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VicHealth

In this edition of Hazard we provide an overview of work injury treated in Victorian hospitals. The recent introduction of the ICD-10 code 'activity of the injured person at the time the event occurred' has allowed better identification of work injuries on the hospital admissions injury surveillance database.

Overview of unintentional hospital-treated work injury, Victoria 1999-2002

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Summary

Work injury imposes a significant health and social burden on our community. Over the 4-year period 1999-2002, at least 82,528 adults were treated in Victoria's hospital system for unintentional work injury, 20,632 per year on average. This estimate is biased toward acute (traumatic) injury and does not include hospital treatments related to occupational disease. Unintentional injuries account for 97% of all hospital-treated work injuries, the remainder are intentional (self-harm and assaults). The major challenge in terms of data collection by hospitals is to improve the use of the 'activity' code in hospital admissions data. Currently, only half of

adult unintentional injury hospitalisations are coded for activity at the time of injury. However, it is probable that work-related cases are better captured using the activity code than other activity categories. The estimated capture is almost 80% due to hospital funding arrangements for compensable work-related cases.

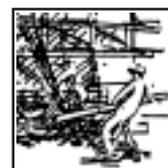
Unintentional hospital-treated injury

- i Based on 1999-2002 injury data, each year in Victoria there are on average at least 4,375 hospital admissions and 16,256 hospital Emergency Department (ED) presentations for unintentional work injury.
- ii Admission rates for all employed persons and males showed little change over the study period. By contrast, the female rate increased by 7%.

This edition of Hazard also includes a brief report entitled *Intentional hospital-treated work injury, Victoria 1999-2002.*

- i 86% of admissions and 79% of ED presentations were males (males comprised 56% of the workforce in the study years).
- ii Average age of hospitalised work injury cases is 37 years and 34 years for non-admitted cases presenting to EDs.
- iii Based on frequency data, the peak age group for work injury admissions was 25-34 year olds (26%), followed by 35-44 year olds (24%) and 15-24 year olds (19%). However, admission rates were highest in the oldest and youngest groups of workers - those aged 65 years and older and 15-24 years.

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- ï The highest admission rates were in younger males in age groups 15-24 and 25-34 years, whereas female admission rates increased as age increased from age 44 years, peaking in females aged 65 years and older.
- ï Rate data are not available for ED presentations. The peak age group for ED presentations was 25-34 year olds (32%), followed by 15-24 year-olds (25%) and 35-44 year olds (23%).
- ï The major causes of admissions were cutting/piercing (18%), falls (18%, mainly from a height), machinery (17%), and being hit/struck/crushed (16%). The major specific causes were cuts and open wounds associated with powered hand tools, knives, and foreign bodies, falls from a height for admissions (including ladders, scaffolding, buildings and structures), same level falls for ED presentations and machinery.
- ï Among admissions, the most common locations for injury were industrial and construction areas including manufacturing (33%) and trade and service areas (12%). Among ED presentations, injuries mostly occurred in trade and service areas (54%) and industrial and construction areas (18%).
- ï Wrist and hand injuries accounted for 42% of all work-related admissions and were most commonly fractures, open wounds and muscle and tendon injuries. Open wounds to the upper extremity (mostly hands) (20%) and foreign body in the eye (11%) were the most common specific work injuries among ED presentations.
- ï The average length of stay in hospital was 2.5 days, however, most admitted cases (70%) spent less than 2 days in hospital. Only a small proportion of admissions (5%) had a length of stay of 8 days or more.

Recommendations include: improvements to injury surveillance systems, especially initiatives to improve the completeness of coding of 'activity at the time of injury' on the Victorian Admitted Episodes Dataset (VAED) and the quality

of case narrative data in VEMD; comparative analysis of VAED admissions data and WorkCover hospital claims; and the introduction of factor/product codes as well as detailed industry and occupational coding. Further investigations of age, gender, regional differences and of the major causes of serious work injury (falls, cutting/piercing, and machinery) are needed to identify contributory factors and mechanisms and to generate research hypotheses and potential prevention strategies and measures.

Introduction

In 2002, 2.3 million Victorians aged 15 years and over were in paid employment, representing 60% of the Victorian population (ABS 2004). The complete burden of work injury in Victoria is difficult to estimate because the Victorian WorkCover Authority (VWA) data collections do not include non-compensable work injury cases. Some categories of workers not included in the VWA databases are self-employed workers (9% of the Victorian workforce) and self-insured employers (comprising 10% of the Victorian workforce) (VWA 2004). Employees of the Commonwealth Government in Victoria (3% of Victorian workforce) are also not included as they are covered by the ComCare scheme (ABS 2002). Further, injuries on journeys to and from work (which fall under the jurisdiction of the Transport Accident Commission), non-fatal claims with less than 10 days compensation, and cases involving payments below the threshold for medical compensation are also not recorded on VWA databases (VWA 2004).

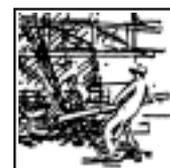
Hospital injury surveillance databases are a potentially valuable source of supplementary information on the size and nature of the work injury problem because they record a broader spectrum of traumatic work-related injury cases than VWA data collections on compensated work injuries.

The aims of this report are:

- ï to provide an overview of unintentional and intentional hospital-treated work injury in Victoria for the four year-period 1999-2002 recorded on the hospital databases accessed or collected by VISAR (described in the Methods section);
- ï to investigate and describe the patterns in all compensable and non-compensable work injuries resulting in hospitalisation in Victoria for 2001-2002; and
- ï to assess the usefulness of the hospital data in the period since 1998 when coding of work injury was improved for hospital admissions.

Before the shift from the WHO International Classification of Diseases Ninth Revision (ICD-9) to ICD-10 in 1998, work-related injury was almost impossible to identify on the VAED. Prior to 1998, some ICD-9-CM external cause codes and categories allowed for the identification of specific work causes (for example, farm machinery) along with some work locations (for example, industrial and construction areas and farms). However, identified cases represented a very small proportion of the bigger picture (Harrison 2001). This changed with the introduction of ICD-10, which included a new set of codes to describe the 'activity of the injured person at the time the event occurred'. One of the five specific codes under the general 'activity' code is 'while working for income' which covers paid work (manual or professional), transportation (time) to and from such activities, and work for salary, bonuses and other types of income.

Two levels of unintentional hospital-treated work injury, namely hospital admissions and emergency department presentations (non admissions), are described in this report. Supplementary analyses of the geographic distribution of work injury admission cases and comparative analysis of VWA compensable with non-VWA compensable work injury admissions are included in this report. Intentional work-related injuries are described in a separate short report.



Method

Data were extracted for the calendar years 1999 to 2002 from the following injury databases held and accessed by VISAR:

- i Victorian Admitted Episodes Dataset (VAED): includes admissions data from all Victorian public and private hospitals. Externally caused hospital admissions for unintentional work injury, from 1999 to 2002 were extracted from the VAED. Cases coded under medical injuries and late effects were excluded from our analyses. Deaths were excluded, as were transfers within and between hospitals and re-admissions, to avoid double counting of cases.
- ii Victorian Emergency Minimum Dataset (VEMD). Externally caused injury emergency department (ED) presentations for the 4-year period, 1999 to 2002 were extracted from the VEMD. Over the study period, the VEMD collected data from 28 Victorian hospital emergency departments, representing approximately two-thirds of statewide ED presentations for injury. Deaths and cases subsequently admitted as hospital inpatients were excluded to avoid duplication. Rate data are not provided because the VEMD did not capture all Victorian ED injury presentations.

Adult cases (defined as persons aged 15 years and over) with an activity code 'working for income' were selected. Hospital treatments for occupational diseases were not included.

The methods of extracting data from each dataset and the limitations of the data are detailed in Box 1.

Results

Hospital admissions

n=17,501 (4 years)

Annual average frequency: 4,375

There was a total of 17,501 hospital admissions recorded on the VAED for unintentional injuries incurred during paid

BOX 1. Methods of extracting work-related cases from death and hospital-based injury databases

Data were extracted from the Victorian Admitted Episodes Dataset (VAED) and the Victorian Emergency Minimum Dataset (VEMD).

Admissions

The VAED records hospital admissions for all Victorian hospitals, both public and private. VAED data are coded using the ICD-10 Australian Modifications (AM) coding system. Admissions were selected for the calendar years 1999, 2000, 2001 & 2002, if they were 15 years and over and resided in Victoria, had an unintentional injury code (anywhere in diagnosis fields) and an activity code of 'working for income'. Deaths, re-admissions, transfers within and between acute care, medical injuries and late effects of injury were excluded. Additional analysis was performed for work-related admissions that were coded as intentional (i.e. assaults, self-harm/attempted suicides). Age and gender-specific estimates for the 1999-2002 Victorian labour force were used to calculate rates of injury per 100,000 employed persons (workers). Labour force estimates were obtained from the ABS for persons aged 15+ years, stratified by gender and 10-year age groupings. Aggregate estimates are included in Table 1.

NB. Admission cases were not selected by payment status, as was done in a recent study of work-related hospitalisations in NSW. The additional cases selected using this code comprised 23% of the total number of NSW work-related admissions (Boufous & Williamson 2003). This level of information has only been supplied to VISAR in the 2001/02 & 2002/03 VAED datasets.

Emergency Department presentations

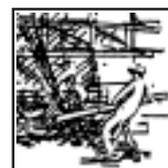
The VEMD records public hospital presentations to 28 Emergency Departments (EDs), representing approximately two-thirds of statewide ED presentations. Presentations (excluding admissions and deaths) aged 15 years and over, resident in Victoria that had an unintentional injury code, an activity code of 'working for income' were selected for the calendar years 1999-2002 for analyses. Frequency data from 1999 to 2002 were utilised to indicate the trend in presentations over the latest 4-year period. It was not possible to calculate rates, as the VEMD does not capture 100% of ED presentations. Additional analysis was performed for work-related admissions that were coded as intentional (i.e. assaults, self-harm/attempted suicides).

Limitations

A general limitation that needs to be considered when interpreting results from both datasets is the validity, accuracy and completeness of coding of the *activity* variable. Completeness is lower for the VAED, where 51% of cases were classified under 'activity: unspecified' compared to VEMD data where only 20% were so classified.

work over the 4-year study period, with an annual average frequency of 4,375 admissions. Work injury admissions accounted for approximately 7% of all unintentional injury admissions to persons aged 15 years and older over the study period. Cases of work injury were identified using the 'activity' code. Half the unintentional injury cases recorded on the VAED over the period 1999-2002 (51%, *n*=123,015) did not have a specific activity code recorded. However, the coding of

activity for work-related cases is probably more complete than for other activities such as sport, because the hospital needs a record of insured cases to substantiate claims for the cost of treatment from WorkCover and other insurers. A check of admissions for which some form of compensation (not necessarily workers' compensation) was paid showed that 36% did not have a specific activity code recorded. Coding for activity was much better for admissions covered by



WorkCover workers' compensation as almost 80% were coded for activity.

Comparison of the data presented here with claims for hospital treatment reported in the WorkCover datasets was outside the scope of this report.

Gender and age

The average age of work injury admitted cases was 37 years, ranging from 15 to 99 years. Eighty-six percent were male.

Table 1 shows the frequency and rate of admissions for the years 1999 to 2002 for all persons, and separately by gender. Rates were also age standardised to the 2002 Victorian employed population, but the standardised rates differed only slightly from crude rates. The work injury admission rates for all workers and for males changed little from 1999 to 2002, about 190/100,000 and 300/100,000, respectively. By contrast, the female rate increased by 7% over the 4-year period, from 58/100,000 to 62/100,000, but decreased slightly between 2001 and 2002. Overall, the male admission rate was five times that for females.

Figures 1 and 2 show the distribution of work injury admissions by age and gender, based on frequency and rate data.

Analysis based on aggregated frequency data found that the peak age group for work injury admissions was 25-34 year olds (26%), closely followed by 35-44 year olds (24%) and 15-24 year olds (19%) (Figure 1). However, when expressed as a proportion of the number of employed persons for each age group (by converting injury frequencies to 4-year average rates) the highest admission rate was observed among workers aged 65 years and older (251/100,000), followed closely by 15-24 year olds (208/100,000) (Figure 2).

When gender was factored into the analysis, the highest admission rate overall was observed in males aged 15-24 years (358/100,000), followed by males aged 25-34 years (328/100,000). The age-related pattern of injury differed by gender quite significantly, as

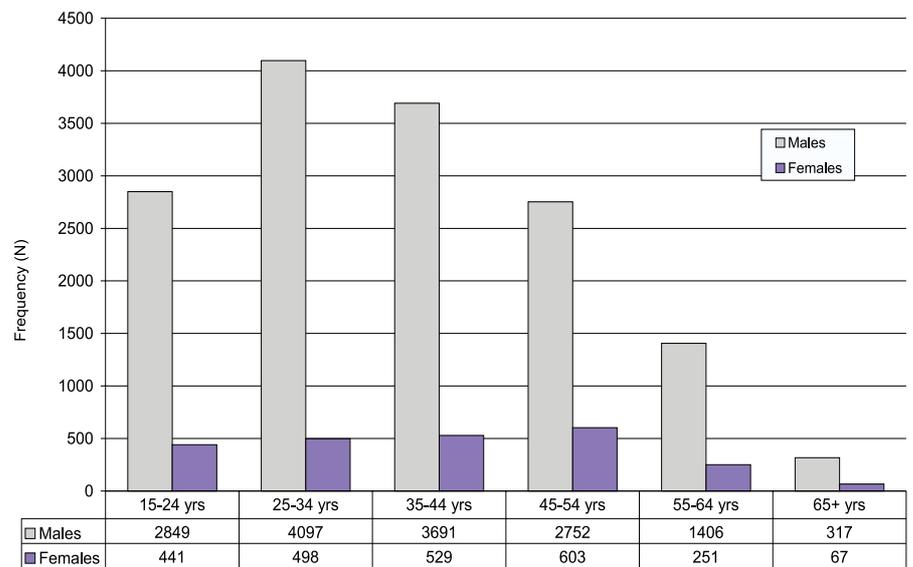
Frequency and rates per 100,000 employed persons (15+ yrs) of work injury admissions, Victoria, 1999 to 2002* Table 1

(All persons 15+ years)	1999	2000	2001	2002
All admissions	4158	4382	4486	4475
Number of employed persons	2,175,400	2,236,800	2,279,700	2,314,700
Crude rate per 100,000 employed persons	191.1	195.9	196.8	193.3
Age adjusted rate per 100,000 employed persons	188.8	194.6	195.6	193.3
Male admissions	3612	3805	3857	3838
Number of employed males	1,223,100	1,248,300	1,274,300	1,280,700
Crude rate per 100,000 employed males	295.3	304.8	302.7	299.7
Age adjusted rate per 100,000 employed males	294.6	304.3	302.7	299.7
Female admissions	546	577	629	637
Number of employed females	952,300	988,500	1,005,400	1,034,000
Crude rate per 100,000 employed females	57.3	58.4	62.6	61.6
Age adjusted rate per 100,000 employed females	57.8	58.7	62.9	61.6

Source: VAED 1999-2002, ABS Labour Force Victoria Cat no. 6291.0.55.001

*Note: Frequencies and rates may be under-estimates due to missing activity codes.

Frequency of work injury admissions by age and gender, Victoria, 1999-2002 Figure 1



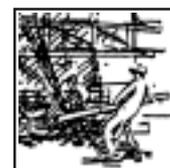
Source: Victorian Admitted Episodes Dataset, 1999-2002 (n=17,501)

illustrated in Figure 2. The male admission rate peaked in the youngest age group (15-24 year olds), declined slightly to age 54 years, and then increased again from age 55 onwards. By contrast, female rates were fairly stable to age 44 years then increased as age increased, peaking in females aged 65 years and older (160/100,000).

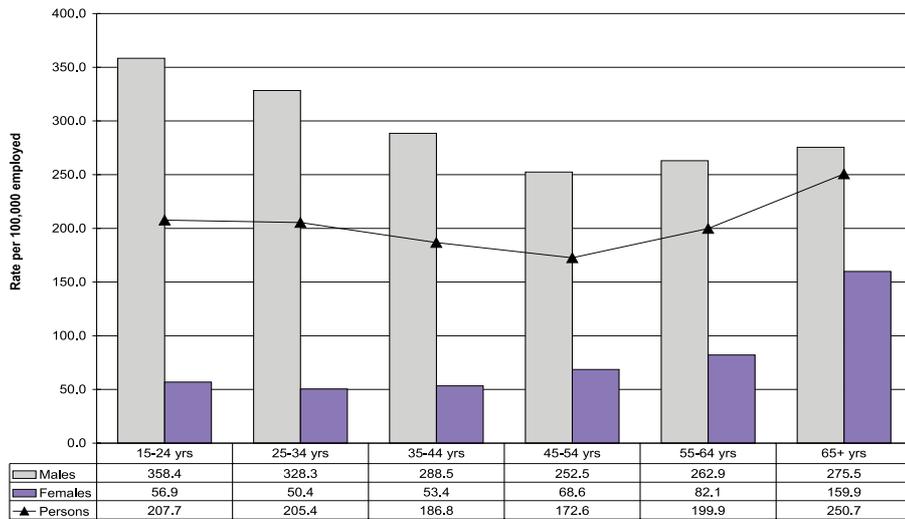
Causes of injury

The most common causes of work injury admissions were cutting and piercing (18%, n=3176), falls (18%, n=3085), machinery (17%, n=2919), hit/struck/crush (16%, n=2806) and transport (8%, n=1358) (Figure 3).

Powered hand tools caused 33% (n=1063) of all cutting and piercing injury admissions. A further 24% (n=765) were caused by



4-year average rate of work injury admissions by age and gender per 100,000 employed persons, Victoria, 1999-2002 Figure 2



Source: VAED 1999-2002, ABS Labour Force Victoria Cat no. 6291.0.55.001

knives and 22% (n=688) by foreign bodies or objects entering through the skin.

Fifty-nine percent of hospital admissions for falls were from a height (n=1806). These mainly comprised falls from a ladder or scaffolding (32% of fall injury admissions, n=576) and falls from a building or structure (20%, n=357). Twenty-nine percent (n=895) were same level falls, mostly slips, trips and stumbles.

Specific causes of machinery injury were unable to be fully identified because 83% (n=2431) were coded as 'contact with other and unspecified machinery'. Eleven percent (n=322) were caused by contact with lifting and transmission devices and 6% (n=166) by agricultural machinery.

Hit/struck/crush injury admissions are not well described by available codes. They were predominantly caused by being caught/crushed/ jammed or pinched in or between objects (43% of hit/struck/crush injury admissions, n=1214) and by being struck by thrown, projected or falling object (31%, n=872). A further 24% (n=662) of these injuries were due to being struck by or striking against other objects, with a smaller proportion (2%) caused by being unintentionally hit, struck or bumped by other people (n=58).

The most common causes of transport-related injury admissions were collisions involving occupants of cars or pickup trucks/vans (26% of transport-related injury admissions, n=348), occupants of heavy transport vehicles (19%, n=252), motorcycle riders (12%, n=165), pedestrians (10%, n=130) and occupants

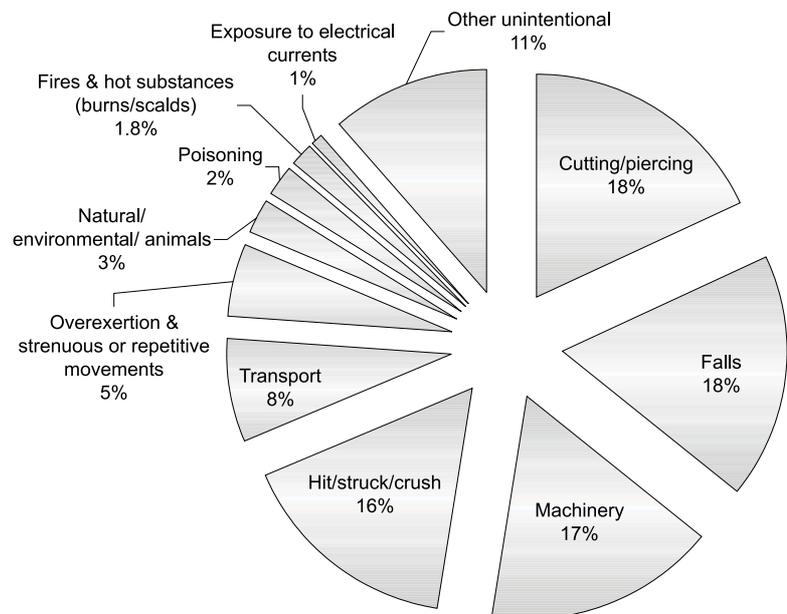
of various other vehicles. Other vehicles included those used on industrial premises, for example forklifts (5%, n=69) and agricultural vehicles, for example tractors (5%, n=67). A small proportion (9%, n=123) of animal riders or occupants of animal-drawn vehicles (mostly horses) were also included in the transport-related injury group.

Place of occurrence of injury (location)

Information on place of occurrence (location) of injury was not available for 1999 and 2000 due to a coding deficiency. Analysis of data for 2001 and 2002 showed that by far the most common locations of work-related injury admissions were industrial and construction areas (33%), followed by trade and service areas (12%) (Figure 4). In 32% of cases the location was unspecified.

The 3rd edition of ICD-10-AM introduced in July 2002 expanded location codes and provided additional information on the location of the injury event. Analysis of work injury admissions over this period (n=4,564 cases) revealed that 30% of admitted cases occurred in industrial and construction areas, which was then

Causes of work injury admissions, Victoria, 1999-2002 Figure 3



Source: Victorian Admitted Episodes Dataset, 1999-2002 (n=17,501)



further broken down into factories and plants (13% of all cases), followed by construction sites (5%). Twelve percent occurred in other specified and unspecified industrial and construction areas. The other common location of work injury hospital admissions was trade and service areas (12%) comprising shops and stores (4%), cafes, hotels and restaurants (3%), commercial garages (1%) and other specified and unspecified trade and service areas (4%). In over one-third of cases (36%) recorded in 2002/03 the location was unspecified.

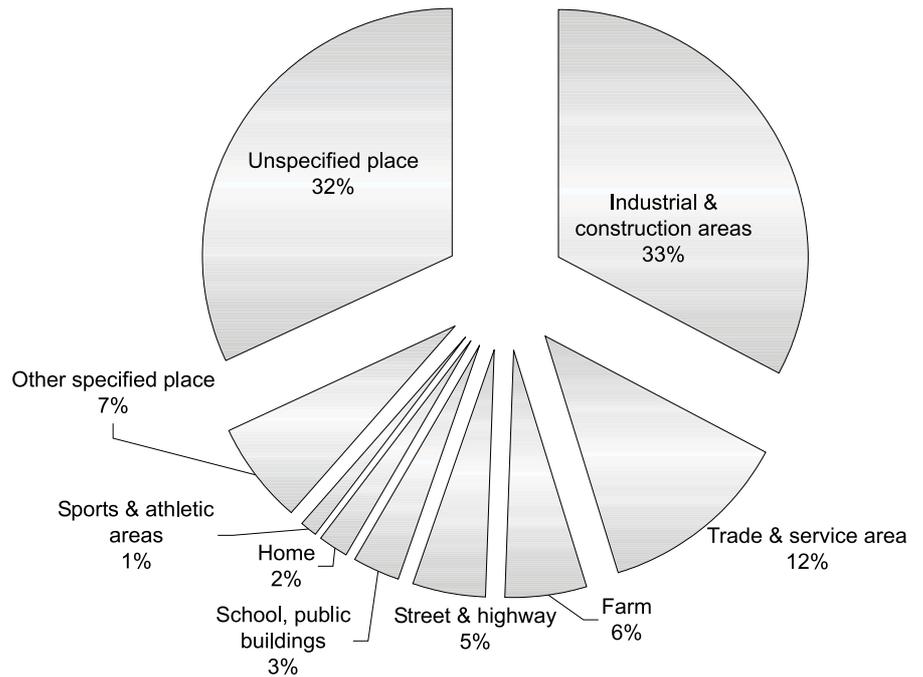
Expanded work activity codes

The 3rd edition of ICD-10-AM introduced expanded work activity codes, providing additional information on the various industry sectors in which injury occurred. This coding was applied to the 2002/03 VAED dataset. Analysis of work injury over this period (n=4,564 cases) revealed that the specific industries associated with injury hospitalisations were construction (11%), followed by manufacturing (9%), agriculture, forestry and fishing industry (7%), wholesale and trade (6%), transport and storage (5%) and health services (2%). Twenty-one percent were coded as other specified work for income. In 38% of cases the industry was unspecified.

Nature of injury and body site injured

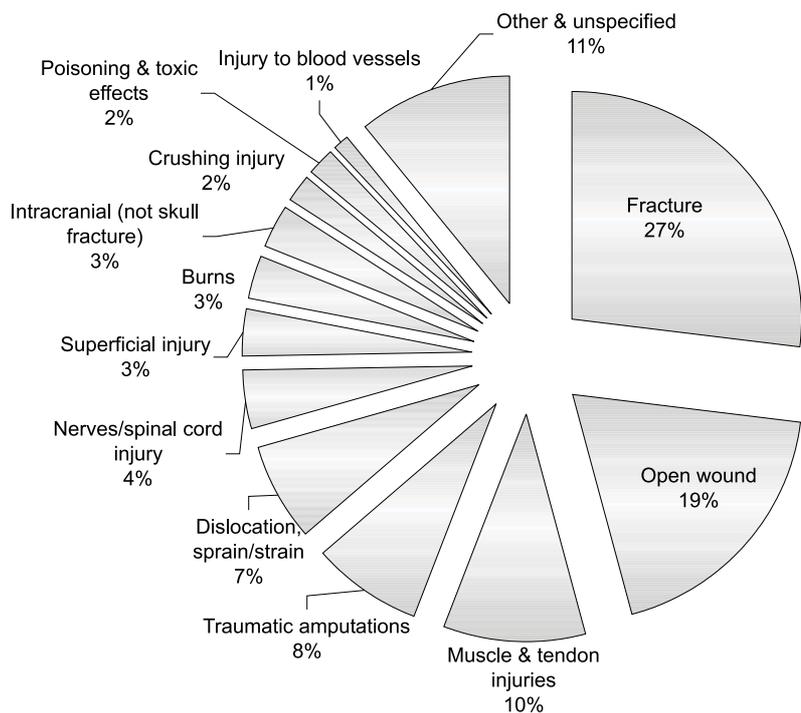
The distribution of diagnoses for injury admissions is illustrated in Figure 5. The most frequently occurring injury diagnoses were fractures (27%) and open wounds (19%). The body sites most commonly injured were the upper extremity (55%), lower extremity (18%), head and face (12%) and trunk (9%). The most common specific injuries were fractures of the upper extremity (mostly wrist/hand) (14%), open wounds to the upper extremity (mostly wrist/hand) (13%), upper extremity muscle and tendon injuries (mostly wrist/hand) (9%), fractures to the lower extremity (mostly knee/lower leg) (8%), and traumatic amputations to the upper extremity (mostly fingers/hand) (8%).

Location of work injury admissions, Victoria, 2001-2002 Figure 4

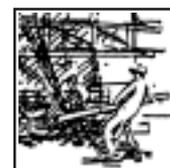


Source: Victorian Admitted Episodes Dataset, 2001-2002 (n=8,961)

Nature of work injury admissions, Victoria, 1999-2002 Figure 5



Source: Victorian Admitted Episodes Dataset (n=17,501)



Wrist and hand injuries

Wrist and hand injuries accounted for a substantial proportion (42%, $n=7,413$) of work injury admissions, of which 5881 (34% of all work injury admissions) involved fingers. Table 2 shows a breakdown of the nature of wrist and hand (excluding fingers) and finger injuries by frequency and rank order. Work injury admissions for wrist/hand injuries were commonly open wounds, fractures and nerve injuries, while finger injuries were mostly open wounds, traumatic amputations and fractures. Ninety percent ($n=6,690$) of wrist and hand injuries occurred in males and three-quarters of admissions were aged 15-44 years. The peak age group in admissions was 25-34 year-olds. Objects and implements that cut and pierce, and machinery were the main causes of wrist and hand injuries, whereas machinery accounted for the majority of finger injury admissions.

Injury severity

Length of hospital stay (bed day count) was used as a proxy measure for injury severity. The total number of hospital bed days for all work injury admissions was 43,583 days, ranging from 7,559 same day admissions to one 216-day stay. The average length of stay was 2.5 days (median=1 day). More than two-thirds of cases (70%, $n=12,176$) spent less than 2

days in hospital, a further one-quarter (25%, $n=4,282$) spent 2 to 7 days in hospital and only a small proportion (5%, $n=1,043$) had a length of stay of 8 days or more.

Two percent of patients ($n=298$) spent time in the intensive care unit (ICU) of the hospital. Almost one-third of these ICU patients (30%) were in intensive care for up to 24 hours, nearly one-half (48%) for 2-7 days, 14% were in for 8 to 14 days and 8% spent more than 2 weeks in ICU.

The most common causes of work injury admissions to ICUs were transport-related injuries (28%), falls (26%) and hit/struck/crush injuries (13%). The most frequently occurring injury diagnoses for ICU admissions were fractures (41%), mostly to the head, chest, lower extremity and pelvis; head injuries (not fractures) (16%), other internal injuries to the chest/abdomen/pelvis (12%); and burns (9%).

Supplementary VAED (admissions) analyses: by geographic distribution and insurance compensations status

1. Geographic distribution of work injury hospital admissions

Work injury hospital admissions data were separated according to ABS-defined

geographic regions (utilising postcode of residence and local government area (LGA) information) and further analysed to ascertain whether there are regional differences in hospital-treated work injury.

Because of small numbers, the regions outside the Melbourne metropolitan region [referred to as the 'Melbourne Major Statistical Region' (MMSR)] were collapsed into one region, referred to as the 'Balance of the Victorian Major Statistical Region' (BVMSR). The MMSR represents the capital city statistical division for Victoria (excluding Geelong) and covers approximately 73% of Victoria's total population (ABS 2002). The MMSR stretches from the semi-rural areas of the Shire of Melton and City of Wyndham in the west, the township of Whittlesea in the north, parts of the Yarra Ranges Shire in the east and the City of Frankston and Mornington Peninsula in the South. The BVMSR includes those areas of Victoria outside of the Melbourne metropolitan region, including all major regional cities (ABS 2002).

A limitation of this analysis is that the postcode of the place where the injury occurred is not recorded on the VAED. We have presumed that it corresponded to the postcode of residence, given that data were analysed by broad geographic region.

Distribution comparison

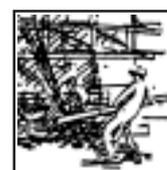
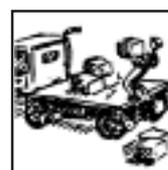
Sixty-nine percent of all work injury admissions occurred in the Melbourne Major Statistical Region (MMSR) ($n=12,035$), slightly lower than the overall proportion (74%) of employed persons in the region (ABS 2004).

Table 3 shows the number and age-adjusted rates of adult work-related hospital admissions for each region over the 4-year period 1999 to 2002. Although the frequency of admissions was much higher in MMSR than BVMSR for all four years, the corresponding rate of admissions per 100,000 adult workers was approximately 1.2 times higher for the BVMSR. In 2002 the BVMSR age-adjusted rate of admissions was 35% higher than the MMSR rate (238/100,000 workers versus 176/100,000 workers).

Frequency and rank order of wrist/hand and finger work injury admissions, Victoria, 1999 to 2002 Table 2

Injury	Wrist & hand (excl fingers)		Fingers		Total	
	N	Rank	N	Rank	N	Rank
Open wounds	456	1	1616	1	2072	1
Fractures	367	2	1248	3	1615	2
Traumatic amputations	5	9	1342	2	1347	3
Muscle and tendon injuries	133	4	833	4	966	4
Injuries to nerves	181	3	438	5	619	5
Crushing injuries	28	8	194	6	222	6
Dislocations, sprains and strains	93	6	89	8	182	7
Injuries to blood vessels	57	7	113	7	170	8
Superficial injuries	122	5	8	9	131	9
Other injuries	-	-	-	-	89	10
Total	1442		5881		7413	

Source: Victorian Admitted Episodes Dataset, 1999-2002



Geographic distribution of work injury hospital admissions, frequency and standardised rates per 100,000 adult workers, Victoria, 1999 to 2002

Table 3

Year	Region	N	Age-adjusted rate per 100,000 employed	95% CI for rate	Total bed days	Average bed days	Rate ratio (RR) Region/Vic	95% CI for RR
1999	Melbourne (MSR)	2 882	175.9	170.0, 182.9	7 245	2.5	0.93	0.91, 0.95
	Balance of Victoria (MSR)	1 276	227.1	216.1, 241.3	3 930	3.1	1.20	1.16, 1.24
	Total (Vic)	4 158	188.8	183.7, 195.2	11 175	2.7	1.00	-
2000	Melbourne (MSR)	3 072	184.2	172.9, 185.7	7 499	2.4	0.95	0.92, 0.97
	Balance of Victoria (MSR)	1 310	223.0	207.3, 231.2	3 631	2.8	1.15	1.11, 1.18
	Total (Vic)	4 382	194.6	184.1, 195.3	11 130	2.5	1.00	-
2001	Melbourne (MSR)	3 059	180.3	170.6, 183.2	7 075	2.3	0.92	0.90, 0.94
	Balance of Victoria (MSR)	1 427	237.4	225.4, 250.3	3 384	2.4	1.21	1.18, 1.25
	Total (Vic)	4 486	195.6	187.3, 198.6	10 459	2.3	1.00	-
2002	Melbourne (MSR)	3022	176.4	169.5, 182.4	6869	2.3	0.91	0.89, 0.93
	Balance of Victoria (MSR)	1453	238.1	214.6, 239.6	3950	2.7	1.23	1.20, 1.27
	Total (Vic)	4475	193.3	183.1, 194.6	10819	2.4	1.00	-

Source: VAED 1999-2002, ABS Labour Force Victoria Cat no. 6291.0.55.001

Rate ratios for each region were derived using the overall Victorian rate as the reference rate (1.00) and are listed in Table 3 along with corresponding 95% confidence intervals. Compared to the overall rate for Victoria, the MMSR rate ratio was significantly lower (i.e. less than 1.00 with 95% CIs less than 1.00) for all 4 years of data and the BVMSR correspondingly higher (Table 3).

Gender and age comparison

Males were over-represented in work injury hospital admissions in both regions. They comprised 86% of admissions in both regions, whereas they represented 55% and 57% of the work force in MMSR and BVMSR respectively (ABS 2004). The distribution of injury cases across 10-year age groups was similar, except that a slightly lower proportion of admissions of workers aged 25-34 years and a slightly higher proportion of workers aged 65 years and older were recorded for the BVMSR.

Length of hospital stay comparison

The average length of stay in hospital for BVMSR was slightly higher (2.7 days) than for MMSR (2.4 days) (Table 3). However, the median value for length of stay for both groups was 1 day. This tendency towards increased length of stay for BVMSR admissions was also apparent when bed days were grouped (Figure 6). The BVMSR had a higher proportion of longer stay (2-7 day) admissions (29% versus 22%) and a correspondingly lower proportion of short stay (<2 days) admissions (64% versus 72%). Whether or not this indicates that injuries that occur in BVMSR are on average more severe or reflects hospital admission policy differences is debatable.

Location comparison

Analysis of data for 2001 and 2002 on the location of injury events by region showed some differences. In both regions the major place of occurrence of injury among admissions was 'industrial and construction areas' (32% in MMSR and

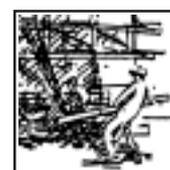
34% in BVMSR). However, injury on farms accounted for a substantial proportion of BVMSR admissions (16%) and were of course, not prominent for MMSR. 'Trade and service areas' were the place of occurrence of a smaller proportion of BVMSR admissions than MMSR admissions (10% versus 14%).

Causes comparison

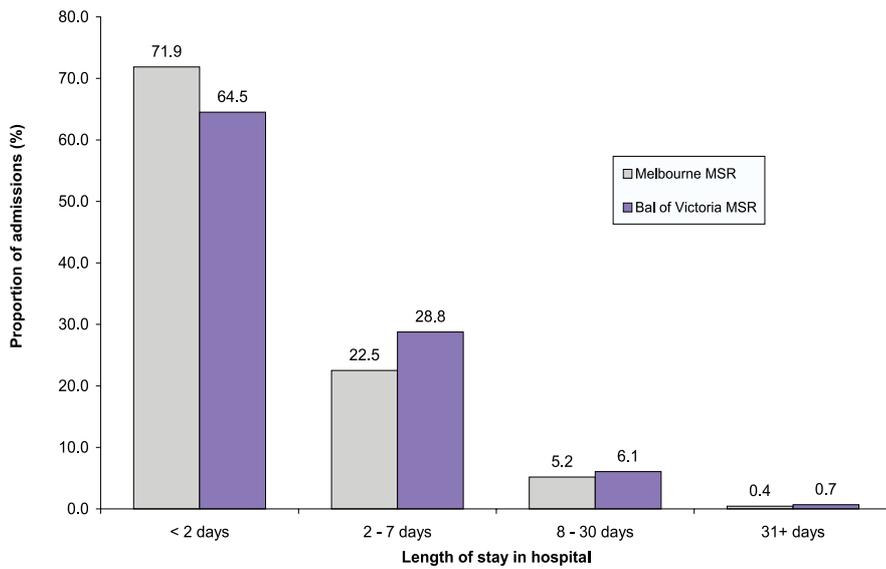
The main causes of work-related injury in the MMSR and BVMSR were similar. There were only minor differences in rank order (Table 4).

Nature of injury and body site injured comparison

In both regions analysis of the nature of injury and body site injured data showed a similar pattern to that reported for the whole of Victoria. In both regions fractures and open wounds were the prominent injury types and the most frequently injured body sites were the upper and lower extremities.



Grouped bar chart showing the proportion of admissions by region (Melbourne MSR and Bal of Victoria MSR) across different lengths of stay in hospital (less than 2 days, 2-7 days, 8-30 days, and 31+ days). Figure 6



Source: Victorian Admitted Episodes Dataset, VAED (MMSR =12305, BVMSR=5466)

Summary rank order of major causes of work injury admissions by region, Victoria, 1999-2002 Table 4

Rank	Melbourne MSR (n=12,035)	%	Balance of Vic MSR (n=5,466)	%	Victoria (n=17,501)	%
1	Cutting/piercing	19.0	Machinery	16.4	Cutting/piercing	18.1
2	Fall	18.7	Cutting/piercing	16.3	Fall	17.6
3	Machinery	16.8	Fall	15.3	Machinery	16.7
4	Hit/struck/crush	16.4	Hit/struck/crush	15.3	Hit/struck/crush	16.0
5	Transport	6.5	Transport	10.6	Transport	7.8

Source: Victorian Admitted Episodes Dataset (VAED)

2. Comparison of Victorian WorkCover Authority (VWA) compensable hospitalisations with all other work injury hospitalisations

This analysis was undertaken to investigate whether WorkCover compensable hospitalisations over the period 2001 to 2002 differ from non-WorkCover compensable work-related hospitalisations in terms of injury patterns and length of hospital stay. Victorian patients admitted to a public hospital are classified as one of the following (DHS 2004):

- i public admitted patient;
- i private admitted patient;
- i Department of Veterans Affairs patient;

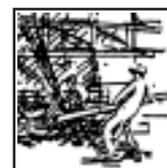
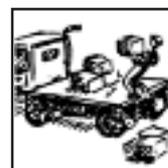
- i compensable patient; or
- i ineligible person.

The government and private insurance agencies chargeable for compensable patients include the Victorian WorkCover Authority (VWA), Transport Accident Commission (TAC), Common Law Recoveries and insurance schemes covering Armed Services, Seamen and others. The Victorian WorkCover compensates most but not all workers injured in Victoria depending on certain eligibility criteria, policies of the Authority, involvement of private insurers and the proportion of the workforce that is self-employed. Admission data on compensable status were not available to VISAR prior to July 2000, therefore only data for the 2001 to 2002 calendar years

were analysed to determine whether the profile of compensable and non-compensable patients differ.

Of the 8,961 working for income earning hospitalisations recorded for the 2-year period 2001-2002, 69% (n=6,152) were categorised as Victorian WorkCover Authority (VWA) compensable admissions. The major proportion of non-VWA compensable hospitalisations (n=2,809), were public patients (24% of all work injury admissions, n=2,173) whose costs were covered by Medicare, followed by private patients (self-insured) (5%, n=444), TAC-covered (2%, n=145) and other compensable admissions (<1%, n=47). Table 5 summarises the patterns of work-related injury admissions for VWA compensable patients compared with all other work-related admissions. Comparative analysis indicates the following similarities and differences:

- i Males were over-represented in both datasets, comprising 86% of admissions in both groups.
- i The average age of admission for VWA compensable patients was 37 years (age range: 15-74 years) whereas non-VWA patients were slightly older, aged 41 years on average (age range: 15-92 years). Injuries peaked in 25-34 year-olds in both datasets, however, the proportion of younger people was higher in VWA hospitalisations (20%) compared to non-VWA hospitalisations (14%) and vice versa for people aged 55 year and over (VWA=9%, non-VWA=18%).
- i Although injuries most commonly occurred in industrial and construction areas for both VWA and non-VWA patients, 38% and 22% respectively, the difference between the proportions was statistically significant (p<0.0001). The second most common injury location for VWA patients was trade and service areas (13%) followed by road/street/highway (4%) whereas for non-VWA patients farm (12%) was ranked second with trade and service areas (11%) ranked third.

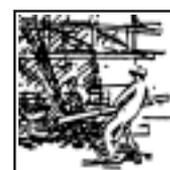


Comparison of the pattern of work injury among VWA compensable cases to all other hospitalised work injury, persons aged 15 years and older, Victoria, 2001 to 2002

Table 5

Characteristics		VWA compensable work injury admissions n=6152		All other VAED work injury admissions n=2809	
		N	%	N	%
<i>Year</i>	2001	3145	51%	1341	48%
	2002	3007	49%	1468	52%
<i>Gender</i>	Male	5298	86%	2397	85%
	Female	854	14%	412	15%
<i>Age (years)</i>	15-24	1251	20%	387	14%
	25-34	1623	26%	706	25%
	34-44	1501	24%	634	23%
	45-54	1199	20%	568	20%
	55-64	518	8%	352	12%
	65+	60	1%	162	6%
<i>Place of occurrence of injury</i>	Home	55	1%	106	4%
	Farm	150	2%	340	12%
	Residential institution	23	<1%	8	<1%
	School/day care/public admin area	202	3%	94	3%
	Sport/recreation area	66	1%	30	1%
	Road, street and highway	214	4%	190	7%
	Trade and service area	783	13%	321	11%
	Industrial and construction area	2320	38%	623	22%
	Other specified place	367	6%	205	7%
Unspecified place	1972	32%	892	32%	
<i>Cause (mechanism)</i>	Transport	413	7%	312	11%
	Poisoning	159	3%	70	3%
	Falls	967	16%	645	23%
	Fires/burns/scalds	124	2%	40	1%
	Natural/environmental/animals	85	1%	132	5%
	Hit/struck/crush	1038	17%	402	14%
	Machinery	1064	17%	332	12%
	Cutting/piercing	1171	19%	487	17%
	Other unintentional	1131	18%	389	14%
	<i>Body site injured</i>	Head/face/neck	699	11%	475
Thorax (chest)		144	2%	112	4%
Abdomen/back/spine/pelvis		335	5%	224	8%
Upper extremity		3633	59%	1293	46%
Lower extremity		1031	17%	524	19%
Body region not relevant		175	3%	123	4%
Other specified and unspecified		118	2%	50	2%
<i>Nature of injury</i>	Superficial	165	3%	151	5%
	Open wound	1169	19%	537	19%
	Fracture	1566	26%	782	28%
	Dislocation, sprain, strain	457	7%	168	6%
	Injury to muscle and tendon	648	11%	198	7%
	Crushing injury	128	2%	30	1%
	Traumatic amputation	541	9%	162	6%
	Burns	205	3%	74	3%
	Intracranial (head) injury	153	3%	127	5%
	Injury to nerves and spinal cord	272	4%	73	3%
	Injury to blood vessels	93	2%	27	1%
	Other specified and unspecified	677	11%	447	16%
	<i>Length of stay</i>	<2 days	4517	73%	1951
2-7 days		1331	22%	670	24%
8-30 days		278	4%	168	6%
31+ days		26	<1%	20	1%
<i>Residential Region</i>	Melbourne MSR	4253	69%	1828	65%
	Balance of Victoria MSR	1899	31%	981	35%

Source: Victorian Admitted Episodes Dataset (VAED), 2001-2002



- i The major causes of injury admission for VWA compensable patients were cutting/piercing (19%), machinery (17%) and hit/struck/crush (17%) injuries whereas the major causes for non-VWA cases were falls (23%), followed by cutting/piercing (17%) and hit/struck/crush (14%).
- ii The upper extremity, lower extremity and head/face/neck were the most frequently injured body sites for both groups. The proportion of upper extremity injuries was significantly higher ($p < 0.0001$) among VWA compensable patients (59%) compared to non-VWA patients (46%). Head/face/neck injury admissions were significantly higher ($p = 0.003$) among non-VWA compensable patients (17%) compared with VWA patients (11%).
- iii Fractures represented just over a quarter of admissions among both VWA and non-VWA patients followed by open wounds (19%). The proportion of muscle and tendon injuries differed with 11% for VWA patients and 7% for non-VWA patients.
- iv VWA compensable patients spent significantly less time in hospital than non-VWA compensable patients, with short stays (<2 days) representing 73% and 69% of admissions for each group, respectively.
- v VWA compensable patients who were more likely to reside in the Melbourne MSR (69%) than non-VWA compensable patients (65%).

Emergency department presentations (non-admissions)

$n = 65,027$ (4 years)
Average annual frequency: 16,256

There were 65,027 ED adult presentations for unintentional work injury recorded in the 4-year period 1999 to 2002, an average of 16,256 presentations per year. Work injury accounted for 15% of all adult unintentional injury presentations recorded on VEMD.

Frequency of work injury ED presentations (15+ yrs) by gender, Victoria, 1999 to 2002* **Table 6**

ED Presentations (All persons 15+ years)	1999	2000	2001	2002	Total
Persons	15,940	15,917	16,299	16,871	65,027
Males	12,819	12,610	12,826	13,466	51,721
% of all cases	80.4	79.2	78.7	79.8	79.5
Females	3,120	3,304	3,470	3,405	13,299
% of all cases	19.6	20.8	21.3	20.2	20.5
Male to female ratio:	4.1:1	3.8:1	3.7:1	4.0:1	3.9:1

Source: Victorian Emergency Minimum Dataset 1999-2002 ($n = 65,027$)

Note: There were 7 cases with missing information on gender.

* Covers approximately two-thirds of Victorian emergency department presentations.

Gender and age

The average age of work-related ED presentations was 34 years (range: 15 to 93 years). Seventy-nine percent ($n = 38,255$) were male (Table 6). There was a small increase of approximately 5% in the frequency of ED presentations for all workers and males over the 4-year period, whereas the frequency of ED presentations for female workers increased by 11% (Table 6). Males were, on average, about 4 times more likely to present to the ED with a work injury than females.

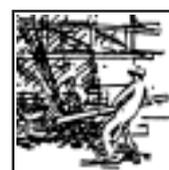
Figure 7 illustrates the distribution of work injury ED presentations by age and gender. Rate data were not available as the ED collection only covered around two-thirds of hospitals. The peak age group for presentations, overall and for both males and females, was 25-34 year olds (32%), followed by 15-24 year-olds (25%) and 35-44 year-olds (23%). The frequency of presentations declined as age increased for both sexes from 35 years and onwards (Figure 7). Younger adults (15-34 year-olds) appear to be over-represented in ED presentations in that they accounted for 57% of work-related ED presentations over the 4-year period, yet represented 42% of employed persons over the same period.

Causes of ED presentations

The most common causes of work injury ED presentations were: hit or struck by a person or object (27%), cutting and piercing (26%), and falls (13%) (Figure 8).

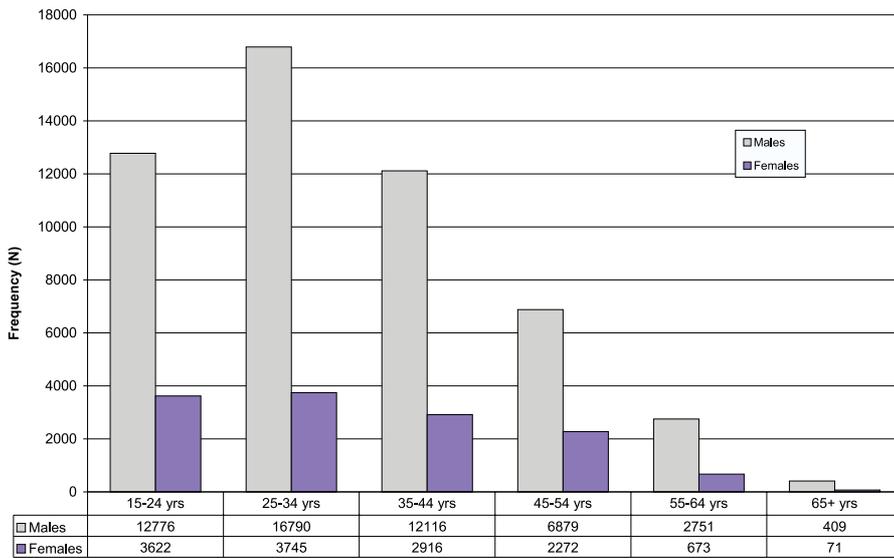
Hit/struck/crush injury presentations ($n = 17,581$) were caused by being struck by or colliding with an object (67%) and being struck by or colliding with a person (33%). Examination of a computer generated 1% random sample of narratives indicated that these injuries were caused by objects such as boxes, heavy equipment, shelves, roof tiles, gas cylinders and car batteries either falling from above or being dropped by the workers. Other scenarios included workers bumping into or knocking objects such as walls, steel bars, heavy equipment and machinery and getting hands and fingers caught between machinery parts, pallets, gates, and boxes.

There are no breakdown codes for cutting and piercing ($n = 17,204$) and machinery ($n = 4,192$) cases. However, examination of a computer generated 1% random sample of case narratives revealed that cutting and piercing injuries were caused by a range of objects including knives, machinery parts, glass, hypodermic needles, metal pieces, scissors and nails. The analysis of a computer generated 5% random sample of machinery ED presentations showed that the types of



Frequency of work injury ED presentations by age & gender, Victoria, 1999-2002

Figure 7



Source: Victorian Emergency Minimum Dataset, 1999-2002 (n=65,027)
 Note: There were 7 cases with gender information missing.

machinery involved in these injuries included angle grinders, industrial rollers, drills, fork lifts, nail guns, circular saws, conveyor belts, sewing machines and agricultural machinery.

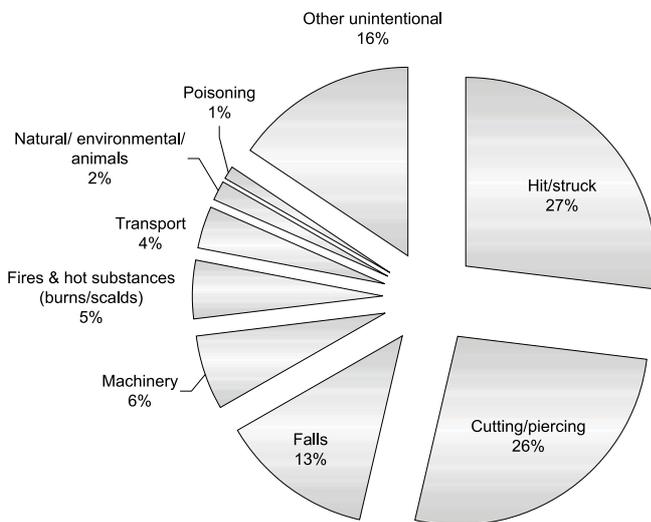
In contrast to hospitalisations, falls injury presentations (n=8,555) were mostly same level (79%), defined as falls involving a height less than one metre. The remainder were from a height over one metre. A computer generated 1% random sample of narrative text that further described fall injuries showed that they were caused by people tripping over objects, slipping on wet or oily surfaces, falling from ladders and scaffolds, tripping or falling down stairs and steps, and losing their footing when alighting from vehicles such as trucks and tractors.

Place of occurrence (location) of work injury ED presentations

Figure 9 provides a breakdown of the place of occurrence (location) of work injury ED presentations. Work injury locations are better reported than in the VAED (only 2% of cases on VEMD were coded as unspecified). Just over one half of work injury ED presentations occurred in trade and service areas (54%) (which includes places such as supermarkets, office buildings, restaurants, shopping centres and warehouses). The next most common location for work injury ED presentations was industrial and construction areas (18%), followed by hospitals (9%) and street or highway areas (4%) (Figure 9).

Causes of work injury ED presentations, Victoria, 1999-2002

Figure 8

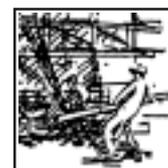


Source: Victorian Emergency Minimum Dataset (n=65,027)

Nature of injury and body region injured

The most frequent injury diagnoses for work injury ED presentations was open wounds (excluding the eye) which comprised 27% of ED presentations, followed by foreign body (eye) injuries (11%), sprains and strains (13%), superficial injuries (excluding the eye) (9%) and other eye injuries (8%) (Figure 10).

The body sites most frequently injured were the upper extremity (42%), the eyes (19%), the lower extremity (15%), and head injuries (4%). The most common



specific injuries were open wounds to the upper extremity (20%), 85% of which were to the hand and fingers, followed by foreign body in the eye (11%), other injuries to the eye (8%) and sprains/strains to the lower extremity (5%), nearly half of which (51%) were to the ankle.

Discussion

Workplace injuries pose a significant burden on the hospital system, society and the injured individual. Hospital databases are a potentially valuable source of supplementary information on the size and nature of the work injury problem because they record injury cases that are not included on workers' compensation claims databases, such as those held by WorkCover.

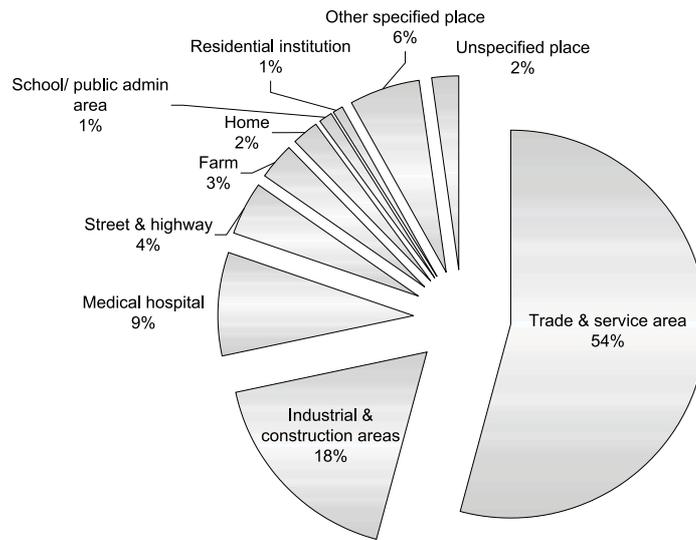
Prior to July 1998, activity codes in the VAED were non-existent and only limited analysis of work injury hospital admissions was possible. The introduction of activity coding to the VAED has greatly enhanced the ability to count and describe all serious work-related injury in Victoria, including non-compensable cases. From a public health viewpoint, it is important to examine the impact of all work-related injury and not to be restricted by legislative and political boundaries covering insured cases, as a less restricted approach allows governments to identify new opportunities to reduce injury (Langley 2004).

Based on data extracted from VAED and VEMD for 1999-2002, we estimate that each year there are at least 4,375 hospital admissions and 16,256 emergency department presentations for unintentional work injury in Victoria. Hospital admissions and ED presentations underestimate work injury because of incomplete recording or coding of admitted cases on VAED at the hospital level, and incomplete coverage of ED presentations on VEMD over the study period.

The latter limitation should be substantially resolved in 2004 as the seven EDs that were not contributing injury data to

Place of occurrence (location) of work injury ED presentations Victoria 1999-2002

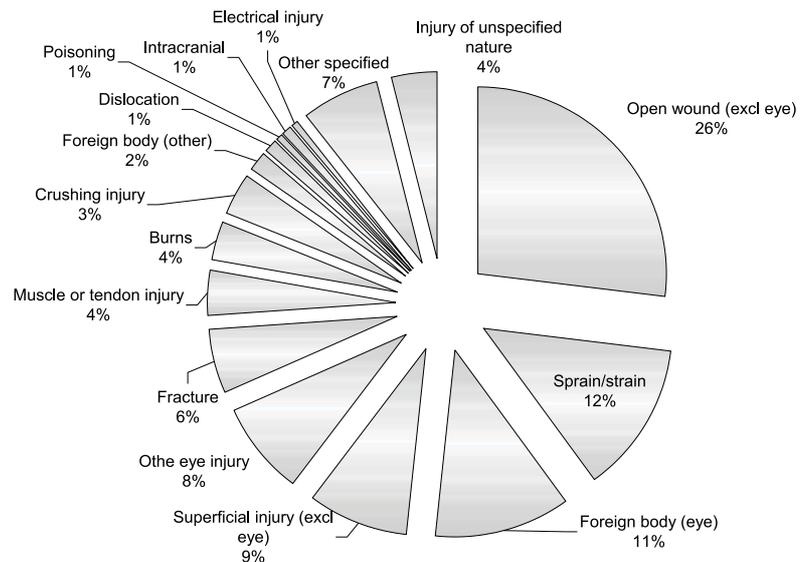
Figure 9



Source: Victorian Emergency Minimum Dataset (n=65,027)

Nature of work injury ED presentations Victoria, 1999-2002

Figure 10



Source: Victorian Emergency Minimum Dataset, 1999-2002 (n=65,027)

VEMD have now joined the system, but the former requires urgent action by the Victorian Department of Human Services (DHS) and Victorian public and private hospitals. Injury researchers and other interested parties, working in collaboration with the National Centre for

Classification in Health (NCCH), have made a concentrated effort to improve the identification and description of work-related injury in datasets coded to ICD-10 Australian Modification. The full benefit will only be realised if the information is entered into medical



records and the new codes are used at the hospital level. Currently, 51% of all hospital admissions are not coded for activity at the time of injury, although the proportion of work-related admissions uncoded for activity appears to be less for VWA compensable admissions (22%). Some steps towards this goal have already been taken by the Medical Services Branch of the VWA. Consultation with the Victorian DHS has resulted in DHS undertaking to progressively implement suggested improvements to the reporting of work-related hospital admissions (Francis 2004).

The third edition of ICD-10-AM came into effect in July 2002 and included several major improvements in the *activity* code variable: i.e. the introduction of eight sub-categories under the working for income main category and expansion of the location code. The activity sub-categories describe various industry sectors including agriculture, forestry and fishing, mining, manufacturing, construction, wholesale and retail trade, transport and storage, government administration and defence, and health services (NCCH 2002). The next financial year of hospital admissions data (for 2002/03), includes these expanded work activity codes. Again, their usefulness is dependent on the completeness of the data. Ideally, the adoption of detailed industry (Australian and New Zealand Standard Industrial Coding - ANZSIC) and occupational coding (Australian Standard Classification of Occupations - ASCO), as used by the Australian Bureau of Statistics would be of enormous benefit. A study conducted by MUARC and several Victorian hospitals indicated the feasibility of collecting such data (Stokes et al 2003).

Patterns of hospitalised occupational injury reported here for Victoria are similar to those reported for Australia, including the over-representation of males (88%), particularly in the 25-44 year age group, injury diagnoses (fractures, open wounds, wrist/hand injuries, lower extremity injuries) and places of occurrence (industrial and

construction areas, trade and service areas, farms) (NOHSC 2004).

Age specific rates of hospital admission were highest for people aged 65 years and over with an average rate of 251/100,000 per employed persons. This was high considering that this age group represented only 2% (n=384) of unintentional work admissions and 2% (n=41,200) of all employed persons in Victoria (ABS 2004). As expected, the most common locations of work-related injury admissions for persons aged 65 years and over were farms (29%) and industrial and construction areas (17%). Older workers should be the special focus of future injury prevention and research initiatives because governments are now encouraging people to stay in the workforce beyond 65 years of age.

The major difference between the MMSR and the BVMSR was the higher work-related admission rate among BVMSR adult residents (average rate ratio of 1.2). Injury patterns were fairly similar except that the length of hospital stay was slightly longer for BVMSR residents and, as expected, the farm was a more prominent location of injury for BVMSR.

Hospital injury surveillance databases include both compensable and non-compensable cases. Just over two-thirds (69%) of unintentional work hospital admissions for the 2-year period 2001-2002 (n=8961) were recorded as Victorian WorkCover Authority (VWA) compensable admissions. VWA compensable patients tended to be slightly younger than non-VWA compensable patients with an average age of 37 and 41 years, respectively. Cutting/piercing injuries were the main cause of admission for VWA patients while falls ranked highest for non-VWA patients. Other notable differences included higher proportions of upper extremity injuries, head/face/neck injuries (mostly fractures and open wounds) and shorter stays in hospital among VWA compensable cases.

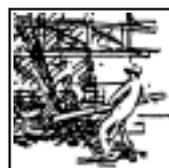
The systematic approach of hazard identification, risk assessment and risk control in the workplace is imperative in managing workplace health and safety

and in reducing serious work-related injury according to WorkSafe (2004). Employers have legal and moral obligations to provide and maintain a safe and healthy workplace for all employees in accordance with the fundamental principles of the Victorian OHS Act (1985). According to this approach, the application of control measures for hazards identified in the workplace should adhere to the hierarchy of risk control which include (in order of effectiveness) (WorkSafe 2004):

- i Elimination - this is the most effective control measure, and involves the removal of the risk (by removing the hazard or changing the work processes)
- ii Substitution - replacing the plant or substance with another with a lower risk
- iii Engineering control - changing the physical characteristics of plant or workplace to remove or reduce risk
- iv Isolation - removing or separating people from the source of the hazard
- v Administrative control - using policies, procedures, signs, training etc. to control risk
- vi Personal protective equipment - equipment or clothing designed to provide protection.

On the other hand, the public health approach suggests that injury results from a chain of events, and that breaking any link in that chain will have the desired effect of preventing the injury. Another approach is to use injury data to drive the process of problem identification and the identification of specific problems against which to target interventions. These two approaches can be used in conjunction.

Further information on regulations, codes of practice, guidance notes and links to other resources can be found at the Victorian WorkSafe website at <http://www.workcover.vic.gov.au>. Other state workcover websites with useful information include New South Wales <http://www.workcover.nsw.gov.au>, Queensland <http://www.whs.qld.gov.au>, and South Australia <http://www.workcover.com>.



Literature on interventions specifically addressing hand injury, the most common site of work injury identified in this study, is very limited. However, the data show that the two main mechanisms of hand injury were cutting and piercing from tools and implements and from various types of machinery.

Manual handling and machine guarding in manufacturing and food processing industries (poultry and meat) and agriculture have been the target of WorkSafe injury prevention initiatives, regulations and codes of practice, and details of interventions can be found at the VWA website (<http://www.workcover.vic.gov.au>). The wearing of protective gloves, particularly woven cut-resistant gloves, is an available countermeasure for people working in the meat and food industries where knives are commonly used (see VWA website for *Guidance Notes: Safe use of knives in the meat & food industries*). A case-crossover study by Sorock et al (2004) showed that glove use was associated with a lower risk (approximately 60-70%) of lacerations and punctures but not crushes, fractures, amputations and dislocations. However, in terms of the hierarchy of risk control, glove use plays a small part in what should be a comprehensive hand injury prevention approach that includes the identification and elimination of hazards; engineering controls; isolating or separating people from the source of the hazard; safety warnings and training; and proper selection and timing of glove use (Sorock et al 2004). While elimination of hazards would be ideal, from the public health perspective, the use of gloves is likely to provide immediate protection and should not be overlooked.

High numbers of hospitalisations due to falls from heights and ED presentations for same level falls were identified in the study. Injuries requiring hospital admission were associated with falls from ladders, scaffolding, buildings and structures. Injuries were commonly fractures to the lower extremity and commonly occurred in industrial and construction areas. ED presentations

were associated with less severe injuries caused by same level falls (slips and trips on wet or oily surfaces, tripping over objects and clutter). Injuries were commonly strains and sprains to the lower extremity and commonly occurred in trade and service areas.

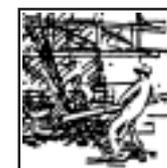
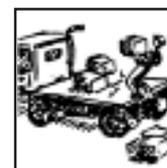
New regulations to address injury-related falls from heights have been developed by WorkSafe and came into effect in March 2004. Two codes of practice specifically targeting the construction industry, additional falls prevention guidance material, as well as the Falls Regulation, can be downloaded from the WorkSafe website by searching for 'Occupational Health and Safety (Prevention of Falls) Regulations 2003'. Included in the regulations are a prescribed list of risk control measures and the sequence in which they should be used. The first step is eliminating the risk of a fall by avoiding doing work at height or doing work on a solid structure where there is no risk of a fall. If this is not practicable, then the next step is to use 'passive fall prevention devices' such as scaffolds, guard railing or perimeter screening, building maintenance equipment, temporary work platforms (scissor lifts, cherry pickers, work boxes) or roof safety mesh. Work positioning systems are recommended next if the previous measures are not practicable. These include industrial rope access systems (rope friction devices, harnesses and anchoring systems), travel restraint systems or a drainer's hoist. If falls prevention measures are not practicable, then injury minimisation measures can be applied such as using a fall injury prevention system which does not stop a fall but minimises the distance someone can fall and therefore reduces any subsequent injuries resulting from the fall. Examples of these systems are industrial safety nets, catch platforms or a safety harness using fall arrest mechanisms. Finally, if all previous measures are not practicable, then the use of a ladder or administrative system is recommended to control the risk of a fall. Administrative systems include actions

such as arranging work procedures to either eliminate or reduce risk.

Recommendations

Surveillance, research, further investigations

1. Despite the limitations of the data presented here, a number of issues identified in this study warrant further investigation:
 - i The gross over-representation of males in hospital-treated work injury cases. Part of the explanation for the gender imbalance will lie in the bias of hospital datasets toward acute episodes of injury and the exposure of males to the more hazardous industries such as manufacturing, construction, transport and storage, agriculture, forestry and fishing (ABS 2002b). Other contributing factors to the gender imbalance require investigation.
 - ii The apparent 7% increase in the rate of female hospital admissions and the frequency of female ED presentations for unintentional work injury over the four-year study period.
 - iii The apparent higher risk of more severe unintentional injuries among the oldest and youngest groups of adult workers, those aged 65 years and older and 15-24 year olds.
 - iv The apparent higher risk of hospital admission for unintentional work injury among workers living outside metropolitan Melbourne and potential contributory factors.
 - v The detailed mechanisms of cutting and piercing injury, falls from heights, machinery and hit/struck/crush injury because of the substantial contribution of these injury causes to hospital admissions.
 - vi The high incidence of work-related hand (especially finger) injuries and potential solutions.
2. A comparative analysis of VAED hospital admissions data and WorkCover hospital claims data



should be undertaken to evaluate their respective roles in the surveillance and monitoring of hospital-treated work-related injuries in Victoria.

3. Responsible data collection agencies should investigate and address the barriers to full coding of activity at the time of injury and place of occurrence of injury on VAED and take action at the hospital level to improve reporting. Case narrative data on VEMD, collected in emergency departments, also need to improve.
4. The introduction of agency/factor codes in hospital data systems to identify objects, products, substances or circumstances leading to or associated with occupational injury events.
5. Introduction of detailed industry coding (Australian and New Zealand Standard Industrial Coding - ANZSIC) and occupational coding (Australian Standard Classification of Occupations - ASCO) as used by the ABS to better identify high-risk occupations and vulnerable groups.
6. Data linkage between health sector and occupational injury database should be considered as an alternative or additional means of obtaining the detailed data required to develop prevention measures and to generate research hypotheses.

Injury prevention

- i Priority should be given to the design, implementation and evaluation of interventions to reduce hand injuries, particularly in industries/workplaces where use of cutting/piercing implements (such as knives) and machinery use is high.
- i Protective gloves are recommended for use in the meat and food industries where knives are normally used.



Community Safety Month

Community Safety Month is a safety awareness program aimed at reducing the risk of crime, violence, emergencies and injuries within our community and increasing community confidence about safety through the promotion of safe practices.

Safety affects all facets of our lives. Crime, violence, injury or an emergency event can take place in our homes, at work or school, during sport and leisure activities, on the road and in public places. A significant cause of death, illness and disability in our community is due to injury. Harm from crime and injury affects people of all ages and from all backgrounds.

Community Safety Month was initiated in 1996 by the Victorian Safe Communities Network (VSCN) and is currently coordinated by Crime Prevention Victoria, Department of Justice. Local communities, groups, schools, regional services, businesses, state and local government departments and agencies, are encouraged to build community safety partnerships by organising safety activities with other organisations and groups. For those with already established partnerships, Community Safety Month provides an ideal opportunity to showcase existing safety programs or develop new ones.

Work Safe Week - 24 > 29 October

Work Safe Week highlights the importance of improving workplace health and safety and reminds Victorians that every 1 can make a difference when it comes to safety at work. Last year, workplace injuries cost Victorians more than \$1 billion. And that's not counting the personal cost to the thousands of people who were injured on the job or affected by work-related disease - nor their families.

Work Safe Week encourages businesses to focus on upholding safe practices in the workplace, to communicate occupational health and safety roles and responsibilities and to recognise positive contributions to workplace safety.

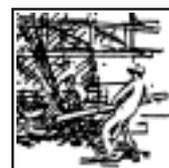
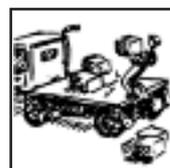
If there's just 1 thing you do in Work Safe Week, consult with every 1 in your workplace. Our aim is to help you make safety an important part of your workplace's business practices. If you involve every 1 in your Work Safe Week activities, they are more likely to remember the lessons they learn, and to make work safety a priority throughout the year - it takes just 1 simple idea.

Injury Prevention Week - 17 > 23 October

All Victorians should be aware of and involved in reducing the risk of injuries at home and in our community. Injury Prevention Week aims to involve members of the community in developing safe practices and attitudes that reduce the incidence and impact of injuries. Injuries can occur in all facets of our daily lives; in the home, at work and school, during sport and leisure activities, on the road and in public places.

Injury Prevention Week is an ideal opportunity for community safety and injury prevention practitioners, service providers, sporting groups and members of the community to undertake activities targeted at preventing injuries, and promoting a range of injury prevention messages to the community.

Visit www.communitysafetymonth.com.au



Intentional hospital-treated work injury, Victoria 1999-2002

Voula Stathakis, Erin Cassell

Intentional injury covers injury resulting from assaults and self-harm. Only 3% of the work-related injury cases treated in Victorian hospitals over the four-year period 1999-2002 were intentional (n=2,504), 97% of which were due to assault.

As for unintentional work injury, these figures may underestimate the size of the problem because data are not complete. Also, some of the recorded cases may not be strictly work-related even though they occurred when the injured person was working for an income ñ they may be related to domestic disputes or other non-work factors. Improvements in coding of assaultive work-related hospital admissions from the 2002/03 dataset and onwards provide information on the assailant to assist the identification of cases that are not work-related. Analysis of the first year of these data is included here.

Assaultive injury

Admissions: n=387 (annual average: 97)
ED presentations (non-admissions): n=2045 (annual average: 511)

There were 387 admissions and 2,045 ED presentations for work-related assaultive injury recorded on hospital injury surveillance databases over the 4-year period 1999-2002. There were increases in the frequency of admissions (13%) and ED presentations (27%) for work-related assaultive injury over that time.

Table 1 shows the frequency and crude rates of assaultive work injury admissions for all employed persons as well as by gender. The overall rate increased by 20% over the 3-year period 1999 to 2001 (from 4.0/100,000 to 4.8/100,000), but then dropped to 4.2/100,000 in 2002. On average, the male admission rate was 7 times higher than the female rate. Rate data are not available for ED presentations because not all hospital EDs collected injury surveillance data over the study period.

Table 2 summarises the pattern of work-related assaultive injury. Comparative analysis indicates the following similarities and differences between admissions and ED presentations.

- i Males were over-represented in both datasets, comprising 90% of admissions and 80% of ED presentations.
- ii More than three-quarters of admissions and presentations were aged 15-44 years, and injuries peaked in 25-34 year-olds. The average age of admissions and ED presentations, respectively, was 36 years (age range: 17-72 years) and 35 years (age range: 15-84 years).
- iii For both admissions and presentations, injuries most commonly occurred in trade and service areas, followed by road, street and highway. Hospitals were also a common location of work-related assaultive injury, but only for ED presentations (23%). In 2002/03 additional codes were applied to VAED to provide more detailed information on location of injury. Analysis of the subset of hospital admissions for that year revealed that 41% of the 97 work-related assaultive cases occurred in trade and service areas (n=40), predominantly in cafes, hotels and restaurants (24%, n=23) and shops and stores (13%, n=13).

- iv More than 60% of hospital-treated cases over the 4-year study period were caused by bodily force (fights and brawls). Injuries caused by cutting/piercing and firearms were more prominent in admissions than presentations.
- v Common case scenarios derived from the analysis of VEMD case narrative data on cutting and piercing and hit/struck injuries are as follows:
 - vi Cutting/piercing injuries from bites, knife stabs, syringe attacks, glass bottles and other glass implements were mainly inflicted by aggressive patients/clients, prisoners, offenders/criminals, thieves, shoplifters, robbers, irate customers, public transport passengers, hotel and nightclub patrons, aggressive co-workers, employees and employers;
 - vii Hit/struck by person or object injuries were inflicted by the same types of perpetrators as above and involved punching, kicking, head-butting, striking people with bottles, iron bars, crow bars, club locks, bats (baseball, cricket), chairs and bar stools;
 - viii The victims of work-related assaults were commonly health care workers (nurses, orderlies, doctors, therapists, carers and other medical and health staff) working in various

Frequency and rates per 100,000 employed persons (15+ yrs) Table 1 for work-related assault injury admissions, Victoria, 1999 to 2002

(All persons 15+ years)	1999	2000	2001	2002
All admissions	87	92	110	98
Number of employed persons	2,175,400	2,236,800	2,279,700	2,314,700
Crude rate per 100,000 employed persons	4.0	4.1	4.8	4.2
Male admissions	78	83	98	89
Number of employed males	1,223,100	1,248,300	1,274,300	1,280,700
Crude rate per 100,000 employed males	6.4	6.6	7.7	6.9
Female admissions	9	9	12	9
Number of employed females	952,300	988,500	1,005,400	1,034,000
Crude rate per 100,000 employed females	0.9	0.9	1.2	0.9

Source: VAED 1999-2002, ABS Labour Force Victoria Cat no. 6291.0.55.001



institutions such as hospitals, hostels, nursing homes, psychiatric wards and health clinics). Other victims included police officers getting hurt in the line of duty, prison guards, security guards (mostly at hotels and pubs), taxi-drivers, shop/store owners and workers, tram drivers, pizza deliverers, pub and hotel workers, paramedics, casino employees, car salespersons, chefs and other kitchen or restaurant workers and co-workers (factories, offices).

- i The head/face/neck and upper extremity were the most frequently injured body sites for both admissions and presentations.
- ii The more serious injuries (those requiring admission) were most commonly fractures, open wounds and intracranial injury. Three-quarters of admissions were discharged from hospital in less than two days.

New codes applied to VAED hospital admissions data from 2002/03 describe the relationship of the victim of the assault to the perpetrator. Analysis of the 97 hospital admissions for work-related assaultive injury in 2002/03 showed that in 39% of cases the injury was inflicted by a person or persons unknown to the victim. In 14% of cases the perpetrator was classed as an acquaintance or friend, a category that includes employers, employees and co-workers. Other specified perpetrators included spouse (1%), carer (1%) and official (2%). A further 15% were categorised as committed by 'other specified person'. In just over one-quarter of cases (27%) the relationship of victim to the perpetrator was not specified.

Self-harm injury

Admissions: n=26 (annual average: 6)
ED presentations (non-admissions): n=46 (annual average: 11)

Self-harm accounted for only a very small proportion (0.1%) of hospital-treated work-related injury over the 4-year period 1999-2002. There were 26 admissions and 46 ED presentations (non-admissions) for work-

related self-harm injury over the 4-year study period, an average of 6 admissions and 11 presentations per year. As for assaultive injury, these cases may relate to personal matters but are classified as work-related because they occurred when the injured person was working for an income.

Table 3 shows the frequency and pattern of hospital-treated work-related self-harm (admissions and ED presentations). Females were over-represented in admissions (58%), but under-represented in ED presentations (26%). Admitted cases were fairly evenly spread over the 10-year age groups 15-24 to 45-54, whereas ED presentations were more concentrated in the 25-34 year age group.

By far the most prominent cause of admissions was self-poisoning by various medications (88%). Three-quarters of admissions had a length of hospital stay of less than two days. The major causes of ED presentations for self-harm were more diverse and included self-poisoning, cutting/piercing and hitting against object or person. Gender differences by cause were observed for ED presentations with two-thirds of self-poisoning ED presentations recorded for females, whereas all cutting and piercing ED presentations and 93% of struck by object/person presentations were male. Analysis of VEMD narrative data revealed that the most common scenarios were drug overdoses using a combination of medications (mainly anti-depressants, analgesics), wrist lacerations and injuries caused by punching objects.

Discussion

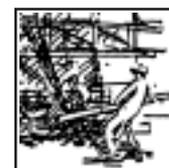
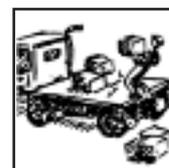
Intentional work-related injury (assaults and self-harm) represents a small proportion of hospital-treated occupational injury in Victoria (3%). The major proportion of intentional work-related injury is assaultive (97%). Any level of violence or aggression in the work place should not be tolerated, particularly violence among co-workers. The nature of some professions (health, security, policing and other community services) is such that dealings with violent or aggressive people cannot be avoided,

however, systems and procedures to minimise harmful situations need to be in place and adhered to at all times.

The Victorian WorkCover Authority (2003a) defines occupational violence as 'any incident where an employee is physically attacked or threatened in the workplace'. Physical attacks on employees include striking, kicking, scratching, biting and other types of direct physical contact as well as attacking with knives, guns, clubs or any other type of weapon, pushing shoving, tripping, grabbing and any form of indecent physical contact (VWA 2003). Data presented in this report only included incidences of physical assault with a hospital-treated injury outcome.

The sources of workplace violence can be grouped into three distinct categories based on their relationship to the workplace - external violence (criminals, robberies), client-initiated violence (patients, customers) and internal organisational violence (co-workers, employers, bullying, harassment) (CAL/OHSA 1998). Co-workers and employers are not the predominant source of workplace assaults, as evidenced by the data presented in this report and other sources (LeBlanc et al 2002, Levin et al 1998, Perrone 1999).

The majority of work-place assaults reported in our study involved client-initiated violence and mainly occurred in health care settings (mostly to nursing personnel) including emergency departments and psychiatric care units. The perpetrators were mostly patients and their family members, which is consistent with findings from other studies (Levin et al 1998). It has been suggested that substance abusing patients (or family members), psychiatric patients and patients with dementia were most likely to assault nursing staff (Levin et al 1998). VEMD case narratives and VAED perpetrator codes did not provide information on patient/client characteristics. Other client-initiated violence reported in this study occurred in law enforcement settings, to police, prison guards, security guards and other community service workers.

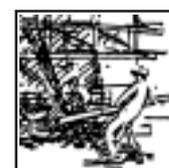


Frequency and pattern of hospital-treated work-related assaultive injury, persons aged 15 years and older, Victoria, 1999 to 2002

Table 2

Characteristics		VAED Admissions n=387		VEMD Presentations (non-admissions) n=2045	
		N	%	N	%
Gender	Male	348	90%	1628	80%
	Female	39	10%	417	20%
Age (years)	15-24	67	17%	358	17%
	25-34	142	37%	792	39%
	34-44	90	23%	515	25%
	45-54	56	14%	284	14%
	55-64	29	8%	84	4%
	65+	3	1%	12	<1%
Place of occurrence* <i>*(2001-2002 only, n=208)</i>	Home	1	<1%	53	3%
	Farm	0	0	4	<1%
	Residential institution	3	1%	68	3%
	School/day care/public admin area	8	4%	44	2%
	H health service area/hospital	13	6%	465	23%
	Sport/recreation area	1	<1%	131	6%
	Road, street and highway	22	11%	281	14%
	Trade and service area	85	41%	635	31%
	Industrial and construction area	15	7%	63	3%
	Other specified place	11	5%	207	10%
	Unspecified place	49	24%	94	5%
Cause (mechanism)	Bodily force (brawls and fights)	233	60%	1411	69%
	Pierced by sharp object (stab)	61	16%	135	7%
	Hit with blunt object	41	11%	192	9%
	Firearms	15	4%	-	-
	Other specified	20	5%	268	13%
	Unspecified	17	4%	39	2%
Body site injured	Head/face/neck	211	55%	809	39%
	Trunk	56	15%	119	6%
	Upper extremity	86	22%	556	27%
	Lower extremity	21	5%	116	6%
	Multiple body regions	1	<1%	170	8%
	Body region not relevant	2	<1%	176	9%
	Foreign body	-	-	18	1%
	Unspecified	1	<1%	46	2%
	Missing code	9	2%	35	2%
	Nature of injury	Superficial	41	11%	544
Open wound		81	21%	402	20%
Fracture		119	31%	141	7%
Dislocation, sprain, strain		12	3%	274	13%
Injury to muscle and tendon		11	3%	87	4%
Eye injury		2	<1%	71	4%
Intracranial (head) injury		43	11%	43	2%
Injury to internal organs		20	5%	4	<1%
Bite		-	-	87	4%
Other specified and unspecified		49	13%	338	16%
Missing code		9	2%	54	3%
Length of stay		<2 days	303	78%	N/A
	2-7 days	67	17%	N/A	N/A
	8-30 days	17	5%		
	31+ days	-	-		

Source: VAED 1999-2002, VEMD 1999-2002.



Frequency and pattern of hospital-treated work-related self-harm injury, persons aged 15 years and older, Victoria, 1999 to 2002

Table 3

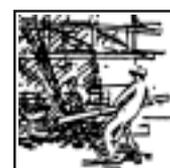
Characteristics		VAED Admissions n=26		VEMD Presentations (non-admissions) n=46	
		N	%	N	%
<i>Gender</i>	Male	11	58%	34	74%
	Female	15	42%	12	26%
<i>Age (years)</i>	15-24	7	27%	6	13%
	25-34	5	19%	23	50%
	34-44	7	27%	11	24%
	45-54	7	27%	3	7%
	55-64	-	-	3	7%
	65+	-	-	-	-
<i>Place of occurrence</i>	Home	6	23%	3	6%
	Residential institution	1	4%	-	-
	School/day care/public admin area	1	4%	-	-
	Health service area/hospital	-	-	4	9%
	Road, street and highway	1	4%	5	11%
	Trade and service area	4	15%	23	50%
	Industrial and construction area	5	19%	3	7%
	Other specified place	2	8%	5	11%
	Unspecified place	6	23%	3	6%
<i>Cause (mechanism)</i>	Self-poisoning by medications	23	88%	14	30%
	Hit/struck by object/person	-	-	14	30%
	Cut/pierce	1	4%	8	18%
	Other specified & unspecified	2	8%	10	22%
<i>Body site injured</i>	Head/face/neck	1	4%	6	13%
	Trunk	-	-	1	2%
	Upper extremity	1	4%	16	35%
	Lower extremity	-	-	1	2%
	Body region not relevant (poisoning)	24	92%	15	33%
	Other specified & unspecified	-	-	7	15%
<i>Nature of injury</i>	Superficial	-	-	3	7%
	Open wound	2	8%	13	28%
	Fracture, sprain, strain	-	-	7	15%
	Systemic-poisoning, toxic effects	23	88%	15	33%
	Other specified	1	4%	7	15%
	Unspecified	-	-	1	2%

Key risk factors associated with external violence in the workplace include the exchange of money with customers, few workers on site, evening or night trading, and workers who have face-to-face communication with customers (Mayhew 2002). Occupations with these job characteristics identified in VEMD case narratives for assaultive injury included taxi-drivers, convenience store workers (24hr), pub/hotel workers and retail workers.

Injury prevention and control initiatives relevant to work-related violence

Essentially, preventing occupational violence involves identifying hazards in the workplace, conducting risk assessments and implementing appropriate and effective risk control measures (VWA 2003b). According to VWA guidelines, employers should consider eliminating the source of risk where practicable, for

example changing client contact arrangements by providing services over the phone or electronically. If eliminating the risk is not possible then measures to reduce risk should be considered next. These can include making changes to the workplace environment (introduction of barriers, screens, security devices, closed circuit television) or the equipment used or by changing work practices or systems. Finally measures such as the provision of personal protection such as personal alarms and mobile phones should be



considered (VWA 2003b). The public health approach tends to be multifaceted, and guided by effectiveness, acceptability, accessibility and cost/benefit considerations. Further information on occupational violence prevention and control initiatives can be found at the following websites:

- i VWA initiative 'Prevention of bullying and violence at work', see Guidance Note for details http://www.workcover.vic.gov.au/dir090/vwa/home.nsf/pages/b&v_intro as well as the paper (with extensive reference list) written by Claire Mayhew 'Preventing violence against health workers' at http://www.workcover.vic.gov.au/dir090/vwa/home.nsf/pages/b&v_healthseminar
- i Several other Australian resources and guidelines on occupational violence are also available on the Internet as follows: <http://www.workcover.nsw.gov.au> <http://www.whs.qld.gov.au/guide/gde02v1.pdf> <http://www.workcover.com/ftp/documents/resViolenceGuidelines.pdf>
- i Australian Institute of Criminology has a comprehensive report on occupational violence in Australia at http://www.aic.gov.au/publications/rpp/22/full_report.pdf as well as an annotated bibliography of prevention policies, strategies and guidance materials at <http://www.aic.gov.au/research/cvp/occupational/index.html>.
- i International Council of Nurses (ICN) has published two reports at http://www.icn.ch/guide_violence.pdf and <http://www.icn.ch/proof3b.screen.pdf>

Recommendations Surveillance, research, investigations

- i Expansion of ICD-10-AM assault perpetrator codes to distinguish between co-workers, employers, and employees, patients, customers, patrons and criminal offenders/robbers. Currently these categories are grouped under as 'acquaintance/friend' or 'person unknown to victim'.

- i Improvement of VEMD case narratives to more consistently include information on perpetrators of assault and other factors/circumstances contributing to the assault.
- i Introduction of detailed industry (Australian and New Zealand Standard Industrial Coding - ANZSIC) and occupational coding (Australian Standard Classification of Occupations - ASCO) as used by the ABS to better identify high-risk occupations and vulnerable groups.
- i Data linkage with other data collections or sources of data on occupational violence, i.e. crime statistics, compensation data.
- i Further investigation of the 27% increase in the frequency of ED presentations for work-related assault injury over the four-year study period.

Prevention

The use of surveillance and other data to guide the development, implementation, and evaluation of innovative strategies and measures to reduce assaultive injury in high-risk settings such as health care, retail and pubs/hotels.

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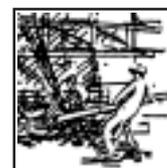
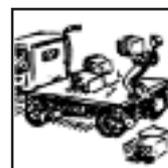
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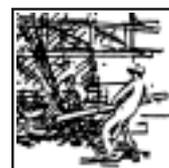
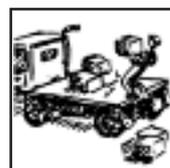
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Participating hospitals

From October 1995

Austin & 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

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Western Hospital - Sunshine

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From November 1995

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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

Coronial Services

Access to coronial data and links with

the development of the Coronial's Services statistical database are valued by VISAR.

National Injury Surveillance Unit

The advice and technical back-up provided by NISU is of fundamental importance to VISAR.

How to access

VISAR data:

VISAR collects and analyses information on injury problems to underpin the development of prevention strategies and their implementation. VISAR analyses are publicly available for teaching, research and prevention purposes. Requests for information should be directed to the VISAR Co-ordinator or the Director by contacting them at the VISAR office.

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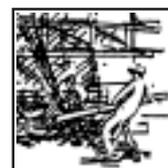
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All issues of *Hazard* and other information and publications of the Monash University Accident Research Centre can be found on our internet home page:

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