Examination of narratives from emergency department presentations to identify road trauma, crash and injury risk factors for different age groups

Rebecca J. Mitchell and Mike R. Bambach

Abstract

Background: Road trauma represents a high proportion of injury-related emergency department presentations. Narrative text recorded in the emergency department could provide useful information to monitor road trauma and to identify crash and injury risk factors by age group. **Objective**: To examine the Public Health Real-time Emergency Department Surveillance System (PHREDSS) to identify road users (i.e. motor vehicle drivers, motor vehicle passengers, motorcyclists, pedal cyclists and pedestrians), and crash (e.g. vehicle speed) and injury risk factors (e.g. non-restraint use) by age group. **Method**: Narrative text from the PHREDSS in New South Wales, Australia, during 1 January 2006 to 31 December 2012 was reviewed. **Results**: A keyword search of all emergency department presentations potentially identified 388,991 road trauma-related presentations and between 6,420 motorbike crashes to 138,889 motor vehicle accident emergency department presentations. Potential crash and injury risk factors were also identified. **Conclusion**: This exploratory study demonstrated the capability of information from PHREDSS to be used to support injury prevention efforts in road safety.

Keywords (MeSH): *Injuries; Surveillance; Emergency Treatment; Motor Vehicles; Traffic Accidents; Age Factors*
Supplementary keywords: *Road Trauma; Narrative Text*

Introduction

Road traffic injuries are a significant and increasing public health issue around the globe. Despite advances in road safety measures, road crashes account for an estimated 1.3 million deaths annually and are projected to become the third leading cause of the burden of disease by 2030 (World Health Organization 2008). In Australia, the road fatality toll has been decreasing since the 1970s (Australian Transport Safety Bureau 2003; Bureau of Infrastructure Transport and Regional Economics 2012). However, the burden of road trauma remains considerable at around 1,400 deaths and 32,500 serious injuries each year (Henley & Harrison 2011). Estimates suggest that road trauma in Australia costs $27 billion annually (Australian Transport Council 2011).

While the past focus of prevention efforts has largely been on reducing fatalities, reductions in the number of injuries, particularly serious injuries, are now common targets for road safety performance in Australia and elsewhere (Australian Transport Council 2011; Transport for NSW 2012; Papadimitriou & Yannis 2013). To be able to monitor performance in road safety, the conduct of timely and routine surveillance of road trauma and the dissemination of information from surveillance activities to inform prevention activities are key components of effective injury surveillance practices (Thacker & Berkelman 1988).

In New South Wales (NSW) Australia, fatal injuries as a result of road trauma that are unintentional, occur on a public roadway, and those reported to police are reported daily and casualties are reported monthly (Transport for NSW 2013). Both fatal and non-fatal casualties in NSW are reported in annual statistical summaries of road trauma (Transport for NSW 2013). While almost all road trauma-related fatalities in NSW are captured by police, not all road crashes that result in injury are recorded by police (Bambach et al. 2012; Mitchell et al. 2013). To be able to conduct daily reporting of road traffic-related injuries some health administrative data collections have the capacity to provide routine surveillance of road trauma, including the potential identification of key crash and injury risk factors across different age groups.

The Public Health Real-time Emergency Department Surveillance System (PHREDSS) is a health administrative data collection that can contain narrative text of the circumstances of an injury event. A review of this text could enable the identification of key factors relating to an injury event. Data text mining of narrative descriptions has been conducted previously for injury surveillance purposes (Mitchell, Finch & Boufous 2009; McKenzie et al. 2010) and,

in particular, for identification of road crash circumstances (Pollock et al. 2013; Retzer, Hill & Pratt 2013). This research aims to examine the PHREDSS to identify road users (i.e. motor vehicle drivers, motor vehicle passengers, motorcyclists, pedal cyclists and pedestrians), and crash (e.g. vehicle speed) and injury risk factors (e.g. non-restraint use) by age group.

Method

Information was obtained from the PHREDSS for the period from 1 January 2006 to 31 December 2012. Data collection for the PHREDSS began on 1 September 2003 at 12 emergency departments (EDs) in public hospitals in the Sydney metropolitan region. From 2006 there were 38 EDs providing data to the PHREDSS and in 2012 there were 59 EDs providing data to the PHREDSS. Twenty-four EDs consistently provided data to the PHREDSS over the whole seven-year period. Hospitals in Sydney, South Western Sydney and Western Sydney Local Health Districts (LHDs) changed their ED information system in either 2007 or 2008 and it was not possible to collect data from these hospitals for an extended period of time.

Development and preparation of data from the PHREDSS is described in detail elsewhere (Muscatello et al. 2005) and an overview is provided here. The majority of public hospital EDs in NSW collect information on patient presentations using the Emergency Department Information System (EDIS), a patient administration and clinical data collection system. Information from EDIS is then conveyed by each LHD to the NSW Ministry of Health via computer networks. Data are collected in the PHREDSS by either real-time electronic messaging or through data extraction every four to six hours and batch file transfer from LHDs.

Data items recorded in the PHREDSS include: patient age, gender, postcode of residence, arrival date and time, triage category, visit type (e.g. emergency, planned, or unplanned return visit), mode of arrival (e.g. ambulance, private vehicle), country of birth, provisional diagnoses, hospital code, departure status (e.g. discharged, admitted to hospital, transferred, or died), free-text presenting problem (e.g. lacerated finger), and free-text triage nurse assessment. The provisional diagnosis is allocated by ED clinical staff via keyword searching and selection of the most relevant diagnosis.

An initial free-text search of the free-text nurse triage assessment and free-text presenting problem fields was conducted by the NSW Ministry of Health using the following key words: 'MVA' or 'MVC' or 'ROAD' or 'MBA' or 'MBC' or 'BIKE' or 'CYCL' or 'PASSENG' or 'DRIVER' or 'PEDEST' or 'VEHIC' or 'TRUCK'. The selection of these keywords was based on existing knowledge of the abbreviations and terms used to describe road trauma events by trauma clinical staff. Records that contained the keywords were provided to investigators. Secondary keyword searches were then conducted to attempt to identify crash or other risk factors using keywords that were selected based on existing knowledge of common road trauma crash and injury risk factors and abbreviations used commonly by trauma clinical staff in the PHREDSS. These keyword included: 'BELT', 'RESTRAIN', 'HELMET', 'ALCOHOL', 'ETOH', 'DRINK', 'DRANK', 'INTOX', 'BEER', 'WINE', 'FATIGUE', 'TIRED', 'SLEEP', 'AIRBAG', 'AIR BAG', 'CAPSULE', 'CAR', 'SPEED', 'KM', 'KPH', and 'ROLL'. In addition, keyword searches were also used to attempt to identify the provisional injury diagnosis by searching of the provisional diagnosis description using the keywords of 'FRACTURE', 'LACERATION', 'OPEN WOUND', 'CONTUSION', 'DISLOCATION', 'SUPERFICIAL', 'HEAD', and 'WHIPLASH'.

True case identification was assessed using a 1% random sample of cases for each keyword. The proportion of 'true' road trauma-related injury presentations was calculated by dividing the number of ED presentations identified as road trauma-related by the keyword search alone by the number of road trauma-related ED presentations that were identified as road trauma-related by the keyword search in the free-text nurse triage assessment or free-text presenting problem fields. For an ED presentation to be considered as a 'true' road trauma-related presentation, the presentation was required to have been identified as road trauma-related during either the initial or secondary keyword search and to have a corresponding road trauma-related narrative in the free-text nurse triage assessment or free-text presenting problem fields. Alternatively, 'false positive' cases were identified as a road trauma-related presentation using the keyword searches, but the free-text nurse triage assessment or free-text presenting problem fields were not road trauma-related. Each narrative was reviewed by one of the investigators (RM) to determine if the presentation was road trauma-related or not.

Results

During 1 January 2006 to 31 December 2012 there were 12,891,941 ED presentations recorded in the PHREDSS. The initial keyword text search of all ED presentations identified 388,991 potential road trauma-related presentations. Of these, 117,339 (30.2%) involved individuals aged 19 years or less, 214,849 (55.2%) individuals were aged 20-54 years and 56,801 (14.6%) were aged 55 years or older. For two individuals age was not recorded. Text searching

of both the triage nurse assessment and the presenting problem data fields potentially identified between 6,420 motorbike crashes to 138,889 motor vehicle accident road trauma ED presentations. Following the initial keyword search, other potential crash and injury risk factors were also able to be identified from the text descriptions for each age group, such as use of vehicle restraints, vehicle speed, helmet use, alcohol consumption, driver fatigue, whether the vehicle rolled or whether an airbag deployed (Table 1). The identification of true road trauma events for each keyword varied from 100% for motor bike crashes (i.e. 'MBC'), deployment and/or presence of airbags and use of baby capsules to 40.6% for vehicle crashes involving trucks based on the 1% manual review sample (Table 2).

Table 1: Identification of road trauma and risk factor keywords in the PHREDSS, 2006-2012

KEYWORD (KEYWORD SEARCHED)	≤19 YEARS	20-54 YEARS	≥55 YEARS	ALL PERSONS[1]	
	n	*n*	*n*	*n*	%[2]
Road trauma					
Motor vehicle accident (MVA)	29,442	83,030	26,416	138,889	35.7
Motor vehicle crash (MVC)	5,793	12,640	4,074	22,507	5.8
Motorbike accident (MBA)	8,964	27,153	3,767	39,884	10.3
Motorbike crash (MBC)	2,080	3,929	411	6,420	1.7
Motor or push bike (BIKE)	61,558	59,636	7,967	129,162	33.2
Cyclist (CYCL)	13,454	25,746	5,927	45,128	11.6
Driver (DRIVER)	11,121	51,756	15,279	78,156	20.1
Passenger (PASSEN)	15,982	18,042	6,865	40,889	10.5
Pedestrian (PEDEST)	2,410	3,438	1,892	7,740	2.0
Vehicle (VEHIC)	10,048	27,131	8,556	45,736	11.8
Truck (TRUCK)	3,621	17,314	4,713	25,648	6.6
Roadway (ROAD)	7,831	16,278	6,912	31,021	8.0
Crash and other risk factors[3]					%[4]
Car (CAR)	24,186	60,855	19,309	104,351	26.8
Rollover (ROLL)	4,678	9,506	2,303	16,487	4.2
Seat belt (BELT)	8,753	21,285	6,421	36,459	9.4
Restrained (RESTRAIN)	4,511	8,896	2,838	16,245	4.2
Airbag (AIRBAG, AIR BAG)	4,241	18,203	6,073	28,517	7.3
Baby capsule (CAPSULE)	523	33	7	563	0.1
Helmet (HELMET)	14,504	17,851	1,898	34,253	8.8
Alcohol (ALCOHOL)	701	3,128	488	4,317	1.1
ETOH (ETOH)	1,131	6,226	952	8,309	2.1
Drink (DRINK)	1,517	3,460	627	5,604	1.4
Drank (DRANK)	451	326	57	834	0.2
Intoxicated (INTOX)	452	2,478	358	3,288	0.8
Beer (BEER)	169	1,158	185	1,512	0.4
Wine (WINE)	103	582	169	854	0.2
Fatigue (FATIGUE)	11	78	21	110	0.0
Tired (TIRED)	342	498	182	1,022	0.3
Asleep (SLEEP)	1,747	2,665	693	5,105	1.3
Speed (SPEED)	14,469	34,647	10,295	59,411	15.3
Kilometres per hour (KM)	15,654	44,138	10,012	69,805	17.9
Kilometres per hour (KPH)	3,693	10,507	2,182	16,382	4.2

1 There were two unknown ages.
2 Percent of ED presentations relating to road trauma that were identified on the basis of the keyword. Multiple keywords could be identified per presentation.
3 Crash and other risk factors were identified from the narrative text descriptions previously identified using the road trauma keywords.
4 Percent of ED presentations relating to road trauma that included information on a crash or injury risk factor that were identified on the basis of the keyword.

Table 2: Proportion of road trauma and risk factor keywords that were identified as being true road trauma in the PHREDSS for all persons, 2006-2012

KEYWORD (KEYWORD SEARCHED)	*n*[1]	%[2]
Road trauma		
Motor vehicle accident (MVA)	1,389	97.8
Motor vehicle crash (MVC)	225	98.7
Motorbike accident (MBA)	399	98.7
Motorbike crash (MBC)	64	100.0
Motor or push bike (BIKE)	1,292	96.4
Motorcyclist or cyclist (CYCL)	451	56.5
Driver (DRIVER)	782	99.0
Passenger (PASSEN)	409	98.8
Pedestrian (PEDEST)	77	92.2
Vehicle (VEHIC)	457	94.7
Truck (TRUCK)	256	40.6
Roadway (ROAD)	310	44.2
Crash and other risk factors[3]		
Car (CAR)	1,043	91.2
Rollover (ROLL)	165	95.8
Seat belt (BELT, RESTRAIN)	527	97.7
Airbag (AIRBAG, AIR BAG)	285	100.0
Baby capsule (CAPSULE)	6	100.0
Helmet (HELMET)	343	99.1
Alcohol (ALCOHOL, ETOH, DRINK, DRANK, INTOX, BEER, WINE)	247	65.6
Speed (SPEED, KM, KPH)	862	99.5
Fatigue (FATIGUE, TIRED, SLEEP)	62	66.1

1 Number of records in the 1% random sample that were reviewed.
2 Percent of ED presentations identified as road trauma on the basis of the keyword search that were confirmed to be relating to road trauma on the basis of a review of the narrative text. Multiple keywords could be identified per presentation.
3 Crash and other risk factors were identified from the narrative text descriptions previously identified using the road trauma keywords.

An examination of the characteristics of motor vehicle crashes identified using keywords with an estimated greater than 90% true case ascertainment (i.e. 'MVA', 'MVC', 'DRIVER', 'PASSEN' and 'VEHIC'), identified similar proportions of injured males and females for each age group. The number of ED presentations related to motor vehicle crashes increased over time, particularly for those aged 20-54 years and 55 years and older. Around half of the injured individuals aged 54 years or less arrived by ambulance, with almost two-thirds of those aged 55 years and older arriving by ambulance. One-quarter of each age group were given a triage status requiring treatment within 10 minutes. Crash and injury risk factors were able to be identified for individuals injured in motor vehicle crashes, with vehicle speed mentioned in approximately half the records for each age group and restraint use mentioned in around one-third of records for those aged 19 years or less and in one-quarter of presentations for those aged 20 years or older. A higher proportion of individuals aged 55 years and older were admitted to hospital compared to the younger age groups (Table 3). Fractures were the most common injury type identified for each age group using the keyword searches of the provisional diagnosis text field for the identified motor vehicle crash-related ED presentations (Table 4).

Discussion

While EDs are in a prime position to provide rapid information regarding infectious disease outbreaks, the information collected in EDs can also be used for injury surveillance capabilities (Hirshon et al. 2009). This exploratory research has shown that road trauma-related ED presentations can be identified using information available from text descriptions available in the PHREDSS for different age groups. By using select keywords related to road trauma and crash and injury risk factors, there is further potential for information on road trauma from the PHREDSS to be incorporated into routine reporting of the burden of road trauma-related injuries in NSW. As data from the PHREDSS are reviewed daily, it is possible that information from the PHREDSS would allow rapid, routine road trauma surveillance to be conducted. This would allow data from the PHREDSS to be used as a potential sentinel sample of road trauma-related injuries presenting to an ED for medical treatment.

For this study, an assessment of true case identification was conducted using a 1% random sample of records for each keyword. While a 1% sample is relatively low, this resulted in over 9,650 records being reviewed. True road trauma identification was generally high for the identification of road trauma

Table 3: Characteristics of individuals potentially injured in motor vehicle crashes1 identified in the PHREDSS by age group, 2006-2012 (n=183,506)

CHARACTERISTIC	≤19 YEARS		20-54 YEARS		>= 55 YEARS		ALL PERSONS[2]	
	n	%[2]	*n*	%[2]	*n*	%[2]	*n*	%[3]
Sex[4]								
Male	20,440	52.3	58,175	53.0	17,236	49.7	95,852	52.2
Female	18,668	47.7	51,521	47.0	17,451	50.3	87,640	47.8
Year of crash								
2006	5,087	13.0	13,969	12.7	3,945	11.4	23,002	12.5
2007	6,027	15.4	15,425	14.1	4,550	13.1	26,029	14.2
2008	5,066	13.0	13,340	12.2	4,010	11.6	22,416	12.2
2009	5,705	14.6	16,455	15.0	5,023	14.5	27,183	14.8
2010	5,800	14.8	16,762	15.3	5,461	15.7	28,023	15.3
2011	5,723	14.6	16,746	15.3	5,696	16.4	28,165	15.4
2012	5,702	14.6	16,981	15.5	6,005	17.3	28,688	15.6
Mode of arrival								
NSW Ambulance Service	20,293	51.9	57,251	52.2	22,802	65.7	100,346	54.7
Private car	14,498	37.1	38,273	34.9	7,781	22.4	60,552	33.0
Helicopter	573	1.5	1,452	1.3	434	1.3	2,459	1.3
Police/Correctional Services vehicle	288	0.7	1,610	1.5	196	0.6	2,094	1.1
Community/public transport	67	0.2	681	0.6	145	0.4	893	0.5
Air ambulance	212	0.5	332	0.3	121	0.4	665	0.4
Hospital transport/internal ambulance	88	0.2	202	0.2	125	0.4	415	0.2
Other and unknown	3,091	7.9	9,904	9.0	3,086	8.9	16,082	8.8
Triage status[4]								
Resuscitation (within seconds)	1,864	4.8	3,592	3.3	1,225	3.5	6,681	3.6
Emergency (within 10 min)	9,283	23.7	26,893	24.5	8,818	25.4	44,994	24.5
Urgent (within 30 min)	14,527	37.1	41,096	37.5	13,588	39.2	69,211	37.7
Semi-urgent (within 60 min)	11,476	29.3	32,070	29.3	9,530	27.5	53,076	28.9
Non-urgent (within 120 min)	1,946	5.0	6,008	5.5	1,509	4.4	9,463	5.2
Departure status								
Admitted	8,745	22.4	28,638	26.1	13,861	40.0	51,244	27.9
Departed	30,223	77.3	80,740	73.6	20,653	59.5	131,616	71.7
Deceased on arrival	26	0.1	55	0.1	49	0.1	130	0.1
Not known	116	0.3	272	0.2	127	0.4	516	0.3
Crash risk factors[5]								
Vehicle speed	20,927	53.5	56,339	51.4	17,071	49.2	104,271	56.8
Fatigue	849	2.2	1856	1.7	537	1.5	3,264	1.8
Alcohol	1,465	3.7	6,453	5.9	909	2.6	10,399	5.7
Injury risk factors[5]								
Motor vehicle restraint	12,553	32.1	29,201	26.6	8,975	25.9	51,721	28.2
Baby capsule	518	1.3	*	*	*	*	539	0.3
Air bag	4,235	10.8	18,153	16.5	6,061	17.5	17,954	9.8
Vehicle rollover	3,369	8.6	7,137	6.5	1,756	5.1	12,084	6.6

1 Identified using the keywords: 'MVA, or 'MVC' or 'VEHIC' or 'DRIVER' or 'PASSEN'.

2 There was one unknown age.

3 Percent of characteristics that were identified in ED presentations relating to motor vehicle crashes on the basis of keyword searches.

4 There were 14 unknown genders and 81 unknown triage status.

5 Keyword mentioned in narrative text and identified using: Vehicle speed: 'SPEED', 'KM' and 'KPH'; Fatigue: 'FATIGUE', 'TIRED', and 'SLEEP'; Alcohol: 'ALCOHOL', 'ETOH', 'DRINK', 'DRANK', 'INTOX', 'BEER', and 'WINE; Motor vehicle restraint: 'BELT' and 'RESTRAIN'; Baby capsule: 'CAPSULE'; Airbag: 'AIRBAG' and 'AIR BAG'; and Vehicle Rollover: 'ROLL'.

* Cell sizes less than 5 or removed to prevent identification of cell sizes less than 5.

Table 4: Identification of injury keywords for individuals potentially injured in motor vehicle crashes[1] identified in the PHREDSS by age group, 2006-2012 (n=183,506)

KEYWORD	≤19 YEARS	20-54 YEARS	≥55 YEARS	ALL PERSONS[2]	
	n	*n*	*n*	*n*	%[3]
Fracture	2,471	7,846	3,864	14,181	7.7
Laceration	1,749	3,909	1,109	6,767	3.7
Open wound	1,439	3,237	914	5,590	3.1
Contusion	1,684	3,927	1,206	6,817	3.7
Dislocation	94	396	107	597	0.3
Superficial	371	696	189	1,256	0.7
Sprain	1,600	5,583	1,223	8,406	4.6
Head injury	2,348	4,456	1,159	7,964	4.3
Whiplash injury	437	1,959	323	2,719	1.5

1 Identified using the keywords: 'MVA, or 'MVC' or 'VEHIC' or 'DRIVER' or 'PASSEN'.
2 There was one unknown age.
3 Percent of ED presentations relating to injury type as a result of a motor vehicle crash that were identified on the basis of the keyword.

keywords, such as 'MVA', 'MVC', 'MBA', 'MBC', 'BIKE', 'DRIVER', 'PASSEN' and 'VEHIC'. For some of the road trauma keywords, use of the keyword in a different context resulted in false positive identification of road trauma records. For example, the keyword 'DRIVER' also identified injuries that occurred while using a screw driver or an assault on a taxi driver. For some ED presentations, the keyword 'PASSEN' also referred to passengers of aircraft or of cruise ships and the keyword 'VEHIC' was also used to refer to individuals who were 'travelling in vehicle and felt unwell'.

Like the identification of 'MBC', it might be expected that the true case ascertainment for the keywords of 'MVA', 'MBA', and 'MBC', would also be 100%. However, for a few ED presentations, the narrative text referred to historical injuries from a previous road trauma event that were not the primary reason for the current ED attendance. For other road trauma keywords, such as 'TRUCK', 'ROAD' or 'CYCL', the relatively low true case identification posed some difficulties for identification of true road-related trauma. The keyword 'TRUCK' was often used in the context of an individual who 'fell from a truck', rather than an individual who was injured as a result of a vehicle crash. The keyword 'ROAD' was often used to describe an intoxicated person that was found on or beside the roadway or a person that fell on the roadway. Searching for the keyword 'CYCL' also identified individuals who were prescribed Acyclovir, and identified references to the cycle of drug or to a women's menstrual cycle.

For crash and injury risk factor keywords, such as 'HELMET', 'AIRBAG', 'ROLL', 'CAPSULE' or those referring to use of seat belts (i.e. 'BELT' and 'RESTRAIN'), there was little doubt that the text narratives were able to indicate risk factors related to a road trauma event. In a few ED presentations, 'ROLL' identified a 'patient on trolley', rather than a vehicle rollover, while 'CAR' also identified individuals with 'tachycardia', who had a 'cardiac arrest', or who received a particular type of 'care'. The keyword search for crash and other risk factors was conducted after the initial keyword search and this might have resulted in the identification of fewer crash and injury risk factor keywords. However, if all keywords were used in the initial search, it would have likely resulted in the identification of a large number of false positive records. For example, using 'CAR' would have identified all the cardiac arrests. Further assessment of keyword identification of true and false positive records is warranted.

Narrative text has been found to be useful in providing information on the nature of circumstances surrounding an injurious incident and potential injury risk factors (Taylor et al. 2014). The example for individuals injured in motor vehicle crashes shown in Table 3 has demonstrated the ability of various risk factors to be identified by type of road user and for different age groups. However, it is possible that not all motor vehicle crashes identified were 'true' road trauma cases. For improved case ascertainment of road trauma cases in the ED, it might be possible to improve capture with the addition of a check box or flag to allow triage staff to indicate road trauma events. However, use of a check box did not enhance the identification of all work-related fatalities on death certificates in the United States, with sensitivity of the

identification of individuals 'at work' at 77.6% (Kraus et al. 1995).

In the ED, the immediate focus should be on patient treatment, but for injury prevention purposes information on the injury circumstances and risk factors contributing to the crash and/or injury outcome are also important (Brenner et al. 2002). It might be possible to consider using structured narratives or standardised text (Runyan, Bowling & Bangdiwala 1992) to better describe crash and injury risk factors as has been attempted elsewhere (Irving, Norton & Langley 1994; Williams et al. 1995). However, the need for supplementary information regarding road crashes would require dedicated staff in the ED to identify cases, collect and record information. It should not place additional burden on hospital staff.

It is possible that requesting that road-related trauma be identified using select keywords, such as 'MVC', could result in a better identification of all road-related trauma. In addition, it could be suggested that for all motorcyclist and pedal cyclist crashes that whether a helmet was worn should be indicated. Likewise for motor vehicle crashes, whether the injury involved the driver or passenger, an estimate of vehicle speed, if a seat belt was worn, whether alcohol or fatigue was a factor, and whether an airbag was present and deployed would also assist in informing injury prevention efforts. In the longer term, there is potential to link police-reported road crash information to data from the PHREDSS to provide additional information regarding the crash and there is also the potential to link information from the PHREDSS to hospital admission and/or mortality records to obtain further information regarding crash risk factors, without the need to link to police-reported data. However, data linkage would require the consent and support of each hospital contributing to the PHREDSS.

There are limitations to searching for keywords in narrative text to identify road trauma and crash risk factors. For the ED presentations reported in the PHREDSS, the number of hospitals participating in ED surveillance increased over time from 38 in 2006 to 59 in 2012. It is possible that some road trauma and crash and injury risk factors were not identified if narrative descriptions were missing, relevant information was absent or there was orthographic variation resulting from spelling errors or use of abbreviations. Therefore, it is likely that the number of road trauma cases identified in the current research is under-enumerated. In addition, there is potential for recording bias in the type of crash and injury risk factors that were recorded by ED staff for different demographic groups and type of road users (Delgado-Rodriguez & Llorca 2004). For instance, risky driving behaviour, such as excessive vehicle speed, is a common risk factor for vehicle crashes involving young drivers (Ivers et al. 2009), so it is possible that estimates of vehicle speed may be more likely to be provided for this age group. Further studies are needed to examine the influence of prior knowledge of trauma staff of crash risk factors on the reporting of risk factors for road trauma. It was not possible to determine if there were any false negatives in the PHREDSS as the NSW Ministry of Health performed the initial text search case identification and due to the sheer number of records, with 12.8 million records recorded during this time period. The amount of information regarding the incident in the free-text nurse triage assessment and free-text presenting problem fields was variable, so this would have an impact on crash and injury risk factor identification (Appendix 1).

Conclusion

This exploratory study has demonstrated the capability of information from the PHREDSS to be used to support injury prevention efforts in road safety. Information from the PHREDSS could be used to enhance surveillance capabilities for road trauma surveillance in NSW, especially as police do not attend all road trauma in NSW, nor are all individuals who may be injured in a vehicle crash identified by police. Some improvements could be made to ED surveillance for road trauma events, such as use of a check box, to allow triage staff to indicate road trauma events or the use of agreed standardised narrative format across the state. Any surveillance improvements should not place additional burden on ED staff.

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Rebecca J. Mitchell*, *BA(Psych), MA(Psych), MOHS, PhD*
Senior Research Fellow
Transport and Road Safety (TARS) Research
University of New South Wales NSW 2052
AUSTRALIA

Mike R. Bambach, *BE, PhD*
Senior Research Fellow
Transport and Road Safety (TARS) Research
University of New South Wales
Sydney, NSW 2052
AUSTRALIA
email: m.bambach@unsw.edu.au

* Current contact details:
Associate Professor Rebecca Mitchell, Australian Institute of Health Innovation, Macquarie University NSW 2109. Tel: +61 2 9850 2321; email: r.mitchell@mq.edu.au

Appendix 1

Examples of narrative descriptions in the PHREDDS for road trauma events are shown below[1]

MVA - car collision - passenger c/o lower back pain and slightly pain to neck RT side.
MVA - car collision - driver low medium impact speed front left damage wearing seatbelt head on collision airbag deployed BIBA
MBA....driver...braked to avoid vehicle...falling onto right side...30kph approx. ... wearing helmet…. complaining of right shoulder pain...right hip pain...right ankle pain.
Pt was on push bike hit by a car starting to move…. hit by a car on the lower r leg. very minor injury.
MVA - car collision – passenger … in stationary car - hit from behind by other car - travelling approx. 80 mph. baby in capsule in back of car - remained in capsule. cried immediately on collision.
fall from bike, laceration – chin.
MVA - pedestrian hit by car travelling at approx.. 20km/hr nil head injury. lower back pain and right knee pain.
BIBA driver of single car MVA today. travelling at approx.. 60-70 km/hr. slid on wet road. car rolled x 2 ending up on its roof.
MVA - car collision - passenger front passenger wearing seatbelt travelling <60k/hr hit by car turning RT in front of them, car spun hit a pole on front LT, airbag deployed, extricated by CDA.

1 Identifying characteristics and/or vital signs of individuals at the time of presentation have been removed.

Note: Examples of common medical abbreviations are: Pt: patient; MVA: motor vehicle accident; MBA: motorbike accident; LOC: loss of consciousness; RT or R: right; LT: left; BIBA: brought in by ambulance; CDA: Central District Ambulance.