



Factors influencing worker use of personal protective eyewear

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ARTICLE INFO

Article history:

Received 18 November 2008

Received in revised form 23 March 2009

Accepted 27 March 2009

Keywords:

Occupational

Injury

Epidemiology

Personal protective equipment

Eyes

ABSTRACT

Objective: To identify and describe the array of factors that influence a workers' decision to wear personal protective eyewear (PPE) and the barriers that exist in preventing their use.

Design, setting and participants: A series of focus groups enrolled workers and supervisors primarily from manufacturing, construction, or service/retail industries that had potential exposure to eye injury hazards in their job tasks. Focus group sessions were facilitated to collect qualitative and quantitative data in two categories, "sought information" and "emergent themes", related to the factors influencing use of PPE.

Results: We conducted a series of 7 groups with 51 participants, 36 (71%) males and 15 (29%) females ranging in age from 19 to 64 years old, from a variety of occupations including construction (24%), production (22%), installation, repair and maintenance (14%), and healthcare (10%). Most were highly experienced in their occupation (>10 years); males (86%) and females (53%), and had received some safety training in the past (82%). The majority of workers in this study were required to wear PPE on their worksite (78%), however only 55% had a dedicated safety officer. A conceptual model that summarizes the "sought information" and "emergent themes" is presented that depicts the decision making process for the factors influencing use of PPE and consists of three primary branches; perceptions of hazards and risks, "barriers" to PPE usage, and enforcement and reinforcement. Lack of comfort/fit, and fogging and scratching of the eyewear were suggested as the most important barriers to PPE usage. Younger age and lack of safety training were other important factors affecting use of PPE.

Conclusions: Several potentially modifiable factors identified would lead to an increase in workers' PPE use and encourage supervisors to provide ongoing positive feedback on the continuous use of PPE by workers at risk for an eye injury.

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1. Introduction

Acute eye trauma is a common world-wide injury both at home and in the workplace (Fea et al., 2008; Lombardi et al., 2005; Smith et al., 2005; Islam et al., 2000), however many injury cases are preventable with the proper use of protective eyewear (Mancini et al., 2005). A Bureau of Labor Statistics (BLS) study estimated that 60% of those experiencing a work-related eye injury was either not wearing protective eyewear or wearing the wrong type at the time of their injury (Bureau of Labor Statistics, 1999). Recent estimates from National Health Interview Survey (NHIS) data suggest that 29.3% of U.S. adults engage in activities that could cause an eye injury and among them, 32.1% used eye protection while doing such activities (Forrest et al., 2008).

The burden of work-related ocular injuries is relatively high compared to other work-related injuries. Ocular injuries reportedly account for between 5.0% (Lombardi et al., 2005) and 6.1% of all workers compensation claims (Islam et al., 2000). In a population study, among 10,620 traumatic eye injuries treated in an ophthalmic emergency department (Fea et al., 2008), 57.1% occurred at work. Ocular injuries vary in severity; however they have the potential to result in the permanent loss of vision and/or employment and it has been estimated that 16% of all work-related eye injuries are severe (Welch et al., 2001).

Personal protective eyewear (PPE), such as goggles, face shields, and safety glasses, are highly effective when worn and fitted properly in preventing the impact to the eye of foreign bodies, chemicals, hot particles, biological agents, and radiation, as well as potentially reducing the severity when an impact occurs (Mancini et al., 2005; Forst et al., 2006; Lipscomb, 2000). A review on the effectiveness of interventions to prevent work-related eye injuries, reported that both the rate of eye injury and lost work time can be reduced by 50% or more when PPE is worn (Lipscomb, 2000). Several factors related to the use of protective eyewear have been identified in various occupations, for example in farm workers (Forst et al.,

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2006), researchers identified discomfort, fogging and other visibility issues, and perceived lack of protection arose, whereas other studies have reported similar findings, in addition to factors such as group “norms”, storage, and lack of reinforcement or enforcement (Lipscomb, 2000; Dingsdag et al., 1998; ISEA, 2001). In addition to identifying other important factors influencing PPE use, we sought to understand whether these known factors would be consistent across a broader range of occupations.

Focus groups are used in public health research to collect qualitative data on behaviors, opinions, or exposures when limited information is known (Salazar et al., 1999; Krueger and Casey, 2000; Bender and Ewbank, 1994). Injury epidemiologists and other safety and health researchers, have recently used focus groups to help identify safety hazards and job risks and to inform the development and/or implementation of interventions (Salazar et al., 1999; Simpson et al., 2002; Gillen et al., 2004).

To identify the factors that influence workers to use PPE among workers from a broad range of occupations, and continue to inform eye injury prevention strategies, we designed a focus group study to obtain detailed qualitative and quantitative data across four domains previously suggested by the literature to be important. These include: (1) perceptions of eye injury hazards and risks, (2) “barriers” to the use of protective eyewear usage, (3) availability, training and enforcement of protective eyewear, and (4) strategies to increase the use of protective eyewear.

2. Methods

2.1. Study design

The current study recruited primarily workers (non-management) employed in manufacturing, construction, service, and retail industries in Massachusetts, USA who reported having potential exposure to eye injury hazards either in their specific job, tasks or workplace. Industries were selected (excluding mining and agriculture) that reportedly have the highest incidence of work-related eye injuries (Lombardi et al., 2005; Islam et al., 2000). Potential participants were recruited using local newspaper advertisements. They were screened and invited to participate if they met the following criteria:

- 18–70 years of age.
- Work in manufacturing, construction, service/retail or related industries.
- Employed for at least 6 months in the past year.
- Potential exposure to occupational eye injury hazards.
- Fluent in English.

Seven focus group sessions (6 groups of workers and 1 group of managers/supervisors) were conducted, with each group consisting of 7–9 participants, including a 10% over-recruitment to account for potential no-shows (with a goal of a total 49–56 participants). The single group of managers/supervisors was recruited to understand more about enforcement, reinforcement, and issues centered on cost and supply of protective eyewear; however both workers and managers/supervisors were asked all questions. The duration of each focus group was approximately 120 min (two 55 min sessions with a 10 min break) in total. Prior to the start, participants were informed of the general context of the study, the use of audio taping, and detailed note taking. Participants were ensured of confidentiality and informed consent was obtained. The study was approved by the Liberty Mutual Research Institute for Safety Institutional Review Board and Harvard School of Public Health Human Subjects Committee.

Table 1
Worker characteristics—focus group participants (N=51).

Characteristics	Male N (%)	Female N (%)	Total N (%)
Number of participants	36 (71)	15 (29)	51 (100)
Age (years)			
Mean (SEM)	47.3 (1.8)	43.3 (2.7)	46.1 (1.5)
Median (range)	49.0 (19–64)	43.7 (24–61)	47.2 (19–64)
Race/ethnicity			
White/Non-Hispanic	35 (97)	15 (100)	50 (98)
Hispanic	1 (3)	0 (0)	1 (2)
Occupational category			
Construction	12 (33)	0 (0)	12 (24)
Production	7 (19)	4 (27)	11 (22)
Installation, repair, and maintenance	6 (17)	1 (7)	7 (14)
Healthcare	1 (3)	4 (27)	5 (10)
Management	3 (8)	1 (7)	4 (8)
Building and grounds cleaning and maintenance	3 (8)	1 (7)	4 (8)
Life, physical, and social services ^a	1 (3)	2 (13)	3 (6)
Protective service	1 (3)	1 (7)	2 (4)
Sales, office and admin support	1 (3)	1 (7)	2 (4)
Food preparation and serving related	1 (3)	0 (0)	1 (2)
Experience in occupation			
0–3 years	1 (3)	2 (13)	3 (6)
4–5 years	3 (8)	3 (20)	6 (12)
6–10 years	1 (3)	2 (13)	3 (6)
11–20 years	7 (19)	2 (13)	9 (18)
>20 years	24 (67)	6 (40)	30 (59)
Received safety training			
Yes	29 (81)	13 (87)	42 (82)
No	7 (19)	2 (13)	9 (18)

^a Includes zookeeper (code 4350).

Participants were encouraged to express their opinions, and clearly instructed that there were no wrong answers to any questions asked. Participants were initially presented with open-ended questions. The facilitator probed and guided the discussion until each question had been exhaustively addressed (based on the consensus of the two facilitators). Audiotapes for each group were later transcribed by a professional transcriber, who was provided with notes taken for each focus group to ensure the accurate interpretation of discussions.

2.2. Worker and job characteristics

A self-administered questionnaire was used to collect worker demographics, work history and information on their workplace or job (Tables 1 and 2). Workplace and job characteristics included the number of employees, requirements for protective eyewear and whether or not there is a safety officer present at each employee's current workplace.

2.2.1. Qualitative focus group measures

To understand workers' attitudes towards “barriers” or potential factors related to the use of PPE, the study modified a conceptual model originally published by Salazar et al. (1999) which identified inter-related factors affecting the use of respiratory protective equipment among hazardous waste workers. The study team integrated other previously reported factors identified as related to the use of PPE from the published literature. The goal was to capture important factors influencing the use of PPE as both “sought information” or what is considered expected themes, and “emergent themes” or as information that provides unanticipated insights offered by the respondents (Bender and Ewbank, 1994).

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