

# ACUTE MOUNTAIN SICKNESS IN THE HIGH ALTITUDE URGENT CARE

Jack Miller DNP, FAWM  
RN, ACNP-BC, CCRN, CFRN  
EmCare  
Emergency Physician Services  
Dallas, Texas, USA

# Introduction

- ▣ Increased recreational and professional exposure to altitude
- ▣ Headache, High Altitude
- ▣ Acute Mountain Sickness

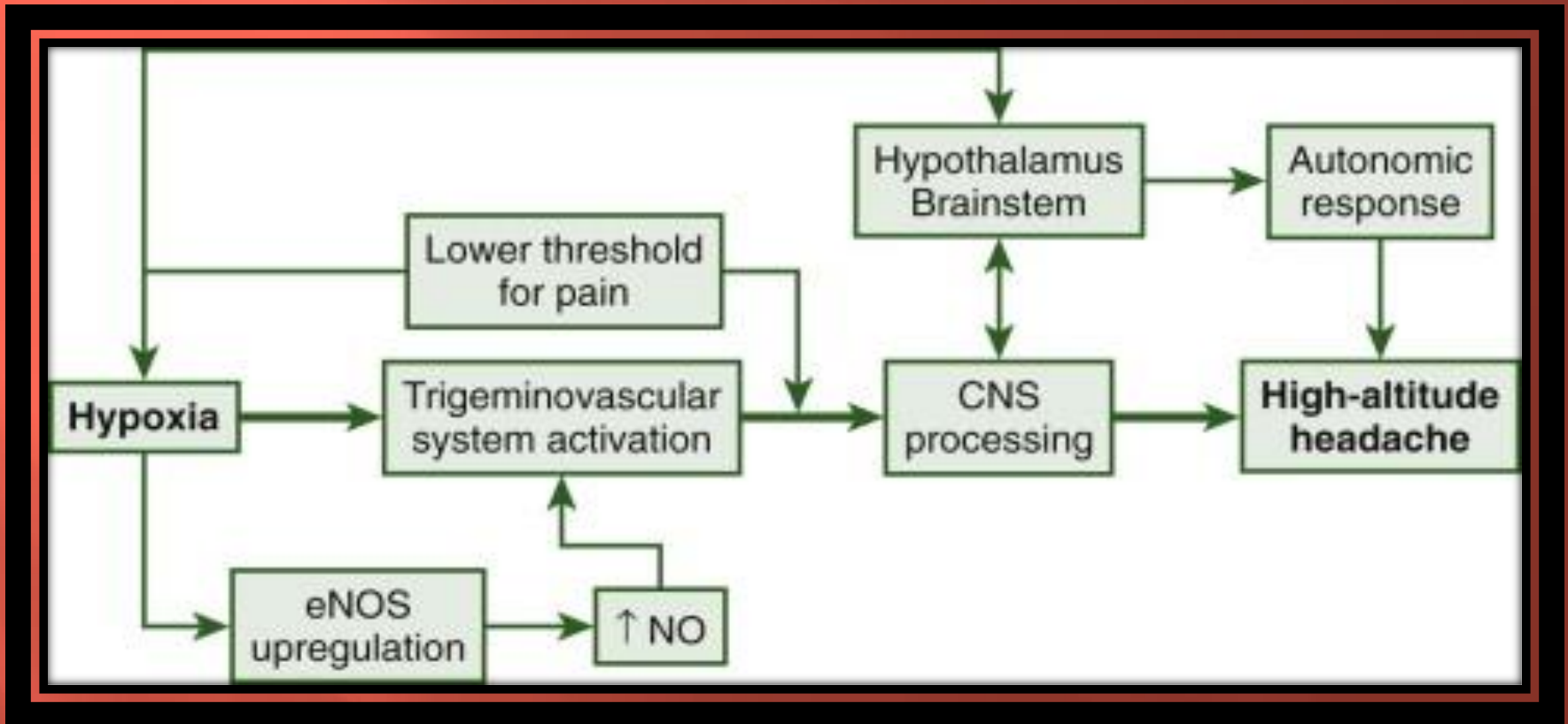


# Risks of Acute Mountain Sickness

- ❑ Young Age
- ❑ Female
- ❑ Regular Mountaineering
- ❑ Regular Exercise
  - High perceived rate of exertion
- ❑ Previous history of AMS
- ❑ History of migraines
- ❑ Rapid ascent to altitude
  - Low oxygen saturation
- ❑ Dehydration



# High Altitude Headache



Proposed pathophysiology of high-altitude headache. Modified from Sanchez del Rio, M and Moskowitz, MA: *High altitude headache*. In Roach, RC, Wagner, PD, and Hackett, PH, editors: *Hypoxia: Into the next millennium*, New York, NY; 1999,

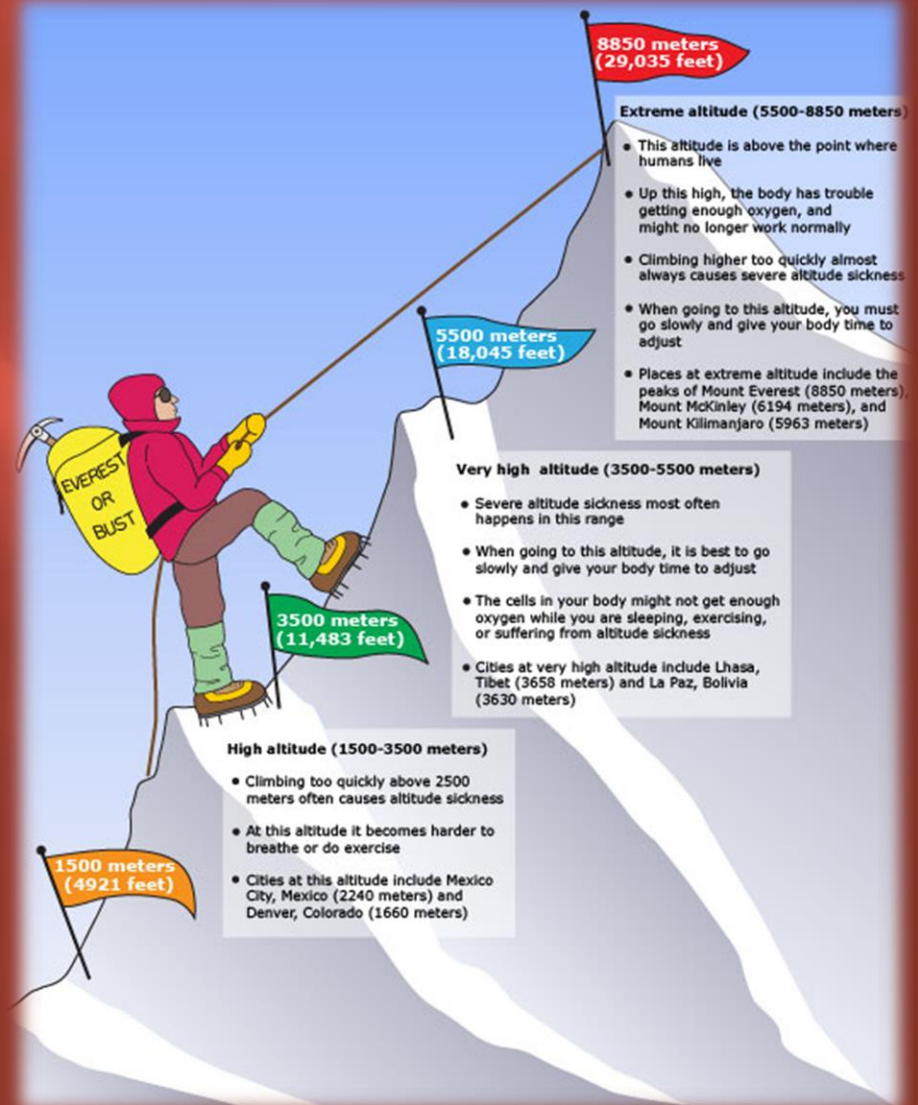


# Definition of High Altitude

▣ 2000m (6562ft)



SueThomas



# Increasing the rate of diagnosing Acute Mountain Sickness

- ▣ 2012-2013 Red River & Angel Fire, NM ski season=4.3%
- ▣ Diagnostic rate should=  
≥ 20%
- ▣ Increasing diagnostic rate could
  - Decrease the amount of mountain injuries
  - Prevent progression of the severity of AMS



# Question

- ▣ 1. When high-risk patients present to a high altitude urgent care clinic, will the inclusion of the Lake Louise Scale (LLS) with the Review of Systems for patient interview upon intake, increase the diagnosis of acute mountain sickness?
- ▣ 2. Are individuals with a history of vascular headaches at an increased risk for acute mountain sickness?

# Data Collection

- ▣ LLS score
- ▣ Sex
- ▣ Age
- ▣ Race
- ▣ Altitude of residence
- ▣ Time of departure from residence
- ▣ Time of arrival to altitude
- ▣ Altitude gained
- ▣ Days at altitude
- ▣ History of migraine headache
- ▣ Any onset of migraine headache at altitude
- ▣ History of cluster headache
- ▣ Any onset of cluster headache at altitude
- ▣ History of altitude illness
- ▣ Presenting for Injury or Illness



# Lake Louise Scale

| Signs                          |  | Score    |
|--------------------------------|--|----------|
| <b>Headache</b>                | <b>None at all</b>                                   | <b>0</b> |
|                                | <b>Mild headache</b>                                 | <b>1</b> |
|                                | <b>Moderate headache</b>                             | <b>2</b> |
|                                | <b>Severe, incapacitating headache</b>               | <b>3</b> |
| <b>Gastro-intestinal</b>       | <b>No nausea or vomiting</b>                         | <b>0</b> |
|                                | <b>Poor appetite or nausea</b>                       | <b>1</b> |
|                                | <b>Moderate nausea or vomiting</b>                   | <b>2</b> |
|                                | <b>Severe, incapacitating nausea and/or vomiting</b> | <b>3</b> |
| <b>Fatigue/<br/>Weakness</b>   | <b>Not tired or weak</b>                             | <b>0</b> |
|                                | <b>Mild fatigue/weakness</b>                         | <b>1</b> |
|                                | <b>Moderate fatigue/weakness</b>                     | <b>2</b> |
|                                | <b>Severe, incapacitating fatigue/weakness</b>       | <b>3</b> |
| <b>Dizziness</b>               | <b>None</b>  | <b>0</b> |
|                                | <b>Mild</b>  | <b>1</b> |
|                                | <b>Moderate</b>                                      | <b>2</b> |
|                                | <b>Severe, incapacitating</b>                        | <b>3</b> |
| <b>Difficulty<br/>Sleeping</b> | <b>Slept as well as usual</b>                        | <b>0</b> |
|                                | <b>Did not sleep as well as usual</b>                | <b>1</b> |
|                                | <b>Woke many times, poor night's sleep</b>           | <b>2</b> |
|                                | <b>Could not sleep at all</b>                        | <b>3</b> |
| <b>Total</b>                   |  |          |

# Recruitment

- ▣ Inclusion
  - (a) age of 18 years or older
  - (b) rapid ascent to altitude
  - (c) patient consent granted
- ▣ Exclusion
  - (a) local population or permanent residence of 1500m
  - (b) pregnancy
  - (c) unstable trauma patient that requires immediate evacuation to higher level of care



# Results

- ▣ N=213 (107 female and 106 male)
- ▣ mean age=37.17 years ( range 18-79 years)
- ▣ 171 subjects (80.3%) presented for injury
- ▣ Remaining 42 (19.7%) presenting for illness

| Race                   | Frequency | Percent |
|------------------------|-----------|---------|
| Caucasian/White        | 186       | 87.3    |
| Hispanic/Latino        | 17        | 8.0     |
| Native American        | 2         | 0.9     |
| African American/Black | 1         | 0.5     |
| Asian American         | 4         | 1.9     |
| Pacific Islander       | 1         | 0.5     |
| Creole                 | 2         | 0.9     |

# Results

- ▣ Mean altitude gain by subjects was 7531.27ft (2295.53m) Range 1128-8670ft (344-2643meters)
- ▣ Over a mean time of 17.87hrs (range 2.0-72.0hrs).
- ▣ Days spent at altitude before presenting to clinic had a mean of 1.85 days (range 1-4 days).

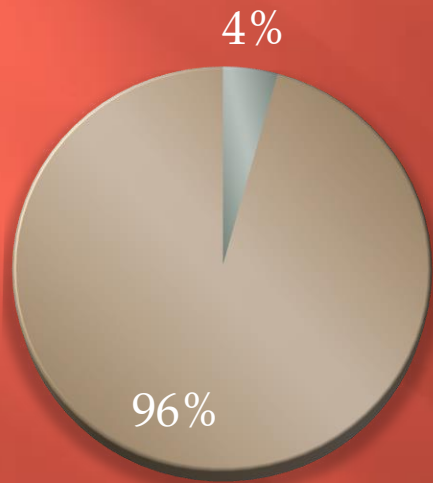




# Acute Mountain Sickness Rate

2012-2013

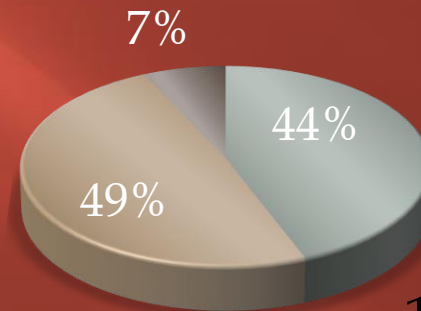
■ AMS  
Dx



4.3%  
Diagnostic  
rate of AMS

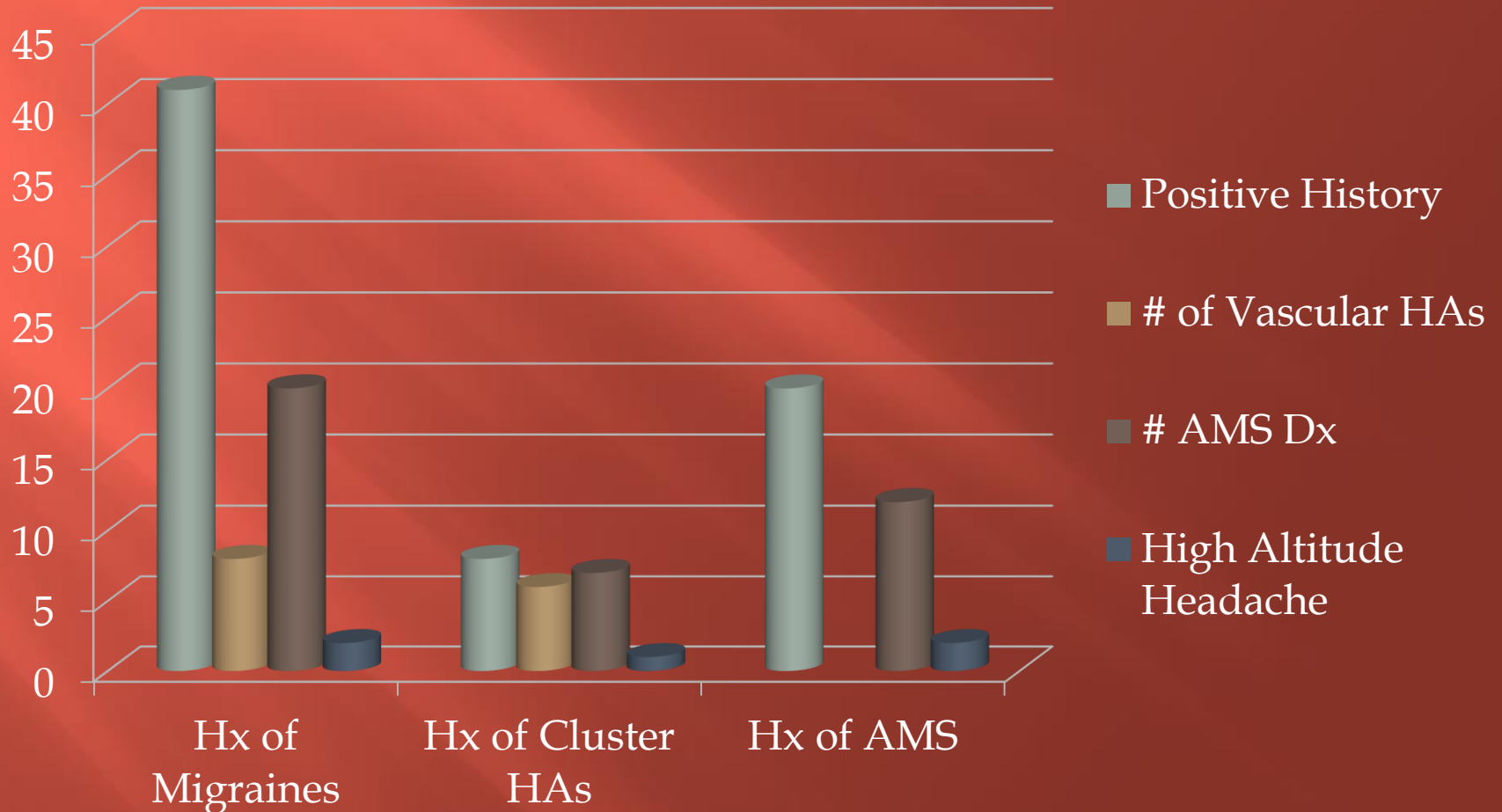
2013-2014

■ AMS Dx  
■ No AMS  
■ HAH



1. 44.1%  
Diagnostic rate  
of AMS  
& 7.0% HAH  
rate

# Previous History



# Discussion



- ▣ Study shows that we can easily identify patients who are experiencing AMS

# Discussion (cont.)



- ▣ Study continues to indicate that those with a history of vascular headaches are at risk for AMS



# Study Strengths & Weaknesses

## Future Studies



- ▣ Sample Study Size
  - 213 for LLS 🤔
  - 49 for vascular HAs 🙄
- ▣ Future Study
  - ?AMS increase  
likelihood of injury

# Conclusion



- ▣ Screening for AMS with the LLS will increase the diagnostic rate

# Conclusion (cont.)

- ▣ Individuals with a history of vascular headaches are at risk for developing AMS



# Questions





# References