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Epidemiology of Whitewater Fatalities in the Arkansas Headwaters Recreation Area

Introduction.—The Arkansas Headwaters Recreation Area (AHRA) is one of the most popular Colorado locations for whitewater rafting. Any fatalities that occur during commercial rafting trips in this area are reported to the Colorado Parks and Wildlife service. Whitewater rafting is an activity with inherent risks associated, but certain factors may increase these risks.

Objective.—The goal of this study was to examine factors that may correlate with increased risk of whitewater fatalities.

Methods.—This is a retrospective case series of data from the AHRA regarding details of all commercial whitewater fatalities between the years 1991 and 2011. Descriptive statistics are reported for factors such as weather conditions, river conditions, guide experience, location of boat, safety equipment, and participant characteristics.

Results.—Over 17 years, there were 37 deaths among 4,489,235 commercial boating participants in the AHRA, or approximately 1 death for every 121,000 visitors. The majority of victims were male (73%), the median age of victims was 48 years (range 36–52 years), and the median victim body mass index was 31 kg/m² (range 25–34 kg/m²). In all, 78% of these trips did not have a safety kayaker with them, and 37% of the fatalities were participants located in the first boat. The majority of guides (70%) had more than 1500 miles of experience, and nearly all fatalities (97%) were participants wearing type V portable flotation devices.

Conclusions.—Whitewater rafting fatalities on the Colorado portion of the Arkansas River are uncommon. Factors such as guide experience and participant safety equipment did not significantly influence these fatalities. Victims tended to have a higher body mass index, which may be a marker of a lower baseline fitness level or a propensity toward underlying cardiovascular disease. Further research is needed to determine whether there are any medical risk factors that would make a person unsafe to participate in whitewater rafting.

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Study Looking at End Expiratory Pressure for Altitude Illness Decrease (SLEEP AID): A Randomized Controlled Trial

Objective.—Acute mountain sickness (AMS) affects 25% to 75% of the tens of millions of high altitude travelers

annually. Major contributing factors to AMS are hypoxia and nocturnal desaturations. Small studies have found that positive end-expiratory pressure devices are able to prevent and ameliorate AMS, but there have been no controlled trials. The purpose of this study was to assess a single-use nasal strip, Theravent, that provided 5 cm H₂O positive end-expiratory pressure (PEEP) while sleeping for the improvement of AMS and nocturnal hypoxic events.

Methods.—Healthy, unacclimatized adult participants trekking in the Khumbu region of the Himalayas during Fall 2013 were randomly assigned to Theravent or to a visually identical sham device before their first night sleeping at 4280 m or 4358 m. The primary outcome was AMS incidence, measured by the Lake Louise Score questionnaire, with secondary outcomes of physiologic sleep indices measured by the WatchPAT-200 continuous sleep monitor.

Results.—Two hundred nineteen participants were included for intent-to-treat analysis, 115 received PEEP and 104 placebo, with no differences in demographic characteristics between groups. There was no decrease in AMS with the intervention (14% PEEP vs 17% placebo, $P = .65$, 95% CI: -7% to 14%). The PEEP group reported decreased headache (64% vs 76%, $P = .047$, OR 0.51, 95% CI: 0.27–0.95) and dizziness (81% vs 98%, $P = .024$, OR 0.29, 95% CI: 0.09–0.78). The PEEP group showed significant improvement in average oxygen saturation (SpO₂ [80.4% vs 78.3%; $P = .007$, 95% CI: 0.58–3.63]), reduced rate of SpO₂ below 80% (30.9% vs 46.1%; $P = 0.022$, 95% CI: 2.22–28.18), and a significant correlation between percentage of time in deep sleep and SpO₂ ($r = 0.22$, 95% CI: 0.05–0.39).

Conclusions.—Although Theravent had a high rate of user discomfort, this lightweight inexpensive PEEP device may improve some distressing symptoms of AMS and nocturnal oxygenation while sleeping at high altitude.

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