

Managing Falls from Vehicle Injuries – Prevalence, Severity and Importance

Peter Thorning, Cameron Allan and Sebastian Bielen
Workplace Health and Safety Queensland

Abstract

Despite a decline in the incidence of serious claims in transport in recent years, there is still a substantial work health and safety (WHS) performance gap between transport and other industries. Using workers' compensation data, this paper examines the association between common mechanisms of incident and common agencies of incident in transport in Queensland. The analysis finds that the most important injury cluster entails falls from a height from trucks, semi-trailers and lorries. A content analysis of claim narratives reveals that the majority of these claims are due to falls from the vehicle (54 per cent) or falls while exiting the vehicle (31 per cent). From 2012, transport operators in Queensland have specific duties manage risks to health and safety associated with falls and this paper will outline some the most effective methods to protect workers from the risk of fall injuries from vehicles.

Background

As part of the National OHS Strategy 2002–2012, the transport industry was identified as one of the priority industry targeted for improvement due to its high claim rate compared to other industries. The national OHS strategy aimed to work with high-risk industries to reduce workplace injuries and disease (National Occupational Health and Safety Commission, 2002).

National statistics shows that over recent years, the incidence of claims in transport has reduced in most states and territories. For Australia as a whole, the serious claim rate has declined from 27 to 24 claims per 1,000 workers between 2005-06 and 2009-10 (Productivity Commission, 2010). This decline in the injury incidence rate in Australia has also been witnessed in other developed countries around the world.

However, despite these improvements, the transport industry remains hazardous.

Safe Work Australia (2012) reports that workers in transport and storage sustained the highest injury incidence rate of all industries: 24.0 serious claims per 1000 employees, nearly twice the national 'all-industries' rate of 12.6.

In terms of all accepted claims in transport and storage, over half of all lost workdays were due to:

- soft tissue injuries;
- fractures; and,
- trauma to muscles, tendons, joints and ligaments.

Most injuries were due to the mechanisms of muscular stress, falls and vehicle accidents.

In Queensland, the serious claim rate was 28 claims per 1,000 workers in transport and storage compared to 18 claims per 1,000 workers average across all Queensland industries for

2007-08. Much remains to be done to reduce the substantial OHS performance gap between transport and rest of the economy (Productivity Commission, 2010).

The safety focus on the trucking industry has mainly been on those factors that influence on-road incidents. Factors such as fatigue, speeding, load restraints and drug use are common topics (Johnstone, 2002; Mayhew and Quinlan, 2006). This is slowly changing and Shibuya *et al* (2010) report that there is increasing attention on non-traffic occupational injuries although it is modest compared to the extensive attention paid to the health and fatigue of truck drivers as a risk to other road users.

The area of non-traffic occupational injuries which is best represented in the literature is muscular stress. For example:

- Van der Beek (2011) highlighted that truck drivers are exposed to a range of hazards including ergonomic hazards and that in general musculoskeletal symptoms are the most prevalent health problem among truck drivers. Issues identified included the design of the cab and sleeping compartment and the performance of physically demanding loading and unloading activities.
- Robb *et. al.* (2007) found that 81% of questionnaire respondents (HGV truck drivers) reported some musculoskeletal pain during the previous 12 months and 60% reported low back pain. Manual handling and subjective ratings of seat discomfort were associated with reported musculoskeletal problems.
- Lyons (2002) found in a review of the literature that professional drivers are at a higher risk for low back pain and injury due to job demands. Factors that have been associated with low back pain and injury among the professional driver cohort are whole body vibration, shocks and jolts, lifting and carrying of heavy objects, pushing and pulling tasks, awkward postures, and psychosocial issues.
- The Heads of Workplace Safety Authorities (HWSA 2011) have found that forceful bodily exertion and awkward working postures were the most frequently observed manual tasks risk factors. These were primarily caused by handling bulky and awkward loads, poor work area design particularly at customer sites and issues arising from the use of load handling equipment such as poor maintenance of equipment.

Falls from trucks has received less attention in the literature and Shibuya *et al* (2010) noted that special emphasis is needed as falls have been shown to be the most frequent type of accident among truck drivers. Earlier work by Routley and Valuri (1994) showed that the most common injuries sustained by drivers as a result of falling from a truck were ankle and knee sprains/strains and lower arm and rib fractures. This was supported by Jones and Switzer-McIntye (2003) who found that strain/sprains, contusions and fractures were common and that these were significant injuries with considerable periods of disability and related costs.

Drivers state that common factors contributing to a fall include bad weather, slippery load, haste, inattention, tripping, uneven load, no support, improper footwear and fuel on steps (McClay, 2008). These factors were supported by Scott *et al* (2003) who found that slips when accessing or egressing from the cab of the truck or the 5th wheel area were exacerbated by lack of uniformity in step height, varying slip resistance and contamination with diesel (for the 5th wheel area). The cab and 5th wheel area were found to be less implicated by Loo-Morrey (2007) who found that most falls (60 per cent) were from the trailer or flatbed.

Aims

This paper has three aims. First, the paper uses workers' compensation data to identify the main injury clusters in transport and storage in Queensland. The paper examines the relationship between injury agents (agency of incident) and the events that give rise to injuries (mechanisms of incident). The paper finds that falls (mechanism) from trucks, semi-trailers and lorries (agent) is one of the most serious injury clusters in the industry. Second, the paper highlights that under the new OHS laws all persons conducting a business or undertaking in Queensland have a specific obligation to protect workers and others from falls. Third, the paper highlights that practical guidance for managing the risk of falls is available to transport operators.

Methods

This study uses worker compensation statistics from the Queensland Employer Injury Data Base (QEIDB), derived from Q-COMP (Workers' Compensation Scheme Regulator) statistics. A limitation of workers' compensation statistics is that they do not capture all injuries/illnesses, as many are not compensated. The Australian Bureau of Statistics (ABS) estimates that for 2009-10 in Australia only 36 per cent of persons who experienced a work-related injury or illness received workers' compensation (ABS, 2010:20).

Of those who did not apply for workers' compensation, approximately 50% reported that the main reason for not applying for workers' compensation was that their injury or illness was minor/not considered necessary, 10% said that they were not covered or not aware of workers' compensation, and 10% did not think they were eligible (ABS, 2010:8).

In Queensland the under reporting of work-related injuries via the workers compensation scheme is significantly lower - between 15 and 39 per cent (Borooah and Mangan, 2008). Nevertheless, a substantial number of workers' compensation claims (around 100,000) are lodged in Queensland each year. This large dataset provides a wealth of information that can be analysed to better understand the patterns of workplace injury and disease.

QEIDB contains unit record data for each claim including demographic, claim and injury information. In this study the QEIDB categories of information used are industry subsector, mechanism of incident, agency of incident and claim narrative. Importantly, the QEIDB dataset also includes a proxy for the severity of claims - reported workdays lost for each claim. Accordingly, this study includes an analysis of both the number of claims and the severity of claims (workdays lost).

Workers' compensation data is commonly reported according to the mechanism of incident and the agency of incident. The Type of Occurrence Classification System 3rd edition (TOCS3) defines the 'mechanism of incident' as 'the overall action, exposure or event that best describes the circumstances that resulted in the most serious injury or disease' (National Occupational Health and Safety Commission, 2004:143). The 'agency of incident' is defined as the 'object, substance or circumstance that was principally involved in, or most closely associated with, the point at which things start to go wrong and which ultimately led to the most serious injury or disease' (National Occupational Health and Safety Commission, 2004:167).

Safe Work Australia reports separately both the mechanism of incident and agency of incident for serious workers' compensation claims in their Compendium of Workers' Compensation Statistics Australia 2009-10 (2012) and other publications. This paper, in

contrast, reports the association between the most common mechanisms of incident and the most common agencies of incident. These cross-tabulations, therefore, identify the agents which give rise to particular incidents. This type of analysis is not commonly undertaken, but produces interesting results.

The cross-tabulations below highlight the most common and severe injury clusters. These clusters are explored further through a content analysis of claim narratives for each cluster. Each claim, associated with the most severe clusters, was examined individually. Categories of meaning were generated from the claim narratives and claims were coded accordingly. In most cases, the categories of meaning were relatively straightforward and were common to a considerable proportion of claims. A miscellaneous category was used to code claims where the narratives was not written clearly or pertained to uncommon injury causes.

Results

Mechanisms of injury cross-tabulated with agency of injury

The cross-tabulation in Table 1 shows, for the number of accepted non-fatal claims, the association between the most common mechanisms and the most common agencies of injury. For 2007-08, there were 6,182 claims in transport and storage in Queensland. Any row or column with a low number of values was excluded from the analysis. The resultant cross-tabulation of mechanism by agency captures 1,092 claims. The data in Table 1 shows that in terms of claim numbers, there are a number of clear mechanism/agency clusters (highlighted). Some of the main ones are:

- muscular stress, lift, carry, put down involving crates, cartons, boxes and cases;
- muscular stress, lift, carry, put down involving baggage and luggage;
- muscular stress, handling objects involving trucks, semi-trailers and lorries;
- falls from height involving trucks, semi-trailers and lorries;
- vehicle accident involving trucks, semi-trailers and lorries; and,
- vehicle accident involving cars station wagons, vans and utilities.

Table 1

Agency of Injury	Mechanism Of Injury						Total
	Muscular Stress, Lift Carry, Put Down	Muscular Stress Handling Objects	Falls From a Height	Falls on Same Level	Vehicle Accident	Being Hit by Moving Objects	
Other and not Specified Trucks, Semi-trailers, Lorries	16	149	219	39	120	6	549
Agency not Apparent	63	8	1	3		6	358
Other and not Specified Cars, Station Wagons, Vans, Utilities		28	12	9	261	13	323
Crates, Cartons, Boxes, Cases Etc - Cardboard	185	28	2	6		1	222
Baggage and Luggage	158	17		2		2	179
Buses, Trolleybuses, Minibuses	1	81	21	13	18	3	137
Other and not Specified Forklift Trucks	2	34	24	8	9	45	122
Other and not Specified Traffic and Ground Surfaces			6	112			118
Total	425	345	285	192	408	76	2,008

Source: QEIDB, 20.3.12, all accepted claims.

Note: excludes fatalities, asbestosis, mesothelioma claims. Total claims for 2007-08 for transport and storage was 6,182.

Table 2 shows the same cross-tabulation but based on severity (workdays lost) rather than number of claims. The same clusters are evident.

Table 2

Workdays Lost, Most Common Mechanism by Agency of Injury, Transport and Storage, Qld, 2007-08 (Number)								
<i>Agency of Injury</i>	<i>Mechanism Of Injury</i>							Total
	Muscular Stress, Lift Carry, Put Down	Muscular Stress Handling Objects	Falls From a Height	Falls on Same Level	Vehicle Accident	Being Hit by Moving Objects	Muscular Stress No Objects Handled	
Other and not Specified Trucks, Semi-trailers, Lorries	320	4,817	11,168	1,363	7,931	283	25,882	
Agency not Apparent	1,877	261	0	60		124	9,100	
Other and not Specified Cars, Station Wagons, Vans, Utilities		328	82	168	7,946	612	9,136	
Crates, Cartons, Boxes, Cases Etc - Cardboard	2,487	626	151	144		5	3,413	
Baggage and Luggage	3,344	1,198		0		5	4,547	
Buses, Trolleybuses, Minibuses	2	2,553	321	351	338	45	3,610	
Other and not Specified Forklift Trucks	158	674	55	325	507	1,110	2,829	
Other and not Specified Traffic and Ground Surfaces			146	2,940			3,086	
Total	8,188	10,457	11,923	5,351	16,722	2,184	61,603	

Source: QEIDB, 20.3.12, all accepted claims.

Note: excludes fatalities, asbestosis and mesothelioma claims. Total workdays lost for transport and storage during 2007-08 was 155,105.

Claim narratives

‘Falls from height involving trucks, semi-trailers and lorries’ is the single most hazardous cross-tabulation shown in Table 2. A content analysis was conducted of the claim narratives to explore the factors giving rise to fall from vehicle injuries (Table 3) showing that most occur when workers fall off vehicles or fall as they exit a vehicle.

Table 3

Content Analysis of Claim Narratives of Fall from a Height Claims Associated with the Agency of Trucks, Semi-trailers and Lorries, Transport and Storage, Queensland, 2008-09 (Number, Per Cent) - Accepted Non-fatal Claims

<i>Falls from Height Claims</i>	
Falling off vehicle	54%
Fall exiting vehicle	31%
Fall entering vehicle	5%
Jumping from truck	4%
Miscellaneous	6%
Total	100%

Source: QEIDB, 12.1.12.

Notes: excludes asbestos, mesothelioma and fatality claims. Excluded also are claims for 'agency not apparent' which comprise around 10 per cent of all claims.

Content analysis of claims for the ‘muscular stress, handling objects involving trucks, semi-trailers and lorries’ cluster showed similar risk factors to falls with ‘entering or exiting a vehicle’ and ‘working on vehicle’ accounting for 60% of claims (Table 4).

Table 4

Content Analysis of Claim Narratives for Muscular Stress Injuries Associated with the Agency of Trucks, Semi-trailers and Lorries, Transport and Storage, Queensland, 2008-09 (Number, Per Cent) - Accepted Non-fatal Claims

<i>Muscular Stress While Handling Objects Other Than Lifting, Carrying or Putting Down Claims</i>	
Entering or exiting vehicle	34%
Working on vehicle	26%
Injury/pain operating vehicle	23%
Uneven ground	4%
Inadequate seating/suspension	5%
Loading/unloading	4%
Miscellaneous	4%
Total	100%

Source: QEIDB, 12.1.12.

Notes: excludes asbestos, mesothelioma and fatality claims. Excluded also are claims for 'agency not apparent' which comprise around 10 per cent of all claims.

Discussion and conclusions

The results confirm that muscular stress, fall from height and vehicle accidents are a major cause of non-fatal injuries in the transport and storage industry. The analysis of severity is particularly interesting as it highlights the relative risk associated with the key agencies and mechanisms. The highest severity is from falls from height from other and not specified trucks, semi-trailers, lorries with 40 per cent more work days lost from these injuries than from non-fatal truck vehicle accidents.

The content analysis from these claims provide valuable information about risk management and the areas where solutions to control risk need to be developed or implemented. While falling off the vehicles is a key issue (54 per cent of falls from height from trucks), entering and exiting from the vehicle accounts for the next highest amount 36 per cent. Entering and exiting also accounts for 34 per cent of claims for ‘muscular stress while handling objects other than lifting, carrying or putting down claims’ associated with trucks, semi-trailers and lorries. This indicates that risk management should focus on the tasks of working at height on trucks and on the routine task of entering and exiting the cab of the truck.

The *Work Health and Safety Regulation 2011* (Part 4.4, S78(1)) in Queensland (Queensland Government, 2011) now places a specific obligation on all persons conducting a business or undertaking to manage risks to health and safety associated with falls.

Falls from vehicles risks are recognised by Workplace Health and Safety Queensland (WHSQ) and other work health and safety agencies who have released guidance material to raise industry awareness and to provide examples of solutions. Publications include: Falls from trucks (WHSQ, 2010); Prevention of falls - Trucks (Worksafe Victoria, 2005) and Preventing falls from vehicles (Health and Safety Executive, 2012). This information generally includes the risk factors, such as poor design, slippery surfaces, trip hazards, footwear, lighting and inclement weather. Risk controls focus on: the need to provide safe access/egress to the cab; using a retractable ladder to access the trailer; using elevated work platforms (either mobile or fixed) while loading/unloading; using fall protection devices such as guard rails or temporary platforms; wearing non-slip footwear; and, using fall arrest systems where fall protection devices cannot be used.

Given the frequency and severity of fall from height injuries in transport, it is incumbent upon all persons conducting a business to have in place effective fall protection measures to eliminate or minimise the probability of fall injuries. This appears to be an area of health and safety requiring a higher level of awareness among transport operators and a diligent approach to identifying and implementing risk management.

Legislation and supporting information, on their own, do little to change behaviour and address the risk factors leading to injuries. Engagement programs between government and industry, which create positive environments, are required to identify barriers to safety, share ideas, develop and test solutions. One of the first stages of this is to consider where the problem is occurring and then to work with industry to develop specific solutions.

WHSQ will be using the analysis of the claims data to focus attention on the risks of falls from vehicles through a campaign which actively engages industry to identify the types of information and support that they require from the regulator and the information and support that they can, as an industry, can provide.

The Queensland Safe Work Awards (WHSQ 2012) are an example of way in which WHSQ encourages the development, implementation and sharing of innovative solutions to identified workplace health and safety issues. Figure 1 highlights the highly commended entry “SAFER on the GROUND” from Cement Australia for the 2011 awards.





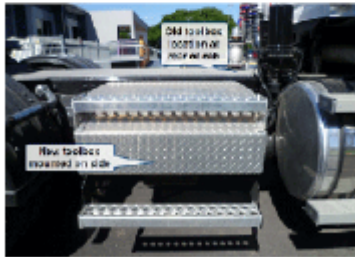
Safe Work Awards 2011
Highly Commended: Cement Australia Pty Ltd

Cement Australia delivers a broad range of products and services from bulk cement to alternative fuels and waste management, employing more than 300 tanker drivers.

Fourteen per cent of Cement Australia's injuries in 2009-10 were directly attributed to driver access and egress from truck cabs or slips and falls when performing pre-start checks resulting in soft tissue shoulder damage, sprains and strains to wrists, backs, shoulders and arms and severe bruising.

Cement Australia's initiative 'SAFER on the GROUND' saw the implementation of innovative solutions to ensure drivers could conduct their pre-start checks with their feet firmly on the ground. This included:

1. The installation of clear glass on coolant header tanks that could be seen from both sides of the engine at ground level. This task previously required drivers to climb on top of the vehicle or the vehicle's tyres to access this area.
2. The installation of different sized dry-break fluid couplings connected to the radiator and engine through hoses which drivers can service using an easily maneuverable service trolley. This top-up procedure previously required drivers to climb onto vehicle tyres whilst holding containers of coolant and oil.
3. Relocation of the vehicle's toolbox to be mounted on the side of the vehicle so that drivers do not have to climb onto a platform behind the cab.
4. The addition of non-slip insert and hand-grabs to provide extra grip and safer access for drivers.

Cement Australia has provided safer work procedures for their drivers and as a result has had no injuries relating to the activities addressed by the 'SAFER on the GROUND' program since its inception.

Last updated 21 May 2012

(adapted from <http://www.deir.qld.gov.au/workplace/training/events/safeworkawards/2011finalists/cement-australia/index.htm>)

Further innovative ideas will be identified through Transport Safety Network groups, which have been established by WHSQ in eight locations around Queensland, and are aimed at identifying and understanding safety management in the industry and, over time, encouraging continuous improvement. These will be a primary means of highlighting the risks, identify barriers to reducing the risks, sharing ideas, developing and testing solutions, and learning from evaluating those experiences.

It is recognised that injuries from falls are a complex issue involving many factors and it is not likely that changed design and behaviours be rapidly introduced into the industry and a sustained effort will be required. Providing a focus on falls and implementing a campaign for change is a positive step that, over time, should result in lower injury rates.

References

- ABS (2010) Work-related injuries. Retrieved from [www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/04A80CA5D52DFAA8CA25793B000E2236/\\$File/63240_2009-10.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/04A80CA5D52DFAA8CA25793B000E2236/$File/63240_2009-10.pdf)
- Borooh, V. K. and Mangan, J. (2008). Can Hospital Casualty Data be used to Improve Estimates of the True Rate of Workplace Injuries?
- Health and Safety Executive. (2012). Preventing falls from vehicles. Retrieved from <http://www.hse.gov.uk/workplacetransport/vehicles/preventingfalls.htm>
- Heads of Workplace Safety Authorities (2011) Manual Tasks and Moving Objects in the Retail and Wholesale and Transport and Storage Industries. Retrieved from www.hwsa.org.au/activities/activities-campaign_final_reports.aspx
- Johnstone, R. (2002). The Legal Framework for Regulating Road Transport Safety: Chains of Responsibility, Compliance and Enforcement. Canberra: National Research Centre for OHS Regulation Australian National University.
- Jones, D., & Switzer-McIntyre, S. (2003). Falls from Trucks: A descriptive study based on a workers compensation database. *Work: A Journal of Prevention, Assessment and Rehabilitation*, 20(3), 179-184.
- Loo-Morrey, M. (2007). Analysis of RIDDOR DATA 2000 to 2005 - Falls from Vehicles: Health and Safety Laboratory.
- Lyons, J. (2002). Factors contributing to low back pain among professional drivers: A review of current literature and possible ergonomic controls. *Work* 19 (2002) 95–102
- Mayhew, C., & Quinlan, M. (2006). Economic pressure, multi-tiered subcontracting and occupational health and safety in Australian long-haul trucking. *Employee Relations*, 28(3), 212-229.
- McClay, R. (2008). Truck Falls. *Professional Safety*, May 2008, 26-35.
- National Occupational Health and Safety Commission, (2002). National OHS strategy 2002-2012. Canberra: Commonwealth of Australia.
- National Occupational Health and Safety Commission, (2004). The Type of Occurrence Classification System. 3rd edition. Retrieved from www.safeworkaustralia.gov.au/sites/SWA/AboutSafeWorkAustralia/WhatWeDo/Publications/Documents/494/Type_of_Occurrence_Classification_System_3rd_Edition.pdf

- Productivity Commission. (2010). Performance benchmarking of Australia business regulation: occupational health and safety. Canberra: Productivity Commission.
- Queensland Government. (2011) Workplace Health and Safety Regulation 2011. Office of the Queensland Parliamentary Counsel
- Robb, M. J. & Mansfield, N. J. (2007). Self-reported musculoskeletal problems amongst professional truck drivers. *Ergonomics*, 50(6): 814-27.
- Routley, V., & Valuri, J. (1994). Work Related Injuries. *Hazard*, 18, 1-10.
- Safe Work Australia, (2012). Compendium of workers' compensation statistics Australia 2009-10, Canberra: Safe Work Australia.
- Scott, A., Millar, M., & Hallas, K. (2003). The underlying causes of falls from vehicles associated with slip and trip hazards on steps and floors. Buxton, Derbyshire.
- Shibuya, H., Cleal, B., & Kines, P. (2010). Hazard scenarios of truck drivers' occupational accidents on and around trucks during loading and unloading. *Accident Analysis and Prevention*, 42, 19-29.
- Van der Beek, A. J. (2011). World at work: truck drivers. *Occupational Environmental Medicine*, 69: 291-295.
- WHSQ (2010). Road freight transport industry series - falls from trucks. Retrieved from http://www.deir.qld.gov.au/workplace/resources/pdfs/sb_road_freight_falls_from_trucks_guidancesheet_2006.pdf.
- WHSQ (2012). Queensland Safe Work Awards 2012. Retrieved from <http://www.deir.qld.gov.au/workplace/events/safeworkawards/index.htm>.
- Worksafe Victoria. (2005). Prevention of Falls - Trucks. Retrieved from http://www.worksafe.vic.gov.au/wps/wcm/connect/dcc533004071f4919e24dee1fb554c40/prevention_falls_trucks.pdf?MOD=AJPERES.