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UNINTENTIONAL
WORK-RELATED
INJURY IN VICTORIA



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Victorian Injury Surveillance Unit (VISU)
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Monash University Accident Research Centre (MUARC)

UNINTENTIONAL WORK-RELATED INJURY IN VICTORIA

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This edition of *Hazard* explores the incidence of hospital-treated injury that occurred whilst working for income, among Victorian residents aged 15 years and over, for the period 2005/6 to 2014/15. Specific attention is given to injury experienced by older workers; injury involving transportation; and sources of compensation for hospital-treated injury. A brief overview of work-related deaths over the period 2010–2012 is also included.

Findings related to ten-year trends and three-year patterns are presented to provide a comprehensive overview of the current profile and recent developments of work-related injury in Victoria.

This report is based on hospital admissions recorded in the Victorian Admitted Episodes Dataset, Emergency Department presentations recorded in the Victorian Emergency Minimum Dataset, and deaths recorded in the National Coronial Information System.

EXECUTIVE SUMMARY

This edition of *Hazard* is focused on unintentional hospital treated injuries and injury deaths that occurred whilst working for income, among Victorians aged 15 years and over. Death data were extracted from the National Coronial Information System (NCIS) for the period 2010–2012. Hospital admissions data and emergency department (ED) presentations data were extracted from the Victorian Admitted Episodes Dataset (VAED) and Victorian Emergency Minimum Dataset (VEMD), respectively, for the period 2005/6–2014/15. Broadly, the criteria for extraction were that the injury had an external cause, and that the individual was working for income when the injury occurred, as indicated by the activity code.

Over the ten-year period from 2005/6 to 2014/15, the total number and the annual rate of hospital admissions for unintentional work-related injury increased by 1.5% per year. Men comprised a larger proportion of the workforce (59.2%) and were overrepresented among hospital admissions (84.7%). However, male injury admission rates increased at a slower rate than female injury admission rates (+1.2% vs. +2.5% per year).

Labour force participation, measured in full-time equivalents (FTEs), grew for both men and women; growth was most pronounced among workers aged above 60 years, particularly among female workers aged above 60 years. Although older workers and in particular older female workers contributed to the increase in the annual number of work-related injury admissions,

rates among older workers did not increase over time. In other words, older workers made up a greater proportion of work-related injury admissions each year through increased workforce participation, but there was no evidence indicating that work-related injury risk for older workers increased over time. This was, however, the case for workers aged 20–24 years: in this age group, work-related injury rates increased over time.

Transport injuries accounted for 49.3% of work-related injury deaths; 8.4% of work-related injury admissions and 3.3% of work-related ED presentations. Consistent with overall work-related injury admissions, males were more frequently represented among work-related transport injury admissions than females, at a ratio of 4:1. Over half (54.7%) of all unintentional work-related transport-related injuries occurred on roads, streets, and highways. Over a third (34%) of work-related, transport-related admissions were residents of regional/rural Victoria.

The work-related injuries captured in this report were not limited to those covered by WorkSafe, the Victorian workers' compensation scheme. From 2012/13 to 2014/15, only two thirds of work-related injury admissions that were considered to be work-related (based on activity at the time the injury occurred) were recorded as WorkSafe Victoria patients.

OVERVIEW

Admissions: Ten-year trends, 2005/6 to 2014/15

Over the ten-year period from 2005/6 to 2014/15, there were an average of 5,570 hospital admissions for unintentional work-related injury per year of which 84.8% were males (n=47,220).

The average annual rate of work-related injury admissions was 243 per 100,000 full-time equivalents (FTEs, a measure of workforce participation); 348 per 100,000 FTEs for males and 91 per 100,000 FTEs for females.

Work-related injury admissions occurred most frequently in the 25–34 year age bracket (22.1%, n=12,134). For males, 15–19 year olds had the highest admission rates (619 per 100,000 FTE), whilst for females, the peak admission rate was observed in the 65 year and over age group (291 per 100,000 FTE).

The average change in rate was a 1.5% increase per year over the ten-year period; 2.7% for females and 1.2% for males. For males and females, workers aged 20–24 years showed the largest annual change in work-related injury admission rate with increases of 4.0% and 6.4%, respectively.

The proportion of work-related injury admissions that were recorded as WorkSafe Victoria (WSV) patients decreased from 73.3% in 2004/5 to 64.3% in 2014/15.

Admissions: Three-year patterns, 2012/13 to 2014/15

In the three-year period from 2012/13 to 2014/15, there were 18,430 admissions to Victorian hospitals for unintentional work-related injury. The majority of admissions were males (83.4%, n=15,375).

The greatest proportion of admissions were observed in the 25–34 year age group (23.1%, n=4,261) while the smallest proportion was observed in those aged 65 years and over (4.3%, n=790).

Residents of metropolitan Melbourne comprised 70.7% of admissions (n=13,038); 26.5% were from regional/rural areas (n=4,883).

Over half of all admissions (51.3%) did not have a recorded defined location at which the injury occurred. Industrial and constructions areas (14.5%, n=2,665) were the most common location of injury; 32% of these occurred in factories and plants and 29% in construction zones.

The most frequent cause of work-related injury was cutting and piercing (22.6%, n=4,167). Transport-related injuries accounted for 8.4% of admissions (n=1,544). Falls accounted for 19.5% of injuries; among those aged 55 years and over, falls accounted for 33.4% of injuries.

Fractures were the most commonly observed injury (29%, n=5,348) and accounted for 39.4% of admissions among those aged 55 years and over.

Work-related injuries most commonly affected the upper extremities (58.9%, n=10,850) followed by the lower extremities (19.0%, n=3507). Injuries to the lower extremities were proportionally more common in those aged 55 years and over (25.2%).

Almost two-thirds (65.7%, n=18,430) of hospital admissions had their costs covered by WorkSafe Victoria (WSV). This proportion dropped to 60.6% among those aged 55 years and over.

Direct costs of work-related injury hospital admissions were AU\$112.3 million over the three years, of which AU\$94.2 million (83.8%) was incurred by injuries to males. The age group 45–54 years incurred the greatest proportion of the financial burden (21.1%, AU\$24.8 million). Those aged 65 years and over accounted for 7.1% of costs (AU\$7.9 million).

Hospital beds were occupied for a total of 47,505 days, 82.4% of which were accounted for by males (n=39,143). Almost a quarter (22.6%, n=10,746) of bed days were accounted for by those aged 45–54 years, and 11.9% (n=5,666) were utilised by those aged 65 years and over.

ED presentations: Ten-year trends, 2005/6 to 2014/15

An average of 26,077 ED presentations per year for unintentional work-related injury were recorded over the ten-year period 2005/6 to 2014/15 of which 79.1% were ED presentations by males (n=206,365).

The average annual rate of ED presentations for work-related injury was 1,140 per 100,000 FTEs: 1,522 per 100,000 FTEs for males and 584 per 100,000 FTEs for females.

Overall, 26.2% (n=68,450) of ED presentations for work-related injury occurred among 25–34 year olds. Injury rates among both males and females peaked in the 15–19 year age bracket (3,769 and 1,284 per 100,000 FTEs, respectively).

Work-related injury ED presentation rates decreased by 1.8% per year over the ten-year period. Male ED presentation rates decreased by 2.0% per year and female rates decreased by 0.9% per year. The greatest statistically significant decrease was observed among males and females aged 35–44 years (3.6% and 2.1% decrease per year in ED presentation rates, respectively).

ED presentations: Three-year patterns, 2012/13 to 2014/15

There were 76,219 ED presentations for work-related injury during the three year period 2012/13 to 2014/15, of which 78% (n=59,454) were ED presentations by males.

Those aged 25–34 years contributed the largest proportion of ED presentations (27%, n=20,596) whilst workers aged 65 years and over accounted for the smallest proportion of ED presentations (2%, n=1,512).

A geographical breakdown showed that 60.2% (n=45,884) resided in metropolitan Melbourne and 36.9% (n=28,120) resided in regional/rural Victoria.

Trade and service areas were the most commonly reported locations at which work-related injuries occurred (42.3%, n=32,206). In 8.9% (n=6,765) of cases, location was not specified.

The most common cause of work-related injuries was cutting and piercing (23.5%, n=17,871). Falls accounted for 16.3% of injuries; this proportion was 28.9% among those aged 55 years and over.

Open wounds accounted for 28% (n=21,302) of injuries resulting in ED presentations.

Almost half of all injuries affected the upper extremities (46.5%, n=35,456).

The financial burden of work-related injury ED presentations during the three years amounted to AU\$30.7 million, of which 79.3% (AU\$24.3 million) was spent on males. The greatest financial burden resulted from injuries to 25–34 year olds (25%, AU\$7.6 million). Those aged 65 years and over accounted for 2.9% (AU\$ 0.9 million).

Urgent ED presentations: Ten-year trends, 2005/6 to 2014/15

Note: Urgent ED presentations are those cases triaged as 'urgent', 'emergency' or 'resuscitation required'

Over the ten year period 2005/6 to 2014/15, there were an average of 7,090 ED presentations triaged as urgent each year, with males accounting for 81.3% (n=57,662) of cases.

The average annual rate was 310 per 100,000 FTEs per year; 425 per 100,000 FTEs for males and 142 per 100,000 FTEs for females.

Overall, the 25–34 year age group comprised the largest proportion of ED presentations triaged as urgent (25.8%, n=18,311). The rate of ED presentations triaged as urgent peaked in the 15–19 year age group for both males and females (933 and 272 per 100,000 FTEs, respectively).

The annual change in rate was an increase of 0.8% per year over the ten-year period; 0.8% for males and 0.6% (not statistically significant) for females. The rate of work-related injury ED presentations triaged as urgent changed most among males and females aged 20–24 years, with annual increases of 2.9% and 3.3% , respectively.

Urgent ED presentations: Three-year patterns, 2012/13 to 2014/15

There were 23,028 ED presentations triaged as urgent during the three year period 2012/13 to 2014/15 (30.2% of all ED presentations), of which 80.8% (n=18,621) were male.

Those aged 25–34 years contributed the largest proportion of ED presentations triaged as urgent (26.3%, n=6,048) whilst workers aged 65 years and over accounted for the smallest proportion of ED presentations (2.8%, n=639).

A geographical breakdown showed that 65.4% (n=15,076) resided in metropolitan Melbourne and 31.7% (n=7,304) resided in regional/rural Victoria.

Over a third (39.8%, n=9,174) of work-related injuries resulting in ED presentations triaged as urgent occurred in trade and service areas. In 8.6% (n=1,982) of cases, a location was not specified.

The most common cause of work-related injuries was being hit, struck, or crushed (20.2%, n=4,655) followed closely by falls (18.8%, n=4,340). Among those aged 55 years and over, falls accounted for 31.3% of injuries.

Open wounds accounted for the largest proportion of ED presentations triaged as urgent (19%, n=4,381).

Over a third (38.5%, n=8,861) of all injuries affected the upper extremities.

The financial burden of ED presentations triaged as urgent totalled AU\$12.5 million; males accounted for 83.1% (AU\$10.3 million) of the total. The greatest financial burden resulted from injuries to 25–34 year olds (23.6%, AU\$2.9 million). Those aged 65 years and over accounted for 4.2% (AU\$521k).

Deaths: 2010–2012

Over the three-year period 2010–2012, 146 persons aged 15–74 years died as a result of unintentional work-related injury in Victoria.

Almost 90% of decedents were male (89.7%, n=131), and deaths were most frequently observed among those aged 45–54 years (23.3%, n=34).

Truck driver was the most commonly listed occupation among decedents (17.1%, n=25) whilst the most common activity being performed at the time of death was travelling to or from work (24.7%, n=35).

Almost half of the deaths recorded occurred in transport areas (47.9%, n=70).

Blunt force trauma was the leading mechanism of death (80.8%, n=118).

The head was the specific body region most frequently injured (28.8%, n=42) although over a third of deaths involved injuries to multiple regions (35.6%, n=52).

RECOMMENDATIONS

1.

The burden of serious fall-related injuries could be addressed by WorkSafe enforced development of a falls prevention plan for Victorian workplaces, with specific elements designed to reduce the number of fall-related injuries sustained by older workers.

2.

With the rapid increase in older workers in the Victorian workforce, increased availability of screening for age-related conditions that increase the risk of injury and injury severity is recommended. For example osteoporosis risk assessment for older workers is currently not captured in the WorkHealth program but could be driven by general practitioners.

3.

The annual increase in the number of injured older workers could warrant further research into injury rehabilitation needs of older workers: this could include physical rehabilitation as well as age tailored return to work plans and prevention of injury recurrence.

4.

Given the injury rate increases observed among younger workers, workplaces could benefit from more rigorous OHS training and supervision for new employees to prevent injuries resulting from inexperience and a lack of awareness of potential hazards in the workplace. This could also be coupled with formalised implementation of the 'buddy' system for young or inexperienced workers currently suggested by WorkSafe.

5.

The disproportionate representation of males among work-related injury cases should be addressed by injury prevention campaigns targeting male dominated occupations and industries.

6.

Workplaces with a significant proportion of vehicle centred workload could benefit from increasing training and awareness regarding safe and appropriate use of vehicles. A required minimum number of position specific training hours, to be dictated by the requirements of the role, for new employees could be mandated and enforced by WorkSafe Victoria. This training should focus on the skills required to perform a given role safely, and an understanding of the risks specific to the role and within the specific work environment.

7.

Workplaces and employers should be required to ensure that company owned vehicles are adequately maintained through scheduled maintenance programs and regular inspections in order to guarantee roadworthiness and maximise safety.

8.

Commuting injuries are currently outside the scope of Victorian workers' compensation injury prevention activities; however, a transport safety campaign (run by an organisation focussed on road safety) specifically targeting commuters could be an effective means to reduce work-related injury deaths.

9.

The gradual decrease in the proportion of work-related injury admissions that are WorkSafe patients should be further investigated: if this is due to decreased compensation claiming among those who are eligible, potential barriers should be identified and addressed.

10.

Continued improvement of hospital data collection and coding quality is required to provide more complete and accurate data on work-related injury in Victoria. This is needed to better inform the design and implementation of interventions to prevent work-related injury.

INTRODUCTION

As of June 2015, three million Victorians aged 15 years and over were engaged in some form of paid employment, accounting for 50% of the Victorian population. Job roles and workplaces can vary greatly with regard to conditions, environments and the tasks involved. This variation is reflected in variation in injury risk. Although work-related laws, regulations and policies are applied state-wide, and occupational health and safety practices (OHS) should be implemented within all workplaces, unintentional work-related injuries continue to occur, significantly impacting individuals, families, industries, and the health care system. In Victoria, Australia, the burden resulting from work-related injuries is difficult to determine precisely as WorkSafe Victoria (WSV), Victoria's workers compensation authority, does not publish statistics on *all* work-related injury. Injuries that are not captured by WSV include those incurred by (some) self-employed workers; employees of self-insured employers, which comprise approximately 10% of the Victorian workforce (WorkSafe Victoria, 2013); and employees of the Commonwealth Government of Victoria (covered by the ComCare scheme), comprising 3% of the workforce. Furthermore, non-fatal injury claims with less than 10 days' sick leave and cases involving payments below the threshold for medical expenses are not included. Lastly, injuries sustained during travel to and from the workplace are the jurisdiction of the Transport Accident Commission (TAC) and are not covered by WorkSafe Victoria. Overall, work-related injury is a broad and complex issue which not only encompasses traumatic physical injury, but also less acute chronic injuries and mental health conditions. However, this edition of *Hazard* will focus only on hospital-treated physical injuries and injury deaths.

Recent trends in work-related injuries and the burden of injury are of particular interest as they are likely to be impacted by workforce ageing. The proportion of Australia's population that is between 15–64 years of age remained stable between 1995 (66.6%) and 2015 (66.2%) (ABS, 2016a); however, during the same period, the proportion of Australia's population that was aged 65 years and over increased from 12% to 15% (ABS, 2016a), and Victoria's median age increased from 33 to over 36 years. An ageing population, in combination with factors such as the recent delay of pension qualification and discretionary prolonging of working years, means that current workers will be exposed to the risk of workplace injury for longer than previous cohorts. Whilst there is no set retirement age in Australia, Australians are unable to access superannuation prior to reaching the age of 60 years, and they are ineligible for the Age Pension prior to 65 years. However, legislation passed in 2009 will effectively increase the retirement age of many Australians from 65 to 67 years over a seven year period from 2017 to 2023, by lifting the Age Pension qualifying age in six-month increments. According to the ABS, attitudes favouring voluntary delay of retirement are becoming more common, with 23% of persons aged 45 years and over not intending to retire before reaching 70 years of age (ABS, 2016b).

A second focus of interest for this edition of *Hazard* is work-related transport injuries. Over 30% of vehicles registered in Australia are used for work-related purposes and evidence suggests that more people are injured in or by work-related vehicles than vehicles for private use (Newnam et al, 2016).

This includes injuries that occur travelling to and from work, whilst working, and as a result of another person's work-related activity (bystander injuries). Injuries can occur in a variety of ways including a failure to drive safely within the environmental conditions (e.g., rain, glare), pedestrian lack of awareness (often in the case of road maintenance and construction workers), improperly restrained cargo and lack of vehicle maintenance (Stuckey, 2012). Transport safety in Victoria has been the target of a large number of campaigns over the last few decades including campaigns such as the TAC's 'Wipe off 5' campaign, aimed at encouraging drivers to reduce their speed on roads, and Metro Trains' 'Dumb Ways to Die' campaign, targeting safety around trains. Despite the natural tendency to only consider cars, motorcycles and heavy transport vehicles, several other modes of transport are involved in work-related transport injuries each year including boats, tractors, and animals, i.e. horses. Under OHS laws, modes of transport used for work purposes are considered as part of the workplace and, therefore, employers and employees have a duty of care to ensure safe transport usage (OHS Act, 2004). Efforts to reduce the number of work-related transport injuries (and fatalities) have sought to inform employers and employees of their responsibilities regarding factors such as maintenance of transport vehicles, selection of vehicles based on safety features and ratings, safe and lawful usage of transport vehicles, reporting of potential vehicular issues, as well as general understanding of hazards and risks involved in carrying out work-related tasks pertaining to transportation. Work-related transport injuries in Australia result in a greater average time lost due to worker absence than any other type of workplace claim, and result in an estimated compensation amount of approximately \$500 million per year (Centre for Accident Research and Road Safety — Queensland, 2014). The purpose of this report is to provide an overview of unintentional work-related injury in Victoria, 2005/6–2014/15, as captured by hospital admissions and emergency department (ED) presentations records and death data for the period 2010–2012. Specifically addressing topics of interest, the aims are:

- To distinguish patterns of compensable and non-compensable work-related injury admissions;
- To provide insight into work-related transport injuries, including injuries that occurred during commuting to and from work;
- To explore the effect of workforce ageing on work-related injury, by comparing injury rates and trends for older adult workers with those of their younger counterparts.

Work-related injury data covered in this report came from two primary VISU-held, Department of Health and Human Services (DHHS) sources: the hospital admissions dataset, known as the Victorian Admitted Episodes Dataset (VAED), and the ED presentations dataset, known as the Victorian Emergency Minimum Dataset (VEMD). Additionally, data on deaths resulting from unintentional work-related injuries were sourced from the National Coronial Information System (NCIS).

INFOGRAPHIC



84.8%

OF HOSPITAL ADMISSIONS WERE MALE 2005/6–2014/15

Work-related injury was more common among males than females: 84.8% of hospital admissions and 79.1% of ED presentations for unintentional work-related injury over this time period were males

HIGHEST ADMISSION RATES 2005/6–2014/15



15–19 yo MEN

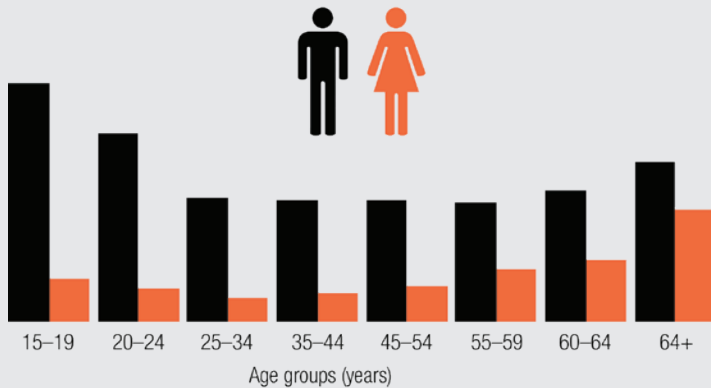


65+ yo WOMEN

Among males, work-related injury admission rates were highest in the 15–19 year age group; among females, admission rates were highest in the 65+ year age group

AVERAGE ANNUAL HOSPITAL ADMISSIONS

Work-related injury 2005/6 to 2014/15, Victoria



UP 2.7% PER YEAR FOR FEMALES

UP 1.5% PER YEAR FOR MALES

Between 2005/6 and 2014/15, work-related injury admissions rates increased by 2.7% per year for females and 1.5% per year for males

2012/13 – 2014/15



Broken bones

Bone fractures were the most commonly observed type of injury (29% of injuries resulting in admission, n=5,348) in 2012/13 to 2014/15. Fractures accounted for 23.4%, 30.0% and 39.4% of work-related injury admissions among injured workers aged 15–34 years, 35–54 years and 55 years and over, respectively



Falls

A third (33.4%) of injuries resulting in admission suffered by those aged 55 and over were the result of falls, compared to 19.7% for 35–54 year olds and 12.9% for 15–34 year olds.



Cost

The cost of work-related injury hospital admissions were AU\$112.4 million over the three years 2012/13–2014/15; males accounted for 83.8% of the cost.



Deaths

Over 2010–2012, 146 people aged 15–74 died as a result of unintentional work related injury: 131 (90%) were male and 25 (17.1%) were truck drivers

25% of deaths occur whilst driving to or from work



Health and Human Services

The Victorian Injury Surveillance Unit (VISU) is a unit within the Monash University Accident Research Centre (MUARC). VISU is supported by the Victorian Government.

Table 1

Labour force participation, work-related injury admissions and work-related injury Emergency Department presentations, 2005/6–2014/15

	Labour force participation		Admissions 2005/6 to 2014/15			ED presentations 2005/6 to 2014/15			ED presentation, urgent [∞] 2005/6 to 2014/15		
	FTEs, average (x1000)	Average annual change in FTEs (%)	Total	Average annual rate per 100,000 FTEs	Average annual change in rate (%) [*]	Total	Average annual rate per 100,000 FTEs	Annual rate, change over time (%)	Total	Average annual rate 100,000 FTEs	Annual rate, change over time (%)
Males											
15–19 yr	46.5	-2.7	2882	619	+1.8 [0.1, 3.6]†	17542	3769	-1.6 [-2.9, -1.2]†	4343	933	+1.6[-0.4, 3.6]
20–24 yr	127.4	-0.1	6242	490	+4.0 [2.5, 5.4]§	35711	2803	+0.0 [-1.2, 1.1]	9157	719	+2.9 [1.0, 4.9]‡
25–34 yr	332.4	+2.0	10838	326	+1.7 [0.7, 2.7]‡	55855	1681	-2.4 [-3.1, -1.8]§	15023	452	+0.1 [-0.9, 1.2]
35–44 yr	330.8	+0.5	10407	315	-0.3 [-1.2, 0.6]	44423	1343	-3.6 [-4.1, -3.1]§	12638	382	-0.8 [-1.4, -0.1]†
45–54 yr	296.4	+1.0	9338	315	+1.2 [0.1, 2.3]†	32432	1094	-1.5 [-2.2, -0.9]§	9681	327	+1.5 [0.7, 2.4]
55–59 yr	112.4	+3.1	3478	309	+0.2 [-1.9, 2.3]	10529	937	-2.0 [-2.9, -1.0]§	3328	296	+1.1 [-0.5, 2.9]
60–64 yr	71.6	+5.0	2459	343	+0.9 [-1.1, 3.1]	6540	913	-0.6 [-1.6, 0.4]	2207	308	+1.5 [0.2, 2.8]†
65+ yr	38.1	+13.3	1576	413	-0.2 [-3.1, 2.8]	3333	874	-3.3 [-5.1, -1.6]	1285	337	+0.6 [-2.4, 3.8]
Total males	1355.6	+1.8	47220	348	+1.2 [0.7, 1.8]§	206365	1522	-2.0 [-2.4, -1.6]§	57662	425	+0.8 [0.3, 1.4]‡
Females											
15–19 yr	36.3	-2.5	411	113	+3.6 [-1.2, 8.5]	4665	1284	-1.4 [-3.5, 0.7]	987	272	+2.3 [0.0, 4.6]
20–24 yr	108.2	-0.1	938	87	+6.4 [2.2, 10.9]‡	8973	829	+0.3 [-1.0, 1.6]	2140	198	+3.3 [0.9, 5.8]‡
25–34 yr	236.0	+3.0	1476	63	+2.9 [0.3, 5.6]†	12595	534	-1.3 [-1.8, -0.7]§	3288	139	-0.7 [-2.6, 1.2]
35–44 yr	208.7	+1.1	1537	74	+1.4 [0.0, 2.8]	10250	491	-2.1 [-2.8, -1.4]§	2489	119	-2.2 [-3.7, -0.6]‡
45–54 yr	216.6	+1.8	2069	96	+1.7 [-0.5, 4.0]	11199	517	-0.7 [-1.3, 0.0]†	2636	122	+1.3 [0.3, 2.4]†
55–59 yr	74.2	+3.5	1023	138	+3.8 [2.1, 5.6]§	3904	526	+1.1 [-0.2, 2.6]	971	131	+3.0 [-1.1, 7.3]
60–64 yr	38.6	+13.3	626	162	+2.7 [-1.9, 7.4]	2089	541	-0.5 [-3.0, 2.1]	504	130	+2.2 [-2.1, 6.7]
65+ yr	13.7	+28.3	399	291	-1.4 [-6.4, 3.8]	734	534	-2.5 [-8.8, 4.1]	228	166	-1.2 [-8.1, 6.3]
Total females	932.4	+2.1	8479	91	+2.7 [1.6, 3.7]§	54409	584	-0.9 [-1.4, -0.4]	13243	142	+0.6 [-0.3, 1.6]
Total	2288	+1.8	55699	243	+1.5 [0.6, 2.4]‡	260774	1140	-1.8 [-2.3, -1.2]§	70905	310	+0.8 [0.3, 1.3]‡

^{*}Based on Poisson loglinear models, adjusted for age group and sex; †p<0.05; ‡p<0.01; ||p<0.001; §p<0.0001; [∞]cases triaged as urgent, emergency or resuscitation required





HOSPITAL ADMISSIONS

Ten-year trends, 2005/6–2014/15

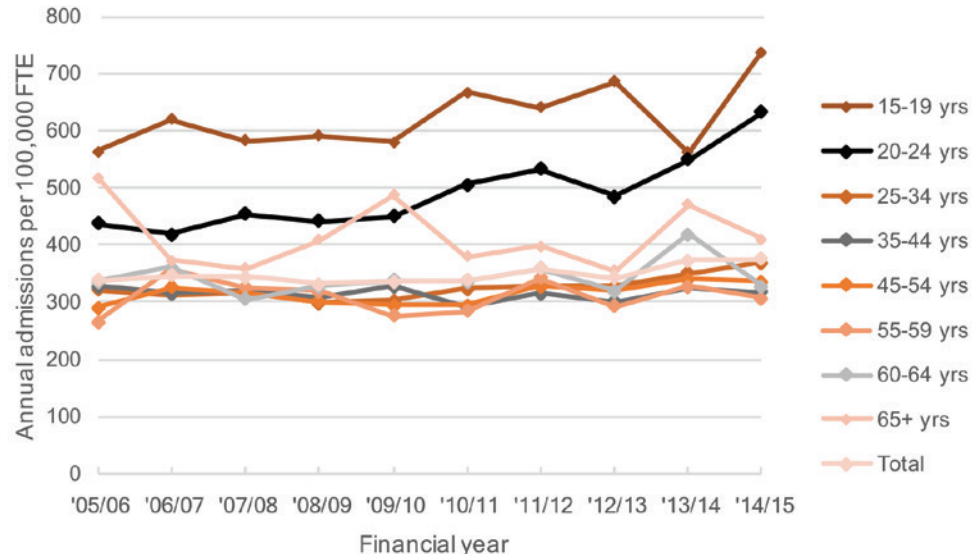
Over the ten-year study period 2005/6 to 2014/15, there were on average 5,570 admissions for unintentional work-related injury per year (Table 1). Males were overrepresented, accounting for 84.8% of admissions ($n=47,220$). Work-related injury admissions occurred most commonly in workers in the 25–34 (22.1%, $n=12,314$) and 35–44 (21.4%, $n=11,944$) year age groups.

Workforce participation and annual change are also shown in Table 1; workforce participation is expressed in full-time equivalents (FTEs), a measure of total workload by employed persons. Workforce participation in Victoria during the ten years was overall greater among men than women (1355.6 vs. 932.4 x 1000 FTEs, respectively). FTEs increased during this period by 1.8% per year for men and 2.1% per year for women. In both sexes, increases were greatest in the age groups 60–64 years and 65 years and over. The single greatest increase was observed among women aged 65 years and over, with an average increase in FTEs of 28% per year. In both sexes, FTEs decreased slightly in the age groups 15–19 and 20–24 years.

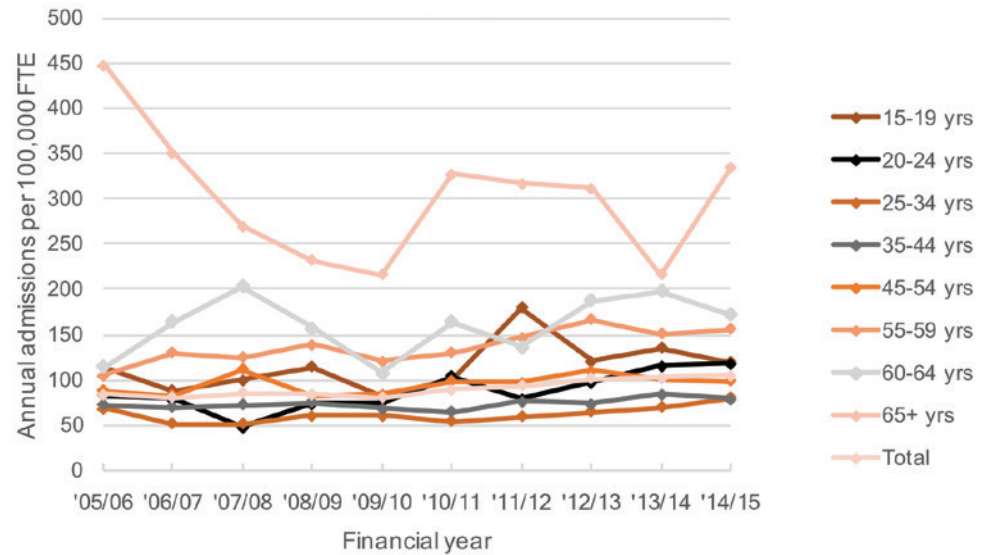
Taking workforce participation into account by calculating annual work-related injury admissions per 100,000 FTEs, overrepresentation of males remained pronounced (348 versus 91 admissions per 100,000 FTEs for males vs. females). The overall average rate was 243 work-related injury admissions per 100,000 FTEs. The peak injury rate for males occurred in the 15–19 year age bracket with an average annual admission rate of 619 per 100,000 FTEs. In the female working population, older age groups experienced higher injury rates peaking at an average rate of 291 per 100,000 FTEs for females aged 65 years and over. The lowest observed injury rates for males occurred in the 55–59 year age bracket (309/100,000 FTEs) whilst for females the lowest injury rates were observed in the 25–34 year age group (63/100,000 FTEs). During the ten-year period, the work-related injury admission rate increased significantly by 1.5% per year; the observed rate of change was greater for females (2.7%) than males (1.2%). However, in both cases, the rates fluctuated over that period (Figure 1, top panel, bottom panel). The greatest annual change in rate was observed among females aged 20–24 years (6.4%) (Table 1). This result was mirrored for males with the greatest average annual change in rate being a 4.0% increase to admission rates seen among those aged 20–24 years. Despite females aged 65 years and over having the highest average annual rate of injury admissions, the rate dropped by 1.4% per year over the ten-year period (not statistically significant). The only other groups to experience a reduction in the average annual injury rate over this period were males aged 35–44 years (-0.3%) and 65 years and over (-0.2%); both not statistically significant. During the ten-year period, the proportion of work-related injury admissions that occurred in the age groups of 55 years and over increased from 14.4% in 2005/6 to 18.1% in 2014/15 (Figure 2).

Figure 1

Males



Females



The annual rate of work-related injury admissions by sex per 100,000 full-time equivalents (FTE) in Victoria, 2005/06 to 2014/15.

Figure 2

Proportion of hospital treated injuries by those aged 55+ years

Proportion of hospital treated injuries per financial year by those aged 55 years and over, Victoria, 2005/6 to 2014/15

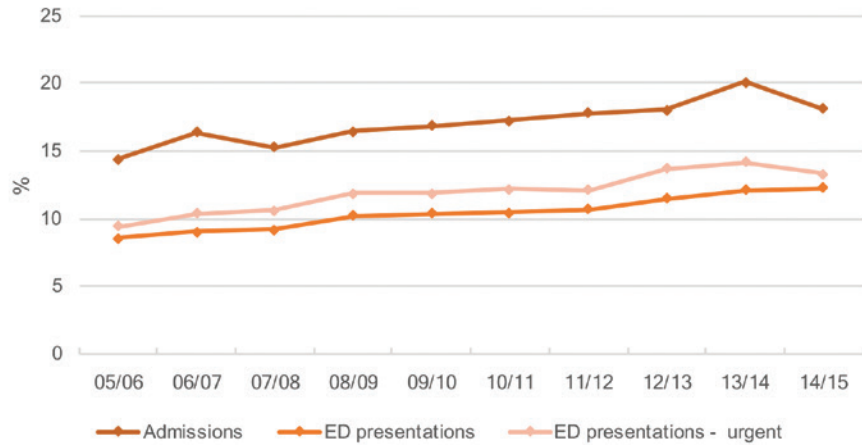
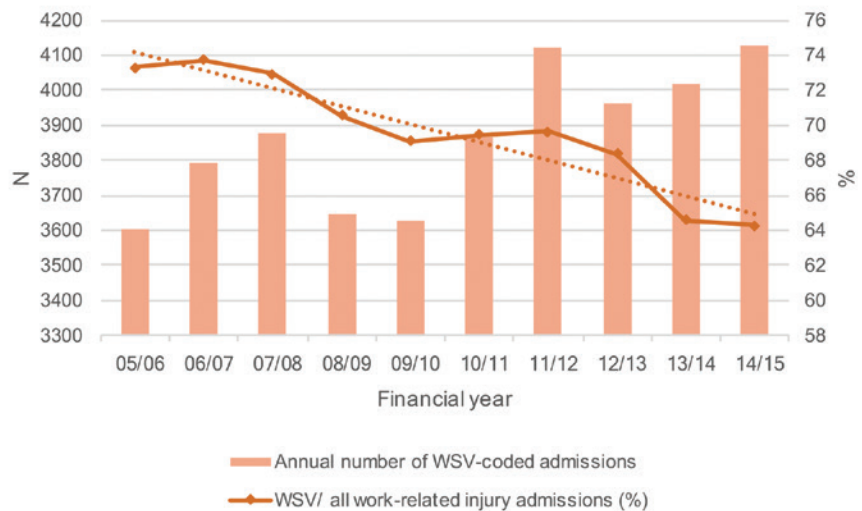


Figure 3

WorkSafe Victoria (WSV)

The annual number of injury admissions recorded as WSV (WorkSafe Victoria), and the annual percentage of work-related injury admissions that were coded as WSV.



In 2005/6, 73.3% of work-related injury hospital admissions in Victoria were recorded as WSV patients (i.e. patient type was coded as WorkSafe Victoria). This proportion steadily decreased to 64.3% in 2014/15 (Figure 3). During this ten-year period, the number of WSV injury admissions increased from 3602 to 4126 (1.6% per year), but the overall number of work-related injury admissions increased more steeply from 4914 to 6418 (3.4% per year) (Figure 3).

During the 10-year period, on average 69% of work-related injury admissions were WSV patients, only 1.1% were Transport Accident Commission (TAC) patients and the remaining 30% were public (22%), private (7%), ineligible (0.5%), other compensable (0.3%) or Department of Veterans Affairs (0.1%). N.B. In interpreting the low number of TAC patients, the selection of cases (injury admissions with activity='working for income' OR patient status=WSV) should be kept in mind.

Of the work-related injury admissions where the patient status was neither TAC nor WSV, the injury causes were varied: 51% were caused by exposure to inanimate mechanical forces, 23% by falls, 6% by overexertion, travel and private, 5% by accidental exposure to other and unspecified factors, 4% by exposure to animate mechanical forces and the remaining 12% of cases were due to other causes.

Three-year patterns, 2012/13–2014/15

Over the three year period 2012/13–2014/15, there were a total of 18,430 admissions to Victorian hospitals for unintentional work-related injuries, of which 97.2% (n=17,921) were Victorian residents while 70.7% (n=13,038) were from the metropolitan Melbourne area (Table 2). Males accounted for 83.4% (n=15,375) of work-related injury admissions resulting in a male-to-female ratio of approximately 5:1.

Hospital admissions broken down by age group were generally reflective of workforce participation, with 23.1% (n=4,261) of those admitted aged 25–34 years (Table 2). The next highest figure was observed within the 45–54 year age bracket (20.2%, n=3,728) followed by those aged 35–44 years (19.9%, n=3,667). Workers aged 65 years and over accounted for 4.3% of admissions (n=790).

Table 2

Work-related injury admissions and Emergency Department presentations by year and demographics in Victoria, 2012/13 to 2014/15

Characteristics	Hospital admissions (VAED)		ED presentations (VEMD)		ED presentations – urgent* (VEMD)	
	N	%	N	%	N	%
Year						
2012/13	5798	31.5	25449	33.4	7452	32.4
2013/14	6214	33.7	25218	33.1	7695	33.4
2014/15	6418	34.8	25552	33.5	7891	34.3
Sex						
Male	15375	83.4	59454	78.0	18621	80.8
Female	3055	16.6	16765	22.0	4417	19.2
Age groups						
15–19 years	922	5.0	5470	7.2	1513	6.6
20–24 years	2397	13.0	13310	17.5	3771	16.4
25–34 years	4261	23.1	20596	27.0	6048	26.3
35–44 years	3667	19.9	14853	19.5	4524	19.6
45–54 years	3728	20.2	12895	16.9	4023	17.5
55–59 years	1547	8.4	4645	6.1	1546	6.7
60–64 years	1118	6.1	2938	3.9	974	4.2
65+ years	790	4.3	1512	2.0	639	2.8
Geographic region						
Melbourne Metropolitan Area	13038	70.7	45884	60.2	15076	65.4
Regional/Rural Victoria	4883	26.5	28120	36.9	7304	31.7
Interstate/Overseas/Unknown	509	2.8	2215	2.91	658	2.9

* Cases triaged as urgent, emergency or resuscitation required

Table 3

Work-related injury admissions and Emergency Department presentations by injury type, Victoria, 2012/13 to 2014/15

Injury type	Hospital admissions (VAED)		ED presentations (VEMD)		ED presentations – urgent (VEMD)*	
	N	%	N	%	N	%
Fracture	5348	29.0	7253	9.5	2772	12.0
Open wound	3816	20.7	21302	28.0	4381	19.0
Injury to muscle & tendon	2249	12.2	3547	4.7	912	4.0
Dislocation, sprain & strain	1445	7.8	11896	15.6	2823	12.3
Traumatic amputation	940	5.1	677	0.9	545	2.4
Injury to nerves & spinal cord	682	3.7	250	0.3	111	0.5
Superficial injury	522	2.8	6900	9.1	1485	6.5
Injury to blood vessels	514	2.8	127	0.2	52	0.2
Intracranial injury	447	2.4	720	0.9	464	2.0
Burns	419	2.3	2516	3.3	1106	4.8
Systemic-poisoning/toxic effects	177	1.0	508	0.7	248	1.1
Other effects of external cause/ complications/late effects	172	0.9	967	1.3	655	2.8
Crushing injury	150	0.8	2751	3.6	1071	4.7
Injury to internal organs	134	0.7	146	0.2	101	0.4
Eye injury excl. foreign body	119	0.7	3709	4.9	2040	8.9
Foreign body	20	0.1	7780	10.2	2092	9.1
Other & unspecified injury	1276	6.9	5170	6.8	2180	9.5

* Cases triaged as urgent, emergency or resuscitation required

The most common types of work-related injuries in the admissions data were fractures (29%, n=5,348), open wounds (20.7%, n=3,816), and injuries to muscles and tendons (12.2%, n=2,249) (Table 3). Taking age into account, 39.4% of admissions of those aged 55 years and over were a result of fractures compared to 30.0% for the 35–54 year age group and 23.4% for those aged 15–34 years (Figure 4). Open wounds accounted for 25.6% of admissions among 15–34 year olds, 18.8% of admissions among 35–54 year olds, and 14.1% of admissions among those aged 55 years and over.

Data regarding the location at which work-related injuries occurred was not well-defined: 51.3% of cases had 'unspecified' place of occurrence (Table 4). Industrial and construction areas (14.5%, n=2,665), and trade and service areas (12.1%, n=2,231) were the most frequently recorded locations at which work related injuries occurred. Looking further into these figures, of the work-related injury hospital admissions recorded as occurring in trade and service areas, 40% were coded as having occurred in an unspecified trade or service area, 21% occurred within a shop or store, 18% in cafes, hotels or restaurants, 14% were designated as occurring in an 'other specified trade and service area', 5% in a commercial garage, and 2% in an office building. Of injuries occurring within industrial and construction areas, 32% occurred in a factory or plant, 30% in an unspecified industrial or construction area, 29% took place in a construction zone, 6% in an 'other specified industrial or construction area', and less than 1% in each of: mines or quarries, demolition sites, shipyards, power stations, and oil and gas extraction sites.

The cause of work related injuries was varied. The most common cause observed was cutting and piercing (22.6%, n=4,167) (Table 5). Falls were the second most commonly observed cause of work related injuries (19.5%, n=3,590) and included incidents such as tripping over an object or falling from height (e.g., ladders). Being hit, struck, or crushed was the next most frequent cause of work related injury (13.7%, n=2,515) followed by unspecified causes (10.9%, n=2,015) and machinery inflicted injuries (10.6%, n=1,544). Transport was the cause of 8.4% of injuries (n=1,544). Age breakdown of the results showed that 33.4% of injuries suffered by those aged 55 years and over were the result of falls: proportionally more than for those aged 35–54 (19.7%) and 15–34 years (12.9%) (Figure 5). Conversely, 31.7% of injuries to 15–34 year olds were the result of cutting or piercing, compared to 18.5% for 35–54 year olds and 12.2% for those aged 55 years and over.

Figure 4

Hospital admissions Injury type by age group

Proportions of hospital admissions for work-related injury (Victoria, 2012/13 to 2014/15): injury type per age group

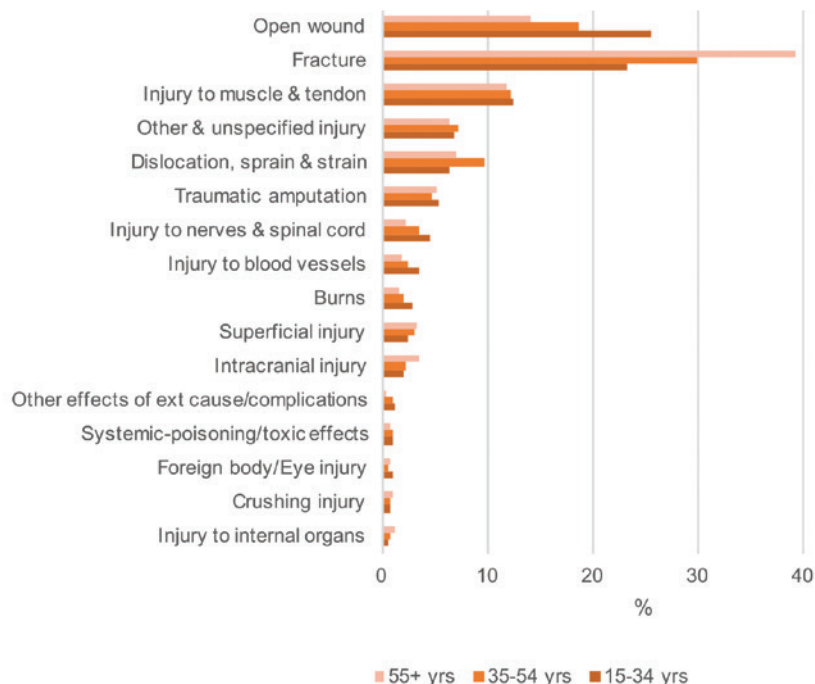


Table 4

Work-related injury admissions and Emergency Department presentations by place of occurrence, Victoria, 2012/13 to 2014/15

Place of occurrence	Hospital admissions (VAED)		ED presentations (VEMD)		ED presentations – urgent (VEMD)*	
	N	%	N	%	N	%
Industrial and constructive area	2665	14.5	15644	20.5	4683	20.3
Trade and service area	2231	12.1	32206	42.3	9174	39.8
Street and highway	954	5.2	2970	3.9	1557	6.8
School, other institution and public administrative area	942	5.1	5011	6.6	1335	5.8
Other specified place of occurrence	684	3.7	6883	9.0	2037	8.8
Farm	657	3.6	2463	3.2	884	3.8
Home	472	2.6	3254	4.3	1035	4.5
Sports and athletic area	294	1.6	476	0.6	196	0.9
Residential institution	80	0.4	547	0.7	155	0.7
Unspecified place of occurrence	9451	51.3	6765	8.9	1982	8.6

* Cases triaged as urgent, emergency or resuscitation required

Table 5

Work-related injury admissions and Emergency Department presentations by cause/
mechanism, Victoria, 2012/13 to 2014/15

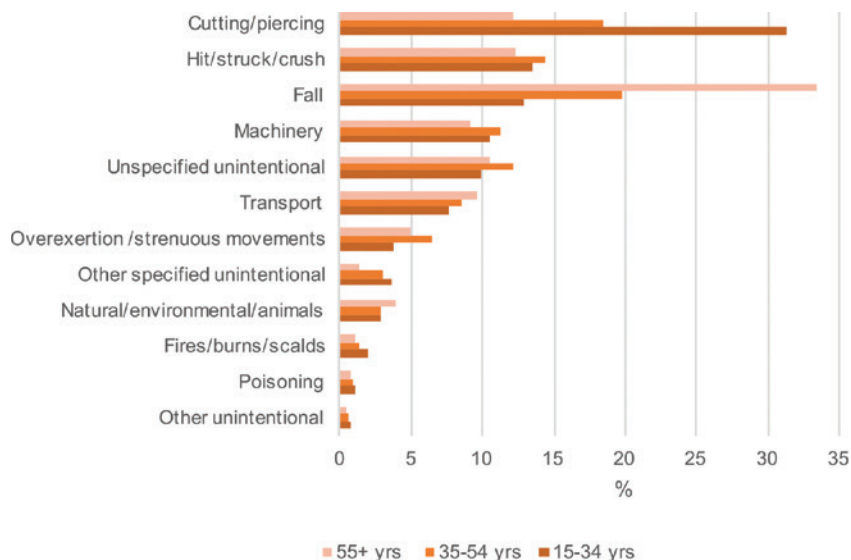
Cause (mechanism)	Hospital admissions (VAED)		ED presentations (VEMD)		ED presentations – urgent (VEMD)‡	
	N	%	N	%	N	%
Cutting/piercing	4167	22.6	17871	23.5	3813	16.6
Fall	3590	19.5	12447	16.3	4340	18.8
Hit/struck/crush	2515	13.7	16889	22.2	4656	20.2
Unspecified unintentional	2015	10.9	3837	5.0	990	4.3
Machinery	1950	10.6	2640	3.5	1129	4.9
Transport	1544	8.4	2476	3.3	1617	7.0
Overexertion / strenuous movements	947	5.1	n/a		n/a	
Natural/environmental/animals	572	3.1	2146	2.8	976	4.2
Other specified unintentional	549	3.0	8281	10.9	2361	10.3
Fires/burns/scalds	292	1.6	2850	3.7	1390	6.0
Poisoning	178	1.0	317	0.4	201	0.9
Explosions/firearms	60	0.3	6	0.0		
Foreign body – natural orifice	45	0.2	6398*	8.4	1529†	6.6
Choking/suffocate	6	0.0	50	0.1		
Drowning/near drowning	0	0.0	11	0.0		

*Foreign body-eye 97%; foreign body-respiratory tract 1.8%; foreign body-ear 0.8%; foreign body –alimentary tract 0.5%; foreign body genitourinary tract 0.1%. † Foreign body-eye 96%; foreign body-respiratory tract 2.9%; foreign body –alimentary tract 0.7%; foreign body-ear 0.5%. ‡Cases triaged as urgent, emergency or resuscitation required

Figure 5

Hospital admissions Cause (mechanism) by age group

Proportions of hospital admissions for work-related injury (Victoria, 2012/13 to 2014/15): injury cause (mechanism) per age group



The majority of work-related injury admissions were the result of injuries sustained to the upper extremities (58.9%, n=10,850) which includes the upper arm, elbow, lower arm, wrist, hand, and digits (Table 6). Injuries to the lower extremities, which include the upper leg, knee, lower leg, ankles, feet, and toes, accounted for 19% (n=3,507) of cases. Among those aged 55 years and over, 25.2% of injuries were to the lower extremities, compared to 19.7% for those aged 35–54, and 15.6% for those aged 15–34 years (Figure 6). The opposite pattern was observed for injuries to the upper extremities with 64% of injuries among those aged 15–34 years affecting this region compared to 57.6% for the 35–54 year age group and 50.3% for those aged 55 years and over.

Table 6

Work-related injury admissions and Emergency Department presentations by main body region injured, Victoria, 2012/13 to 2014/15

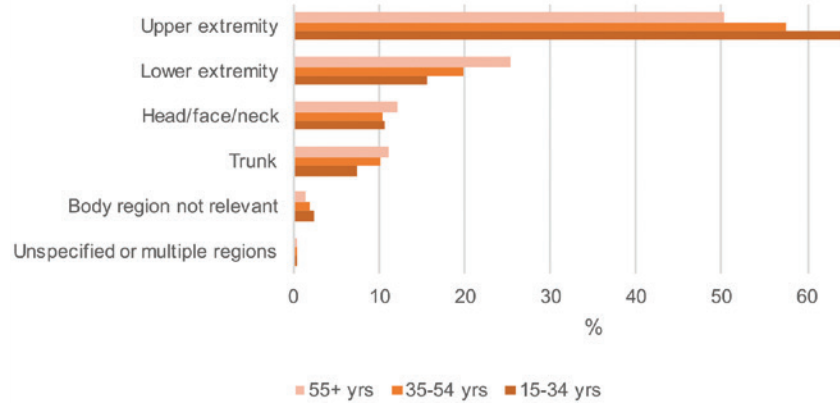
Body region	Hospital admissions (VAED)		ED presentations (VEMD)		ED presentations – urgent (VEMD)*	
	N	%	N	%	N	%
Upper extremity	10850	58.9	35456	46.5	8861	38.5
Lower extremity	3507	19.0	14036	18.4	2976	12.9
Head/face/neck	1967	10.7	17368	22.8	6563	28.5
Trunk	1687	9.2	4109	5.4	1713	7.4
Body region not relevant	349	1.9	1228	1.6	781	3.4
Unspecified or multiple regions	70	0.4	4022	5.3	2144	9.3

*Cases triaged as urgent, emergency or resuscitation required

Figure 6

Hospital admissions Body region by age group

Proportions of hospital admissions for work-related injury (Victoria, 2012/13 to 2014/15): main body region injured per age group



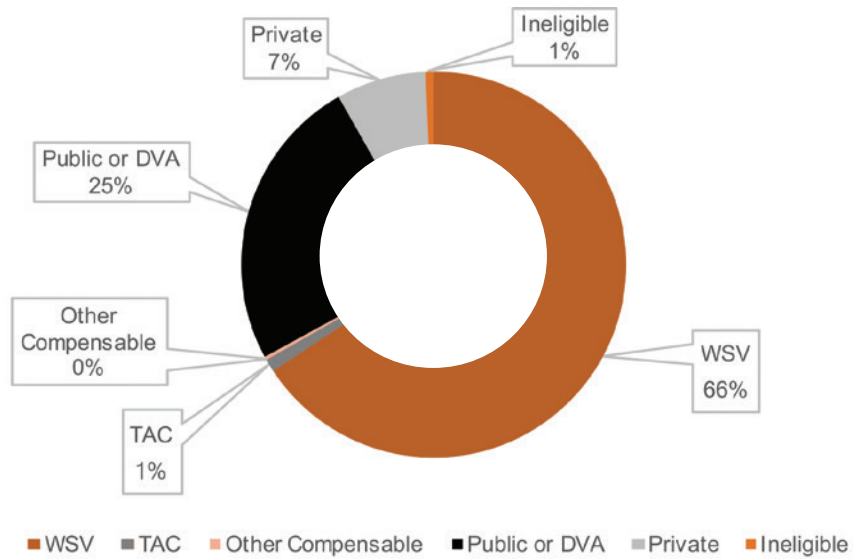
The most common work-related injuries resulting in hospital admission are listed in Table 8. Given the large proportion of injuries involving the upper extremities, it is unsurprising that the most common four specific injuries involved the wrist and hand: open wound of wrist and hand (14.1%, n=2,604), fracture of wrist and hand (10%, n=1,837), muscle and tendon injury at wrist and hand level (5.8%, n=1,067), and traumatic amputation at wrist and hand level (5%, n=915) (Table 8). The most common type of amputation was a single finger amputation, accounting for 71.1% of all amputations at the wrist and hand level. The ten most commonly occurring injuries together accounted for 54.9% of all work-related injury hospital admissions.

The direct burden of work-related injury admissions falls to a number of parties. Of the 18,430 hospital admissions for work-related injury, almost two-thirds (65.7%) were classified as WorkSafe Victoria (WSV) patients (Figure 7). A quarter (24.7%) of admissions were public patients, 7.6% were private patients, 1.1% were Transport Accident Commission (TAC) patients, 0.3% had the status of 'other compensable', whilst 0.1% were covered by the Department of Veterans' Affairs (DVA). The remaining 0.7% were ineligible for benefits or compensation for the injury sustained. Of those with work-related injury admissions, WSV compensable status was less common with increasing age: 68% of 15–34 year olds, 65.7% of 35–54 year olds, and 60.6% of those aged 55 and over.

Figure 7

Hospital admissions By patient type

Proportions of hospital admissions for work-related injury (Victoria, 2012/13 to 2014/15) by patient type. WSV=WorkSafe Victoria; TAC= Transport Accident Commission; DVA=Department of Veterans' Affairs.



In total, \$112.3 million in hospital costs was spent on work-related injury admissions of which \$94 million (83.8%) was used to cover injuries to males (Table 7). The age group breakdown shows that costs were highest in the 45–54 year age group (21.1%, \$24.8 million) followed closely by the 25–34 (19.6%, \$22.1 million) and the 35–44 year age groups (18.8%, \$21.1 million). Those aged 65 years and over accounted for 7.1% of hospital costs (\$7.9 million) despite accounting for only 4.3% of admissions. Hospital beds were occupied for 47,505 days; females accounted for only a small proportion of hospital bed days (17.6% n=8,362 vs. 82.4% n=39,143 for females and males, respectively) (Figure 8). These burden of injury figures are aligned with the overall male/female injury proportions. Broken down by age group, the greatest proportion of hospital bed days were used by the 45–54 year age group (22.6%, n=10,746). Notably, whilst accounting for just 4.3% of admissions, the 65 years and over age group accounted for 11.9% (n=5,666) of bed days.



Table 7

Summed costs of work-related injury admissions, Emergency Department presentations and Emergency Department presentations triaged as urgent by sex by age group, Victoria, 2012/13 to 2014/15

	Admissions N=20,142 episodes*		ED presentations N=76,560†		ED presentations – urgent N= 23,056†	
	AU\$	%	AU\$	%	AU\$	%
Males						
15–19 yrs	4,075,650	3.6	1,522,772	5.0	554,966	4.5
20–24 yrs	10,199,903	9.1	3,944,260	12.9	1,477,854	11.9
25–34 yrs	18,905,166	16.8	6,258,697	20.4	2,456,796	19.7
35–44 yrs	18,197,727	16.2	4,907,270	16.0	2,095,755	16.8
45–54 yrs	20,782,341	18.5	4,316,912	14.1	1,987,661	16.0
55–59 yrs	9,115,460	8.1	1,580,014	5.1	783,022	6.3
60–64 yrs	6,498,621	5.8	1,086,423	3.5	537,817	4.3
65+ yrs	6,380,150	5.7	716,032	2.3	445,089	3.6
Total — males	94,155,018	83.8	24,332,380	79.3	10,338,960	83.1
Females						
15–19 yrs	616,861	0.5	412,531	1.3	127,656	1.0
20–24 yrs	1,487,240	1.3	971,357	3.2	330,055	2.6
25–34 yrs	3,151,208	2.8	1,421,542	4.6	483,420	3.9
35–44 yrs	2,882,546	2.6	1,098,974	3.6	359,256	2.9
45–54 yrs	4,028,088	3.6	1,337,386	4.4	420,794	3.4
55–59 yrs	2,675,208	2.4	574,671	1.9	199,877	1.6
60–64 yrs	1,838,692	1.6	359,959	1.2	121,133	1.0
65+ yrs	1,546,225	1.4	173,443	0.6	75,990	0.6
Total — females	18,226,068	16.2	6,349,863	20.8	2,118,181	17.0
Total	112,381,085	100	30,682,246	100	12,457,142	100

* Includes admissions classified as statistical admission (change in care type within the same hospital) and transfer from acute/extended care, rehabilitation or geriatric centre; † includes planned return visits and pre-arranged admissions.

Figure 8

Summed length of stay (bed days) of work-related injury

Summed length of stay (bed days) of work-related injury admissions in Victoria, 2012/13 to 2014/15. Results are shown by sex and age group.

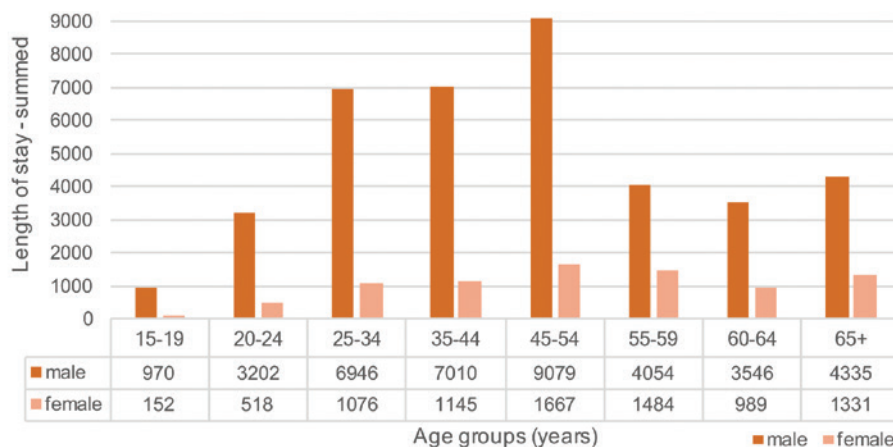


Table 8

Work-related injury admissions and Emergency Department presentations by injury type, Victoria, 2012/13 to 2014/15

	Hospital admissions (VAED)		ED presentations (VEMD)		ED presentations – urgent (VEMD) †				
	N	%	N	%	N	%			
1	Open wound of wrist and hand	2604	14.1	Open wound of wrist and hand	14043	18.4	Open wound of wrist and hand	2550	11.1
2	Fracture at wrist and hand level	1837	10.0	Foreign body on external eye	6490	8.5	Injury of eye and orbit	1952	8.5
3	Injury of muscle and tendon at wrist and hand level	1067	5.8	Injury of eye and orbit	3531	4.6	Foreign body on external eye	1611	7.0
4	Traumatic amputation of wrist and hand	915*	5.0	Dislocation, sprain and strain of joints and ligaments at ankle and foot level	3037	4.0	Injury of unspecified body region	916	4.0
5	Fracture of lower leg, including ankle	878	4.8	Fracture at wrist and hand level	2918	3.8	Fracture at wrist and hand level	840	3.7
6	Fracture of forearm	814	4.4	Open wound of head	2853	3.7	Crushing injury of wrist and hand	762	3.3
7	Injury of nerves at wrist and hand level	548	3.0	Superficial injury of wrist and hand	2709	3.6	Dislocation, sprain and strain of joints and ligaments of shoulder girdle	673	2.9
8	Dislocation, sprain and strain of joints and ligaments of knee	528	2.9	Injury of unspecified body region	2224	2.9	Open wound of head	670	2.9
9	Injury of muscle and tendon at shoulder and upper arm level	467	2.5	Dislocation, sprain and strain of joints and ligaments at wrist and hand level	2164	2.8	Effects of other external causes	636	2.8
10	Other and unspecified injuries of abdomen, lower back and pelvis	465	2.5	Crushing injury of wrist and hand	2007	2.6	Traumatic amputation of wrist and hand	585	2.5

*Traumatic amputation of other single finger (complete)(partial) n=651; traumatic amputation of thumb (complete)(partial) n=170; traumatic amputation of two or more fingers alone (complete)(partial) n=84; combined traumatic amputation of (part of) finger(s) with other parts of wrist and hand n<5; traumatic amputation of hand at wrist level n<5; traumatic amputation of other parts of wrist and hand n<5; traumatic amputation of wrist and hand, level unspecified n<5. †Cases triaged as urgent, emergency or resuscitation required

Work-related Transport Injury Analysis

This analysis was undertaken to investigate the nature of work-related transport injuries resulting in admissions to Victorian hospitals over the period 2012/13–2014/15. Transport safety has been the target of numerous campaigns over the last few decades, and has prompted policy, regulation, and law changes, in an effort to reduce transport-related injuries and fatalities.

Of all unintentional work-related injury admissions during the period 2012/13–2014/15 in Victoria, 1,544 (8.4%) were transport-related. The number of work-related transport injuries per year fluctuated with a maximum of 552 (35.8%) in 2013/14 and a minimum of 476 (30.8%) in 2012/13. Males were overrepresented, accounting for 79.9% (n=1,234) of transport injuries. With regard to broad geographic region, 60.8% (n=939) of those admitted to hospital with a transport injury that occurred while working for income were residents of the Melbourne metropolitan region whilst 34.0% (n=525) resided in regional Victoria and 5.2% (n=80) were interstate/from overseas/unknown.

The age breakdown revealed that those aged 25–34 years were most frequently admitted for transport related injuries while working for income (21.6%, n=333). Those age groups at the ends of the spectrum, 15–19 year olds (4.3%, n=66) and those 65 years and over (6.5%, n=95) were less frequently represented among transport related injuries. These figures are reflective of the overall age breakdown for work-related injury admissions.

The majority of transport-related injuries occurred on roads, streets, and highways (54.7%, n=845) followed by farms (9.6%, n=148), and sports and athletics areas (7.6%, n=118). However, it should be noted that in 16.4% (n=253) of cases the place of injury occurrence was recorded as 'unspecified'.

WorkSafe Victoria compensates the majority of workers injured in Victoria, but other organisations such as the Transport Accident Commission (TAC) and Department of Veterans Affairs (DVA) may cover the costs instead, based on the circumstances. For example, the TAC covers workers injured whilst commuting between the workplace and their residence. For the three-year period 2012/13–2014/15, WSV provided compensation for 64.1% of work-related injury admissions due to transport accidents (n=989) whilst the TAC covered costs in 12.2% (n=188) of cases. There were 271 public (Medicare) patients (17.6%), and 72 private patients (4.7%). The remaining cases (n=24) were covered by DVA, were ineligible for compensation, or were designated as 'other compensable'.

The largest proportion of transport related workplace injury admissions were designated as 'other land transport accident' (25.8%, n=398) of which almost half (47%, n=187) were caused by falls from horses. Injured car occupants accounted for 22.2% (n=342) of cases, followed by occupants of heavy transport vehicles accounting for 16.2% (n=250) of transport injuries. Injuries to motorcycle riders (11.8%, n=182), and pedestrians (9.9%, n=153) were the next most frequent.





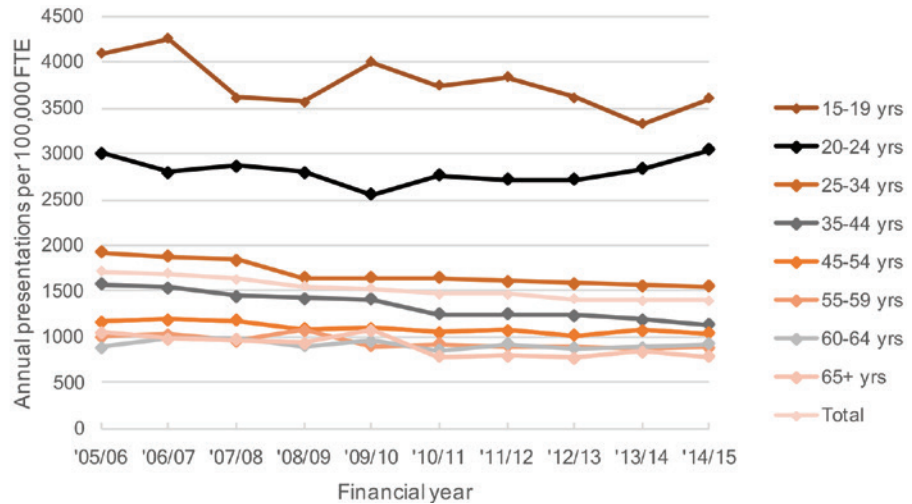
EMERGENCY DEPARTMENT PRESENTATIONS

Ten-year trends, 2005/6–2014/15

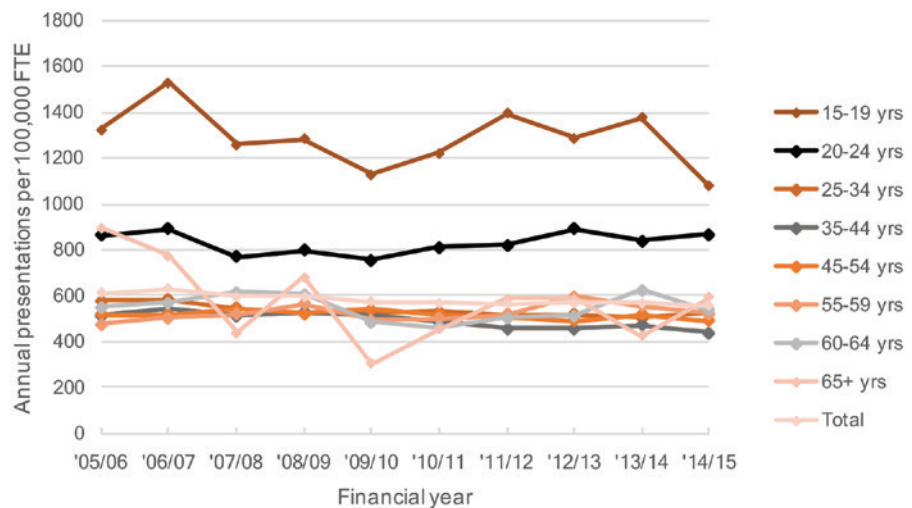
There were on average 26,077 unintentional work-related injury Emergency Department (ED) presentations each year over the period 2005/6–2014/15 (Table 1). As with admissions, males were overrepresented, accounting for 79.1% (n=206,365) of presentations. Workers in the 25–34 year age bracket presented most frequently (26.2%, n=68,450), followed by 35–44 year olds (21%, n=54,672). Males remained overrepresented once workforce participation was taken into account, with work-related injury presentation rates of 1,522 versus 584 per 100,000 FTEs for males and females, respectively. The overall average rate was 1,140 per 100,000 FTEs. Male and female work-related injury ED presentation rates both peaked in the 15–19 year old age group at 3,769 and 1,284 per 100,000 FTEs, respectively. The lowest rates for males occurred in the 65 years and over age bracket (874 per 100,000 FTEs) whilst female rates were lowest in the 35–44 age bracket (491 per 100,000 FTEs). In contrast to the increase in admission rates, observed presentation rates dropped significantly over the ten-year period (-1.8%) and more markedly in males (-2.0%) than females (-0.9%). Rates over time per age group are shown in Figure 9, top panel, bottom panel. For males, the most pronounced decreases were observed in the 35–44 year (-3.6%) and 65 year and over (-3.3%) age groups (Table 1). No age group within the male population showed an increase in ED presentation rates. Similarly, for females, marked decreases in presentations were also observed in the 35–44 year (-2.1%) and 65 year and over age groups (-2.5%). However, the latter result was not statistically significant. Insignificant increases in presentation rates were also noted within the 20–24 (0.3%) and 55–59 (1.1%) year age groups for females. The representation of persons aged 55 years and over among work-related injury ED presentations steadily increased from 8.5% in 2005/6 to 12.2% in 2014/15 (Figure 2).

Figure 9

Males



Females



The annual rate of work-related injury ED presentations by sex per 100,000 full-time equivalents (FTE) in Victoria, 2005/6 to 2014/15.

Three-year patterns, 2012/13–2014/15

There were a total of 76,219 ED presentations to Victorian hospitals for unintentional work-related injuries during the three-year period from 2012/13 to 2014/15 of which 97.1% (n=74,004) were Victorian residents and 60.2% were from the Melbourne metropolitan region (Table 2). The number of ED presentations remained stable over the three-year period with a minimum of 25,218 in 2013/14 and a maximum of 25,552 in 2014/15. Males were overrepresented, accounting for 78% (n=59,454) of ED presentations: a male-to-female ratio of 4:1.

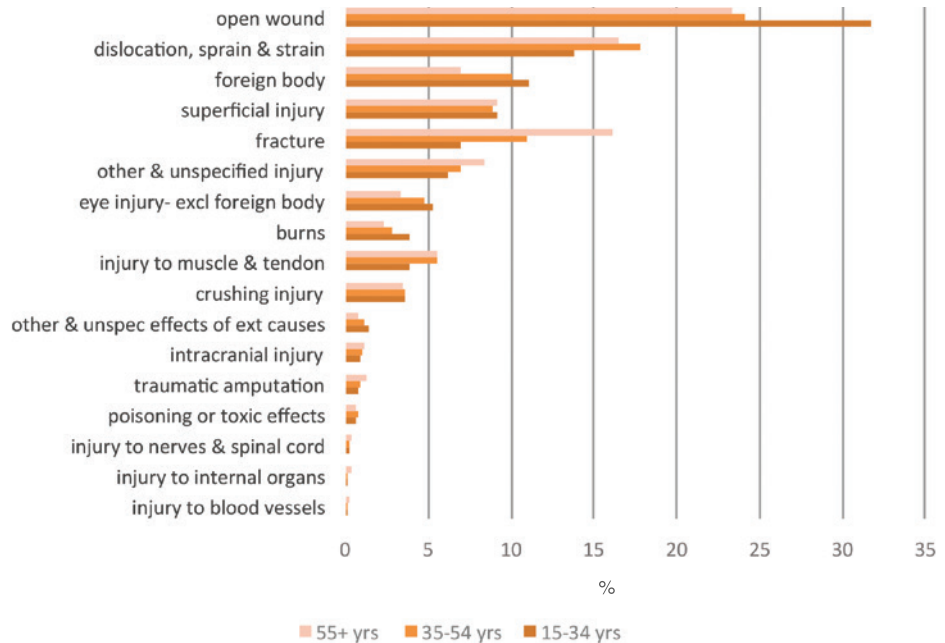
The highest proportion of presentations were in the 25–34 year age group, accounting for 27% (n=20,596), with the next most frequently represented age group being 35–44 years (19.5%, n=14,853). Workers aged 65 years and over comprised only 2% (n=1,512) of presentations. Of the 76,219 ED presentations, 11.6% were admitted to ward; this percentage increased steadily with age from 8.6%, 9.1%, 10.2%, 11.5%, 13.5%, 15.3%, 18.1% to 26.8% among age groups 15–19, 20–24, 25–34, 35–44, 45–54, 55–59, 60–64 and 65 years and over, respectively.

Open wounds were the most frequently observed injury type, accounting for 28% (n=21,302) of presentations, followed by dislocations, sprains and strains which were approximately half as common (15.6%, n=11,896) (Table 3). Other common injury types were foreign bodies e.g. dust particles in eye (10.2%, n=7,780), fractures (9.5%, n=7,253), and superficial injuries i.e. minor cuts and bruising (9.1%, n=6,900). The age breakdown reveals that open wounds accounted for 31.7% of injuries within the 15–34 year age group, but only 24.4% for those aged 35–54 years, and 23.3% for those aged 55 years and over (Figure 10). Fractures impacted the 55 year and over age group more frequently, accounting for 16.1% of injuries compared to 10.9% for those aged 35–54 years and 7.0% for 15–34 year olds.

Figure 10

ED presentations Injury type by age group

Proportions of ED presentations for work-related injury (Victoria, 2012/13 to 2014/15): injury type per age group

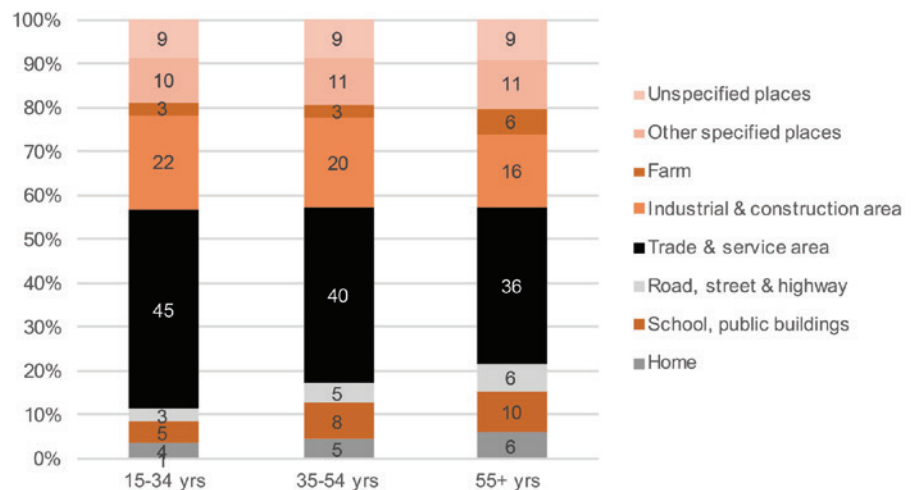


Work-related injuries culminating in ED presentation were most likely to occur in trade and service areas (42.3%, n=32,206) or industrial and construction areas (20.5%, n=15,664) (Table 4). It should be noted that in 8.9% of cases (n=6,765), the location at which the injury occurred was assigned an 'unspecified' code. Of presentations involving those aged 55 and over, trade and service areas were less often identified as the location of injury but remained the most frequently observed (36%) whereas 45% of presentations involving 15–34 year olds occurred in trade and service areas (Figure 11). Farms (6%), and schools and public buildings (10%) were locations more frequently mentioned in relation to presentations for those aged 55 years and over in comparison to younger age groups.

Figure 11

ED presentations Place where the injury occurred

Proportions of ED presentations for work-related injury (Victoria, 2012/13 to 2014/15): place of injury occurrence per age group

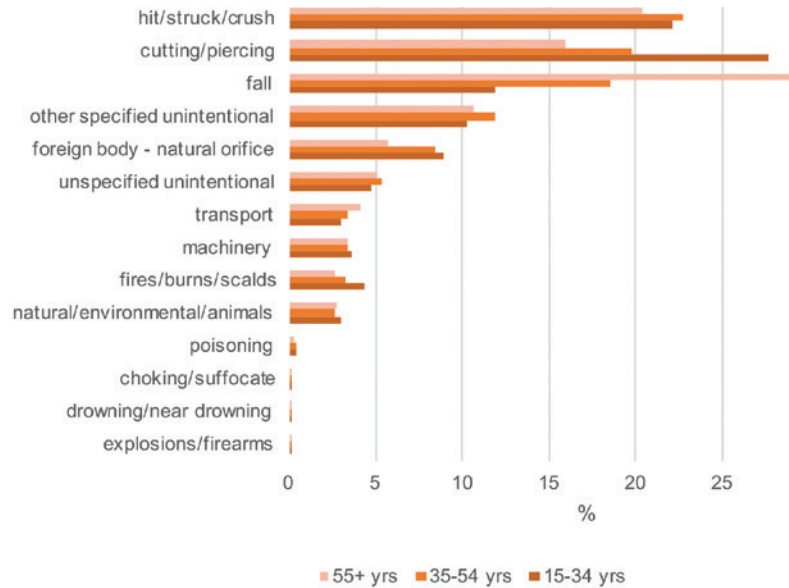


The causes of work-related injury ED presentations were spread primarily over three categories: cutting and piercing (23.5%, n=17,871), hit, struck, or crush injuries (22.2%, n=26,889), and falls (16.3%, n=12,447) (Table 5). Foreign bodies accounted for 8.4% (n=6,398) of presentations, the majority of which affected the eye (97%). An examination of the age breakdown revealed that 28.9% of injuries to workers aged 55 years and over were caused by falls compared to 18.5% for 35–54 year olds and 11.9% for 15–34 year olds (Figure 12). Conversely, 16% of injuries to those aged 55 years and over were the result of cuts and piercings, whilst the proportion was 19.8% for those aged 35–54 years and 27.7% for those aged 15–34 years.

Figure 12

ED presentations Cause (mechanism) by age group

Proportions of ED presentations for work-related injury (Victoria, 2012/13 to 2014/15): injury cause (mechanism) per age group

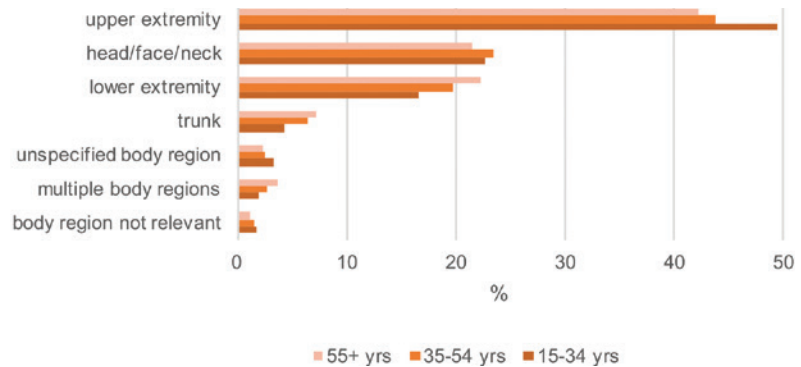


The distribution of injured body region among ED presentations differed from that observed in the injury admissions. Injuries to the upper extremities were less frequent but remained the most common (46.5%, n=35,456) (Table 6). Injuries to the head, face, and neck were the next most frequent body region affected (22.8%, n=17,368) followed by the lower extremities (18.4%, n=14,036). Age breakdown revealed that of all injuries to those aged 55 years and over, 42.1% affected the upper extremities while the proportion was 43.7% for the 35–54 year age group and 49.5% for the 15–34 year age group (Figure 13). Injuries to the lower extremities were less common in the 15–34 year age group, accounting for 16.6% of injuries and increasing to 19.7% for those aged 35–54 and 22.2% for those aged 55 and over.

Figure 13

ED presentations Body region by age group

Proportions of ED presentations for work-related injury (Victoria, 2012/13 to 2014/15): main body region injured per age group



Among ED presentations, the ten most common injuries accounted for 55.1% of all work-related injuries. Open wounds to the wrist or hand were identified as the most commonly observed specific injury, accounting for 18.4% (n=14,043) of all presentations, occurring more than twice as frequently as foreign bodies within the eye (8.5%, n=6,490) (Table 8). The next most frequently observed injuries resulting in ED presentations were injuries to the eye and orbit (4.6%, n=3,531), dislocations, sprains and strains of joints and ligaments at the ankle and foot level (4%, n=3,037), and fractures at the hand and wrist level (3.8%, n=2,918).

The financial burden of ED presentation episodes amounted to \$30.6 million, of which 79.3% (\$24.3 million) was spent on the male population (Table 7). An inspection of the breakdown by age group revealed that the greatest financial burden resulted from presentations by 25–34 year olds (25%, \$7.6 million). Those aged 35–44 years accounted for 19.6% of the financial burden (\$6 million), followed by the 45–54 year age group which accounted for a further 18.5% of costs (\$5.6 million). Those aged 65 years and over accounted for 2.9% (\$0.9 million).



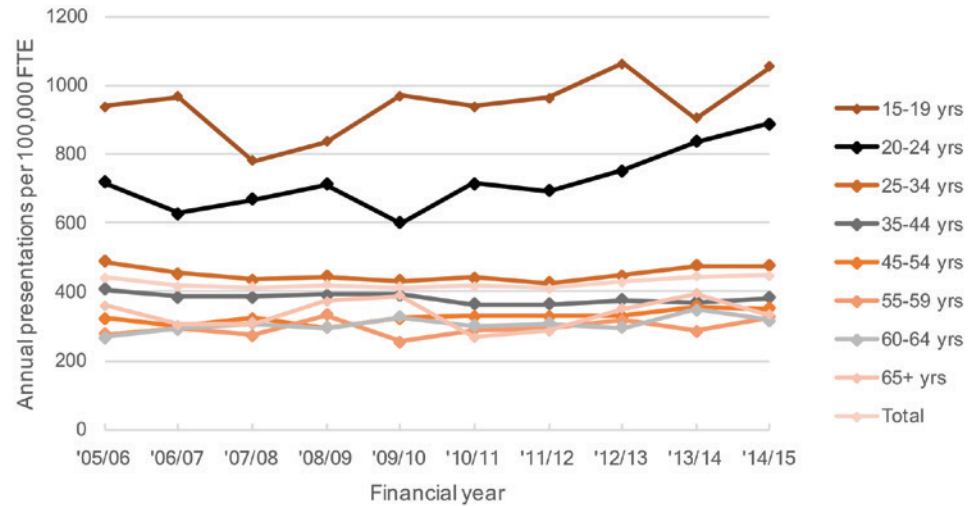
EMERGENCY DEPARTMENT PRESENTATIONS TRIAGED AS URGENT

Ten-year trends, 2005/6–2014/15

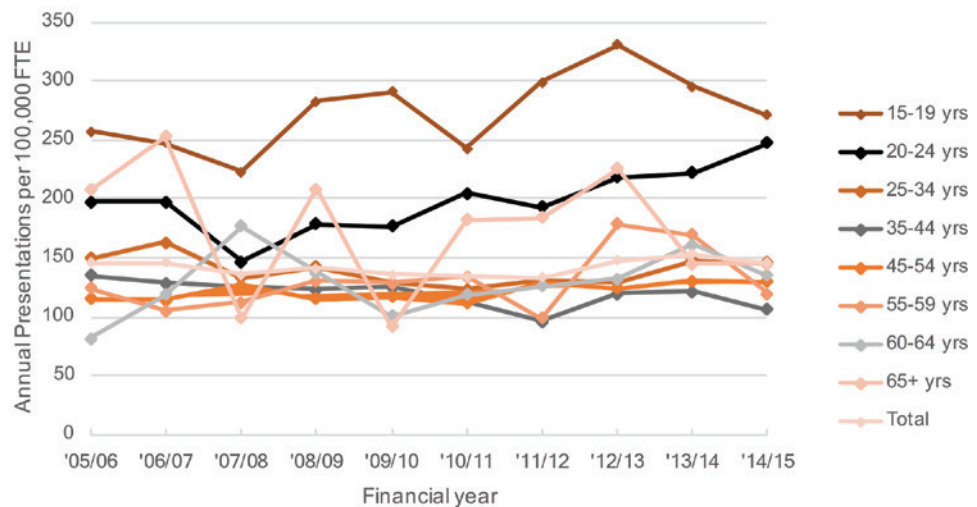
Cases triaged as *urgent*, *emergency* or *resuscitation required* (henceforth referred to as *urgent* presentations) accounted for 27.2% (n=70,905) of all work-related injury ED presentations at an average of 7,090 presentations per year over the ten-year study period (Table 1). The gender split was disproportionate, with males accounting for 81.3% (n=57,662) of cases triaged as urgent. Urgent ED presentations were most frequently observed in the 25–34 year age bracket (25.8%, n=18,311) followed by the 35–44 year age group (21.3%, n=15,127). This closely reflects the age breakdown for all ED presentations. Accounting for workforce participation rates, males were overrepresented at a ratio of 3:1 (425 urgent ED presentations per 100,000 FTEs for males versus 142 per 100,000 FTEs for females). The overall average rate was 310 per 100,000 FTEs. In the working male population, urgent ED presentations peaked in the 15–19 year age group at 933 per 100,000 FTEs. Among the female working population, the peak rate was also observed in the 15–19 year age group, 272 per 100,000 FTEs. This pattern matches that observed within all ED presentations. The lowest rates for males and females were observed in the 55–59 year (296 per 100,000 FTEs) and the 35–44 year age groups (119 per 100,000 FTEs), respectively. During the ten-year period, the urgent ED presentations rate showed a small but statistically significant increase (0.8% per year). The rate increased significantly among male workers (0.8% per year) whilst the increase among female workers (0.6%) was not statistically significant. Rates for males and females fluctuated slightly over the ten-year period (Figure 14). In the male population the largest change in injury rates was observed in the 20–24 year age bracket with a significant increase of 2.9% per year. Similarly, a significant 3.3% increase was observed for females aged 20–24 years. Other groups that showed significant annual changes to injury rates were males aged 35–44 (-0.8%), 45–54 (1.5%), and 60–64 (1.5%), and females aged 35–44 (-2.2%), and 45–54 years (1.3%). The representation of persons aged 55 years and over among work-related injury urgent ED presentations increased from 9.4% to 13.3% over this period (Figure 2).

Figure 14

Males



Females



The annual rate of work-related injury ED presentations by sex per 100,000 full-time equivalents (FTE) in Victoria, 2005/6 to 2014/15.

Three-year patterns, 2012/13–2014/15

During the years 2012/13 to 2014/15, 23,028 work-related ED presentations were triaged as urgent: 30.2% of all presentations. Minor increases in urgent presentations were observed over the three-year period, from 7,452 in 2012/13 to 7,891 in 2014/15 (Table 2). A breakdown of geographic region revealed that 65.4% (n=15,076) of urgent presentations were residents of the Melbourne metropolitan area and a total of 97.1% were Victorian residents. Males were overrepresented, accounting for 80.8% (n=18,621) of urgent ED presentations: a male-to-female ratio of 4:1, the same ratio as observed for all work-related injury ED presentations.

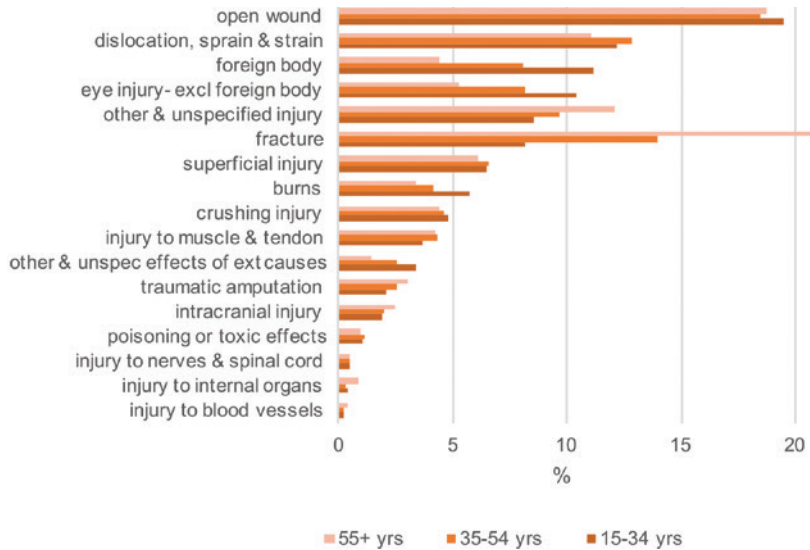
As with admissions and ED presentations, peak rates for urgent presentations were observed in the 25–34 year age group, accounting for 26.3% (n=6,048) of all urgent presentations. The next most frequently represented age group was 35–44 years (19.6%, n=4,524). Workers aged 65 years and over accounted for the smallest proportion of urgent presentations (2.8%, n=639).

As was the case with overall ED presentations for unintentional work-related injury, the most commonly observed type of injury was open wounds (19%, n=4,381) followed by dislocations, sprains, and strains (12.3%, n=2,823), and fractures (12%, n=2,772) (Table 3). Other common injury types included foreign bodies e.g. dust particles in eye (9.1%, n=2,092), and eye injuries excluding foreign bodies (8.9%, n=2,042). A number of notable discrepancies were observed when injury type was examined by age. Fractures were a relatively prominent type of injury among those aged 55 years and over, accounting for 20.7% of injuries within the age group, compared to 14% of injuries observed among those aged 35–54 years, and 8.1% of injuries among those aged 15–34 years (Figure 15). Foreign body related injuries were more common among 15–34 year olds, accounting for 11.1% of injuries, compared to 8.1% of injuries among 35–54 year olds and 4.4% of injuries among those aged 15–34. Lastly, eye injuries accounted for 10.4% of injuries in the 15–34 year age group but were less common among those aged 35–54 years (8.1%) and those aged 55 years and over (5.2%).

Figure 15

ED presentations – urgent Injury type by age group

Proportions of work-related injury ED presentations triaged as urgent (Victoria, 2012/13 to 2014/15): injury type per age group

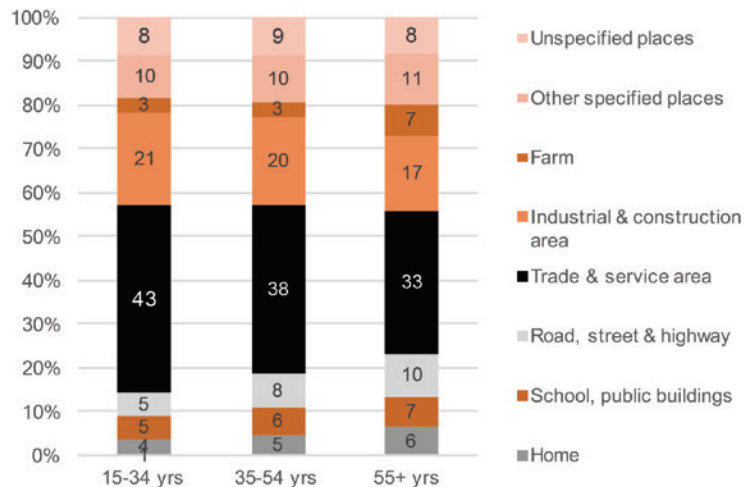


Trade and service areas were the most frequently observed location of injury resulting in urgent ED presentations (39.8%, n=9,174); industrial and construction areas featured as the location of injury approximately half as frequently (20.3%, n=4,683) (Table 4). In 8.6% (n=1,982) of cases, a location was not specified. Broken down by age, 43% of urgent ED presentations for younger workers aged 15–34 years occurred in trade and service areas, compared to 33% for workers aged 55 years and over (Figure 16). A similar pattern was seen with regard to industrial and construction areas, where those aged 55 years and over experienced 17% of their injuries compared to 21% for workers aged 15–34 years. Those aged 55 years and over were proportionately more likely to suffer injuries triaged as urgent in locations such as farms and on roads, streets and highways in comparison to younger workers.

Figure 16

ED presentations – urgent Place where the injury occurred

Proportions of ED presentations for work related injury that were triaged as urgent (Victoria, 2012/13 to 2014/15): place of injury occurrence per age group

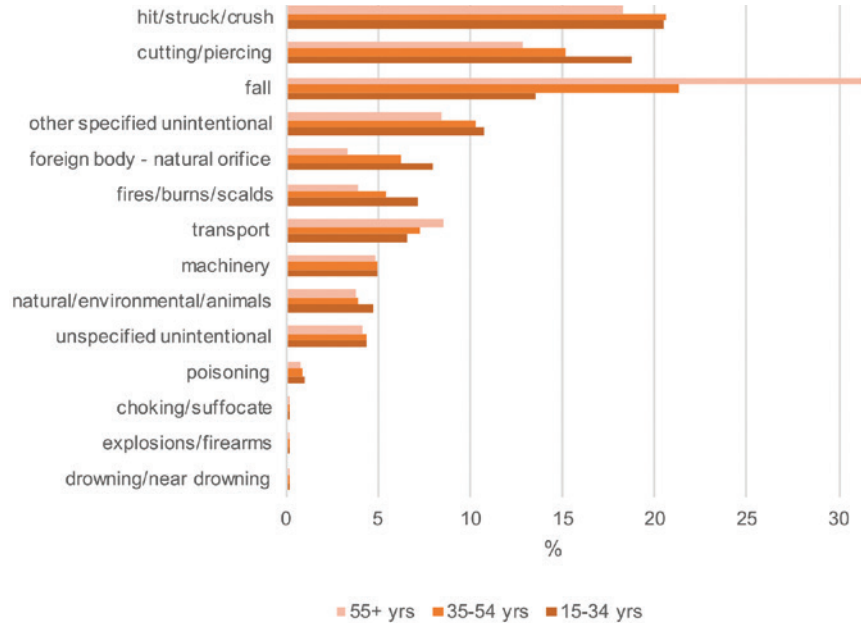


The most common cause of injuries triaged as urgent upon ED presentation was being hit, struck or crushed (20.2%, n=4,656) (Table 5). Falls (18.8%, n=4,340), and being cut or pierced (16.6%, n=3,813) were the next most frequent causes of injuries triaged as urgent upon presentation to the ED. Age breakdown shows that falls accounted for 31.3% of all injuries to those aged 55 years and over: a greater proportion than for 35–54 year olds (21.3%) and 15–34 year olds (13.6%) (Figure 17). Cutting and piercing injuries accounted for 18.7% of injuries to 15–34 year olds, 15.1% of injuries to 35–54 year olds, and 12.8% of injuries to those aged 55 years and over.

Figure 17

ED presentations – urgent Cause (mechanism) by age group

Proportions of work-related injury
ED presentations triaged as urgent
(Victoria, 2012/13 to 2014/15): injury
cause (mechanism) per age group

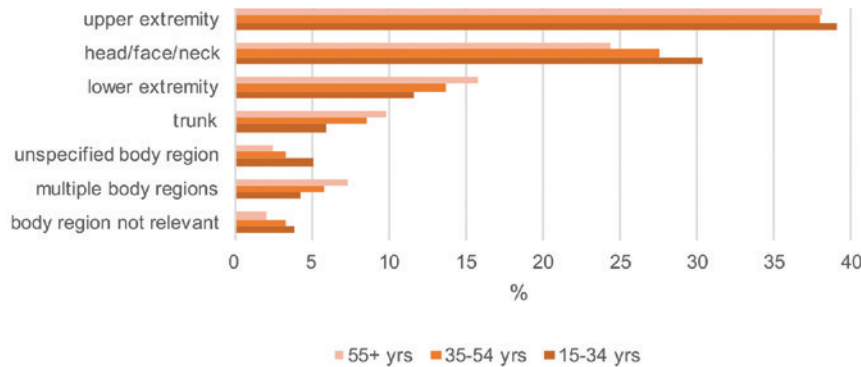


As with overall work-related ED presentations, work-related urgent ED presentations most commonly affected the upper extremities (38.5%, n=8,861), followed by the head, face, and neck (28.5%, n=6,563), then the lower extremities (12.9%, n=2,976) (Table 6). Each age group was roughly equally represented in terms of injuries to the upper extremities. However, similarly to overall ED presentations, injuries triaged as urgent affecting the lower extremities accounted for a larger proportion of injuries to those aged 55 years and over (15.8%) compared to the 35–54 (13.7%) and 15–34 year (11.6%) age groups (Figure 18).

Figure 18

ED presentations – urgent Body region by age group

Proportions of work-related injury
ED presentations triaged as urgent
(Victoria, 2012/13 to 2014/15): injury
cause (mechanism) per age group



Among urgent ED presentations, the ten most commonly reported specific work-related injuries (determined by collating injury type and body region data) accounted for 48.6% of all injuries (Table 8). Open wounds to the wrist and/or hand (11.1%, n=2,550), injuries to the eye and orbit (8.5%, n=1,952), foreign bodies within the eye (7%, n=1,611), injuries of an unspecified body region (4%, n=916), and fractures at the hand and wrist level (3.7%, n=840) were the five most commonly observed injuries triaged as urgent.

For work-related injury urgent ED presentations, the total financial burden was \$12.4 million: 40.6% of the total unintentional work-related injury ED presentation burden (Table 7). Males accounted for 83.1% (\$10.3 million) of the burden of work-related injury ED presentations triaged as urgent: a greater proportion than that observed for all presentations (79.3%). The age breakdown of financial burden for urgent ED presentations closely reflects overall ED presentations. The greatest cost was incurred by those aged 25–34 years (24.6%, \$2.9 million), followed by 35–44 year olds (19.7%, \$2.5 million), and 45–54 year olds (19.4%, \$2.4 million). Those aged 65 years and over accounted for 4.2% (AU\$0.5 million).



DEATHS, 2010–2012

Over the 3-year period 2010–2012, 146 persons aged 15–74 years died from unintentional injuries sustained while engaged in 'paid work' in Victoria.

Sex and age group

The majority of the decedents were male (89.7%, n=131). Table 9 shows the age of the deceased at the time of death. Cases were fairly evenly spread across the age ranges 25–34 (17.1%), 35–44 (22.6%), 45–54 (23.3%) and 55–64 years (19.2%). Those aged 25 years and under, and those aged 65 years and over each accounted for 8.9%.

Table 9

Number of deaths by age group, Victoria, 2010–2012

Age group	N	%
15–19	7	4.8
20–24	6	4.1
25–34	25	17.1
35–44	33	22.6
45–54	34	23.3
55–59	19	13.0
60–64	9	6.2
65–74	13	8.9
Total	146	100.0

Occupation

The most common specific occupations recorded for persons who died as a result of unintentional injury while engaged in paid work were truck drivers (n=25), other drivers, including couriers, taxi drivers and delivery drivers (n=5) and farmers (n=18).

Detailed activity at the time of death

Almost one quarter (24.7%, n=35) of decedents were travelling to or from paid work at the time of the incident leading to death. A further 11% (n=16) were travelling in the course of paid work; almost half of these were truck drivers (n=7).

Mechanism of injury

Overall, 80.8% of cases were classified as blunt force (n=118). Further detail on the mechanism of blunt force cases shows 72 cases were transport injury events (49.3% of all deaths), mostly vehicle occupants (n=46, includes cars, trucks, tractors etc.), followed by pedestrians (n=13) and motorcyclists (n=12). Of the remaining blunt force cases, 20% (n=29) were the result of contact with an object or animal — most of these were the result of contact with static objects (n=18), falling objects (n=6), or moving objects (n=4). Finally, 11.6% (n=17) of blunt force cases were the result of crushing. A further 10% of cases were classified as threat to breathing (n=14; mostly classified as mechanical threat to breathing).

Body region and injuries sustained

Table 10 shows that 'multiple injuries' was recorded as the cause of death in more than a third of cases (35.6%, n=52) and head injuries in almost a third of cases (28.8%, n=42).

Table 10

Number of deaths by body region and injury type, Victoria, 2010–2012

Body region and injury type	N	%
Multiple injuries	52	35.6
Head injuries	42	28.8
Chest injuries	14	9.6
Asphyxia	11	7.5
Other specified injuries	18	12.3
Unspecified 'injuries'	9	6.2
Total	146	100.0

Location of incident leading to death

The location of the incident was a transport area in 47.9% (n=70) of cases, an industrial or construction area in 21.2% (n=31) of cases and a farm or other place of primary production in 13% (n=19) of cases (Table 11).

Table 11

Number of deaths by location of injury occurrence

Location	N	%
Transport Area [#]	70	47.9
Industrial Or Construction Area	31	21.2
Farm Or Other Place Of Primary Production	19	13.0
Home	8	5.5
Countryside	6	4.1
Commercial Area (Non-Recreational)	5	3.4
All other locations [*]	7	4.8
Total	146	100.0

[#]Any highway, freeway, street or road specified as public or not specified as private

^{*}All other locations include: medical service areas; recreational areas, cultural areas, or public buildings; schools, educational areas; other places of occurrence; and 'unlikely to be known'.



DISCUSSION

Over the ten-year period from 2005/6 to 2014/15 the total number and the annual rate of hospital admissions for unintentional work-related injury increased by 1.5% per year. Men comprised a larger proportion of the workforce (59.2%) and were overrepresented among hospital admissions (84.7%). However, male injury admission rates increased at a slower rate than female injury admission rates (+1.2% vs. +2.5% per year). Labour force participation, measured in full-time equivalents (FTEs), grew for both men and women; growth was most pronounced among workers aged above 60 years, particularly among female workers aged above 60 years. Although older workers and, in particular, older female workers contributed to the increase in the annual number of work-related injury admissions, rates among older workers did not increase over time. In other words, older workers made up a greater proportion of work-related injury admission each year through increased workforce participation, but there was no evidence indicating that the work-related injury risk increased over time for older workers. This was, however, the case for workers aged 20–24 years, who showed increased injury rates.

Gender

Across work-related injury admissions, ED presentations, and urgent ED presentations, males were overrepresented, accounting for 84.7%, 79.1%, and 81.3% of cases, respectively, over the ten-year period. Furthermore, 89.7% of work-related deaths in Victoria in 2010–2012 were male. Whilst a greater proportion of the workforce is male (males accounted for 59.2% of workforce participation), the disparity is still present when workforce participation is taken into account. A possible explanation for this is that males are more frequently employed in roles involving higher levels of physical risk, such as work in construction and manufacturing. In support of this, in the results presented in this edition of *Hazard*, industrial and construction areas were the most commonly observed location for injuries resulting in hospital admissions. Within the cohort of industrial and construction workers, the gender distribution of the workforce is heavily skewed toward males (ABS, 2016c). Another, perhaps more speculative, theory is that the disproportionate representation of males among unintentional work-related injury hospital admissions is due to males being generally more likely to engage in physical risk-taking behaviours. Risk-taking does not necessarily refer to drastic behaviours likely to result in unwanted outcomes (such as injury) but rather, may involve not adhering to OHandS procedures designed to minimise the risk of harm. However, recent research based on workers' compensation claims has shown that when injury claim rates are adjusted for industry and occupation, little gender difference remains (Berecki-Gisolf, Smith, Collie, and McClure, 2015). As such, the relatively high risk inherent in male dominated occupations and industries remains as the likely explanation for male injury overrepresentation. Despite the disproportionate frequency of male injury-related admissions, admission rates among females have experienced a sharper rise over the ten-year period when compared to males (2.7% versus 1.5%, per year). One plausible explanation for this rise is that the female workforce is growing and ageing at a faster rate and it may be that workplaces and industries have been slow in adjusting to these demographic changes. However, to fully understand the nature of the gender disparity, it is important to consider the changes occurring within various age groups and the potential effect of the ageing workforce.

Ageing

An overall increase in work-related injury rate was observed over the ten-year period: rate increases were observed in hospital admissions, ED presentations and ED presentations triaged as urgent. Workforce participation among older adults has increased rapidly, especially among females, with the largest increases in workforce participation observed among males and females aged 60 years and over. Representation of workers aged 55 years and over among injured workers, among admissions, ED presentations and urgent ED presentations, has increased over the ten year period. However, over the ten-year period, *rates* of work-related hospital treated injury among those aged 60 years and over generally did not increase substantially. Only work-related ED presentations *triaged as urgent* for males aged 60–64 years showed a significant increase, and overall work-related ED presentations for this group actually decreased significantly. In contrast, some younger age groups showed significant increases in the annual rates for admissions, ED presentations and urgent ED presentations, while workforce participation showed only modest increases, and on some occasions, decreases. For example, females and males aged 20–24 years both experienced minimal change (0.1% decrease) in FTEs per year during the ten-year period but significant increases in annual work-related injury hospital admissions rates, and rates of urgent ED presentations. According to previous research, relative inexperience is a significant factor in workplace injury (Pratt, Cheesman, Breslin, and Do, 2016) but given that injury rates among younger workers are increasing, it may be that younger workers are now being exposed to more risk or that employers are not ensuring that younger workers are properly equipped to perform their role safely. Overall, based on the available evidence, we can conclude that (1) the workforce is ageing; (2) overall work-related injury rates have increased (modestly), mainly due to rate increases among younger workers; and (3) due to workforce ageing, the representation of older persons among hospital-treated injured workers has increased. The work-related injury rates among older persons have not increased: therefore, (4) there is no evidence to suggest that the *risk of injury* has increased for older workers.

Workforce ageing impacts on the direct burden of work-related injury, based on hospital bed occupancy and admission cost over the three-year period 2012/13–2014/15. Workers aged 60–64 years accounted for 6.1% of admissions but 9.5% of total bed days and 7.4% of admissions costs, and workers aged 65 years and over accounted for 4.3% of admissions but 11.9% of bed days and 7.1% of admissions costs. Therefore, whilst the increasing rates of work injury related hospital admissions are not due to older workers, older workers require relatively more resources for treatment and rehabilitation. This could indicate that injuries to older workers are generally more severe and/or that older workers are impacted more greatly by injuries. The equivalent data for ED presentations supports the explanation; workers aged 60–64 years accounted for 3.9% of ED presentations whilst accounting for 4.7% of the associated costs,

and 4.2% of urgent ED presentations whilst accounting for 5.3% of associated costs. Workers aged 65 years and over accounted for 2.0% of ED presentations and 2.9% of associated costs, whilst also accounting for 2.8% of ED presentations classified as urgent and 3.9% of the costs. Whilst the disparity suggests older workers incur greater costs than would be expected solely based on the number of injuries, the disparity is less in comparison to admissions. Furthermore, older workers' representation among admissions is larger than their representation within ED presentations and once in the ED, their admission rates are higher compared to younger workers: this suggests that they may experience severe injuries more frequently and may be slower to recover from those injuries. It should also be noted that older workers who are in poor health are less likely to have remained in the workforce to this point, and older workers are significantly less well represented in the workforce overall (i.e., healthy selection has taken place among older workers). This healthy selection bias may lessen when the retirement age is increased: relatively less healthy older workers will remain in the workforce for longer. Older workers' use of injury treatment and rehabilitation resources can therefore be expected to increase.

The combination of susceptibility to fractures and falls among older workers deserves attention. A third (33.4%) of all unintentional work-related hospital admissions among those aged 55 years and over were a result of falls, and fractures were the most common injury suffered among those aged 55 years and over, accounting for 39.4% of admissions. In comparison, the overall proportions show that 19.5% of injuries resulting in admission were a result of falls, and 29% of admissions were for fractures. The same pattern occurred within ED presentations and urgent ED presentations, highlighting the severity and the impact these injuries have on older workers. Baseline health levels and comorbidities such as osteoporosis are likely to influence injury rates and recovery among older workers; chronic disease such as diabetes mellitus can impair rehabilitation. Overall, these results are not surprising but they serve to highlight the main areas of concern for older workers and potential areas for primary, secondary and tertiary injury prevention in this population.

Transport

The interaction between OHS policies and work-related road safety is vital to the development of effective interventions to reduce the occurrence and impact of work-related transport injuries. Furthermore, there are flow on effects for the general population as a large proportion of private vehicles were initially purchased or used for commercial purposes (Small, Bailey, and Lydon, 2014). Significant effort has been made to produce legislation, standards, and OHS procedures to ensure that vehicles used for work-related purposes are adequately maintained and safely operated to ensure the safety of those operating the vehicles, and individuals who may be within the general vicinity of the vehicles during their operation (Small Bailey, and Lydon, 2014; Stuckey, 2012).

Consistent with overall work-related injury admissions, males were more frequently represented among work-related transport injuries than females, at a ratio of 4:1. The disparity here may be more readily explained given the propensity for males to be employed in occupations with a large travel component including, for example, trades and construction, heavy transport driver/operator (trains, trams, busses, trucks), private vehicle operation (e.g. taxi) and postal delivery services/courier (ABS, 2016c, Workplace Gender Equality Agency, 2016). However, the data on work-related transport injuries includes those who are injured travelling to and from work, not only injuries that occurred in the course of performing work tasks. Over half (54.7%) of all unintentional work-related transport-related injuries occurred on roads, streets, and highways. Whilst this includes the aforementioned occupations, the proportion is too large to conclude that male-favoured occupations can explain the disparity completely. It seems plausible that, in addition to males dominating employment in industries that involve transportation, males within many of these industries are likely to do more driving compared to women within those industries and therefore, have increased exposure to the risk of transport-related injuries.

Transport also features prominently among work-related deaths: 49.3% of all work-related deaths involved transport. This Victorian figure is greater than previously reported Australia-wide figures in other sources (e.g., 33%, Centre for Accident Research and Road Safety, 2014) but closer to the figure of 43% for fleet vehicles reported in Queensland (Newnam, et al., 2016). Another study conducted by Safe Work Australia (2014) found that truck related work fatalities comprised 33% of all work-related fatalities over the period 2003 to 2012, highlighting the dangers involved in heavy vehicle occupancy and for bystanders. Stuckey (2012) noted that work-related road use is the most common cause of work-related traumatic injury and death. Returning to the current findings, truck drivers were the single most commonly represented group. This is likely a result of a number of dangers inherent in long-haul truck driving such as fatigue and pressure to adhere to strict schedules (Stuckey, 2012; WorkSafe Victoria, 2008).

Another point of interest is that cause designation among transport-related injuries is led by the 'transport: other land transport accident' category which accounts for 25.8% of admissions. Breaking down this designation, it was revealed that falls from horses make up 47% of the category. This means that approximately one in eight work-related, transport-related admissions results from horse-related injuries (mainly falls). Over a third (34%) of work-related, transport-related admissions were residents of regional/rural Victoria. Considering the population distribution of Victoria, regional/rural residents were overrepresented in terms of transport-related injuries. From these findings it can be concluded that work-related transport injuries and horse-related injury in rural/regional Victoria warrant attention and tailored intervention.

Compensable Status

Only two thirds of work-related injury admissions were recorded as WorkSafe Victoria (WSV) admissions during the years 2012/13 to 2014/15. There are a number of possible reasons for work-related injury admissions to be non-WorkCover patients. First, work-related injury is determined based on activity code (ICD-10-AM) 'while working for income'. This includes paid work as well as and transportation to and from such activities. Commuting to and from work is not covered by WSV (road traffic accidents are generally insured through the Transport Accident Commission, if the accident involves a registered Victorian vehicle). Second, not all Victoria workers are insured through WSV. Alternatives are self-insurers (companies such as Woolworths Ltd, Qantas Airways Limited, and Westpac Banking Corporation), ComCare (providing workers' compensation and/or monitoring to self-insurers and some Commonwealth authorities), self-employed persons and interstate workers whose employer is based outside of Victoria. Third, case selection accuracy depends on the accuracy with which the *working for income* activity code and patient status were recorded. Poor data quality will result in mismatches between WSV patient status and the working for income activity code.

Overall, the proportion of work-related injury admissions that were WSV patients decreased steadily over the ten years from 2005/6 to 2014/5. This could be due to a shift of any of the aforementioned factors: for example, an increase in self-insurers. It could also be due to a change in data quality, such as overall improved reporting of the activity 'working for income'. A gradual drop in workers' compensation claiming among those who are eligible is also a possibility that should be further investigated: if this is the case, potential barriers to claiming compensation should be identified and addressed.

Data Quality and Differences between Sources

The final issue is that of data quality. Incomplete data and issues regarding coding are not new in injury surveillance (McKenzie et al, 2009), and continue to require attention. The information presented in this issue of Hazard reflects the sources from which the data is taken, the VAED, VEMD and NCIS. These data sets allow us to make certain inferences about injuries within the Victorian population. However, in some cases the bigger picture is unclear due to data quality limitations. The most obvious example presented in this issue of Hazard is that 51.3% of cases of unintentional work-related hospital admissions were labelled as having an 'unspecified' location of occurrence. Although the available data is likely proportionally representative of the broader scope of work-related injuries in Victoria, it may be the case that the information is not missing entirely at random and some bias is inherent in the pattern of missing or unspecified data. In order to design interventions, a complete picture of the problem is required. In this example, being uncertain about the location of 51.3% of work-related injuries would make it difficult to appropriately design and implement a location-based intervention. A more complete picture of work-related, and all injury, will contribute to reducing the burden on the health care system by allowing more effective interventions to be designed and implemented.

Furthermore, data from different sources may vary. A good example of this can be seen between the results obtained in this publication and WorkSafe statistics on work-related deaths. In Victoria, from 2010 to 2012, 146 persons died from unintentional injuries while engaged in paid work. This number of work-related fatalities, based on an NCIS search, is considerably higher than that reported by WorkSafe Victoria: 66 fatalities in 2010 to 2012 (WorkSafe Victoria, 2016). The latter includes deaths notified to WorkSafe Victoria, which occurred at a workplace or arose out of the conduct of an employer, employee or self-employed person's undertaking (WorkSafe Victoria, 2016). Traffic accidents were excluded from the WorkSafe fatality data, unless the cause was work-related. The fatality data presented in this edition of Hazard were selected based on a broader definition of work-relatedness: cases where the activity undertaken by the person when injured was coded as 'paid work'. This included travelling to and from paid work and travelling in the course of paid work. Inclusion of transport related accidents in the death data will explain most but not all of the discrepancy between these and the WorkSafe results. Other differences in case selection include the WorkSafe Victoria exclusion of deaths of persons covered by legislation not administered by WorkSafe, such as fatalities occurring in mines or on ships. Conversely, the WorkSafe fatality data did include persons who died as a result of *faulty work or unsafe practices*: this definition of work-relatedness is not limited to being engaged in paid work. Overall, these findings show that even though work-related transport deaths are not recorded by WorkSafe, transport is the most common cause of work-related death and should be a primary focus for intervention. At the macro level, this also demonstrates the importance of understanding the methods used to measure injury and death within any given report to determine why differences may occur.

RECOMMENDATIONS

Given the findings discussed, the Victorian Injury Surveillance Unit recommends the following:

1.

The burden of serious fall-related injuries could be addressed by WorkSafe enforced development of a falls prevention plan for Victorian workplaces, with specific elements designed to reduce the number of fall-related injuries sustained by older workers.

2.

With the rapid increase in older workers in the Victorian workforce, increased availability of screening for age-related conditions that increase the risk of injury and injury severity is recommended. For example osteoporosis risk assessment for older workers is currently not captured in the WorkHealth program but could be driven by general practitioners.

3.

The annual increase in the number of injured older workers could warrant further research into injury rehabilitation needs of older workers: this could include physical rehabilitation as well as age tailored return to work plans and prevention of injury recurrence.

4.

Given the injury rate increases observed among younger workers, workplaces could benefit from more rigorous OHS training and supervision for new employees to prevent injuries resulting from inexperience and a lack of awareness of potential hazards in the workplace. This could also be coupled with formalised implementation of the 'buddy' system for young or inexperienced workers currently suggested by WorkSafe.

5.

The disproportionate representation of males among work-related injury cases should be addressed by injury prevention campaigns targeting male dominated occupations and industries.

6.

Workplaces with a significant proportion of vehicle centred workload could benefit from increasing training and awareness regarding safe and appropriate use of vehicles. A required minimum number of position specific training hours, to be dictated by the requirements of the role, for new employees could be mandated and enforced by WorkSafe Victoria. This training should focus on the skills required to perform a given role safely, and an understanding of the risks specific to the role and within the specific work environment.

7.

Workplaces and employers should be required to ensure that company owned vehicles are adequately maintained through scheduled maintenance programs and regular inspections in order to guarantee roadworthiness and maximise safety.

8.

Commuting injuries are currently outside the scope of Victorian workers' compensation injury prevention activities; however, a transport safety campaign (run by an organisation focussed on road safety) specifically targeting commuters could be an effective means to reduce work-related injury deaths.

9.

The gradual decrease in the proportion of work-related injury admissions that are WorkSafe patients should be further investigated: if this is due to decreased compensation claiming among those who are eligible, potential barriers should be identified and addressed.

10.

Continued improvement of hospital data collection and coding quality is required to provide more complete and accurate data on work-related injury in Victoria. This is needed to better inform the design and implementation of interventions to prevent work-related injury.

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APPENDIX A: DATA SOURCES AND CASE SELECTION

Deaths

Death data have been extracted from the National Coronial Information System (NCIS). The NCIS is an international internet based data storage and retrieval system for Australian and New Zealand coronial cases. VISU only has access to closed Australian cases on the system and there is a substantial lag between the death occurring, the closing of the case by the coroner and the eventual coding and closing of the case on the NCIS. For this reason, analysis was confined to the 3-year period 2010–2012 as at the time of data extraction (5/9/2016) over 95% of Victorian Coroner's cases in each of those years were closed in the NCIS.

Cases were selected according to the following criteria:

- Victorian cases (closed cases only)
- The deceased was aged 15–74 years
- Death was coded as due to external cause on completion of coronial process
- Intent (the role of human purpose in the event resulting in death as determined at the completion of the coronial investigation) was coded as unintentional
- The type of activity being undertaken by the person when injured was coded as “paid work”. This includes travelling to/from paid work, travelling in the course of paid work, paid work, and unspecified paid work.

**Note: The NCIS has a specific “work-relatedness” variable included in the dataset which captures deaths that occur as a result of injury, disease or illness that has been attributed to the work environment, event or activity of the deceased or other person(s) (NCIS, 2010). According to this definition, fatalities that occur while commuting to and from a work location, or during a recess period such as a lunch break, are not considered to be work related. For the purposes of this report, VISU did not extract cases using this variable due to inconsistencies with the VISU-held hospital-treated datasets which by definition do include cases commuting to and from paid work. Instead, cases were selected if the activity at time of the incident was coded as ‘paid work’.*

Hospital admissions

Hospital admission data were extracted from the Victorian Admitted Episodes Dataset (VAED) for the years 2005/6 to 2014/5. The VAED records all hospital admissions in public and private hospitals in the state of Victoria.

Work related injury incident cases were selected for patients aged 15 years or more at the time of admission, if the admission was for a community injury (principle diagnosis code in range of S00-T75 or T79) with activity coded as ‘working for income’ and/or compensation type recorded as ‘VWA’ (Victorian WorkCover

Authority); referred to as WorkSafe Victoria (WSV) throughout this publication. Those who were admitted via a statistical separation within the same hospital or transferred inward from another hospital were excluded to prevent over-counting of incident injuries.

When calculating estimates of direct hospital costs and number of hospital bed days, all cases with a principal diagnosis as an injury in the ICD-10-AM code range S00-T75.9, T79-T79.9, T89-T98.99 (these codes exclude medical injury) or was one of two relevant rehabilitation codes - Z094 (follow-up examination after treatment of a fracture) or Z509 (care involving use of rehabilitation procedure, unspecified) with an injury code (any of the diagnosis codes in the range of S00-T98) were included, to provide a more accurate estimate of the burden of injury.

Note: Frequencies less than 5 and rates based on frequencies less than 10 are suppressed and appear with an “” in the tables provided.*

Emergency department (ED) presentations

ED presentations data were extracted from the Victorian Emergency Minimum Dataset (VEMD) for the years 2005/6 to 2014/15. The VEMD records all presentations to Victorian public hospitals with 24-hour emergency departments (currently 39 hospitals – 100% state-wide coverage of these hospitals applies from 2004). ED presentations were selected for persons aged 15 years and over, if the presentation was for a community injury (primary diagnosis code in the range of S00-T75 or T79) with activity coded as ‘working for income’ and/or compensable status recorded as ‘Work Safe’. Only cases coded as unintentional were included. Pre-arranged admissions (through the ED) and return visits were excluded to avoid over-counting of incident injury presentations. ‘Urgent’ ED presentations were a subset of these cases, including only those triaged as *resuscitation*, *emergency* or *urgent*. This subgroup was investigated as a more precise measure of work-related injury in comparison to all ED presentations which includes those cases deemed not to warrant hospital treatment, whilst also being unaffected by hospital admission policies.

When calculating estimates of direct hospital costs, to provide a more accurate estimate of the burden of injury, pre-arranged admissions and return visits were not excluded.

Note: Frequencies less than 5 and rates based on frequencies less than 10 are suppressed and appear with an “” in the tables provided.*

APPENDIX B: ANALYSIS METHODS

Rates

Work-related injury rates (per 100,000) were calculated using ABS employment data for Victorians in the corresponding years of injury. Employment data were sourced from Employed persons (ST EM3) by Usual hours worked, State and Territory, Age and Sex, April 2001 onwards data, copyright © Commonwealth of Australia 2015 (ABS, 2016c). Labour force participation was expressed in full-time equivalents (FTEs). FTEs were calculated as persons employed full-time plus persons employed part-time. Persons employed part-time were calculated as the total (usual) hours worked part-time divided by the average full-time hours. Crude rate and 95% confidence interval of the crude rates are shown, for ED presentation rates and hospital admission rates. Confidence intervals were calculated as:

$$\frac{100,000}{FTEs} \times (events \pm [1.96 \times \sqrt{events}])$$

Trend analysis

Workforce based trends in the rates of Victorian hospital work-related injury admissions and ED presentations were modelled using Poisson models, as trends in the annual number of events, with the log of the Victorian workforce FTEs as offset. All models were adjusted for age group and sex, where possible (i.e. unless the analysis was limited to a single age group or sex). The results are shown in figures as the observed rates over time as well as the fitted rates with 95% confidence intervals. The results are presented in a table as the modelled annual % change in rate, calculated as:

$$percentage\ change = [e^{\alpha} - 1] \times 100\%$$

where α is the estimated value from the Poisson model. The analyses were conducted using the PROC GENMOD procedure in SAS V9.4.

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PARTICIPATING HOSPITALS

From October 1995

Austin and Repatriation Medical Centre
Ballarat Base Hospital
The Bendigo Hospital Campus
Box Hill Hospital
Echuca Base Hospital
The Geelong Hospital
Goulburn Valley Base Hospital
Maroondah Hospital
Mildura Base Hospital
The Northern Hospital
Royal Children's Hospital
St Vincent's Public Hospital
Wangaratta Base Hospital
Warrnambool and District Base Hospital
Western Hospital — Footscray
Western Hospital — Sunshine Williamstown Hospital
Wimmera Base Hospital

From November 1995

Dandenong Hospital

From December 1995

Royal Victorian Eye and Ear Hospital
Frankston Hospital

From January 1996

Latrobe Regional Hospital

From July 1996

Alfred Hospital
Monash Medical Centre

From September 1996

Angliss Hospital

From January 1997

Royal Melbourne Hospital

From January 1999

Werribee Mercy Hospital

From December 2000

Rosebud Hospital

From January 2004

Bairnsdale Hospital
Central Gippsland Health Service (Sale)
Hamilton Base Hospital
Royal Women's Hospital
Sandringham and District Hospital
Swan Hill Hospital
West Gippsland Hospital (Warragul)
Wodonga Regional Health Group

From January 2005

Mercy Hospital for Women

From April 2005

Casey Hospital

From July 2011

Bass Coast Regional Health

How to access VISU data

VISU collects and analyses information on injury problems to underpin the development of prevention strategies and their implementation. VISU analyses are publicly available for teaching, research and prevention purposes. Requests for information can be lodged via the data request form on the VISU website or by contacting the VISU office by phone.

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