Development of a specialist investigation standard for heavy vehicle fatal collisions in Victoria

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Abstract

The Work Related Liaison Service (WRLS)[1] of the Victorian Coronial Services Centre was established in July 2005 to enhance injury prevention and control. The primary role of the WRLS is to assist the Coroner by reviewing work-related deaths, developing evidence-based information on injury risk factors and countermeasures and facilitatating effective inter-agency collaboration.

In the 2005-2006 financial year, the WRLS noted that 29% of the deaths meeting their inclusion criteria involved a heavy vehicle collision, and that 33% of the total number of unintentional work-related deaths were of heavy vehicle drivers undertaking their core work activities.

It was also recognised that the investigation of fatal heavy transport collisions needed to be improved in order to assist in the systematic identification of causal risk factors and the subsequent development of countermeasures. The development of a comprehensive investigation standard for the WRLS for work-related heavy vehicle collision is the focus of this paper. The standard benefited from the input of a number of experts from different areas of heavy vehicle safety. The standard will be validated by applying it to a series of fifty completed Victorian death investigations of heavy vehicle drivers for the period 2000 to 2005. It is envisaged that a prospective field trial of the standard be conducted by expert Victoria Police crash investigators in the near future.

[1] The WRLS is funded by the Victorian WorkCover Authority (VWA)

Background

All work-related fatalities are required to be reported to the state-based coronial system, which is the primary source of comprehensive information on work-related fatalities in Australia (Driscoll, 2004). In addition to confirming the identity of the deceased and determining the circumstances surrounding the death, increasing emphasis has been placed on the Coroner's developing role in death and injury prevention (Victorian Parliament Law Reform Committee, 2006). This role can be facilitated through formal recommendations published in coronial findings to promote safety improvements and preventative measures. However, a number of limitations to the use of coronial information for prevention purposes have been identified, including (Driscoll, 2004):

- a lack of standardised classification and investigation approaches;
- a lack of mutually exclusive classification categories;
- an incomplete coverage; and
- a lack of relevant information in the coronial files.

To address these and other limitations, and following the recognition of the need for a death investigation and prevention service to assist the coroner in the area of work-related fatalities, the Work-Related Liaison Service (WRLS) was established in July 2005 at the Coronial Services Centre in Victoria (Victorian Institute of Forensic Medicine, 2007). The role of the WRLS is to:

1. assist the coroner by reviewing work-related deaths and developing evidence-based information on injury risk factors and countermeasures; and
2. facilitate effective inter-agency collaboration with external stakeholders with a role in injury prevention and control.

The philosophy for the WRLS drew heavily from the recognised success of the existing Clinical Liaison Service (CLS), also based at the Coronial Services Centre in Victoria. The CLS reviews hospital-related fatalities and builds on models found in the fields of injury epidemiology, and public policy development and implementation (Bohensky et al., 2005b).

The Victorian WorkCover Authority (VWA) generally defines a work-related incident as occurring at a workplace that is managed or controlled by an employer or self-employed person. A "workplace" is defined as "a place, whether or not in a building or structure, where an employee or self-employed person works" (*Occupational Health and Safety Act*, 2004).

The WRLS has adopted a broader definition of deaths considered to be "work-related". For example, the VWA does not regard a transport collision in which the driver had finished a shift and was driving home as work-related, whereas the WRLS does for the purposes of considering shift-work and rostering practices at the deceased's place of work. Due to legislation restrictions, few work-related fatalities ascribed to transport collisions are investigated by the VWA.

During 1989-1992 the transport and logistics industry accounted for 45% of the total number of workers killed in Australia (Mitchell, Driscoll & Healey, 2004), but only 8% of the work-related transport deaths in Australia were investigated by an occupational health and safety authority (National Occupational Health and Safety Commission, 1998). Thus the WRLS criteria deliberately includes many fatalities that the VWA does not investigate.

The Need for a Heavy Vehicle Fatality Investigation Standard

During the period 2001-2005 (inclusive) heavy vehicles[2] were involved in, on average, 1,067 collisions per year in Victoria, 63 of which resulted in a fatality. In other parts of Australia, heavy vehicles are reported to comprise 17% of all fatal transport crashes per year (Roads and Traffic Authority, 2003). While this constituted a relatively small proportion of all collisions and transport-related fatalities in Victoria, most of these collisions were work-related (with the proportion increasing as the size of the vehicle increases). This issue represents a significant occupational health and safety concern.

Using its inclusion criteria, the WRLS found that between July 2005 and June 2006, 126 unintentional work-related deaths occurred in Victoria (including bystanders, commuters, 'do it yourself' and volunteers). Of these deaths, 29% (n=27) involved a heavy transport vehicle (excluding buses and emergency vehicles). Further, heavy vehicle drivers represented 33% (n=12) of the total number of workers killed whilst undertaking their core work activity.

Extensive work in the area of road safety has been undertaken to identify the nature and extent of heavy vehicle collisions as well as risk factors and countermeasures, much of it based on mass crash databases (Australian Transport Safety Bureau, 2007).Crashes at all levels of severity are captured in a series of databases. These databases have a large number of cases available for analysis.

Coroners' data consists only of fatalities and so a smaller volume of cases is available. However, the information collected during the coronial investigation is generally significantly more detailed, particularly when the crash is investigated by the Major Collisions Investigations Unit (MCIU) of Victoria Police. This information provides potentially fertile ground for identifying contributory factors and devising road safety countermeasures. To assist the Coroner, the ideal brief of evidence would have a systematic approach, be comprehensive and identify remediable factors.

In Victoria, all fatal on-road crashes, are primarily investigated by a Victoria Police member on behalf of the Coroner. In some instances the MCIU conducts in-depth investigations of crashes, however their involvement is dependent upon the nature of the collision. MCIU's criteria for investigating crashes include those:

- resulting in serious or fatal injury that involve some form of criminal activity (such as a hit and run or criminal negligence by a surviving driver); or
- involving a police pursuit or other police-involved collision; or
- in which three or more persons are fatally injured.

As around 17% of heavy vehicle-involved collisions in Victoria are single-vehicle crashes that commonly result in one fatality, the MCIU experts are not be involved in the investigation. Therefore the majority of heavy vehicle collision investigations are conducted by general duties or at best Traffic Management Unit police members, often with less experience and expertise in such investigations.

The limitations of coroners' investigations related to transport collisions has been raised in a number of forums over the last five years. The Victorian Parliament Law Reform Committee in their review of the *Coroners Act 1985* (Vic) reported that coroners do not have any legal control over the death investigation process nor any power to direct an investigation (Victorian Parliament Law Reform Committee, 2006. It was also noted that there is an absence of comprehensive guidelines for coroners

[2] A heavy vehicle was defined as greater than 4.5 tonne gross vehicle mass (GVM)

conducting death investigations and widespread discrepancy between the standard of coroners' investigations in Melbourne and those in rural areas.

A 2001 coroner's investigation into a fatal transport collision highlighted a number of deficiencies with the investigation process and subsequent problems following from an inadequate investigation. The coroner found that a lack of evidence compromised the understanding of the fatal incident. The coroner stressed the importance that the judicial system and community should have confidence in the investigations undertaken by police members in the absence of MCIU involvement. The coroner formally recommended that "Victoria Police give consideration to the development of a basic investigation standard for fatal and serious collisions" (Coroners Case Number 1114/2001). As there is no legislative requirement for parties to act upon directed coroners' recommendations, it has yet to impact on procedural changes.

Currently, there is no systematic approach to the coroners' investigation of heavy vehicle related fatalities, which ultimately impacts upon research on fatal heavy vehicle collisions and the development of future countermeasures by industry and authorities.

Much of the information required may already be collected in the police brief of evidence prepared for the coroner, however it has been found that important detail can often be lost in free-text fields and reports. A standardised investigation tool for attending police should guide the information deemed to be useful for the coroners' investigation resulting in a more comprehensive picture of each fatal incident. This will allow recurring crash factors to be more evident across cases.

The objective of this project was to develop a comprehensive, standardised investigation data set with a focus on occupational health and safety to strengthen the coroners' role in prevention of these deaths. Considering the state-based coroners' system is the primary source of comprehensive information on work-related fatalities in Australia (Driscoll, 2004), measures to enhance coronial information is warranted.

The remainder of this paper describes the methodology for the development of the investigation standard. Work has begun on a retrospective case review to validate the standard. The results of the review will inform a prospective trial of the standard.

Development of the Standard

The development of the standard drew heavily from previous studies, field investigation experts, and existing classification systems. The data fields incorporated in the standard were compiled from national and international classification systems used to categorise injury mortality including the:

- National Coroners Information System (NCIS);
- International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10);
- Australian and New Zealand Standard Industry Classification (ANZSIC); and
- Australian and New Zealand Standard Classification of Occupation (ANZSCO).

In addition, consideration was given to data fields present in:

- the Australian Transport Safety Bureau (ATSB) Road Fatalities Crash Database;
- the Workplace Injury and Disease Recording Standard (AS 1885) developed by WorkSafe and Standards Australia; and
- a number of state-based mass crash databases, including that maintained in Victoria.

The compilation of data fields was separately assessed by an expert crash investigator, coronial data experts, and a road safety expert with experience in heavy vehicle safety and the freight and logistics industries. The majority of data fields were aimed at the general duties level police member. There were items relating to causal factors and items that could require incident reconstruction to determine.

Each data field was assessed to determine its value for inclusion in the investigation standard and its value in a subsequent coronial investigation, where the possibility for potential preventative recommendations is a priority, and ranked according to a three-point scale:

1. essential;
2. beneficial; and
3. supplementary.

Data fields ranked as “essential” were those considered critical to the investigation and their collection provides the best overview of the incident. These data fields should be viewed as a priority for an investigating officer. Data fields ranked as “beneficial”, were those considered to strengthen the essential information collected and provide weight to an investigation. “Supplementary” data fields were considered largely for administrative purposes to enable classification and coding processes and, whilst valuable, were not expected to be filled by an investigating officer.

The potential sources of information for each data field was considered and categorised in terms of validity. Whilst a number of data fields could be obtained from a wide variety of sources, the proposed investigation standard specified the preferred source, ideally the most reliable and valid. For example, an estimation of a heavy vehicle’s speed prior to a crash would preferably be derived from scientific calculations using accident reconstruction methods. If this source is unavailable, an investigating officer’s informed opinion following a scene assessment or a reliable eyewitness account would be the next preferable sources of information.

In most cases it is likely that attending police officers are collecting the most reliable data as they document a crash. An intention of the standard is to reinforce this process and highlight a more systematic approach so that the information available for coroners deliberation is consistent from case to case. A number of fields will be new to the crash report form. In many instances their addition is more about future prevention than an investigation of what might be considered to be the most pertinent issues associated with the crash per se.

The Draft Investigation Standard

It is proposed that the investigation standard will be trialled initially in cases in which the heavy vehicle driver has been fatally injured whilst undertaking a work activity. It is expected that further iteration will allow it to be extended to include cases in which another party has been fatally injured while the heavy vehicle driver has survived.

The following criteria was applied to the cases of interest:

- the deceased was a heavy vehicle driver, requiring a special driver’s licence approved by a National Licence Authority;
- the decedent’s vehicle had a gross vehicle mass (GVM) of greater than 4.5 tonnes;
- the deceased was undertaking a work activity at the time of the crash;
- the vehicle was being used for a work activity; and
- the fatal collision occurred whilst the vehicle was used in traffic conditions.

The initial investigation standard comprised a total of 302 data fields, of which:

- 50 were considered essential

- 188 were considered beneficial; and
- 64 were considered supplementary.

A summary of the essential data items are listed in Table 1.

Table 1. Categorised essential data items for proposed investigation standard

Level 1	Level 2
Deceased Details	Age
	Gender
	Toxicology result: BAC and drugs
	Cause of death
	Mechanism of injury
	Licensing detail
	Heavy vehicle driving experience
	Known sleep disorder(s)
	Known medical condition(s)
Employment Details	Nature of employment
	Number of employed heavy vehicle drivers/ heavy vehicles
	Solo/Two-up driver
	Approximate distance of collision location from base
	Previous driving hours and rest periods: - Present shift, 24 hours, 7 days
	Circumstances of last significant rest
	Verification of log book or driving hours
Coroners' Investigation[3]	Victoria Police investigating body(ies)
	Contributing factors
Incident	Date and time of Incident
	Counterpart(s) (including infrastructure, roadside furniture, trees etc.)
	Environment: - Speed limit - Weather conditions - Traffic controls
	Road surface conditions
	Road configuration: - Horizontal/vertical road alignment - Intersection type - Road edge treatments - Number of lanes
	Nature of collision
	Ejection
	Evidence of avoidance actions taken (e.g. skid marks, signs of impact, etc.)
Vehicle (s)	Vehicle detail: make, model, year, cabin type
	Forensic mechanical inspection: identified defects & their contribution to the crash
	Load: type, restraints, weight
	Maintenance history
	Restraint: availability, type, use

[3] Used only for the retrospective analysis, not part of final model

Application of the Standard

The timing of the collection of data items can occur in five defined stages of the coroners' investigation process. These categories have been highlighted in the proposed investigation standard for assistance with data collection:

1. throughout the coronial investigation;
2. at the scene and/or at the initial report of death;
3. during liaison by coronial staff;
4. during compilation of evidence brief for the Coroner; and
5. coroners' case completion.

A preliminiary retrospective trial of the investigation standard was undertaken by the WRLS in order to gain an estimate of the likelihood of the presence of the information deemed essential by the standard. Two randomly selected completed coroners' investigations (from a total of 47 cases identified for the retrospective study) were selected for the trial. The results are presented in Table 2.

Table 2. Presence of essential data items in two randomly selected HV fatality cases

Essential Items	Case 1	Case 2
Present	33	27
Not Present	17	19
Not Applicable	0	4

The absent information typically concerned the previous driving hours of the deceased, critical information for determining whether fatigue may have been a contributing factor in the crash. The major factor identifed as contributing to each case was "another vehicle" (case 1) and "undetermined" (case 2). The data items deemed "not applicable" in the trial related to the counterpart, intersection type and vehicle defects. Interestingly, the type of restraint (i.e. lap only or lap and sash seat belt) was not specified in either case. The need for the collection of this data field is relatively obvious and a critical piece of information that could benefit from the application of the investigation standard.

Discussion

Deaths that repeatedly occur are deemed to be more easily and efficiently investigated if the process for investigating these deaths is standardised (Bohensky et al., 2005a). Following the recognised limitations associated with the current coronial investigations of heavy vehicle fatalities and the lack of an existing systematic approach, the WRLS' proposal for a *Heavy Vehicle Fatal Collision Investigation Standard* aims to address a number of these restrictions. Whilst the standard has been initially developed for Victorian fatal heavy vehicle crash investigations, the model may be transferable to other types of vehicle crashes, and utilised at a national level.

Subsequent to the development of the investigation standard, the WRLS will conduct a restrospective study on all completed coronial investigations of fatally injured heavy vehicle drivers reported to the Victorian State Coroner's Office. Forty-seven such cases from the period 1 January 2000 to 30 June 2007 have been identified for inclusion. The results of the study will enable a systematic assessment of the information available following a coroners' investigation and identify specific information that may often be absent or not presented in a manner that best allows for its consideration. This study will also provide a valuble insight into the nature of heavy vehicle collisions in Victoria from a safety and preventative persepective.

It is expected that certain information may not be present in the coroners' files examined during the retrospective study if at an early stage of the investigation a single contributing factor has been identified as seemingly obvious, and thus all other potential factors may be deemed irrelevant. Similarly, if no causal factors are evident, one could expect information to be collected for every possible avenue of inquiry. For the purposes of obtaining sufficient information for the development of future countermeasures, all information related to an incident should ideally be collected regardless of early assumptions and conclusions.

A purpose of the retrospective study is to refine the standard and how it should be applied. There are plans to then trial the standard in the field prospectively through its use at heavy vehicle crashes. The MCIU has agreed in principle to pilot the investigation standard at a later stage. Whilst the majority of fatal heavy vehicle crashes are not investigated by the MCIU, the Unit's expertise and comments on the feasibility of obtaining the data fields will be of great value to the overall effectiveness of the standard and will enable further refinement to occur. The tool should then be ready for use by general duties or traffic officers.

Enhancing the coronial investigation at the initial occurrence of a heavy vehicle-related fatality will provide a postive impact for future research into risk factors associated with heavy vehicle collision occurrences and the development of prevention intiatives. The systematic collection of key information via the application of a common investigation standard will ultimately address the fundamental aim of reducing the risk of heavy vehicle collisions resulting in unnecessary deaths.

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