The effect of wrist guards on wrist and arm injuries among snowboarders: a systematic review

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CRD summary
The review concluded that the use of wrist guards reduced the risk of wrist injuries among snowboarders. This was generally a well-conducted review. The authors' conclusions were in line with the evidence presented, but should be treated with caution in view of the poor-quality evidence and differences between studies.

Authors' objectives
To assess the effectiveness of wrist guards in preventing wrist injuries among snowboarders.

 Searching
MEDLINE, EMBASE, SPORTDiscus and The Cochrane Library were searched for English language articles between 1966 and March 2005, using the term snowboard. Reference lists of included studies and relevant conference proceedings were also scanned. Published and unpublished articles were eligible for inclusion.

Study selection
Randomised controlled trials, controlled clinical trials, cohort studies and case-control studies comparing snowboarders with and without wrist guard protection were eligible for inclusion if they measured at least one objectively quantified outcome. Studies of wrist guards on cadaver wrists were excluded.

The included studies assessed a variety of wrist guards compared to no wrist guard. Definition and verification of wrist injury varied between studies. Participants included children and adults. Level of experience ranged from beginner to expert.

Two reviewers independently assessed studies for inclusion and disagreements were resolved through consensus.

Assessment of study quality
Validity was assessed using the Jadad scale for clinical trials (maximum score of 5 points) and the Downs and Black checklist for observational studies (maximum score of 29 points). Allocation concealment was categorised as adequate, inadequate or unclear. Two reviewers independently assessed validity and disagreements were resolved through consensus.

Data extraction
Data were extracted on type and severity of injury, compliance and adverse events. Where appropriate, relative risk or odds ratios and attributable risk, along with their 95% confidence intervals and the number needed to treat were calculated. Data were extracted by one reviewer and checked by a second reviewer. Any disagreements were resolved by consensus.

Methods of synthesis
Pooled relative risks or odds ratios with corresponding 95% confidence intervals were calculated using a random-effects model. A priori subgroup analyses included type of wrist guard, snowboarders' experience and age of snowboarders. Heterogeneity was assessed using the I² statistic. Sensitivity analyses were used to assess the effect of study design on the results. Publication bias was assessed using a funnel plot.

Results of the review
Six studies (n=19,060) were included: two randomised controlled trials (n=5,750); two prospective cohort studies (n=4,934); and two case-control studies (n=8,376). Both randomised controlled trials scored 2 points on the Jadad scale. The method of allocation concealment was not reported. The median score for the remaining four studies was 15.5 (range 15 to 17) on the Downs and Black checklist.
There was a significant reduction in the risk of wrist injury (relative risk 0.23, 95% confidence interval: 0.13, 0.41, number needed to treat 50, four studies), wrist fractures (relative risk 0.29; 95% confidence interval: 0.10, 0.87) and wrist sprain (relative risk 0.17, 95% confidence interval: 0.07, 0.41) with wrist guards. Analyses were stratified by study design. Two case control studies also reported reductions in wrist injuries (odds ratio 0.46; 95% confidence interval: 0.35, 0.62). One prospective cohort study reported a protective effect of wrist guards in beginners (relative risk 0.04; 95% confidence interval: 0, 0.66). No statistically significant differences in results were reported for studies assessing children only compared to other studies. There were no statistically significant differences reported for shoulder, finger or elbow-shoulder injury associated with the use of wrist guards. No evidence of statistical heterogeneity was found for any of the analyses. Publication bias was not assessed due to the small number of included studies.

Authors' conclusions
The use of wrist guards reduced the risk of wrist injuries among snowboarders.

CRD commentary
The review question was clear in terms of study design, intervention, participants and outcomes. Several relevant sources were searched, but the restriction to English-language studies may have resulted in the loss of some relevant data. Publication bias was not assessed due to the small number of studies in the review. Two reviewers independently selected studies, assessed validity and extracted data, thus reducing the potential for reviewer bias and errors. Validity was assessed using specified criteria and results of the assessment were reported. Combining studies in a meta analysis may not have been appropriate due to clinical and methodological differences between studies, although differences in study design were accounted for by stratification. This was a well-conducted review. The authors' conclusions were in line with the evidence presented, but should be treated with caution in view of the poor-quality evidence and differences between studies.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.
Research: The authors stated that further methodologically sound research was needed to determine the optimal type of wrist guard and evaluate whether usage increased the risk of other upper extremity injuries.

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