CASE REPORT

The construction flagperson: A target for injury

J. Baron, T. L. Strome and L. H. Francescutti
Department of Public Health Sciences, Faculty of Medicine and Oral Health Sciences, University of Alberta, 13–103 Clinical Sciences Building, Edmonton, Alberta, Canada, T6G 2G3

A road construction 'flagger' is a construction crew member whose responsibility it is to safely coordinate vehicle traffic through road worksites. Flaggers are suffering injuries and fatalities at the worksite as a result of being struck by moving vehicles, both construction and commuter. These incidents are largely preventable with a more defensive flagger training programme. A cross-Canada provincial survey of occupational health and safety organizations revealed no national co-ordination and standardization in flagperson training. Statistics concerning flagger injury and fatality are disjointed and incomplete, and as such are not useful for evaluating and validating training and job performance. We recommend a revisiting of flagperson training standards and that greater effort is taken in gathering data specifically on flagger injuries and fatalities.

Key words: Construction safety, flagger, injury prevention.

INTRODUCTION

Roadways are by their very nature a dangerous environment. To the untrained, non-vigilant or unprepared worker, road construction sites present numerous hazards that can lead to serious worker injury or death. Hazards on the road construction site originate from two main sources: construction machinery and roadway traffic. Flagpersons, also known as 'flaggers' or 'signallers', work on the boundary at which the main sources of threat intersect, co-ordinating safe interactions between machinery, construction crews and public traffic. According to the Alberta Construction Safety Association (ACSA), the main role of the flagger is to 'reduce the speed of the traffic through the work zone for the protection of the work crew and motorist'.

Flaggers are a familiar site to motorists in Canada, often being the first worker seen at a construction site. Attempts are made to keep flaggers highly visible, and they are easily recognized in their white overalls, blaze-orange hard-hat and reflective vest. Besides co-ordinating traffic, flaggers often provide information about the work done or inform motorists of the best way to navigate through the construction site. Indeed, the flagperson is responsible for the safety of themselves, their crew, the motoring public and construction traffic.

Recent on-the-job flagger fatalities have made flagperson safety an issue. In spring 1996 in Edmonton, Alberta, Canada, a flagger died after being run over by a water truck backing up during worksite operations. That fatality was the ninth flagperson fatality in Alberta since 1976. British Columbia reports eight flagperson fatalities since 1978 with 325 disability claims made by flagpersons since 1986. In the winter of 1995, an Ontario flagperson suffered two broken legs after being struck and dragged 16 meters by a careless motorist. The data suggests the need for closer investigation into road construction safety.

To decrease the number of injuries to road construction workers in general, and flaggers specifically, the interactions between occupational training, work conditions and activities, and worker experience must be studied. To study the interactions, timely, accurate and comprehensive data must be available to researchers. Unfortunately, the amount and quality of data obtained for the purposes of this study were often incomplete, disjointed, and, in many cases, simply did not exist. Statistics on flagperson injury and fatalities are difficult to locate as many provinces such as Manitoba and Quebec do not define flagpersons as a separate occupational group. Often this data is com-

Correspondence and reprint requests to: L. H. Francescutti, Department of Public Health Sciences, Faculty of Medicine and Oral Health Sciences, University of Alberta, 13–103 Clinical Sciences Building, Edmonton, Alberta, Canada, T6G 2G3. Tel: (+1) 403 492-6546; Fax: (+1) 403 492-0364; email: Louis.Francescutti@ualberta.ca
bined with other related data classified under the category 'labourers'. Such non-specific and inconsistent data gives rise to uncertainty in research attempting to validate and improve training techniques and safety initiatives. Such uncertainty combined with unstandardized and suboptimal training practices across Canada undoubtedly can result in substandard and inadequate training and safety instruction necessary to perform the job properly and safety.

CASE STUDIES

Case 1
In the spring of 1996, in Edmonton, Alberta a 35-year-old female flagger was killed after a water truck driven by a co-worker ran over her. The work crew was re-paving an off-ramp and the water truck was backing over an area of uneven pavement. Apparently the experienced flagger, who had just recently taken a three-day refresher safety course, was directly behind the water truck as it was backing up. The driver felt a bump as the truck struck the woman but assumed it was caused by the uneven pavement. He then proceeded to pull forward running over the woman again. Witnesses to the incident tried to get the attention of both the driver and the woman but were unsuccessful. The woman received severe crush injuries and later died of her injuries. The back-up warning alarm ('beeper') was operational on the truck, although surrounding noise levels were high due to construction machinery and passing traffic.

Case 2
In Prince George British Columbia a flagperson was directing traffic on a small bridge repair job. A pick-up truck pulling a fifth wheel trailer did not slow down and sped through the work zone, subsequently hitting and instantly killing the flagperson on duty at the site. The driver of the truck claimed he did not see any warning signs of the work occurring further down the road. According to the ACSA flagperson training manual, flagpersons should be working at least 50 meters from the roadway. It seems improbable that this guideline was being followed by the flaggers in both case 1 and 3. Safety standards demand that a flagperson and construction vehicle operator should remain in visual contact during vehicle movements. In both these cases this practice was not followed. Regardless, the driver should have been given an ‘all clear’ signal from another worker before he backed up. The backing area should be surveyed and backing discontinued if the driver loses sight of the flagperson at any time.

Case 3
In the summer of 1990, in Sherwood Park, Alberta, a 19-year-old female flagperson was checking a truck loaded with gravel on a paving operation. The loaded truck was waiting to back up to a gravel spreading machine. A supervisor driving a company pick-up truck pulled up beside the spreader and motioned the operator to join him in the pick-up truck. The flag woman, assuming she was being beckoned, walked toward the pick-up truck as well. In the meantime the loaded truck began to back-up. The flag woman, realizing she wasn’t needed in the pick-up truck, returned to her station. She walked directly into the path of the backing truck and was struck on her upper back and head. She proceeded to fall under the right rear tandem wheels receiving crushing injuries to her right leg and torso. These injuries were fatal.

DISCUSSION

Case studies review
Factors that lead to the fatality in Case 1 as suggested by the ACSA were vehicular traffic noise and a congested work zone created by non-total closure of the roadway. Noisy machinery is suspected to have drowned out the sound of the back-up alarm on the truck. It is possible that the flagger became too accustomed to the sound of the back-up beepers and simply ‘tuned it out’. Inadequate safety precautions taken during construction vehicle movement is likely to have been a contributing factor for both cases 1 and 3. Safety standards demand that a flagperson and construction vehicle operator should remain in visual contact during vehicle movements. In both these cases this practice was not followed. Regardless, the driver should have been given an ‘all clear’ signal from another worker before he backed up. The backing area should be surveyed and backing discontinued if the driver loses sight of the flagperson at any time.

According to the ACSA flagperson training manual, flagpersons should be working at least 50 meters from the work area. It seems improbable that this guideline was being followed by the flaggers in both case 1 and 3. The training manual puts a great deal of emphasis on safe practice in regards to hazards from public motorists. There is no section in the manual, however, dedicated to dealing with dangers from within the boundary of the worksite. Considering that this incident was the second flagger fatality as the result of being struck by a backing up vehicle since 1990, more awareness of and attention to this potential hazard is warranted.

In Case 2, the threat originated from the motoring public. The flagperson is especially vulnerable to motorist traffic, which can be unpredictable. The driver maintained that he was not properly warned of the upcoming construction. The construction zone and the flagperson working it should be preceded by five warning signs spaced about 100 meters apart. Therefore, motorists should be alerted 500 m (at minimum) prior to a work zone. In addition, the flagperson should be standing at a station positioned off the path of traffic usually on the driver’s side of the road. A route of escape should always be planned in the event of errant motorist approaching the flagperson at high speeds. The result of not following these guidelines can be fatal.

Flagperson training and regulation
Most provinces have one or two agencies that train representatives from construction companies to be
Table 1. Comparison of provincial safety regulations and statistics collection

<table>
<thead>
<tr>
<th>Province</th>
<th>Regulatory agency</th>
<th>Standard training programme</th>
<th>Enforcement of training</th>
<th>Statistics collected*</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>Many small agencies</td>
<td>No</td>
<td>Yes</td>
<td>F, I</td>
</tr>
<tr>
<td>Alberta</td>
<td>Alberta Construction Safety Association (ACSA)</td>
<td>Yes</td>
<td>Yes</td>
<td>F</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>Saskatchewan Construction Safety Association/Road Builders</td>
<td>Yes</td>
<td>Yes</td>
<td>F, I</td>
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<tr>
<td>Manitoba</td>
<td>Manitoba Heavy Construction Safety/Manitoba Building Construction Safety</td>
<td>Uniform manual, individual company training programmes</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Ontario</td>
<td>Ministry of Transportation</td>
<td>Yes</td>
<td>Yes</td>
<td>F</td>
</tr>
<tr>
<td>Quebec</td>
<td>Association Sectorial Pritaire</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>Nova Scotia Construction Safety Association (NSCSA)</td>
<td>Based on Alberta manual</td>
<td>Yes</td>
<td>I</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>NSCSA</td>
<td>Based on Alberta manual</td>
<td>Yes</td>
<td>I</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>NSCSA</td>
<td>Based on Alberta manual</td>
<td>Yes</td>
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<tr>
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<td>Based on Alberta manual</td>
<td>Yes</td>
<td>F</td>
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<tr>
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<td>ACSA</td>
<td>Based on Alberta manual</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Yukon Territory</td>
<td>Workers' Compensation Health and Safety Board</td>
<td>Yes</td>
<td>Yes</td>
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</tr>
</tbody>
</table>

* F = fatalities, I = injuries.

Instructors. Table 1 shows a comparison of provincial safety regulations and statistics collection methods. These certified instructors then return to their companies to train their own personnel. Most courses are 1–2 days and involve some level of in-field training. Training is concluded with a written test that the employee must pass to be certified. It is part of the Occupational Health and Safety Acts of most provinces that, by law, flagpersons must be competent in their areas of responsibility. On the job, a certified flagger must carry the wallet card proving that they have taken and passed a flagger training course. Companies often will not hire a flagperson unless this card can be presented. Flagpersons may or may not be registered with an agency once they are certified. Alberta is a leader in the area of standardization of this process. The ACSA, using one programme jointly with Alberta Transportation and Utilities, trains all instructors in Alberta and the Northwest Territories. The instructors receive materials to train their own workers in private companies. All trained flagpersons are then registered with the ACSA. It is illegal in Alberta to hire non-certified flagpersons and it is a pre-bid requirement to have registered flagpersons for the worksite. The Occupational Health and Safety Board along with the ACSA enforce this standard and if a non-certified worker is found he/she is removed from the worksite. This standard is not uniform across the country. Standardization and uniformity of the courses within a province also remains a challenge. British Columbia has a system where many colleges and private companies can offer training courses. Some of these courses are only three hours long. Once instructors are trained and conduct training in their own perspective companies, control of training quality and depth cannot be ensured. The Yukon, Northwest Territories and Alberta have systems that register all flagpersons with one head agency. In larger provinces such as British Columbia and Ontario, workers are not registered with one specific agency or any agency at all.

RECOMMENDATIONS AND CONCLUSION

Flagperson injury and fatality prevention can be approached from three viewpoints: education, enforcement and engineering. Proper training is perhaps the leading contributing factor to ensuring worksite safety. There should be complete standardization and quality assurance of flagger training programmes that are based on the best known occupational training techniques and information. Where possible, one organization should provide training for all instructors in a province. The head agency in every province should perform regular quality assurance checks on instructors and regulation compliance. Alberta is a good model in this area as they seem to have the tightest regulation. Efforts must be made so that small agencies offering courses maintain the necessary standards. Uniform workbooks and materials should be used province-wide. Furthermore, a country-wide manual and course could be implemented to train flaggers (and other construction personnel) to a uniform safety standard across the country. Mandatory minimum on site training should be enforced. Emphasis on training safety practices must be equal between dealing with public motorist and construction machinery hazards.

Enforcement involves greater emphasis on worksite inspections where flagpersons are checked for proper certification and competence. Regular checks should be made on construction companies to ensure that flagperson training is being offered and conducted according to standards. In this age of budget cuts in
government occupational safety agencies, personnel to carry out this enforcement are scarce. Unions may be looked to for the formation of an enforcement agency able to regulate these standards for the benefit of their own workers.

Engineering encompasses all steps that can be made to make the worksite a safer environment for the flagperson. Rear-view video cameras on all large trucks could be utilized to increase the driver's field of view. Flagpersons needing to wear hearing protection could be outfitted with headsets especially frequency-tuned so the background noise made by machinery and traffic is minimized. All flagpersons could use radio headsets such that they are alerted by drivers over VHF radio when backing is about to occur. Similarly, a flagperson will be able report their position at all times. Proximity sensors on trucks can be used to alert the driver when a person or object is too close to the vehicle.

Not only are some training programmes inadequate, but statistics on which to base studies of construction worksite safety are, at best, lacking. Given that different construction occupations (i.e., flaggers, equipment operators) have different training requirements and expose workers to different hazards, grouping all occupation-related statistics into general 'labourer' categories is insufficient for evaluation and study. Since no cross-Canada standard for collection of construction-related injury and fatality data exist, any comparison of such data across regions is likely to be unreliable.

Flagger safety is one issue in the larger construction safety picture in which no one proper standard for training and statistics collection exists. To ensure that such workers are fully trained in how to remain safe on the job, in-depth standardized training programmes are needed. Furthermore, statistics collection to evaluate and validate training systems must be made uniform. If such measures are not taken, injuries and deaths that could be prevented will continue to occur.

REFERENCES