Traumatic injury among avalanche victims has received increasing attention since 2009 when a Canadian study reported a surprising 25% of victims died of trauma. Previous studies suggested trauma as a cause of death occurred in less than half that number. Whatever the number, trauma is often a factor for both victims and survivors.

A significant proportion of avalanche trauma mortality is attributed to head and cervical injuries. The intuitive response has been to advocate for protective strategies, including helmets. I have recently published a commentary on this topic in *Wilderness and Environmental Medicine*, titled Backcountry Skiers, Avalanche Trauma Mortality, and Helmet Use ([http://dx.doi.org/10.1016/j.wem.2015.09.020](http://dx.doi.org/10.1016/j.wem.2015.09.020)).

This post will summarize the commentary, and references are cited in the published piece.

Although it seems to be intuitive that snow helmets should protect against serious (intracranial hemorrhage, operative intervention, coma, death) traumatic brain injury (TBI), the data unfortunately is mixed. There are no studies examining the efficacy of helmets in backcountry skiers and boarders, so one has to extrapolate from studies of similar user groups – namely downhill resort user data. Please note that this topic does not include climbers and mountaineers who are exposed to rock and icefall. Climbing helmets are only standardized for falling objects on the crown; not side, front, rear and rotational impacts.

Several recent studies call into question the effectiveness of helmets preventing severe TBI. Bashera et al (Association between head injury and helmet use in alpine skiers: cohort study from Swiss Level I trauma center, *J Neurotrauma* 2015) found no decrease in severe TBI among alpine skiers despite major increases in helmet use. They do mention increased risk for ‘off piste free riders’. Although not defined, I believe this refers to ascending with a lift and skiing out of the maintained resort.

Even with the increased risk, helmets did not seem to decrease severe TBI, and prevention strategies were suggested.

Another study published in 2013 (Christenesn et al, Skiing and Snowboarding related head injuries in the United States: a retrospective analysis from 2004-2010, *Wilderness and Environmental Medicine*), found an *increasing* rate of head injury despite a *doubling* of helmet use. That is worrisome. There are many possible reasons for this, including increased awareness, diagnostic threshold, risk taking, and high rates of speed with modern equipment. Importantly, they did note children 10 and younger with helmets did have a slightly lower chance of head injury. But children this age generally do not venture into avalanche terrain.

J Shealy is a prominent ski injury researcher, and has maintained for many years that helmets do not appear to affect the incidence of serious TBI and mortality. However, after some noteworthy press
exposure on this topic, he later published data (2015) to suggest that finally there appears to be slight
decrease in the head injury rate in the US. But, importantly, the fatality rate among resort participants
is not decreasing. The injury pattern shifts. The idea is that when people experience trauma from high
rates of speed and impact, the victim will die from other associated injuries (neck, chest, abdomen)
rather than an isolated TBI.

It should be noted that there are numerous studies that conclude helmets decrease the incidence of
severe TBI. But, what needs to be pointed out is this: when different studies come to opposite
conclusions, the likelihood of their being a significant measurable benefit diminishes greatly. If the
answer were obvious, then the results should replicate easily and be reproducible.

Modern snow sport helmet technology is made to protect users from impact speeds between 11 and 14
mph. Avalanches and their victims travel at speeds of 60-80 mph, and take about 5 seconds to reach
that speed. Forces of that magnitude outmatch current helmet standards, and are unlikely to decrease
the mortality rate of avalanche victims secondary to trauma.

The rate at which backcountry users get caught in avalanches ascending versus descending is another
concern. An informal poll of avalanche professionals revealed a wide range opinions regarding the
incidence of being caught in an avalanche ascending vs descending. The opinions ranged from 10 –
50%. Regardless, the practice of lashing a helmet to the back of your pack while skinning affords no
benefit to the user if caught in an avalanche. Helmets should be worn at all times to have a measurable
benefit if reducing avalanche trauma mortality is the objective.

So, is there any downside (harm) to wearing a helmet? It may seem heretical to even consider, but lets
dig past the assumptions. If protective equipment takes precedence over education, decision making,
and other preventative behavior strategies, then harm can occur. Arming oneself with all the latest
gadgets is no substitute for practicing safe travel skills, terrain selection, snowpack evaluation, and
rescue protocols. Our pill popping culture believes in a quick fix for any ailment. We often choose
gadgets over education and behavior modification, even when we know behavior changes provide the
most benefit in the long run. Outfitting oneself with all the latest technology can bolster risk taking and
confidence. The concept of “energy drink culture” permeates a large portion of the targeted
demographic, and has been used to describe prevailing attitudes towards risk.

Helmets will protect against lacerations, contusions, probably minor fractures, and moderate speed (less
than 15 mph) head injuries. Protection against concussions is mixed and debatable. You are unlikely to
lower your fatality risk incurred during an avalanche traveling at 60 – 80 mph wearing a current
technology helmet. I hope the future sees helmet technology improve to the point where they can
reliably prevent serious TBI, and be worn at all times – even ascending.

To decrease trauma avalanche fatalities, prevention strategies consisting of avalanche education and
skills practice should be emphasized. The lack of consistent evidence for helmets preventing severe TBI
and decreasing the fatality rate among skiers and snowboarders will hopefully spur improved helmet
safety standards, science on the issue, and subsequently, lives saved.

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**Region:**

- Salt Lake

Published on [utahavalanchecenter.org](https://utahavalanchecenter.org)

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