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Effect of Simulated Tree-Well vs Avalanche Snow Burial on Core Temperature Cooling Rate

Nicholas Kanaan¹; Joseph Krakker²; Heather Beasley³;
Jeffrey Sorensen⁴; Scott McIntosh¹; Colin Grissom¹

¹University of Utah, Salt Lake City, UT, USA, ²Providence Alaska Family Medicine, Anchorage, AK, USA, ³University of New Mexico, Albuquerque, NM, USA, ⁴Intermountain Medical Center, Salt Lake City, UT, USA

Introduction.—An increasing number of skiers and snowboarders are caught in nonavalanche tree-well snow immersions. Given the lighter density of snow and inverted position of burial, this emerging injury pattern may have different victim physiology and associated rescue considerations compared with avalanche-related burials.

Objective.—This study aimed to measure the differential effect of burial type (tree-well vs avalanche) on victim physiology related to survival.

Methods.—Eleven volunteers participated in 2 paired 60-minute snow burials: avalanche and tree-well scenarios simulated by controlling burial position and snowpack densities. Minute-by-minute physiologic parameters were monitored for safety and recorded, including core temperature, respiratory rate, minute ventilation, end-tidal carbon dioxide, oxygen saturation, and heart rate.

Results.—Using a quasi-Bayesian generalized linear mixed model, we found the subject-specific average rate of core temperature cooling in avalanche conditions was $-0.017^{\circ}\text{C}/\text{min}$. (95% CI -0.023 to -0.011 ; $P = .001$); in tree-well conditions, it was $-0.013^{\circ}\text{C}/\text{min}$. (95% CI -0.019 to -0.005 ; $P < .001$). The subject-level average expected time to hypothermia (35°C) was 185 minutes in avalanche and 250 minutes in tree-well conditions. Upon limiting the false discovery rate to 5%, secondary analyses revealed no statistically significant difference between burial types for respiratory rate, minute ventilation, end-tidal carbon dioxide, oxygen saturation, or pulse.

Conclusions.—The lower density of snowpack in tree-well snow immersions is likely to result in the 24% slower rate of cooling observed and thus in longer expected time to hypothermia compared with higher snow density avalanche conditions. These implications may lead to allocating extended search and rescue efforts to accommodate for longer time to hypothermia when looking for tree-well burial victims compared to avalanche victims.

Reduced Acetazolamide Dosing for Acute Mountain Sickness Prevention Study: A Comparison of 62.5 vs 125 mg BID (the RAD AMS prevention study)

Scott McIntosh¹; Mika Hemphill²; Marion McDevitt³;
Tsering Yangzom Gurung⁴; Mukhiya Ghale⁵; Jonathan Knott⁶;
Ghan Bahadur Thapa⁷; Buddha Basnyat⁸; Jennifer Dow⁹;
David Weber¹⁰; Colin Grissom¹¹

¹University of Utah, Salt Lake City, UT, USA, ²Red Deer Rural Family Medicine, Edmonton, Alberta, Canada, ³Peace Health Ketchikan Medical Center, Ketchikan, AK, USA, ⁴Manipal College of Medical Sciences, Pokhara, Nepal, ⁵Green City Hospital, Kathmandu, Nepal, ⁶UPMC-Hamot Hospital, Erie, PA, USA, ⁷Institute of Medicine and Mountain Medicine Society of Nepal, Kathmandu, Nepal, ⁸Oxford University, Clinical Research Unit-Nepal; Centre for Tropical Medicine and Global Health, University of Oxford, Nepal International Clinic, Kathmandu, Nepal, ⁹Alaska Regional Hospital, National Park Service – Alaska Region, Anchorage, AK, USA, ¹⁰Medical Program, Denali National Park; Intermountain Life Flight, Salt Lake City, UT, USA, ¹¹Critical Care Medicine, Shock Trauma ICU, Intermountain Medical Center, Murray, UT, USA

Objective.—Acetazolamide is the standard agent of choice for medical prophylaxis against acute mountain sickness (AMS). The current North American guidelines propose 125 mg twice daily (BID) as the recommended prophylactic dose. To our knowledge, a dose lower than 125 mg twice daily has not been studied. We sought to determine whether 62.5 mg twice daily was as effective as 125 mg twice daily for the prevention of AMS. In addition, we sought to measure the number and severity of side effects experienced by users of each dose.

Methods.—We conducted a prospective double-blind randomized noninferiority trial of healthy trekkers and climbers traveling to Everest Basecamp in Nepal or those ascending Denali in Alaska. Participants received either the reduced dose of acetazolamide at 62.5 mg twice daily or the standard dose of 125 mg twice daily before and during ascent. Outcome measures included the incidence and severity of AMS in each group as well as the prevalence of common side effects of the medication.

Results.—Ninety participants had data sufficient to be included in the analysis. The incidence of AMS did not vary significantly between the 2 groups; the mean Lake Louise Score