Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

An evidence based review: efficacy of safety helmets in reduction of head injuries in recreational skiers and snowboarders.

Bibliographic Source(s)

Haider AH, Saleem T, Bilaniuk JW, Barraco RD. Efficacy of safety helmets in reduction of head injuries in recreational skiers and snowboarders. Chicago (IL): Eastern Association for the Surgery of Trauma (EAST); 2011. 26 p. [53 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The classes of evidence (I-III) and levels of recommendation (1-3) are defined at the end of the "Major Recommendations" field.

Level 1 Recommendations

1. All recreational skiers and snowboarders should wear safety helmets to reduce the incidence and severity of head injury during these sports.

Note: As with evidence regarding helmet efficacy in the reduction of head injury and mortality in motorcycle crashes, Class I evidence on helmet efficacy in recreational skiing and snowboarding is lacking. However, the above statement has been designated as a Level I recommendation because in the review of evidence, a preponderance of Class II data regarding helmet efficacy in head injuries in skiers and snowboarders with significant construct validity was observed. This was further coupled with the acknowledgement of the inability to ethically perform a randomized controlled trial in this arena.

Level 2 Recommendations/Observations

The following observations were also made during the review of literature on the subject:

1. Helmets do not appear to increase the risk compensation behavior among skiers and snowboarders.
2. Helmets do not appear to increase the risk of neck and cervical spine injuries among skiers and snowboarders.
3. Policies and interventions directed towards increasing and promoting helmet use should be promoted to reduce mortality and head injury in recreational skiers and snowboarders.

Definitions:

Classes of Evidence

Class I: Prospective randomized controlled trial.

Class II: Prospective clinical trial or retrospective analysis based on reliable data.

Class III: Retrospective case series or database review.

Levels of Recommendations

Level 1: The recommendation is convincingly justifiable based on the available scientific information alone. This recommendation is usually based on Class I data; however, strong Class II evidence may form the basis for a Level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format.

Level 2: The recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert opinion. This recommendation is usually supported by Class II data or a preponderance of Class III evidence.

Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

- Head injury
- Neck and cervical spine injury

Guideline Category

Prevention

Risk Assessment

Clinical Specialty

Family Practice

Pediatrics

Preventive Medicine

Sports Medicine

Intended Users

Advanced Practice Nurses

Physician Assistants

Physicians

Public Health Departments

Guideline Objective(s)

To evaluate current medical literature for evidence regarding the efficacy of safety helmets during skiing and snowboarding with particular reference to head injuries and their severity, neck and cervical spine injuries and risk compensation behaviors

Target Population

Recreational skiers and snowboarders

Interventions and Practices Considered

Helmet usage in skiing and snowboarding

Major Outcomes Considered

- Head injury
- Severity of head injury
- Neck or cervical spine injury
- Risk compensation behavior

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

A comprehensive search of published medical literature was conducted using PubMed, Cochrane Library and EMBASE databases using the following key words in different combinations with Boolean operators: "equipment", "helmet", "helmet use", "head protective devices", "skiing", "skiers", "snowboarders", "snowboarding", "snow sports", "injury", "head injury", "head trauma", "traumatic brain injury", "craniocerebral trauma", "neck injury", "cervical spine injury", "winter sports" and "risk compensation behavior". Only published citations involving human participants (all ages, both genders) between January, 1980 and April, 2011 were selected for initial review. As no study analyzed the impact of any legislation for safety helmets, reports from other countries were also included. The keyword combination "helmet OR head protective devices OR equipment AND (skiing OR snowboarding OR skier OR snowboarder)" yielded 554, zero and 2,646 articles in PubMed, Cochrane Library and EMBASE respectively. The search was considerably coned down by eliminating the word "equipment" from the keyword phrase as it was felt to have very broad connotations and the search yield using it included a large proportion of articles evaluating other protective gear such as wrist-guards, mouth-guards, spine-boards, ski-boots, etc. The alternative approach resulted in 83, zero and 96 hits in PubMed, Cochrane Library and EMBASE respectively. Only one article in Cochrane Library was retrieved when the specific keyword combination "skiing OR snowboarding" was used. After the exclusion of duplicates, the titles and abstracts of 91 articles were examined to exclude reports in a language other than English, reports which were not available for review in their entirety, review articles, commentaries, letters to the editor, technical or engineering or biomechanical reports, retrospective studies of poor quality and single case reports. Studies describing analysis of original data on helmet usage in relation to death, head, neck or cervical spine injury and risk compensation behavior were selected.

A total of 16 published studies eventually met inclusion criteria for this evidence based review and careful consideration was given to the methodology section of each paper to ensure that it strictly fulfilled the criteria for inclusion. These selected manuscripts were then reviewed in detail by the authors.

Number of Source Documents

The following 16 studies were reviewed in the preparation of this evidence-based review:

- Case control, case-cross over studies (1)
- Case-control studies (7)
- Cross-sectional studies (3)
- Retrospective cohort studies (2)
- Case series (3)

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Class I: Prospective randomized controlled trial.

Class II: Prospective clinical trial or retrospective analysis based on reliable data.

Class III: Retrospective case series or database review.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

A total of 16 published studies eventually met inclusion criteria for this evidence based review and careful consideration was given to the methodology section of each paper to ensure that it strictly fulfilled the criteria for inclusion. These selected manuscripts were then reviewed in detail by the authors. As is the case with motorcycle or bicycle helmets, no randomized controlled trials (RCTs) can be conducted on helmet usage in recreational skiers and snowboarders due to the ethical concerns involved. Earlier descriptive studies have shown that the most of the fatal injuries in skiers and snowboarders were seen in individuals without helmets. In the absence of Class I studies on helmet usage in these sports, the authors have to completely rely on retrospective cohort, cross-sectional, case-control/case-cross over and case-control studies for evidence of helmet efficacy in recreational skiing and snowboarding. It is also interesting to note that most of the better designed and more robustly analyzed studies on the subject in literature have been conducted only in the past decade.

An evidentiary table (see Table 1 in the original guideline document) was constructed using the 16 references that were identified.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The following questions regarding the efficacy of safety helmets in reduction of injuries in recreational skiers and snowboarders were considered:

1. Does helmet use increase or decrease the rate of fatal and non-fatal head injury among skiers and snowboarders?
2. Does helmet use increase or decrease the rates of neck or cervical spine injury in skiers and snowboarders?
3. Is helmet use associated with higher or lower risk compensation behavior among skiers and snowboarders?

Recommendations were made on the basis of the studies included in the evidentiary table (see the appendix of the original guideline document). Recommendations were classified as level 1, 2, or 3 according to the definitions listed in the "Rating Scheme for the Strength of the

Recommendations" field.

Rating Scheme for the Strength of the Recommendations

Level 1: The recommendation is convincingly justifiable based on the available scientific information alone. This recommendation is usually based on Class I data; however, strong Class II evidence may form the basis for a Level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format.

Level 2: The recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert opinion. This recommendation is usually supported by Class II data or a preponderance of Class III evidence.

Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

The use of safety helmets clearly decreases the risk and severity of head injuries as compared to non-helmeted participants in skiing and snowboarding.

Potential Harms

The beneficial effects of helmets are not negated by unintended risks as their use does not appear to increase the risk of neck or cervical spine injury as compared to non-helmeted participants in skiing and snowboarding. The use of safety helmets also does not appear to increase the risk of compensation behavior as compared to non-helmeted participants in skiing and snowboarding.

Qualifying Statements

Qualifying Statements

- The Eastern Association for the Surgery of Trauma (EAST) is a multi-disciplinary professional society committed to improving the care of injured patients. The Ad hoc Committee for Practice Management Guideline Development of EAST develops and disseminates evidence-based information to increase the scientific knowledge needed to enhance patient and clinical decision-making, improve health care quality, and promote efficiency in the organization of public and private systems of health care delivery. Unless specifically stated otherwise, the opinions expressed and statements made in this publication reflect the authors' personal observations and do not imply endorsement by nor official policy of the Eastern Association for the Surgery of Trauma.
- "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances." * These guidelines are not fixed protocols that must be followed, but are intended for health care professionals and providers to consider. While they identify and describe generally recommended courses of intervention, they are not presented as a substitute for the advice of a physician or other knowledgeable health care professional or provider. Individual patients may require different treatments from those specified in a given guideline. Guidelines are not entirely inclusive or exclusive of all methods of reasonable care that can obtain/produce the same results. While guidelines can be written that take into account variations in clinical settings, resources, or common patient characteristics, they cannot address the unique needs of each patient nor the combination of resources available to a particular community or health care professional or provider. Deviations from clinical practice guidelines may be justified by individual circumstances. Thus, guidelines must be applied based on individual patient needs using professional judgment.

*Institute of Medicine. Clinical practice guidelines: directions for a new program. MJ Field and KN Lohr (eds) Washington, DC: National Academy Press. 1990: pg 39.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Safety

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable. This guideline was not adapted from another source.

Date Released

2011

Guideline Developer(s)

Eastern Association for the Surgery of Trauma - Professional Association

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Eastern Association for the Surgery of Trauma (EAST)

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Guideline Committee

Eastern Association for the Surgery of Trauma (EAST) Injury Control and Violence Prevention Committee

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Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the Eastern Association for the Surgery of Trauma (EAST) Web site .

Availability of Companion Documents

The following is available:

- Utilizing evidence based outcome measures to develop practice management guidelines: a primer. 2000. 18 p. Available in Portable Document Format (PDF) from the Eastern Association for the Surgery of Trauma (EAST) Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on April 4, 2013. The information was verified by the guideline developer on May 1, 2013.

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