Effectiveness of interventions to prevent work-related eye injuries

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Authors' objectives
To describe the effectiveness of interventions designed to prevent work-related eye injuries in the construction, manufacturing and agricultural industries.

Searching
Relevant studies from peer-reviewed journals, technical and government reports, and unpublished reports were retrieved using a systematic approach to literature searching. The databases searched were: MEDLINE from 1966 to 1999, EMBASE from 1974 to 1999, NIOSHTIC, from 1973 to 1999, and Dissertation abstracts from 1861 to 1999.

In addition, other relevant information sources were identified by checking references and consulting with experts in the field.

Study selection
Study designs of evaluations included in the review
All types of study designs were included in the review. These were controlled trials, observational studies, pre-test post-test evaluations, and comparisons to other populations. Only English language articles were considered for inclusion.

Specific interventions included in the review
Any intervention that sought to prevent eye injuries or decrease the severity of injury sustained by the workers. Two types of intervention were of interest.

1. Different types of eye protection and/or environmental controls in the workplace.

2. Behavioural interventions that focused on increasing the use of protection among at-risk workers.

Studies that dealt with the prevention of injuries from exposure to lasers, radiation, or microwaves were not included.

Participants included in the review
The participants of interest were workers employed in the manufacturing, construction or agricultural industries. The participants in the included studies were: shipfitters and shipyard workers; workers involved in operations involving grinding; and workers involved in diverse manufacturing settings, such as chemical plants, aerospace products, light engineering, and electronic components.

Outcomes assessed in the review
Eye injury rates were considered to be the primary outcome. The secondary outcomes included the increased use of eye protection, the costs for eye injury care, and environmental changes in the workplace.

How were decisions on the relevance of primary studies made?
Abstracts were initially reviewed independently by two investigators for relevance. The potentially relevant articles were then obtained and independently screened. The author made the final decision on which articles were included.

Assessment of study quality
The author did not report a formal method for assessing validity. However, the methodological description and quality of the studies was discussed.
Data extraction
The author did not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

The categories of data extracted from each study were: author, date, study population, sample size, intervention, study design, outcome measures, follow-up time period, findings and comments.

Methods of synthesis
How were the studies combined?
A narrative synthesis was undertaken, with studies grouped by the type of intervention. Publication bias was not assessed.

How were differences between studies investigated?
Heterogeneity was not assessed.

Results of the review
Seven studies met the inclusion criteria: 1 controlled study, 5 before-and-after studies, and 1 case-control study. Not all of the studies reported details on the number of participants.

Two studies involved multifaceted programmes with variable components, such as vision screening, education, provision of glasses at no charge, and policy changes requiring the use of eye protection. One of the studies, in which an official policy change was announced after the first wave of interventions, reported a 100% use of eye protection 8 weeks into the programme, compared with 10% at the initiation. This effect began to wane by the fifteenth week. This programme subsequently reported a 92% reduction in injuries and a 98% reduction in lost work time due to eye injuries. The other study reported a 75% reduction in injuries requiring medical care, and a 230% reduction in disabling eye injuries 4 years after the programme was initiated.

Two other studies involving primary policy changes both reported positive effects: one showed a greater than 50% reduction in eye injuries 5 months after the programme, whilst the other showed a 68% reduction in the number of injuries in the year after the programme. The varied magnitude of these effects could have been influenced by baseline rates or by changes in population sizes that were not reported consistently.

Two studies involved primarily behavioural interventions. One study reported a greater reduction in eye injury rates amongst those whose supervisors positively reinforced the use of eye protection: a decrease of 7.48 per 100 workers was reported among the experimental group, compared with 1.16 per 100 workers among controls. In addition, the experimental group had higher injury rates before the intervention than the control group. However, this study did not have adequate power to detect significant differences.

In the other study, short-term use of safety glasses increased from 84.7% during the baseline evaluation period, to 93% after signing a 'promise card' after worker training to garner the commitment to the use of eye protection. However, the behaviour was not maintained at a 1- and 2-month follow-up. The relatively high use of eye protection at baseline could have influenced these results.

In the case-control study, individuals with eye injuries were less likely to report the use of proper grinding goggles in preventing injuries from grinding operations (crude odds ratio 0.38), compared with other types of eye protection (face shields, standard spectacles with some side shielding, custom fit and a standard fit). A widespread use of incorrect protectors due to a misunderstanding of proper use was also reported.

Authors' conclusions
There was some evidence that policy changes were effective in changing behaviours and reducing eye injuries in manufacturing settings, either in conjunction with a broader programme focusing on eye safety or by policy alone. However, there was limited scientific literature about the effectiveness of interventions in preventing eye injuries.
CRD commentary
The review question was stated clearly and was well supported by the study inclusion criteria. The literature search was comprehensive and identified unpublished reports. However, the author did not report whether foreign language papers were identified. The decision on whether or not to include retrieved articles was undertaken by only one reviewer.

There was no formal validity assessment of primary studies. The narrative synthesis of the results was appropriate, but heterogeneity was not assessed. Some details on the review process were provided, such as how decisions were made on the relevance of primary studies, whereas other details were missing, such as how the data were extracted from the primary studies.

The author's conclusions appear to follow on from the findings.

Implications of the review for practice and research
Practice: The author states that there is evidence that policy changes may be effective in changing behaviours and reducing eye injuries in manufacturing settings, either in conjunction with a broader programme focusing on eye safety, or by policy alone. This review also indicates that workers might benefit from training that is specific to their tasks and exposures. This type of training should be directed by an appropriate hazard assessment, which should describe under what circumstances protection is needed, the appropriate type of protection required, and how and when to use the protection.

Research: The author states that there is a need for systematic evaluation of interventions designed to prevent eye injuries, and how they may change the overall safety culture. Carefully designed controlled trials would allow a more clear understanding of the effects of different interventions in different work environments.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.