familiar with the common injuries and illnesses
  - Careful documentation using an injury surveillance system is very helpful
  - Ultimate Goal is an national and international morbidity and mortality registry

Medical Coverage

- A well developed and properly executed medical plan is essential (IAP)
- Appropriate medical care with avoiding unnecessary ER referral
- Wide variety of the number and ability of competitors
- Differences in the type and volume of injury & illness
- Environmental factors
Medical Coverage

- Medical director team approach
  - John Hill
    - Coordination with med/evac/ER teams
    - Pre-race medical advice
  - Morteza Khodaee,
  - Tom Maino and
  - Tod Sweeney
    - Coordination of volunteers
    - Recruitment of volunteers
General Administration

- Assess potential environmental conditions
- Organize the medical team before the event
- Coordination with police, fire and rescue departments
- Develop and communicate medical protocols
- Adhere to HIPAA
- Medical documentation
- Follow precautions protocol for the handling and disposal of body fluids and contaminated medical waste
- Provide all-area access credentials to the medical team
Hazardous Condition Plan

- Hot conditions
- Cold conditions
- Lightning and thunder
- On-site competitors education
- Discuss the risks with participants
Pre-race Medical Check-in

- Review medical history
- Review medications
- Waiver process for high risk conditions
- Weight check-in for run
Aid Stations

- Different locations for Mountain Bike Race and Run
- Main activity at finish line
Aid Stations

- Basic medical equipments
- AED
- O₂
- IV fluids
- Cooling system
- Staff by at least one physician
- Hydration
- Energy replacement
Aid Stations - MTB

- More volunteers
- Shorter time period
### Aid Stations - Run

- Requires careful scheduling
- Longer hours

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Injury Report - Run Race

There were 134 visits to aid stations by 107 (21.4%) different runners. Five runners were referred to the ED.

Injuries

- Skin
- MSK
- Metabolic and GI issues
- Trauma more common in MBK
- Heat illness and fluids imbalance with run
Medical issues in Ultramarathons

• The organization of medical services for ultra-endurance foot races requires an understanding of the medical issues that are likely to be encountered.

• Many medical issues are not life-threatening but can often have substantial effects on racer performance. Serious medical issues may be less common, but require contingency plans.

Blisters and Other Dermatologic Conditions

- Blisters are the most commonly encountered medical problem in ultra-endurance foot races,
- Representing 17–40 % of injuries at continuous ultramarathons and 33–74 % of injuries during multistage ultramarathons

Hydration Issues and Hyponatremia

- Correct management of fluid and nutritional needs is critical to successful completion of ultra-endurance events.
- With potential sweat losses up to 0.5–2 L/h, at least some of the fluid loss must be replaced during extended periods of exercise.
- However, overhydration can contribute to exercise-associated hyponatremia (EAH), defined as a blood sodium concentration below 135 mEq/L during or up to 24 h after prolonged exercise.
- The incidence of the condition has been found to be as high as 51% in some 161-km ultramarathons

Metabolic and Gastrointestinal Issues

- The average runner utilizes 500–800 kcal/h during a 161-km race [29, 30], but is generally able to only ingest between 200 and 300 kcal/h, so caloric deficit cannot be avoided.
- Gastrointestinal symptoms can further compromise intake of necessary calories and add to the deficit, which is accommodated through utilization of stored fat and carbohydrate.
- Gastrointestinal distress (including nausea, vomiting, abdominal cramping, and diarrhea) is prevalent among participants of ultramarathon competitions.

Exertional Rhabdomyolysis and Acute Kidney Injury

- Endurance events typically result in varying degrees of exertional rhabdomyolysis that is evident from elevation of serum creatine kinase (CK) and myoglobin concentrations.
- Serum CK concentrations over 20,000 IU/L are common in ultramarathons, raising concern regarding urinary clearance of myoglobin and development of acute kidney injury.
- The prevalence of those meeting the diagnostic criteria for acute kidney injury has been found to be 4% after a 161-km continuous ultramarathon and over 50% during multistage ultramarathons.
- Yet, few athletes require medical intervention for acute kidney injury

Musculoskeletal Injuries

- Musculoskeletal injuries are typically overuse in nature and are not life-threatening, but can seriously affect performance in ultra-endurance events.
- These issues represent 1–24% of injuries during continuous and 18–22% of injuries during multistage ultramarathon races.

Thermal-Related Disorders

• The most serious temperature-related illnesses are heat stroke and hypothermia.
• Incidence depending in part on the environmental conditions of the event.
• Hyperthermia risk is less than might be expected due to the relatively low exercise intensity of ultra-endurance exercise.
• In a 100 mile race at high altitude, you frequently see both extremes in a single day.

Take Home Points

- The ultrarunner is different than a marathoner, help them help themselves
- Good planning will help you from overwhelming local resources and this information should help you organize medical coverage for similar events
- Understanding what injuries are common will help you prepare and quickly recognize those problems