A settings-based analysis of injury data in Victoria

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In this issue we apply a settings-based approach to the analysis of injury patterns in Victoria to help identify the individuals, organisations and authorities that are able to influence the social and physical environments within those settings, and thereby influence injury risk. Identifying the specific features of injuries within settings provides guidance to relevant parties for developing prevention strategies.

Summary

Deaths (annual average 2,150 injury deaths):
The leading causes of Victorian injury deaths over the 3-year period 2009-2011 were falls (29%), suicide (25%), transport (16%) and unintentional poisoning (10%). For the most recent period in which location was available (2004-2006) more than a third of all injury deaths occurred in the home (35%), 22% occurred on roads/streets/highways and 8% in residential institutions. A further 20% of injury deaths were coded to ‘unspecified location’ (20%).

Hospital-treated injury (annual average 120,143 hospital admissions & 293,888 emergency department [ED] presentations):
Almost a quarter of Victorian injury hospital admissions (24%) and more than a third of injury ED presentations (34%) over the period 2009/10-2011/12 were for injuries that occurred in the home. Other settings in which injuries commonly occurred include the road/street/highway, while working for income, residential institutions and sports & athletics areas.

Trends (hospital admissions):

- In Victoria, over the decade July 2002-June 2012, the annual age-standardised hospitalisation rate increased significantly, and in the following settings: home, health service areas, trade & service areas, sports & athletics areas, and schools & other educational settings.

- Schools & other educational settings showed the highest all-ages average annual increase over the decade (2.3%) and rates increased significantly in all specific age groups in this setting.

- In the road and working for income settings there has been no significant change in the all-age trends over the decade July 2002-June 2012 and these were the only settings in which any of the age specific rates were decreasing. In the road setting rates decreased among the 0-14 years and 15-24 years age groups (by 2.9% and 2.0% annually, respectively) and in the work setting rates decreased among the 65 years and older age group (by 3.2% annually).

- The trend in residential institution injury rates could not be assessed due to a lack of appropriate denominator data.

Priorities for prevention identified include

- Home: falls; intentional self-harm; fires burns/scalds
- Road: car occupants; motorcyclists; pedestrians; cyclists; falls on footpaths
- Residential institutions: falls
- Sport: team ball sports, especially Australian Rules football, soccer, basketball, netball
- Health service areas: falls and choking and
Introduction

The Ottawa Charter, declared in 1986, created a landmark in health promotion and public health by describing an approach to prevention which was radically different to the prevailing modus operandi at the time (Hancock, 2011). Among other things, the Charter championed a settings-based approach to health promotion, noting that health is created by people in the settings in which they live their lives (World Health Organisation, 1986). This broadened the focus from being solely on the determinants of health at an individual level to also including the determinants at a population level, driven by a recognition that health is influenced by interacting environmental, organisational and personal factors which arise in a range of settings. A settings-based approach to health promotion therefore needs to address all these factors to the degree that they are influential in any specific setting. Therefore an intimate understanding of the social, organisational, political and moral climate of the relevant setting becomes a critical part of health promotion practice (Poland et al., 2009). There is agreement that the settings-based approach remains relevant to health promotion in the 21st century (Dooris, 2009). The modern approach to injury prevention also recognises the importance of both the physical and social environment in which injuries occur (McCure et al., 2010).

In this edition of Hazard we apply a settings-based approach to the analysis of injury patterns in Victoria. Identifying the most common settings in which injuries occur helps to identify the individuals, organisations and authorities that are able to influence the social, organisational, and physical environments within those settings, thereby influencing injury risk. Identifying the specific features of injuries within settings provides guidance to relevant parties in developing prevention strategies. In addition, the current Victorian Public Health and Wellbeing Plan which guides preventive health action in the state, assigns importance to an integrated prevention system operating across a range of settings (Victorian Department of Health, 2011). We provide an overview of Victorian hospital-treated injury by the eight settings that, together, account for around sixty-percent of all injury hospital admissions: the home, road/street/highway, working for income, residential institutions, sports & athletics areas, health service areas, trade & service areas, and schools & other educational institutions. Due to the lack of available recent unit record file data, injury deaths data was not able to be analysed by setting. Instead, a brief summary of the most common causes of injury deaths including information on place of occurrence (where available) is provided.

Analysis includes trends in injury hospital admissions by setting over the ten-year period 2002/03-2011/12 as well as more detailed presentation of the frequency, causes, severity and burden of hospital admissions by setting for the recent three-year period 2009/10-2011/12. A very brief overview of emergency department (ED) presentations for injury by setting is also provided. It is important to note that the numbers presented here are underestimates as more than a third of hospital admissions and around a quarter of ED presentations were unable to be assigned a setting. Potential priorities for prevention in each of the main settings are identified based on the combination of frequency, severity and burden.

Method

Data sources, selection and settings definition

Injury deaths information for the 3-year period January 2009-December 2011 was sourced from published Australian Bureau of Statistics (ABS) Causes of Death spreadsheets. VISU also holds unit record data for injury deaths for every year from 1990-2006 – the ABS Death Unit Record File (ABS-DURF). To provide further detail on injury deaths, a combination of information available in the published ABS Causes of Death spreadsheets (covering the period 2009-2011) and the most recent VISU-held unit record data (covering 2004-2006) was used. Settings information was not available for injury deaths so an overview of the causes of injury deaths is presented. See Box 1 for more details about the deaths data sources and case selection.

The hospital admissions and ED presentations data presented in this edition of Hazard were extracted from two injury datasets held by the Victorian Injury Surveillance Unit (VISU) at the Monash Injury Research Institute (MIRI): the Victorian Admitted Episodes Dataset (VAED) and the Victorian Emergency Minimum Dataset (VEMD). The latest available ten years of data (July 2002-June 2012) were extracted from the VAED and the VEMD for trend analysis. The latest 3-year period (July 2009-June 2012) was used for all other analysis. Hospital-treated injury data is presented by the setting in which the injury incident occurred. See Box 1 for full details of the definitions of injury settings, as well as the data sources and case selection.

Rates, trends and other detailed analysis

The all-ages injury rates for most settings have been age standardised using the Victorian 2001 population as the standard (road/street/highway, trade & service areas, sports & athletics areas, health service areas, schools & other educational institutions). See Box 2 for details of rate calculations for the remaining settings (home, residential institutions and working for income). Trends were determined using a log-linear regression model of frequency and rate data assuming a Poisson distribution. A trend was considered to be statistically significant if the p-value of the slope of the regression model was less than 0.05 (see Box 2). Further methods used for this Hazard, including definitions related to the burden, costs and severity of injury are also detailed in Box 2.

Results

Injury deaths overview

Causes of injury deaths

This section provides a brief overview of causes of Victorian injury deaths over the 3-year period January 2009 to December 2011. Data were sourced from published Australian Bureau of Statistics (ABS) Causes of Death spreadsheets and were not available by setting. Deaths of all intents are included: unintentional (‘accidental’), intentional (self-inflicted and inflicted by other) and other and undetermined intent.

Figure 1 shows that the leading causes of Victorian injury deaths over the 3-year period were falls (annual average n=618, 29%), intentional self-harm (suicide, n=532, 25%), transport (n=336, 16%) and unintentional poisoning (n=224, 10%).
VISU holds unit record data for injury deaths for every year from 1990-2006. To provide further detail on the four main causes of death, a combination of information available in the published ABS Causes of Death (ABS COD) spreadsheets (covering the period 2009-2011) and the most recent VISU-held unit record data (ABS DURF) (2004-2006) has been used.

1 Falls (annual average n=618)
   - Of fall deaths with a specific location code, most occurred in residential institutions (39%), the home (33%) or educational institutions, health service areas and other specified public administrative areas (21.5%). (ABS DURF 04-06)
   - Persons aged 80 years and older accounted for more than three-quarters of deaths (76%). Females aged 85 years and older were especially overrepresented accounting for 38% of all fall deaths. (ABS DURF 04-06)
   - Falls on the same level from slipping, tripping and stumbling accounted for almost half of all fall deaths (48%). The mechanism of fall was unspecified in a further 40% of fall deaths. (ABS COD 09-11)

2 Intentional self-inflicted (suicide) (annual average n=532)
   - Most suicides occurred in the home (68%) and a further 15% were coded to ‘other specified location which includes, among other locations, bodies of water, forests, other countryside, and railway lines. Six percent of suicides occurred on roads/streets/highways. (ABS DURF 04-06)
   - Males were overrepresented – accounting for more than three-quarters of suicides (76%), particularly those aged 30-54 years who accounted for 43% of all suicides. (ABS DURF 04-06)
   - The leading mechanisms of suicide were hanging, strangulation and suffocation (53.5%) and poisoning (24%). Other mechanisms included firearms (6%), jumping or lying before a moving object (5%) and jumping from a high place (4%). (ABS COD 09-11)

3 Transport (annual average n=336)
   - Most transport deaths were for on-road (traffic-related) incidents (89%). The remaining incidents occurred either off-road (6%), were land based incidents not further specified (2%), occurred in the water (1%) or in the air (2%). (ABS DURF 04-06)
   - Males were overrepresented – accounting for almost three-quarters of transport-related deaths (72.5%). The number of deaths was lowest among children, peaked among adolescents and young adults (aged 15-24 years) and then generally decreased with age. (ABS DURF 04-06)
   - Car occupants accounted for almost half of all transport deaths (49%), followed by pedestrians (18%) and motorcyclists (14.5%). (ABS COD 09-11)

4 Poisoning (unintentional) (annual average n=224)
   - Of unintentional poisoning deaths with a specified location code, most occurred at home (79.5%), followed by trade and service areas (6%) and the road/street/highway (5%). (ABS DURF 04-06)
   - Males were overrepresented – accounting for two-thirds of unintentional poisoning deaths (67%). Persons aged between 25 and 44 years accounted for more than half of all deaths (56%). (ABS DURF 04-06)
Most deaths were coded to ‘X44 - accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances’ (58%). A further 24% were coded to ‘X42 - accidental poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified – this category includes heroin, cocaine, codeine, cannabis, lysergide (LSD), mescaline, methadone, morphine and opium. (ABS COD 09-11)

**Location of injury deaths - all causes**

- Although the location of the injury incident was unspecified in one fifth of injury death cases (20%), more than a third of all injury deaths occurred in the home (35%), 22% occurred on roads/streets/highways and 8% in residential institutions. (ABS DURF 04-06)
Hospital-treated injury by setting

Table 1 shows the average annual frequency of injury hospital admissions and ED presentations over the period July 2009-June 2012 by the setting in which the incident occurred. Injuries of all intents are included: unintentional (‘accidental’), intentional (self-inflicted and inflicted by other) and other and undetermined intent. See Box 1 for information regarding data sources, selection and definitions of the settings.

Almost a quarter of injury hospital admissions (24%) and more than a third of injury ED presentations (34%) were for injuries that occurred in the home. Other settings in which injuries commonly occurred include the road/street/highway, occupational (working for income), residential institutions (mainly hospital admissions) and sports & athletics areas.

Overall, the pattern among hospital admissions and ED presentations was fairly similar although a higher proportion of ED presentations than hospital admissions were for injuries that occurred in the home (34% compared with 24%) and a higher proportion of hospital admissions than ED presentations were for injuries that occurred in residential institutions (6% compared with 1%) and health service areas (4% compared with 0.3%).

<table>
<thead>
<tr>
<th>Setting</th>
<th>HOSPITAL ADMISSIONS</th>
<th>ED PRESENTATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>home</td>
<td>28,839</td>
<td>100,327</td>
</tr>
<tr>
<td>road/street/highway</td>
<td>10,806</td>
<td>20,142</td>
</tr>
<tr>
<td>working for income</td>
<td>7,582</td>
<td>26,245</td>
</tr>
<tr>
<td>residential institution</td>
<td>6,799</td>
<td>2,288</td>
</tr>
<tr>
<td>sports &amp; athletics area</td>
<td>5,587</td>
<td>21,312</td>
</tr>
<tr>
<td>health service area</td>
<td>4,708</td>
<td>782</td>
</tr>
<tr>
<td>trade &amp; service area</td>
<td>2,792</td>
<td>2,934</td>
</tr>
<tr>
<td>school &amp; other educational institution</td>
<td>2,005</td>
<td>10,914</td>
</tr>
<tr>
<td>area of still water/ stream of water/ large area of water/ beach</td>
<td>849</td>
<td>512</td>
</tr>
<tr>
<td>forest/desert/other specified countryside</td>
<td>507</td>
<td>137</td>
</tr>
<tr>
<td>farm (excluding farm house, or work activity)</td>
<td>428</td>
<td>1,863</td>
</tr>
<tr>
<td>other institution &amp; public administrative area</td>
<td>349</td>
<td>2,214</td>
</tr>
<tr>
<td>other specified setting</td>
<td>2,006</td>
<td>34,998</td>
</tr>
<tr>
<td>unspecified setting</td>
<td>46,886</td>
<td>69,220</td>
</tr>
<tr>
<td>ALL SETTINGS</td>
<td>120,143</td>
<td>293,888</td>
</tr>
</tbody>
</table>

Note: May not sum to total due to rounding

Table 2 provides an overview of the severity and burden associated with injury hospital admissions by setting. Serious injuries are defined using the International Classification of Disease based Injury Severity Score - ICISS (see Box 2 for further information). The burden associated with injury can be quantified in a number of ways and in this edition of Hazard we have included the years lived with disability (YLDs), the direct hospital costs, and the hospital bed days associated with injury hospital admissions as measures of the burden. This information is not provided for ED presentations due to the lack of available data. See Box 2 for information regarding the calculation of injury severity and the various measures of the burden of injury.

- Home injuries accounted for around a fifth of all years lived with disability as result of injury (22%), more than a quarter of direct hospital costs (27%) and around a third of both hospital bed days (33%) and serious injuries (32%).
- Injuries that occurred on the road/street/highway accounted for 18% of serious injuries, 20% of years lived with disability, and around 10% of both hospital costs (11%) and bed days (10%).
- Although injuries that occurred in the health service area accounted for a relatively small proportion of serious injuries (3%) and years lived with disability (1.5%, due to the age profile of injured persons), this setting accounted for 9% of hospital costs and 15% of hospital bed days associated with injury.
- Despite accounting for a relatively small proportion of years lived with disability (3%), hospital bed days (7%) and hospital costs (7%), injuries that occurred in residential institutions accounted for 13% of serious injuries.
- Although sports injuries accounted for 7% of years lived with disability they accounted for a much smaller proportion of serious injuries (2%), hospital costs (3%) and hospital bed days (1%).

Figure 2 summarises the frequency, severity and burden of injury hospital admissions for the eight settings that accounted for 58% of injury admissions, 75% of serious injury admissions, 67% of years lived with disability, 71% of bed days and 65% of hospital costs in Victoria over the period July 2009-June 2012.
Table 2  Injury hospital admissions – average annual serious injuries, years lived with disability, direct hospital costs and hospital bed days (2009/10-2011/12)

<table>
<thead>
<tr>
<th>SERIOUS INJURIES</th>
<th>YEARS LIVED WITH DISABILITY</th>
<th>HOSPITAL BED DAYS</th>
<th>HOSPITAL COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>home</td>
<td>5,479</td>
<td>2,662</td>
<td>279,053 18.0</td>
</tr>
<tr>
<td>road/street/highway</td>
<td>3,120</td>
<td>2,399</td>
<td>82,999 9.8</td>
</tr>
<tr>
<td>working for income</td>
<td>628</td>
<td>1,183</td>
<td>23,030 2.7</td>
</tr>
<tr>
<td>residential institution</td>
<td>2,130</td>
<td>413</td>
<td>55,226 6.9</td>
</tr>
<tr>
<td>sports &amp; athletics area</td>
<td>394</td>
<td>803</td>
<td>11,889 1.4</td>
</tr>
<tr>
<td>health service area</td>
<td>461</td>
<td>182</td>
<td>125,457 14.8</td>
</tr>
<tr>
<td>trade and service area</td>
<td>552</td>
<td>344</td>
<td>16,031 1.9</td>
</tr>
<tr>
<td>school &amp; other educational institution</td>
<td>56</td>
<td>164</td>
<td>3,033 0.4</td>
</tr>
<tr>
<td>other institution &amp; public administrative area</td>
<td>62</td>
<td>36</td>
<td>2,623 0.3</td>
</tr>
<tr>
<td>area of still water/stream of water/large area of water/beach</td>
<td>133</td>
<td>267</td>
<td>3,530 0.4</td>
</tr>
<tr>
<td>farm</td>
<td>89</td>
<td>75</td>
<td>2,250 0.3</td>
</tr>
<tr>
<td>forest/desert/other specified countryside</td>
<td>102</td>
<td>141</td>
<td>2,311 0.3</td>
</tr>
<tr>
<td>other specified setting</td>
<td>310</td>
<td>284</td>
<td>11,251 1.3</td>
</tr>
<tr>
<td>unspecified setting</td>
<td>3,645</td>
<td>3,182</td>
<td>224,592 26.5</td>
</tr>
<tr>
<td>total</td>
<td>17,202</td>
<td>100.0</td>
<td>1,133</td>
</tr>
</tbody>
</table>

Note (1): See box 2 for definitions regarding severity and burden of injury
Note (2): May not sum to total due to rounding

Figure 2  Injury hospital admissions – frequency, severity and burden by setting (2009/10-2011/12)

Note: See box 2 for definitions regarding severity and burden of injury

Hospital admissions – all settings

Trend in all injury admissions (02/03-11/12)

Figures 3 and 4 show the trends in the frequency and rate of all injury hospital admissions over the decade 2002/3-2011/12 by age group (0-14 years, 15-24 years, 25-44 years, 45-64 years, 65-74 years, 75-84 years and 85 years and older).

Frequency:
- The all-ages injury frequency increased significantly from 91,378 in 2002/3 to 127,454 in 2011/12 – an estimated 3.9% annual increase (95% confidence intervals [CI] 3.3% to 4.3%) and a 46.1% overall increase (CI 38.7% to 52.8%) – not shown on figure
- The frequency of injury admissions increased significantly in all age groups and the average annual percentage changes and the change over the whole period,
including 95% confidence intervals, for each of the age groups are shown on figure 3.

**Hospital admission rates (per 100,000 persons):**

- The all-ages injury hospital admission rate (age standardised) increased significantly from 1,878.8 per 100,000 in 2002/03 to 2,205.8/100,000 in 2011/12 – an estimated 1.8% annual increase (CI 1.3% to 2.3%) and a 19.8% overall increase (CI 13.9% to 25.7%) (figure 4)

- Significant increases in injury admission rates were observed among all age groups with the exception being children aged 0-14 years (figure 4)

The remainder of this edition of Hazard provides a more detailed overview of injuries in the following 8 settings that accounted for 58% of injury admissions, 67% of YLDS, 71% of bed days and 65% of hospital costs:

- home,
- road/street/highway,
- working for income,
- residential institution,
- sports & athletics areas,
- health service areas,
- trade & service areas, and
- school & other educational institutions.

Table 3 provides a summary of trends in hospital admission rates across settings and age groups over the decade July 2002 to June 2012. The detailed information is provided later in this edition of Hazard in the trends sections of each setting. The number in the table is the average annual percentage change in hospital admission rates over the decade. A red number indicates an increase, a green number indicates a decrease, ‘ns’ indicates the change was not significant and ‘n/a’ indicates the trend was not assessed. Residential institutions could not be included due to a lack of appropriate denominator data to calculate rates for all years of the period. See Box 2 for details on the denominator data used for the other settings.

- The average annual age-standardised hospitalisation rate increased significantly in Victoria and for all specific settings except the road and work where there has been no significant change in the all-age trends over the decade.

- Schools and other educational settings showed the highest all-ages average annual increase over the decade (2.3%) and rates increased significantly in all age groups in this setting.

- The road and work settings were the only settings in which any of the age specific rates were decreasing. In the road setting rates decreased among the 0-14 years and 15-24 years age groups (by 2.9% and 2.0% annually, respectively) and in the work setting rates decreased among the 65 years and older age group (by 3.2% annually).
Table 3  Estimated annual percentage change in hospital admission rates by age group and setting, Victoria 2002/03-2011/12

<table>
<thead>
<tr>
<th>SETTING</th>
<th>ALL(0)</th>
<th>0-14</th>
<th>15-24</th>
<th>25-44</th>
<th>45-64</th>
<th>65-74</th>
<th>75-84</th>
<th>85+</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1.8%</td>
<td>ns</td>
<td>1.6%</td>
<td>1.5%</td>
<td>3.4%</td>
<td>2.8%</td>
<td>2.0%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Home</td>
<td>1.9%</td>
<td>ns</td>
<td>1.6%</td>
<td>2.3%</td>
<td>3.8%</td>
<td>1.8%</td>
<td>1.5%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Road</td>
<td>ns</td>
<td>-2.9%</td>
<td>ns</td>
<td>2.0%</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Health</td>
<td>2.2%</td>
<td>ns</td>
<td>10.1%</td>
<td>5.1%</td>
<td>5.8%</td>
<td>2.9%</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Trade</td>
<td>1.7%</td>
<td>3.2%</td>
<td>ns</td>
<td>4.2%</td>
<td>3.4%</td>
<td>3.4%</td>
<td>6.0%</td>
<td></td>
</tr>
</tbody>
</table>

Notes:  
(a) The annual percentage changes for the ‘all-ages’ trends are based on age standardised rates, all others are based on age specific rates.  
(b) Work trends were tested separately for the age groups 25-34, 35-44, 45-54 and 55-64 but all these age groups showed non-significant changes so for ease of comparison they are shown on the table as just the two groups 25-44 and 45-64.  
(c) Residential institutions could not be included due to a lack of appropriate denominator data to calculate rates for all years of the period.

Figure 5  Trend in the frequency of home injury hospital admissions by age groups, Victoria 2002/03-2011/12

Figure 6  Trend in home injury hospital admission rates by age groups, Victoria 2002/03-2011/12

**Home**

**Hospital admissions (n=28,839 per year, 09/10-11/12)**

Trend in home injury admissions (02/03-11/12)

Figures 5 and 6 show the trends in the frequency and rate of home injury hospital admissions over the decade 2002/2003-2011/12 by age group (0-14 years, 15-24 years, 25-44 years, 45-64 years, 65-74 years, 75-84 years and 85 years and older).

**Frequency:**

- The all-ages home injury frequency increased significantly from 22,644 in 2002/03 to 30,295 in 2011/12 – an estimated 3.4% annual increase (95% confidence intervals [CI] 2.8% to 3.9%) and a 39.5% overall increase (CI 31.2% to 46.7%) – not shown on figure
- The frequency of home injury admissions increased significantly in all age groups except in children aged 0-14. Average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 5.

**Hospital admission rates (per 100,000 persons):**

- The all-ages home injury hospital admission rate (age standardised) increased significantly from 470.5 per 100,000 in 2002/03 to 514.9/100,000 in 2011/12 – an estimated 1.0% annual increase (CI 0.5% to 1.5%) and a 10.1% increase overall (CI 4.7% to 15.6%) (figure 6).
- Home injury admission rates increased significantly among persons aged 45-64 years, 65-74 years, 75-84 years and 85 years and older.
years and older but not among children or younger adults (0-14 years, 15-24 years, 25-44 years) (figure 6)

Patterns in home injury admissions (09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were 86,516 hospital admissions for persons injured in the home in Victoria, an average of 28,839 admissions per year. Figure 7 shows the burden of home injury hospital admissions by age group and sex. Average annual values are shown in the figures.

- Injury hospital admissions were common across all age groups and among both males and females. Older females had the highest frequency of injury admission.
- The pattern for years lived with disability as a result of home injury is different to the pattern for frequency – males, particularly those aged 45-64 and 25-44 years accounted for the most years lived with disability.
- Older persons, especially older females, accounted for the highest number of bed days and direct hospital costs associated with home injury.

Figure 8 shows the burden of home injury hospital admissions by causes for the 3-year period 2009/10-2011/12. Average annual values are shown in the figures.

- The four pie charts demonstrate that falls dominate home injury admissions. Falls accounted for 60% of injury admissions and 65% of years lived with disability, 85% of hospital bed days and 74% of direct hospital costs associated with home injury.
- Intentional self-harm injury admissions were also relatively common and accounted for 10% of all home injury hospital admissions but a smaller proportion of associated years lived with disability, hospital bed days and direct hospital costs.
- Injuries resulting from fires/urns and scalds, while less common (less than 2% of injury admissions), accounted for 7% of years lived with disability as a result of home injury. The most common causes of these severe injuries were exposure to ignition of highly flammable material (includes gasoline, kerosene, petrol) and contact with hot food and fluids (including drinks, fats and cooking oils, hot fluids other than hot tap water).

Figures 9 and 10 summarise fall injury admissions among persons aged 0-64 years and persons aged 65 years and older, respectively.

- Males accounted for a higher number of child home fall injury admissions (58% v 42%) whereas females accounted for a higher proportion of injury admissions among adults aged 45-64 years (58% v 42%).
- The most common specific types of falls leading to hospital admission among children included falls involving beds (14%), slips, trips & stumbles (13.5%), play equipment falls (13%), falls involving chairs (10.5%) and other same level falls (10%).
- The most common specific types of falls among adults aged 25-44 years included slips, trips & stumbles (26%), other same level falls (18%), falls involving stairs and steps (13%), falls on or through buildings or structures (9.5%) and falls from ladders (6%).

- Among adults aged 45-64 years, the most common specified types of falls were very similar to those among person aged 25-44 years although falls on or through buildings or structures (4%) were less common among the older group.
- Females accounted for approximately two-thirds to three-quarters of home fall injury admissions among the three older person age groups (65-74 years: 62%, 75-84 years: 68%, 85+ years: 73%).
- Slips, trips & stumbles and other same level falls were most common among all older adult age groups. Falls involving stairs and steps, beds and chairs were also common across the three age groups. Ladder falls were common among those aged 65-74 years.
ED presentations (non-admissions) (n=100,327 per year, 09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were around 100,000 ED presentations per year for persons injured in the home setting (n=100,327). Figure 11 provides a very broad overview of these ED presentations.

- In contrast to home injury hospital admissions which generally increased in frequency as age increased (see figure 7), home injury ED presentation peaked in children aged 0-14 years and generally decreased as age increased.
- Males accounted for a slightly higher number of home injury ED presentations than females (54% v 46%).
- The most common causes of home injury ED presentations were falls (32%), hitting, striking, crushing incidents (17%) and cutting and piercing related injury (12%).

Priorities for prevention of home injury

Based on the data presented in this section, the following priorities for prevention of injuries in the home have been identified:

Falls
- Older adults (65+ years)
  - slips, trips and stumbles on the same level
  - adults aged less than 65 years
  - slips, trips and stumbles; falls on and from ladders, and stairs and steps
- Children (0-14 years)
  - slips, trips and stumbles; falls involving beds, chairs and play equipment

Intentional self-harm (fatal and non-fatal)
- Fatalities
  - hanging/strangulation/suffocation, poisoning
- Non-fatal injuries
  - poisoning, cutting with sharp objects

Fires/burns/scalds (due to the years lived with disability and hospital bed days and costs)
- exposure to ignition of highly flammable material (includes gasoline, kerosene, petrol)
- contact with hot food and fluids (including drinks, fats and cooking oils, hot fluid other than hot tap water)
Road/Street/Highway

Hospital admissions (n=10,806 per year, 09/10-11/12)

Trend in road injury admissions (02/03-11/12)

Figures 12 and 13 show the trends in the frequency and rate of road injury hospital admissions over the decade 2002/3-2011/12 by age group (0-14 years, 15-24 years, 25-44 years, 45-64 years, 65-74 years, 75-84 years and 85 years and older).

Frequency:

• The all-ages road injury frequency increased significantly from 9,834 in 2002/03 to 11,252 in 2011/12 – an estimated 1.7% annual increase (95% confidence intervals [CI] 1.1% to 2.3%) and a 18.9% overall increase (CI 11.9% to 25.8%) – not shown on figure 5-24 years (no significant change). Average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 12.

Hospital admission rates (per 100,000 persons):

• The all-ages road injury hospital admission rate (age standardised) showed no significant change over the 10-year period (20.2 per 100,000 in 2002/03 to 197.2/100,000 in 2011/12) (figure 13)

• Road injury admission rates decreased significantly among children aged 0-14 years and persons aged 15-24 years, increased among persons aged 45-64 years and showed no significant change in all other age groups (figure 13)

Patterns in road injury admissions (09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were 32,418 hospital admissions for persons injured on roads, streets and highways in Victoria, an average of 10,806 admissions per year. Figure 14 shows the trend of road injury hospital admissions by age group and sex. Average annual values are shown in the figures

• Road injury admissions were most common among adolescents & younger adults (aged 15-24 years), and adults aged 25-44 years, particularly among males.

• Males were even more overrepresented when examining the burden associated with years lived with disability, hospital bed days and hospital costs.

Figure 15 shows the burden of road injury hospital admissions by cause of injury for the 3 year period 2009/10-2011/12. Average annual values are shown in the figures

• Car occupants accounted for more than 40% of road injury admissions, years lived with disability, hospital bed days and costs. Injury admissions were also common among motorcyclists, pedal cyclists and pedestrians. Falls that occurred on footpaths were also very common among injury admissions (in the ICD-10-AM coding system the road is defined as including the footpath).

• Motorcyclists accounted for almost a fifth of all years lived with disability despite accounting for only 11% of road injury hospital admissions.
Over the 3-year period July 2009 to June 2012 there were more than 20,000 ED presentations per year in Victoria for persons injured on the road/street/highway (n=20,142). Figure 16 provides a very broad overview of these ED presentations.

- Road injury ED presentations were most common among adults aged 25-44 years (33%) and 15-24 year olds (28%). ED presentations were least frequent among older people.
- Males accounted for more road injury ED presentations than females (58% vs. 42%).
- The leading causes of road injury ED presentations were transport related (46%, mostly car occupants [27%], cyclists [9%] and motorcyclists [7%]) and falls (25%).

### Priorities for prevention of road injury

- Car occupants
- Falls (especially on footpaths)
- Motorcyclists
- Pedestrians
- Cyclists
Working for Income

Hospital admissions (n=7,582 per year, 09/10-11/12)

Note: There were, on average, just 5 hospital admissions per year for children aged less than 15 years injured while working for income, therefore this section is restricted to persons aged 15 years and older.

Trend in working for income injury admissions (02/03-11/12)

Figures 17 and 18 show the trends in the frequency and rate of working for income injury hospital admissions over the decade 2002/3-2011/12 by age group (15-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years and 65 years and older). Labour force participation numbers have been used as the denominator for rates calculations (see Box 2 for more detail).

Frequency:
• The all-ages work injury frequency increased significantly from 6,343 in 2002/03 to 8,172 in 2011/12 — an estimated 3.0% annually (95% confidence intervals [CI] 2.1% to 3.9%) and 34.7% overall (CI 22.7% to 46.5%) — not shown on figure
• The frequency of work injury admissions increased significantly in all age groups. Average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 17.

Hospital admission rates (per 100,000 labour force participants):
• The all-ages work injury hospital admission rate (age standardised) showed no significant change over the 10-year period (274.1 per 100,000 in 2002/03 to 284.5/100,000 in 2011/12) (figure 18)
• Work injury admission rates increased significantly among persons aged 15-24 years and decreased significantly among persons aged 65 years and older. All other age groups showed no significant change in work injury hospital admission rates (figure 18).

Patterns in working for income injury admissions (09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were 22,730 hospital admissions for persons injured when working for income in Victoria, an average of 7,577 admissions per year.

Figure 17 Trend in the frequency of working for income injury hospital admissions by age groups, Victoria 2002/03-2011/12

Figure 18 Trend in working for income injury hospital admission rates by age groups, Victoria 2002/03-2011/12

Figure 19 Average annual burden of working for income injury admissions by age group, Victoria 2009/10-2011/12

VICTORIAN INJURY SURVEILLANCE UNIT
Figure 20: Average annual burden of working for income injury admissions by cause, Victoria 2009/10-2011/12

- Frequency (7,577 per year)
  - Fall: 18%
  - Cutting/piercing: 17%
  - Machinery: 12%
  - Other causes: 12%

- YLDs (1,181 per year)
  - Fall: 12%
  - Cutting/piercing: 12%
  - Machinery: 10%
  - Other causes: 10%

- Bed days (23,016 per year)
  - Fall: 10%
  - Cutting/piercing: 20%
  - Machinery: 17%
  - Other causes: 12%

- Costs ($39.7m per year)
  - Fall: 20%
  - Cutting/piercing: 19%
  - Machinery: 13%
  - Other causes: 13%

Figure 21: Work related injury admissions occurring in the construction industry, Victoria 2009/10-2011/12 (n=864 per year)

- Cutting/piercing: mostly result of contact with nail guns, powered saws & non-powered hand tools
- Falls: mostly from ladders, roofs and scaffolding
- HITTING, STRIKING OR CRUSHING: incidents mostly resulted from thrown, projected or falling objects or being caught/crushed/pinched/jammed between objects
- Machinery: incidents commonly involved wood working and forming machinery

Figure 22: Work related injury admissions occurring in the agricultural industry, Victoria 2009/10-2011/12 (n=386 per year)

- Transport: mainly involved ‘special vehicles mainly used in agriculture’ and motorcycles
- Natural/environmental/animal related: incidents commonly involved cattle, horses and sheep
- Machinery: incidents mainly involved ‘agricultural machinery not further defined’

Figure 19 clearly demonstrates that males accounted for the majority of hospital admissions, years lived with disability, hospital day costs and costs associated with work related injury.

The frequency of injury admissions peaked in males aged 25-34 and then decreased with age. Years lived with disability followed a similar pattern, whereas direct hospital costs and bed days peaked at the slightly older age group of 44-54 years.

Figure 20 shows the burden of work injury hospital admissions by cause of injury for the 3 year period 2009/10-2011/12. Average annual values are shown in the figures:

- Falls accounted for 18% of work related injury admissions, followed by cutting and piercing incidents (17%), hitting/striking/crushing incidents (14%) and machinery related injury (11%).
- Transport related injuries, while not common, accounted for the second most years lived with disability (20%), hospital costs (17%) and hospital bed days (13%) suggesting that when they do occur they are serious.

Figures 21 and 22 summarise work injury admissions among persons injured in the construction and agriculture industries, respectively. These two industries accounted for 58% of the cases with a specified industry code.

- Construction injury admissions overwhelmingly affected males (99.5%, n=860) and peaked in those aged 20-24 years before steadily decreasing with age.
- The most common causes of injury in the construction industry were cutting/piercing (29%), falls (23%), hitting, striking or crushing incidents (15%) and machinery-related incidents (10%).
- Agriculture related injury admissions mostly affected males (86%) and were common across all adult age groups.
- The most common causes of injury in the agriculture industry were transport related incidents (18%, mainly involving ‘special vehicles mainly used in agriculture’ and motorcycles) and natural/environmental/animal related incidents (17%, commonly involving cattle, horses and sheep).
ED presentations (non-admissions) (n=26,245 per year, 09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were more than 25,000 ED presentations per year in Victoria for persons injured while working for income (n=26,245). Figure 23 provides a very broad overview of these ED presentations.

- ED presentations occurred most commonly among persons aged 15-24 years (26%) and 25-34 years (26%) before decreasing with age.
- Males accounted for more than three-quarters of ED presentations (78%).
- The leading causes of work related injury ED presentations were cutting and piercing incidents (20%) and hitting/striking/crushing incidents (19%) followed by falls (14%).

Priorities for prevention of work injury

Causes of injury
- Falls, cutting and piercing, transport-related injuries (due to the severity of these injuries), machinery-related incidents and hitting/striking/crushing incidents

Industries
- Construction and agriculture

Residential Institutions

Note: Persons injured while working for income in residential institutions are not included in this section but are included in the working for income section (see Box 1 for further information)

Hospital admissions (n=6,799 per year, 09/10-11/12)

Trend in aged care facilities injury admissions (02/03-11/12)

Residential institutions as defined in the ICD-10-AM include retirement villages, aged care facilities, prisons, juvenile detention centres, military camps, orphanages and other and unspecified residential institutions. The majority of injuries occurring in residential institutions that result in hospital admission occurred in aged care facilities and retirement villages (92.9%). Therefore, the focus of this trends section is injuries occurring in aged care facilities and retirement villages. Appropriate population data, including aged care facilities and retirement villages, could only be sourced for 2011/12 (using the Australia Bureau of Statistics 2011 census) so a rate is only provided for 2011/12 and no trend analysis was conducted (see Box 2 for more detail).

Figure 24 shows the trends in the frequency of aged care facilities and retirement village injury hospital admissions over the decade 2002/3-2011/12 by age group (under 65 years, 65-69 years, 70-74 years, 75-79 years, 80-84 years, 85-89 years and 90 years and older).

- The all-ages aged care injury frequency increased significantly from 3,693 in 2002/03 to 6,709 in 2011/12 – an estimated 6.1% annually (95% confidence intervals [CI] 4.7% to 7.2%) and 81.3% overall (CI 58.4% to 100.4%) – not shown on figure
- The frequency of aged care injury admissions increased significantly in all age groups except persons aged 75-79 years. Average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 24.

The all-ages aged care facilities and retirement village injury hospital admission rate was 7,828.1 per 100,000 residents in 2011/12, considerably higher than for example the rate for home injuries among people 65 years and older (1,930.3 per 100,000 in 2011/12).
Patterns in residential institutions injury admissions (09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were 20,397 hospital admissions for persons injured in residential institutions in Victoria, an average of 6,799 admissions per year (this section is not restricted to aged care institutions and retirement villages). Figure 25 shows the burden associated with these injury admissions by age group and sex. Average annual values are shown in the figures

- Figure 25 shows older females were strongly overrepresented when examining the frequency of hospital admissions as a result of injury in residential institutions as well as for hospital bed days and hospital costs.
- The age and gender pattern was similar when examining years lived with disability although persons aged less than 65 years (especially males), as well as older females, accounted for a significant proportion of years lived with disability.

Figure 26 shows the burden of residential institution injury hospital admissions by causes for the 3 year period 2009/10-2011/12. Average annual values are shown in the figures

- The four pie charts demonstrate that falls dominate among institutional home injury admissions, accounting for 87% of injury admissions, 88% of years lived with disability, 90% of hospital bed days and 87% of direct hospital costs.

Figure 27 summarises residential institution fall injury admissions among persons aged 65 years and older.

- Injury admissions for residential institution falls among person aged 65 years and older peaked in those aged 85-89 years (32%).
- Females accounted for approximately two-thirds of fall injury admissions (74%) in this age group.
- Almost a quarter of all injury hospital admissions for residential institution falls among person aged 65 years and older were for fractures of the femur (23%).
- Almost half of all falls were unspecified but of those types of falls that were specified, slips, trips & stumbles (16%) and other same level falls (22%) were most common among this age group.
Over the 3-year period July 2009 to June 2012 there were more than 2,000 ED presentations per year in Victoria for persons injured in the residential institution setting (n=2,288). Figure 28 provides a very broad overview of these ED presentations.

- In contrast to residential institution injury hospital admissions which were uncommon among those aged less than 65 years, this age group accounted for a third of ED presentations.
- Females accounted for a higher proportion of residential institution injury ED presentations than males (58% v 42%).
- The most common cause of residential institution injury ED presentations were falls (64%).

**Priorities for prevention of residential institution injury**

**Falls among older people**
- The most common types of injuries are fractures of the femur and open wounds of the head
- Same level slips, trips and stumbles and other same level falls

**Sports & Athletics Areas**

**Hospital admissions (n=5,587 per year, 09/10-11/12)**

Trend in sports injury admissions (02/03-11/12)

Figures 29 and 30 show the trends in the frequency and rate of sports-related injury hospital admissions over the decade 2002/3-2011/12 by age group (0-14 years, 15-24 years, 25-44 years, 45-64 years, 65 years and older). The frequency of hospital admissions and rates per 100,000 population are highest among persons aged 15-24 years.

**Frequency:**
- The all-ages sports injury frequency increased significantly from 4,422 in 2002/03 to 5,897 in 2011/12 – an estimated 3.2% annually (95% confidence intervals [CI] 2.5% to 3.8%) and 37.2% overall (CI 28.1% to 45.4%) – not shown on figure
The frequency of sports injury admissions increased significantly in all age groups and average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 29.

**Hospital admission rates (per 100,000 persons):**

- The all-ages sports injury hospital admission rate (age standardised) increased significantly from 91.6 per 100,000 in 2002/03 to 108.7/100,000 in 2011/12 – an estimated 1.8% annual increase (CI 1.0% to 2.4%) and a 19.0% overall increase (CI 10.8% to 27.3%) (figure 30).
- Sports injury admission rates increased significantly among persons in all age groups except adults aged 25-44 years (figure 30).

**Patterns in sports injury admissions (09/10-11/12)**

Over the 3-year period July 2009 to June 2012 there were 16,761 hospital admissions for persons injured in the sports setting in Victoria, an average of 5,587 admissions per year. Figure 31 shows the burden of sports injury hospital admissions by age group and sex. Average annual values are shown in the figures.

- Injury hospital admissions were most common among adolescents and younger adults, particularly among males.
- Male adolescents and young adults also accounted for the most years lived with disability, hospital bed days and hospital costs as a result of sports injury.

Figure 32 shows the types of sports most associated with the burden of sports injury hospital admissions over the 3 year period 2009-2011/12. Average annual values are shown in the figures.

- The four pie charts show that team ball sports accounted for the highest frequency of admissions and burden associated with those admissions.
- Wheeled motor sports injury admissions were less common (4% of sports injury admissions) but accounted for the second highest proportion of years lived with disability (11%), hospital bed days (7%) and hospital costs (6%).
A summary of team ball sports injury admissions over the 3-year period July 2009-June 2012 is shown in figure 33. Australian Rules football accounted for 58% of all team ball sports injury admissions (n=1,945), followed by soccer (14%, n=474), basketball (13%, n=418) and netball (10%, n=319).

- More than half of all Australian Rules football injuries occurred among persons aged 15-24 years (56%). Males accounted for the vast majority of admissions (98%, not shown on figure).
- Soccer injury admissions most commonly occurred among persons aged 15-24 years (41%) and 25-44 years (39%). Males accounted for the majority of admissions (89%, not shown on figure).
- Basketball injury admissions most commonly occurred among persons aged 15-24 years (38%) and 25-44 years (34%). Injuries were also common among children (23%). Males accounted for three-quarters of admissions (72%, not shown on figure).
- More than half of all netball injury admissions occurred among persons aged 25-44 years (51%). Females accounted for the majority of admissions (88%, not shown on figure).

Figure 34 summarises hospital admissions for injuries that occurred in motorsports and cricket. These sports were the next most commonly involved in hospital admissions following the bat and ball sports outlined above.

- Motorsports injuries were most common among persons aged 15-24 years (44%) and 25-44 years (30%). Males accounted for the majority of motorsport injury admissions (94%).
- Males accounted for 97% of cricket related injury admissions. More than half of cricket injury admissions occurred among persons aged 25-44 years (52%).

**ED presentations (non-admissions) (n=21,312 per year, 09/10-11/12)**

"Over the 3-year period July 2009 to June 2012 there were more than 20,000 ED presentations per year in Victoria for persons injured while engaging in sports activities (n=21,312). Figure 35 provides a very broad overview of these ED presentations.

- Sports injury ED presentations were most common among adolescents and young adults aged 15-24 years (44%), followed by children aged 0-14 years (26%) and adults aged 25-44 years (26%).
Note: This setting includes injuries occurring to any person (i.e., patient, visitor) in hospitals, health centres, day procedure centres, hospices, outpatient clinics. Persons injured while working for income in health service areas are not included in this section but are included in the working for income section (see Box 1 for further information).

**Hospital admissions (n=4,708 per year, 09/10-11/12)**

Trend in health service area injury admissions (02/03-11/12)

Figures 36 and 37 show the trends in the frequency and rate of health service area injury hospital admissions over the decade 2002/3-2011/12 by age group (0-14 years, 15-24 years, 25-44 years, 45-64 years, 65-74 years, 75-84 years and 85 years and older).

**Frequency:**
- The all-ages health service area injury frequency increased significantly from 3,378 in 2002/03 to 4,810 in 2011/12 – an estimated 4.6% annual increase (95% confidence intervals [CI] 3.9% to 5.2%) and a 57.5% overall increase (CI 46.7% to 65.6%) – not shown on figure
- The frequency of health service area injury admissions increased significantly in all age groups except in children aged 0-14. Average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 36.

**Hospital admission rates (per 100,000 persons):**
- The all-ages health service area injury hospital admission rate (age standardised) increased significantly from 68.7 per 100,000 in 2002/03 to 79.3/100,000 in 2011/12, an estimated 2.2% increase annually (CI 1.5% to 2.7%) and 23.7% overall (CI 16.5% to 30.8%) (figure 37)
- Health service area injury admission rates increased significantly among persons aged 15-24 years, 25-44 years, 45-64 years and 65-74 years but not among children or those aged 75 years and older (figure 37)

### Priorities for prevention of sports injury

**Team ball sports**
- **Australian Rules football**
  - especially among males aged 15-24 years
  - injuries to the upper and lower limbs

- **Netball**
  - especially among persons aged 15-44 years
  - injuries to the lower limbs

- **Soccer**
  - especially among persons aged 15-44 years
  - injuries to the lower and upper limbs

- **Basketball**
  - especially among persons aged 15-44 years
  - injuries to the upper and lower limbs
Patterns in health service area injury admissions (09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were 14,123 hospital admissions for persons injured in health service areas in Victoria, an average of 4,708 admissions per year. Figure 38 shows the burden associated with these injury admissions by age group and sex. Average annual values are shown in the figures

- Figure 38 shows the burden associated with health service area injury generally tends to increase as age increases, except for the years lived with disability which peak among younger adults and then decrease.

Figure 39 shows the burden of health service area hospital admissions by causes for the 3-year period 2009/10-2011/12. Average annual values are shown in the figures

- Falls accounted for 45% of injury admissions, 56% of years lived with disability, 58% of hospital bed days and 47% of direct hospital costs.
- Injury admissions resulting from choking and suffocation accounted for a significant proportion of the burden of injury, especially hospital costs (22%).
- Intentional self-harm injury admissions were also relatively common and accounted for 11% of all injury hospital admissions but a much smaller proportion of years lived with disability, hospital bed days and direct hospital costs.

The most common principle diagnosis for people injured in health service areas was injury (22%), meaning that these people were injured in a health service area, such as community health centre, hospice, outpatient clinic, and needed admission to hospital. Other common principle diagnoses in order of frequency included diseases of the circulatory system (12%), mental and behavioural problems (11%), and diseases of the respiratory system (9%). In contrast to those with an injury recorded as the principle diagnosis, these people were admitted to hospital for treatment of these conditions, and were injured subsequently. Fall-related injury was the most common injury across these three groups, comprising 52%, 36% and 45% respectively for patients with circulatory system diseases, mental and behavioural problems, and respiratory disease. Other common injuries included choking and suffocation for 18% and 24% of patients with circulatory and respiratory disease respectively; and intentional self-harm for 33% of patients with mental and behavioural problems.

Figure 40 summarises the three major causes of health service area injury admissions: falls, intentional self-harm injury and choking/suffocation.

- The age pattern among falls and choking and suffocation injury admissions is very similar, both generally increasing with age and peaking in persons aged 75-84 years. Intentional self-harm injury is much more common among younger people.
- Among falls, slips, trips & stumbles (19%), other same level falls (24%) and falls involving beds (16%) were most common.
- Almost three-quarters of intentional self-harm injury admissions occurred among females and the major causes were poisoning (pharmaceuticals) (67%) and cutting with a sharp object (21%).

- Males accounted for more choking and suffocation injury admissions than females (61% vs. 39%) and the majority of cases were coded to ‘other and unspecified threats to breathing’ with no further information available.

**ED presentations (non-admissions) (n=782 per year, 09/10-11/12)**

Over the 3-year period July 2009 to June 2012 there were on average 782 ED presentations per year in Victoria for persons injured in health service setting.

- Females accounted for a higher proportion of health service area injury ED presentations than males (58% vs 42%).
• A high proportion of cases were coded to non-specific cause codes but the most common causes able to be identified were falls (26%), cutting and piercing related injury (9%) and hitting, striking, crushing incidents (7%).

Priorities for prevention of health service area injury

Falls among older people
  – Same level slips, trips and stumbles and other same level falls and falls involving beds

Intentional self-harm injury among females aged 15–44 years
  – Poisoning by pharmaceuticals and cutting using sharp objects

Choking and suffocation especially among older persons

Trade & Service Areas

Note: This setting includes injuries occurring in shops/stores, commercial garages, office buildings, cafes/hotels/restaurants, airports, bus/radio/railway/television stations. Persons injured while working for income in trade and service areas are not included in this section but are included in the working for income section (see Box 1 for further information)

Hospital admissions (n=2,792 per year, 09/10-11/12)

Trend in trade & service area injury admissions (02/03-11/12)

Figures 41 and 42 show the trends in the frequency and rate of trade and service area injury hospital admissions over the decade 2002/3-2011/12 by age group (0-14 years, 15-24 years, 25-44 years, 45-64 years, 65-74 years, 75-84 years and 85 years and older).

Frequency:
  • The all-ages trade and service area injury frequency increased significantly from 2,064 in 2002/03 to 2,851 in 2011/12 – an estimated 3.9% annual increase (95% confidence intervals [CI] 3.4% to 4.3%) and a 46.7% overall increase (CI 39.7% to 51.7%) – not shown on figure
  • The frequency of trade and service area injury admissions increased significantly in all age groups except in persons aged 15-24
years. Average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 41.

**Hospital admission rates (per 100,000 persons):**

- The all-ages trade and service area injury hospital admission rate (age standardised) increased significantly from 42.4 per 100,000 in 2002/03 to 48.9/100,000 in 2011/12 – an estimated 1.7% increase annually (CI 1.3% to 2.2%) and 18.8% overall (CI 13.5% to 23.9%) (figure 42)
- Trade and service injury admission rates increased significantly among persons aged 0-14 years, 45-64 years, 65-74 years, 75-84 years and 85 years and older but not among younger persons aged 15-24 years and 25-44 years (figure 42)

**Patterns in trade & service area injury admissions (09/10-11/12)**

Over the 3-year period July 2009 to June 2012 there were 8,375 hospital admissions for persons injured in trade and service areas in Victoria, an average of 2,792 per year. Figure 43 shows the burden associated with these injury admissions by age group and sex. Average annual values are shown in the figures

- The frequency and years lived with disability associated with injury occurring in trade and service areas are concentrated among younger people aged 15-44 years, especially males. In contrast, older females account for the highest proportion of hospital beds days.
- Older females and younger males account for a similar proportion of direct hospital costs associated with trade and service area injury admissions.

Figure 44 shows the causes of injury admissions and the specific trade and services area locations most associated with injury admissions over the 3 year period 2009/10-2011/12.

- Falls accounted for 57% of injury admissions, followed by injuries intentionally inflicted by others (assaults) (19%).
- Two specific locations accounted for 80% of trade and service area injuries: cafes, hotels & restaurants (45%) and shops & stores (35%).
Figures 45 and 46 summarise injuries occurring in the two major locations for trade and service injury admissions, cafes, hotels and restaurants and shops & stores, respectively.

- Although falls were the leading cause of injury across both of these locations the age and gender profile of injured persons was quite different.
  - Those injured falling in cafes, hotels and restaurants were younger than those injured in shops and stores: in cafes, hotels and restaurants 40% of injured fallers were aged 65 years and older compared with 66% of fallers in shops and stores.
  - Males and females were equally represented among those injured by falling in cafes, hotels and restaurants whereas females accounted for almost three-quarters of those who fell in shops and stores (72%).

- Another common cause of injury in cafes, hotels and restaurants was intentional injury inflicted by another person (32% of all hospital admissions). Persons injured were most commonly male (89%) and persons aged 15-24, despite being just a ten year age group, accounted for 43% of assaults that occurred in cafes, hotels and restaurants. Persons aged 25-44 years accounted for almost half of these assaults (48%).

**ED presentations (non-admissions) (n=2,934 per year, 09/10-11/12)**

Over the 3-year period July 2009 to June 2012 there were almost 3,000 ED presentations per year in Victoria for persons injured in trade and service areas (n=2,934). Figure 47 provides a very broad overview of these ED presentations.

- Almost a third of injuries occurred to adults aged 25-44 years (30%) and injuries were also common among adolescents and young adults aged 15-24 years (25%).
- Males accounted for a slightly higher proportion of trade and service area ED presentations than females (58% v 42%).
- The most common specific causes of injury ED presentations were falls (34%), hitting, striking crushing incidents (15%), intentional inflicted by other injury (9%) and cutting and piercing incidents (9%).
Priorities for prevention of trades & service areas injury

Falls among older persons in shops and stores and among adults in café, hotels and restaurants

Assaults among younger males in café, hotels and restaurants

School & Other Educational Institutions

Note: Persons injured while working in schools or other educational institutions are not included in this section but are included in the work setting section (see Box 1 for further information)

Hospital admissions (n=2,005 per year, 09/10-11/12)

Trend in school & other educational institutions injury admissions (02/03-11/12)

Figures 48 and 49 show the trends in the frequency and rate of school and other educational institutions injury hospital admissions over the decade 2002/3-2011/12 by age group - 0-4 years (pre-school), 5-11 years (primary school), 12-17 years (secondary school) and 18 years and older (other educational institutions).

Frequency:

- The all-ages school and other educational institutions injury frequency increased significantly from 1628 in 2002/03 to 2154 in 2011/12 – an estimated 2.9% annual increase (95% confidence intervals [CI] 2.0% to 3.7%) and 33.0% overall (CI 21.6% to 44.1%) – not shown on figure
- The frequency of school and other educational institutions injury admissions increased significantly in all age groups. Average annual percentage changes and the change over the whole period, including 95% confidence intervals, for each of the age groups are shown on figure 48.

Figure 48 Trend in the frequency of school and other educational institutions injury hospital admissions by age groups, Victoria 2002/03-2011/12

Figure 49 Trend in school and other educational institutions injury hospital admission rates by age groups, Victoria 2002/03-2011/12

Figure 50 Average annual burden of school and other educational institutions injury admissions by age group, Victoria 2009/10-2011/12
Hospital admission rates (per 100,000 persons):
- The all-ages school and other educational institutions injury hospital admission rate (age standardised) increased significantly from 34.0 per 100,000 in 2002/03 to 42.8/100,000 in 2011/12, an estimated 2.3% increase annually (CI 1.4% to 3.2%) and 25.9% overall (CI 15.4% to 36.4%) (figure 49)
- School and other educational institutions injury admission rates increased significantly among all age groups (figure 49).

Patterns in schools & other educational institutions injury admissions (09/10-11/12)

Over the 3-year period July 2009 to June 2012 there were 6,016 hospital admissions for persons injured in schools and other educational institutions in Victoria, an average of 2,005 admissions per year. Figure 50 shows the burden associated with these injury admissions by age group and sex. Average annual values are shown in the figures

- The age and gender pattern is generally fairly similar across all the measures of the burden of injury. Primary school aged boys and girls accounted for the highest proportion of cases, hospital costs and bed days. Whereas, secondary school aged boys accounted for the most years lived with disability.

Figure 51 shows the burden of school injury hospital admissions by causes for the 3 year period 2009/10-2011/12. Average annual values are shown in the figures

- Falls accounted for 68% of injury admissions, 53% of years lived with disability, 70% of hospital bed days and 72% of direct hospital costs. The next leading cause of injury admissions and the associated burden were hitting, striking, crushing incidents, which accounted for 18% of injury admissions, 32% of years lived with disability, 15% of hospital bed days and 15% of direct hospital costs.

Children aged 5-17 years accounted for 87% of school and other educational institution-related injury admissions, 87.5% of years lived with disability, 81.5% of hospital bed days and 86% of costs associated with these injury admissions. Figures 52 and 53 summarise injury hospital admissions among children aged 5-11 years (primary school aged) and 12-17 years (secondary school aged), respectively.
• Injury admissions among primary school aged children peaked in children aged 6 years (18%) but were common across all ages.
• Boys accounted for more injury admissions than girls (57% v 43%).
• Most injury admissions were the result of falls (80%). These falls were most commonly from playground equipment (70% of falls).
• The frequency of injury admissions among secondary school aged children was highest among those aged 12 years (23%) and then decreased as age increased.
• Boys accounted for more than three-quarters of school-related injury admissions among children aged 12-17 years (78%).
• Almost half of all injury admissions in this age group were the result of falls (48%) and a further 24% were the result of hitting, striking, crushing incidents.

**ED presentations (non-admissions) (n=10,914 per year, 09/10-11/12)**

Over the 3-year period July 2009 to June 2012 there were more than 10,000 ED presentations per year in Victoria for persons injured in schools and other educational settings (n=10,914). Figure 54 provides a very broad overview of these ED presentations.

• Fifty-eight percent of injuries occurred among primary school aged children and 39% among secondary school aged children (39%).
• Males accounted for a higher proportion of ED presentations than females (61% v 39%).
• The most common specific causes of injury ED presentations were low falls (45%) and being struck by or colliding with an object (17%).

**Priorities for prevention of school & other educational institutions injury**

**Falls**
- Particularly among primary school aged children on playground equipment
- Secondary school aged children more likely to slip, trip or stumble

**Unintentional hitting, striking, crushing incidents (involving both objects and people)**
- Particularly among secondary school aged children

**Discussion**

The home dominates as the leading setting for injury burden, regardless of whether this is measured by mortality (35% of deaths), morbidity (34% of emergency department presentations, 24% hospitalisations, 32% serious injury hospitalisations, 22% years lived with disability following hospitalisation), or health service use (33% total hospital bed days and 27% direct hospital costs, due to injury). The road is clearly the next most prominent setting, accounting for 22% of deaths, and being either the second or third leading setting on measures of morbidity and health service use.

These two settings (home, road) could arguably be nominated as the priority settings for prevention. Four additional settings are worthy of some attention. Residential institutions are the setting for 8% of injury deaths and are notable in terms of serious injury hospitalisations (third largest at proportion 13%), bed days (fourth largest proportion at 7%) and total costs (fourth largest proportion at 7%). Health service areas account for a small proportion of total hospitalised cases (4%) but account for the second largest proportion of total bed days (15%) and the third largest proportion of total costs (9%). The average annual rate of injury hospitalisation in this setting is increasing at a higher rate than that for the home and road and settings (2.2% per year compared with 1.0% and no change respectively). Work and sport settings are notable setting in terms of the number of ED presentations (second and third largest proportions at 9%, and 7% respectively) and years lived with disability (third and fourth largest proportions at 10% and 7% respectively).

These specific priority settings for injury prevention overlap to a large extent with those settings nominated as priorities in the Victorian Public Health and Wellbeing Plan (Table 4). The exceptions are that early childhood and education settings are priorities in the Plan, but these settings account for a very small proportion of the injury burden; and residential institutions are not a priority in the Plan, while this is a notable setting for injury burden.

Settings in the Plan have been selected not necessarily as ones in which poor health occurs but as locations for preventive programs that reach families and individuals at all life stages, and where healthy environments can be created. The Plan recognises that a settings approach requires engagement with local communities which can provide additional impetus for national and state campaigns and support for national or state level legislation and regulation. These implications of a settings-based approach to health and well being are also highly relevant to injury prevention.

“The average annual age-standardised hospitalisation rate is increasing for all settings overall in Victoria, and for all specific settings except road and work, where there has been no significant change in the all-age trends. These were the only two settings in which age
Table 4 Comparison of priority settings in Victorian Public Health and Wellbeing Plan with Hazard injury prevention priority settings

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<td>Home, (local) roads, sport</td>
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<td>Early childhood and education settings</td>
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<tr>
<td>Health services</td>
<td>Health services</td>
</tr>
<tr>
<td>Not a priority setting</td>
<td>Residential institutions</td>
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</table>

group specific rates were decreasing: 0-14 and 15-24 years in the road setting, and over 65 years on the work setting. Clearly, Victoria’s population is at increasing risk of hospital admission due to injury in most settings. Injury is nominated as a priority area for prevention in the Victorian Public Health and Wellbeing Plan and the challenge for Victoria is to respond with specific targeted action.

All of these priority settings are in the public domain, or are overseen by a relevant regulatory authority, except the home. Strategic plans and/or action plans have been developed by the responsible authorities for the public domain priority settings we have nominated.

Road: VicRoads, the Transport Accident Commission, Victoria Police and the Department of Justice recently developed Victoria’s Road Safety Strategy 2013-2022 (see Table 5), setting a target to reduce fatalities and serious injuries by more than 30% in this period. The strategy and action plan are underpinned by the safe system philosophy and adopt a multi-faceted approach. Serious injuries have become a new focus of the road safety action plan in recognition that these have not been reducing to the same extent as fatalities. The continuing reductions in Victoria’s road toll provide strong evidence that addressing injuries in the settings in which they occur can be a successful approach to injury prevention.

Residential institutions: Aged care facilities are the main location in which injuries occur within this type of setting (93%). The Australian Government has established accreditation standards that residential aged care facilities must meet in order to receive government funding. Falls completely dominated as a cause of injury in this setting, and falls prevention, while maintaining optimal levels of mobility, is covered under Standard 2: Health and Personal Care (see Table 5). The standard does not, however, recommend specific actions for falls prevention. A recent Cochrane review provides recommendations for preventing falls among older people in care facilities based on the best available evidence (Cameron et al., 2010).

Health services: The Australian Commission on Safety and Quality in Health Care, in consultation with a range of stakeholders, developed the National Safety and Quality Health Service Standards in 2011. There are ten standards, one of which deals with preventing falls and harm from falls (Standard 10). The Standards are intended for use by health services such as hospitals, outpatient facilities, community health centres and clinicians rooms. They can be used as part of internal quality assurance or as part of an accreditation process. Standard 10 describes the systems and processes that services should meet, including taking action to reduce falls and minimise associated harm. It does not however outline what these actions might be. A recent Cochrane review provides recommendations for preventing falls among older people in hospitals based on the best available evidence (Cameron et al., 2010).

Work: Occupational health and safety at work in Victoria is governed by laws, regulations and compliance codes which outline the responsibilities of employers and employees in relation to ensuring safety in the workplace. The WorkSafe Victoria website (see Table 5) explains the legal obligations of all parties and provides a wide range of prevention resources, including specific material for the two industries that we have identified as priorities – construction and agriculture.

Sport: The Victorian Government established a Sports Injury Prevention Taskforce in 2011 to provide advice on improving risk management and injury prevention while encouraging an active lifestyle. The Taskforce’s 2013 report provides a blue print for action by a range of key agencies over the next three years, and is a useful resource for those working in this sector (see Table 5).

Home: In contrast to the public domains where the responsibility for safety may vest in one authority, responsibility for safety in the home mainly rests with thousands of private individuals and families. Laws and regulations are effective in protecting populations and can be used effectively in different settings (Schrieber et al., 2010), and this does apply to the home, perhaps to a lesser extent than in other settings. Laws governing home design and construction provide for basic safety of the dwelling itself, while laws, regulations and standards also provide a degree of safety for the many products which are used in the home. There is a lag effect however which means that older homes often lack some of the basic safety features required in new homes. This also applies to product safety. Beyond the safety related aspects of physical environment of the home and its contents that are regulated, the choices made by the residents have a large influence on home safety. Engaging with the Victorian community to increase awareness of, and commitment to, injury prevention in the home will be an important factor in addressing the injury burden in this priority setting. In addition to authorities that govern home design and product safety, a range of other organisations could play a role in home safety including local government, Medicare Locals, primary care partnerships, community health agencies and non-government organisations like KidSafe and the Royal Children’s Hospital Safety Centre (see Table 5). An overarching framework for action for home safety in Victoria, focused on the priority areas identified here and accompanied by leadership and co-ordination, could stimulate injury prevention activity in this key priority setting.
Resources

VISU has previously published detailed analysis of injuries in a range of settings over the previous 10 years, accompanied by overviews of effective interventions and recommendations for preventive action. The relevant editions of Hazard are shown in Table 5 along with some other useful resources. The VISU website also has links to research reports and other prevention information listed by injury topic (http://www.monash.edu/miri/visu/injury-by-topic.html).

Table 5 Useful resources relating to injury prevention in the priority settings

<table>
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<tr>
<th>Setting</th>
<th>Previous editions Hazard</th>
<th>Other useful resources</th>
</tr>
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<tbody>
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<td>Traffic-related pedestrian injury (Hazards 71 and 72)</td>
<td>Victoria’s Road Safety Strategy 2013-2022</td>
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<tr>
<td></td>
<td>Dog bite injury (primarily occurs in the home) (Hazard 69)</td>
<td><a href="http://www.rch.org.au/safetycentre/">http://www.rch.org.au/safetycentre/</a></td>
</tr>
<tr>
<td></td>
<td>Preventing home injury among children 0-14 years (Hazard 65)</td>
<td><a href="http://www.kidsafevic.com.au/">http://www.kidsafevic.com.au/</a></td>
</tr>
</tbody>
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References


Box 1: Data sources, case selection and definitions

Deaths
Information on Victorian injury deaths was sourced from the Australian Bureau of Statistics catalogue 3303.0 Causes of Death, Australia, 2011 and VISU-held Australian Bureau of Statistics Death Unit Record File (ABS-DURFs 2004-2006).

Hospital admissions
Hospital admissions data were extracted from the Victorian Admitted Episodes Dataset (VAED). The VAED records all hospital admissions in public and private hospitals in the state of Victoria.

Cases were selected if the injury was unintentional, intentional or of other or undetermined intent (external cause codes in the range V00-Y36). For trends sections data covers the 10-year period July 2002-June 2012. For all other analysis data covers the most recent available 3-year period (July 2009-June 2012). For most analyses readmissions to the same hospital within 30 days, deaths in hospital and transfers within and between hospitals were excluded to avoid over counting. All injury admissions were used to get a truer picture of the burden of injury when providing estimates of direct hospital costs and number of hospital bed days.

Emergency Department (ED) presentations
ED presentations data were extracted from the Victorian Emergency Minimum Dataset (VEMD). The VEMD records all presentations to Victorian public hospitals with 24-hour emergency departments (currently 39 hospitals).

Cases were selected if the injury was unintentional, intentional or of other or undetermined intent (intent codes 1-7, 9-11, cases were excluded if the intent category was 8 ‘Adverse effect or complication’). Deaths, cases subsequently admitted to hospital and return visits for follow-up care were excluded to avoid over counting. For ease of comparison, where possible, VEMD cases were re-coded to match VAED settings and cause of injury groups.

Settings definitions
The settings are mutually exclusive. For hospital admissions all settings are defined exclusively by location coding except working for income. Working for income cases are defined by activity code OR compensable status. Further, preference is given to activity cases with an activity recorded as working for income are defined as working for income and removed from the setting of their location code. For ED presentations text descriptions were also used to identify some settings that were not covered by existing location or activity coding (i.e., area of still water/ stream of water/ large area of water/ beach & forest/ desert/ other specified countryside)

1. ‘Home’ includes injuries occurring in homes, drive-ways, apartments, boarding houses, caravans, farmhouses, swimming pools tennis courts in private residences.
2. ‘Sports setting’ includes injuries occurring at any sports and athletics area.
3. ‘Road/street/highway’ includes injuries occurring on roadways, sidewalks and cycle-ways next to roads.
4. ‘Residential institution’ includes injuries occurring in prisons, juvenile detention centres, military camps, orphanages, aged care facilities (nursing home/old people’s home/retirement village). Most hospitalisations for this setting were for injury occurring in aged care facilities (93%).
5. ‘Working for income’ includes injuries occurring while the person was engaged in paid work or transportation to and from such activities.
6. ‘Health service area’ includes injuries occurring to any person (i.e., patient, visitor) in hospitals, health centres, day procedure centres, hospices, outpatient clinics. Data presented here exclude ‘medical injuries’ as is normal practice for VISU injury reports. Persons working for income are not included as they are already counted in the working for income setting.
7. ‘Trade and service area’ includes injuries occurring in shops/stores, commercial garages, office buildings, cafes/hotels/restaurants, airports, bus/radio/railway/television stations.
8. ‘School & other educational institution’ includes injuries occurring in boarding/residential schools, colleges, day nurseries, institutes for higher education/universities, kindergartens.
9. ‘Other institution & public administrative area’ includes injuries occurring in buildings (including adjacent grounds) used by the general public such as assembly hall, church, cinema, clubhouse, court house, dancehall, gallery, library, movie house, museum, music hall, opera house, public hall, theatre, youth centre.
10. “Area of still water/ stream of water/ large area of water/ beach” includes injuries occurring at a dam, fen, marsh/swamp, pond, pool, reservoir, brook, canal, creek, river, stream, bay, lake, ocean, sea, foreshore, sand dunes.
11. ‘Farm’ includes injuries occurring in farm buildings/ranches or on land under cultivation, excluding the farm home.
12. “Forest/ desert/ other specified countryside” includes injuries occurring in a forest, desert, e.g, gorge, mountain, outback, prairie, wilderness.
13. ‘Other specified location’ includes injuries occurring in campsites, public place NOS, park NOS, railway line, zoo, parking lot, town camps.
14. ‘Unspecified setting’ includes injuries occurring in an unspecified place of occurrence.
Box 2: Special analyses: definitions and methods

Hospital admissions only

Trend analysis
Trends, analysed for the period 2002/3-2011/12, were determined using a log-linear regression model of the rate data assuming a Poisson distribution of injuries. The statistics relating to the trend curves, slope and intercept, estimated annual percentage change, estimated overall change, 95% confidence intervals around these estimated changes and the p-value were calculated using the regression model in SAS® 9.3. A trend was considered to be statistically significant if the p-value of the slope of the regression model was less than 0.05.

Rates
Injury rates for sports, road/street/highways, health service areas, trade and service areas and schools & other educational institutions were calculated per 100,000 Victorian residents. The all-ages rates calculated for these settings were age-standardised using the 2001 Victorian population as the standard. All other rates are age-specific.

Working for income injury rates were calculated using labour force participants as the denominator (ABS, 2013A). Residential institutions (including aged care facilities and retirement villages only) injury rates were calculated using the population living in aged care and retirement villages as the denominator (ABS, 2013B). A residential institution injury hospital admissions rate was only calculated for 2011/12 as appropriate population data by age groups were not available for other study years. Home injury rates were calculated using the Victorian population less the population identified as living in aged care facilities as the denominator (AIHW, 2012). For work and home injury age-standardised rates the first year of the period is used as the standard population (2002/03). No age standardised rates were calculated for residential institutions. All other rates are age-specific.


Hospital costs
The National Hospital Costs Data Collection (NHCDC) is based on the principles of CaseMix costing analysis which is a scientific approach to the classification of patient care whereby each hospital admission is assigned an Australian Refined Diagnosis Related Group (AR-DRG). AR-DRGs provide a clinically meaningful way of relating the types of patients treated in a hospital to the resources required by the hospital. The NHCDC contains component costs per DRG and enables DRG Cost Weights and average costs for DRGs (national and state/territory specific) for acute in-patients to be produced. The types of component costs included are ward medical, ward nursing, non-clinical salaries, pathology, imaging, allied health, pharmacy, critical care, operating rooms, ED, ward supplies and other overheads, specialist procedure suites, on-costs, prostheses, hotel and depreciation. The NHCDC have ceased publishing state-specific costs data so for this Hazard the Victorian Department of Health supplied VISU with Victorian average costs per AR-DRG by year, 5-year age group and sex for the 3 financial years 2009/10, 2010/11 and 2011/12. These costs were applied to each admission to estimate the direct hospital costs associated with injury admissions in Victoria.

Years lived with disability
The Disability-Adjusted Life Year (DALY) can be thought of as one lost year of “healthy” life. DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lived with Disability (YLD) for people living with the health condition or its consequences. YLLs by setting were not able to be calculated so the YLD component of the DALY is presented in this edition of Hazard.

To estimate years lived with disability (YLDs) as a result of injury, the number of incident hospital admission cases in the study period was multiplied by the average duration of the injury and a weight factor that reflects the severity of the injury on a scale from 0 (perfect health) to 1 (dead) – that is, YLDs were calculated according to the formula YLD = 1*SW*L where I = the number of incident cases of injury in Victoria, SW = the severity weight of the injury and L = the average duration (in years) of the injury. Future years were also discounted at a 3% rate. Disability weights and durations were sourced from the Australian and Victorian Burden of Disease Studies [Mathers et al., 1999; Vos et al., 1999].

**Injury severity: definition of ‘serious injury’**

To examine the severity of injury hospitalisations each hospital record was given an International Classification of Disease (ICD)-based Injury Severity Score (ICISS) (Davie et al., 2008). The ICISS involves estimating probability of death using the ICD injury diagnosis codes recorded in a person’s hospital record. Determining which injuries are ‘serious’ involves calculating a survival risk ratio (SRR) for each individual injury. An SRR is the proportion of cases with a certain injury diagnosis in which the patient does not die, or in other words, a given SRR represents the likelihood that a patient will survive a particular injury. Each patient’s final ICISS is the product of the SRRs associated with all the diagnoses listed on the patient hospital record. An injury is considered serious if the ICISS is less than or equal to 0.941, this is equivalent to a survival probability of 94.1% or worse – meaning the injured person has a probability of death (when admitted) of at least 5.9%.


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</tr>
<tr>
<td>Work-related</td>
<td>1,17,18,58</td>
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</tbody>
</table>
VI$U Staff

Director: Assoc. Prof Lesley Day
Manager Data Quality Improvement and Consumer Product Safety: Ms Karen Ashby
Manager Data Systems Data Requests & Reports: Ms Angela Clapperton
Research Officer Ms Shannon Gray
Statistical Advisor Mr Angelo D’Elia
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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
St Vincents Public Hospital
Wangaratta Base Hospital
Warrnambool & District Base Hospital
Western Hospital - Footscray
Western Hospital - Sunshine
Williamstown Hospital
Wimmera Base Hospital

From November 1995
Dandenong Hospital

From December 1995
Royal Victorian Eye & Ear Hospital
Frankston Hospital

From January 1996
Latrobe Regional Hospital

From July 1996
Alfred Hospital
Monash Medical Centre

From September 1996
Angliss Hospital

From January 1997
Royal Melbourne Hospital

From January 1999
Werribee Mercy Hospital

From December 2000
Rosebud Hospital

From January 2004
Bairnsdale Hospital
Central Gippsland Health Service (Sale)
Hamilton Base Hospital
Royal Women’s Hospital
Sandringham & District Hospital
Swan Hill Hospital
West Gippsland Hospital (Warragul)
Wodonga Regional Health Group

From January 2005
Mercy Hospital for Women

From April 2005
Casey Hospital

From July 2011
Bass Coast Regional Health

How to access VISU data:
VISU collects and analyses information on injury problems to underpin the development of prevention strategies and their implementation. VISU analyses are publicly available for teaching, research and prevention purposes. Requests for information should be directed to the VISU Data Request Manager or the Director by contacting them at the VISU office

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All issues of Hazard and other information and publications of the Monash Injury Research Institute can be found on our internet home page:
www.monash.edu/miri/visu

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