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## Role of Helmets in Reducing Skull Fractures Incurred by Children in Skiing and Snowboarding Accidents

*ScienceDaily (Feb. 18, 2011) – New research reviews skull fractures incurred by young skiers and snowboarders and the role helmets play in reducing these head injuries.*

Severe head trauma is the most frequent cause of death and severe disability in skiers and snowboarders and accounts for about 15 percent of all skiing and snowboarding related injuries. Although helmet use is apparently increasing, it remains far from universal. The authors\* cite a large survey of skiers and snowboarders of all ages in western United States and Canada published in 2003 which indicated that 12.1 percent wore helmets, and more recently a 2008 study that indicated that as many as 42 percent of children in the state of New York wore helmets. At present, there are no current state laws mandating helmets for skiers or snowboarders.

The role of protective helmets in reducing ski and snowboard injuries is a matter of active epidemiological research and some debate. Several large observational surveys collectively suggest that the use of helmets reduces the need to be evacuated by ambulance or visit a hospital. A recent meta-analysis concludes that helmet use reduces head injuries by 35 percent and another recent meta-analysis suggests head injury reductions ranging from 15-60 percent. However, none of these studies have established whether or not helmet use in skiers and snowboarders reduces the incidence of head injuries seen on CT scans. The present study is the first to analyze head injury patterns sustained by helmeted versus unhelmeted skiers and snowboarders under the age of 21, as confirmed on CT scans.

The authors reviewed data on head injured skiers and snowboarders treated at two level 1 trauma centers in New England from 2003-2009. The authors focused their research on 57 children (age 21 and younger). The primary endpoints of interest were the presence of CT findings that included epidural hematoma, subdural hematoma, other

traumatic intracranial hemorrhage, and skull fractures. The secondary endpoints of interest were the presence of cervical spine injury, the need for a neurosurgical procedure, the admission location, length of hospital stay, discharge location, and incidence of death.

### Noteworthy results culled from this in-depth analysis:

- \* Helmet usage: 19 helmeted (33.3 percent), 38 unhelmeted (66.7 percent)
- \* Helmet usage by sport: 30.8 percent skiers, 35.5 percent snowboarders
- \* Skull Fractures: 5.2 percent of helmeted patients suffered skull fractures versus 36.8 percent of unhelmeted patients.
- \* Helmeted fracture patterns: 1 non-depressed skull fracture
- \* Unhelmeted fracture patterns: 14 skull fractures, 8 of which were depressed

### The authors cite several studies that attributed a majority of skiing fatalities to head injury:

- \* Utah study: 88.9 percent of fatal injuries attributed to head injury
- \* Vermont study: 87.5 percent of fatal injuries attributed to head injury
- \* Alberta study: 80.0 percent of fatal injuries attributed to head injury
- \* Switzerland study: 80.0 percent of fatal injuries attributed to head injury

A review of other studies shows compelling evidence that skull fractures sustained by children in skiing and snowboarding pose serious risk. A New Hampshire study reported that 71.1 percent of all children involved in a ski accident and admitted to the hospital had suffered a skull fracture. An analysis of 16 fatal ski injuries in Vermont from 1980-1986 revealed that of the 16 deaths, 14 patients had suffered head injuries and 13 of those were associated with skull fractures.

"We are able to show that helmets are associated with reduced skull fractures in skiers and snowboarders seen at the hospital. Given that skull fractures can be an indication of severe brain injury and sometimes associated with intracranial bleeding, a reduction in skull fractures is a compelling finding. Furthermore, we did not see any increase in the risk of cervical spine injuries as some might predict. Although not a focus of our work, other research

has shown that helmet use in skiers and snowboarders does not increase risk-taking behavior. This study supports the protective role of helmets in skiers and snowboarders," said Dr. Rughani.

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