



Adventure Race Medicine

Healthcare that Works 2016
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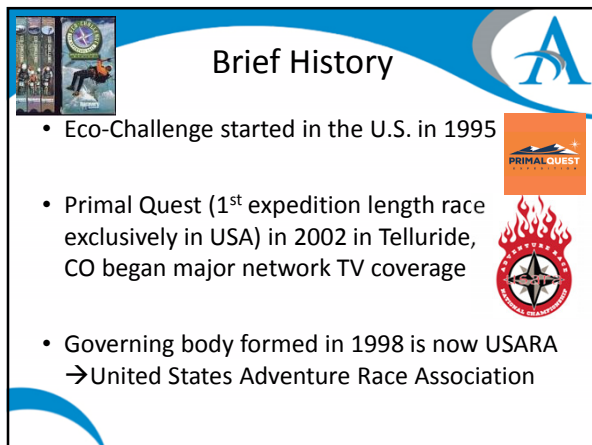
Introduction

- Last 25 years tremendous growth in multisport adventure races
- Advanced and improved outdoor equipment
- More efficient and affordable travel



Brief History

- Eco-Challenge started in the U.S. in 1995
- Primal Quest (1st expedition length race exclusively in USA) in 2002 in Telluride, CO began major network TV coverage
- Governing body formed in 1998 is now USARA → United States Adventure Race Association



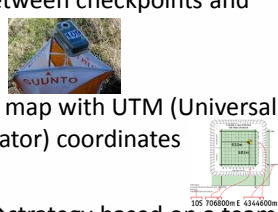
Events Included

- Caving
- Fixed-line mountaineering
- Flat and white-water boating
- Hiking
- Mountain biking
- Navigation and orienteering
- Technical climbing and rope skills
- Trail running
- Trekking




Unique Attributes

- No set course between checkpoints and transition areas
- Each team given map with UTM (Universal Transverse Mercator) coordinates
- No built in rest → strategy based on a team strength and weakness



Rules of Travel

- Dictate aspects e.g. where and when team can travel on paved roads, use trails, get water
- ALSO govern use of medications, specify penalties for use of medical resources during the race, outline criteria for withdrawal from the event
- Breach of these rules → penalties ranging from extra time to disqualification




Goals of Care

- Rapid access and triage 
- Stabilization and transport of seriously ill or injured 
- On-site care for minor injury or illness 


9 Elements of Planning

- Crowd size 
- Personnel
- Medical Triage & Facilities
- Communication 
- Transportation
- Medical Records
- Public information
- Mutual Aid
- Data Collection


Medical Support Categories

- I. Spectators seated for duration of event
 - stadium events, concerts
- II. Spectators are mobile/may become participants
 - Golf tournament, Mardis Gras
- III. Large geographic area where participants outnumber spectators
 - Marathon, triathlon, cycling 
- IV. 3+ extreme events and unique challenges
 - Adventure racing and related endurance events


Examples in Category 4

- Rough and remote terrain 
- Logistical difficulties with communication
- Prolonged transport time to definitive care
- Requirement for technical search and rescue 

Mass Gathering Recommendations

- Basic first aid in 4 minutes
- ALS care in 8 minutes 
- Evacuation to medical facility in 30 minutes
- Minimum 2 person team (RN, EMT, paramedic) per 10,000 participants
 - Rates of utilization ~ 0.5-2 patients/1000 athletes

Controversies

- Penalties for acceptance of medical support
 - 1) 4 hour penalty to accept IVF
 - 2) Require >2L IVF or multiple IVF = disqualification
 - 3) All who require IVF must be medically cleared by race director prior to return to play
- Conflicts when medical team and athletes disagree about RTP 

EMS & SAR

- Expedition length races cover multiple hospital, trauma center, EMS/SAR jurisdictions
- Integrate member of the local EMS community as liaison b/t race and local medical community




Medicolegal Aspects

- Liability of volunteer vs paid responder?
- Licensed personnel require insurance beyond general liability policy per event
- Validity of liability waivers
- What constitutes practice of medicine?
- Controlled substances in medical kits?




Injury Patterns in 223 Surveyed Adventure Racers

Class	Acute	v.	Chronic
• Advanced	44%		59%
• Intermediate	35%		54%
• Beginner	19%		56%




Injuries and Illness Primal Quest

Type	N = 302	Percentage
• Skin/soft tissue	• 145	48%
• Respiratory	• 55	18.2%
• Altitude (AMS/HAPE)	• 36	11.9%
• Orthopedic	• 29	9.6%
• Dehydration	• 21	7%
• Gastrointestinal	• 6	2%
• HEENT	• 5	1.7%
• Genitourinary	• 3	1%
• Other	• 2	<1%




Trends

- Acute injuries in adventure races > triathlons
- Most common site of injury ankle>arm and shoulder>knee>low back
- While injury is more common, illness→more medical withdrawals from event
- Reactive airway disease/asthma incidence high (N.B. progressive decline in both FEV₁ & FVC from baseline up to 20%)



Acute Mountain Sickness

- Incidence and severity depends on rate of ascent and altitude obtained, duration of exposure, level of exertion, inherent physiologic susceptibility
- Headache, fatigue, dizziness, anorexia
- Specific physical findings often lacking
- NO NEURO FINDINGS unlike in High Altitude Cerebral Edema



High Altitude Pulmonary Edema

- Most common cause of death related to high altitude
- Prevalence depends on rate of ascent, altitude reached, degree of cold, physical exertion, and individual susceptibility
- Fatigue, weakness, dyspnea on exertion, persistent dry cough, nail beds cyanotic
- Pulmonary edema may manifest w/ neuro sx



Endemic Disease

- 1997 Raid Gauloises in South Africa → 13 cases African tick-bite fever *Rickettsia africae*
- 2000 Eco-Challenge Borneo → 80 cases Leptospirosis (immersion Segama River)
- 2001 Para Jungle Brazil → myiasis screwworm fly larvae *Cochlomyia hominivorax*



Dehydration and Hyponatremia

- Serum sodium <135 with malaise, disorientation, hyperreflexia, nausea, fatigue
 - Mechanism? Net H₂O gain and Na lost vs. Na depletion 2/2 massive sweat losses
- 1) 0.5L fluid in per Lb. lost
 - 2) 1g/hr Na replacement in races >4h
 - 3) 1 week to acclimatize from cooler climate + 10-25g/d Na
 - 4) IVF therapy races >4h 5% dextrose in normal saline

