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REPORT COST OF HOSPITAL-ADMITTED INJURY IN VICTORIA 2016/17-2020/21

PRESENTED BY
THE VICTORIAN INJURY
SURVEILLANCE UNIT

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Summary

The cost of injury-related hospital admissions in Victoria 2016/17 to 2020/21 is summarised in this report, which captures direct and indirect hospital admission. The analysis is based on the Victorian Admitted Episodes Dataset (VAED) and the Victorian Cost Data Collection (V CDC), sourced from the Victorian Department of Health. V CDC public sector average cost estimates were applied to all public and private hospitals captured in the VAED.

The focus of this report is on the most recent year of cost data currently available, 2020/21, but five-year trends are also provided. This time period captures the onset of the Covid-19 pandemic and subsequent lock-down periods in Victoria, affecting hospital activity.

Injury-related hospital spending is presented as total cost and cost per hospital stay, which is calculated as the sum of all injury admissions, including statistical separations and transfers, divided by the number of incident injury admissions. Results are presented per patient demographics, hospital funding source, place of injury occurrence, activity when injured, cause (unintentional and intentional), and injury type and severity. Costs are also presented per patients' region of residence at Statistical Area Level 4 (SA4). The final section of the report summarises five-years' hospital spending in Victoria: from 2016/17 to 2020/21.

Study highlights:

- In Victoria, 2020/21 there were 134,939 incident injury admissions, with an average hospital stay cost of \$9,060. The total cost of hospital spending related to injuries was \$1.22 billion, of which an estimated 20% was spent in private hospitals and 80% in public hospitals.
- Injury-related hospital costs were highest in older age groups, with people aged 75+ years accounting for 37% of costs. Males incurred higher costs than females in the age groups below 65 years. From 65+ years, this pattern reversed and females incurred greater hospital costs. Females aged 65+ years accounted for 31% of all injury-related hospital costs.
- The top three specified unintentional injury causes in terms of inpatient hospital spending in 2020/21, Victoria, were: falls (\$676.8 million, 59%); transport (\$161.1 million, 14%) and cutting/piercing (\$49.7 million, 4.4%).
 - Among people aged 85+ years, there was a 2:1 female to male ratio in falls admission expenditure.
 - More than half of falls injury costs (52%, \$352.3 million) were attributed to same-level falls.
 - The cost of unintentional injury admissions for *falls that occurred in the home* was \$359.0 million: 31% of all unintentional injury admission costs in Victoria, 2020/21
 - Transport injuries that incurred the most expense in 2020/21 were car occupant injuries (\$51.5 million), motorcycle rider injuries (\$39.0 million) and pedal cyclist injuries (\$35.2 million).
- Intentional self-harm injury admissions cost \$40.8 million and assault injury admissions cost \$27.6 million in 2020/21, Victoria.
 - The three most common causes of self-harm injury admission were all related to pharmaceutical poisoning.
 - Self-harm admission costs were highest for females aged 15-29 years (23% of self-harm admission costs; \$9.2 million).
 - The three most common assault injury admission causes were assault by bodily force, assault by sharp object and assault by blunt object, costing \$11.5 million, \$7.7 million, and \$3.5 million, respectively.

- Fractures and open wounds were the most common and costly injury types accounting for 58% (\$705.2 million) and 9% (\$103.3 million) of injury admission expenditure, respectively. Femur fractures accounted for 32% of all fracture costs (\$224.6 million).
- Over the five-year period, injury admission costs increased from \$875.1 million in 2016/17 (price-indexed to 2020/21) to \$1.22 billion in 2020/21. This increase was mostly due to increased costs per hospital stay from \$7,079 (indexed) in 2016/17 to \$ 9,060 in 2020/21.

Introduction

Injuries in Australia are associated with substantial morbidity and mortality; 575,000 injury hospitalisations were recorded in Australia in 2020/21 and there were 13,400 recorded injury deaths in 2019/20¹. The health care costs associated with injuries are considerable, with injuries ranked third in areas of health care spending, surpassed only by musculoskeletal disorders and cardiovascular disease². Health care spending attributed to injuries varies considerably by patient age group, geographic region, injury type and cause, and other factors. The most recent available report on Australian health care spending on injury is by the AIHW, reporting on injuries that occurred in 2015/16. The majority of injury treatment spending was reported to occur in hospitals (78%). Given the variation in injury occurrence and health care spending by place and circumstance, local and timely cost of injury reporting is crucial for a better understanding of the distribution of costs. The most recent Victorian cost of injury report is now dated by ten years (it was released in 2015 but captured data from 2012/13³. As injury incidence as well as costs of hospital treatment change markedly over time, this needs updating. This report provides contemporary analysis of available injury cost data for Victoria, building on previous evidence from AIHW reports. Cost of injury information informs health service planning, epidemiological research and policy. This aligns with the Victorian Public Health and Wellbeing Plan 2023-2027 and its priority of reducing injury in the community, and is particularly relevant to policy for falls prevention (falls accounted for 41% of health care spending on injury in Australia, 2015/16²), road safety and violence prevention.

¹ Australian Institute of Health and Welfare 2023. Injury in Australia. Cat. No. INJCAT 213. Web report, AIHW. Viewed 14 June 2023, <https://www.aihw.gov.au/reports/injury/injury-in-australia/contents/technical-notes>

² Australian Institute of Health and Welfare 2020. Injury expenditure in Australia 2015–16. Cat. no. HWE 78. Canberra: AIHW. Viewed 14 June 2023, <https://www.aihw.gov.au/reports/health-welfare-expenditure/injury-expenditure-in-australia-2015-16>

³ https://www.monash.edu/__data/assets/pdf_file/0010/372385/cost-of-injury.pdf

Methods

Data sources

Injury incidence data was based on hospital admissions records extracted from the Victorian Admitted Episodes Dataset (VAED)⁴ sourced from the Victorian Department of Health. The VAED collects a minimum dataset on admitted patient care from all public and private hospitals in Victoria: these include rehabilitation centres, extended care facilities and day procedure centres. The data collection is intended to support planning, to underpin policy, and to facilitate epidemiological research related to health services in Victoria. The VAED is also used to inform public hospital funding based on patient case-mix.

Cost data were sourced from the Victorian Cost Data Collection (VCDC)⁵ and provided to VISU by the Funding Policy, Accountability and Data Insights Group at the Victorian Department of Health. The VCDC collects data on costs for all public sector hospital activities, from health services across Victoria. The VCDC undergoes quality assurance evaluation as well as validation and reporting, to allow benchmarking. Victoria uses a patient case-mix funding model for administering and managing public hospital funding. The VCDC is used to inform, refine, benchmark, and develop funding models, as well as enabling analysis of health service cost data. For consistency and comparability of cost data, cost buckets are derived from the Victorian standard chart of accounts. Cost data was supplied to VISU as average costs per AR-DRG (Australian Refined Diagnosis Related Groups) for admitted episodes, stratified by age group and sex. AR-DRGs are broadly based on costs per diagnosis and intervention profile. Age group and sex specific AR-DRG-based cost estimates were applied to VISU-held VAED data to derive patient treatment costs, which includes both direct and indirect costs. It should be noted that these are VCDC *public sector* average cost estimates, which were then applied to all *public and private hospitals* captured in the VAED. Of the included admissions, cost data was missing in <5 cases per year in 2016/17 – 2019/20/21. In 2020/21, 1.1% of admissions had missing cost data; this was due to missing AR-DRG code in the VAED. Considering only incident admissions in 2020/21, cost was missing in 0.7% of cases.

Residential population estimates by age group and sex for Victoria, 2016/17 to 2020/21 were sourced from the Australian Bureau of Statistics⁶ and used to calculate population-based injury rates.

Sample selection

For this report, hospital admission records were extracted for the five-year period from 1 July 2016 to 30 June 2021 (there is currently no cost data available beyond this date), by admission (not separation) date. As the consolidated 2021/22 admissions data were already available at the time of extraction, it can be expected that all 2020/21 admissions had separated and the 2020/21 data included in this report was complete. Injury case selection was based on International Classification of Disease 10th Revision Australian Modification (ICD-10-AM) diagnosis codes. Injury cases were selected as admissions with a principal diagnosis in the range of S00-T75.8, T79-T79.9, T89-T98.9 (these codes do not include medical injury). Only admissions by males and females were included in the results tables: reporting of sex other than male or female would result in small cell counts in the various breakdowns presented in this report and could potentially compromise patient confidentiality. Transfers, statistical separations and repeat treatments were flagged but not

⁴ <https://www.health.vic.gov.au/data-reporting/victorian-admitted-episodes-dataset>

⁵ <https://www.health.vic.gov.au/data-reporting/victorian-cost-data-collection-vcdc>

⁶ <https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release>

excluded from the sample selection. These admission types were excluded from the *incident admissions* and calculation of *injury incidence*, to prevent overcounting. They were, however, included in cost of injury calculations to allow for a complete capture of the hospital-admission costs per injury.

Statistical analysis

Injury admission rates per 100,000 population were calculated for the five-year period 2016/17 to 2020/21. The numerators used for calculating rates were incident injury admissions (excluding transfers, statistical separations and repeat treatments). The denominators used for calculating rates were December population estimates from the Australian Bureau of Statistics. In the first part of the report which was based on 2020/21 only, crude rates are presented. In the final section of the report which covers the five-year period from 2016/17 to 2020/21, age standardisation of rates was carried out using 5-year age groups and the direct method. The standard population used was the Victorian resident population at 30 June, 2001. Age-standardised rates are presented alongside crude rates. Admission costs were calculated using all injury admissions, including transfers, statistical separations and repeat treatments. Analyses were conducted in SAS V9.4.

Results

There were 134,988 injury-related hospital admissions in Victoria in 2020/21; 49 of these had sex recorded as other than male or female. To preserve data confidentiality, these 49 are not further reported on. The remaining 134,939 injury admissions had an estimated summed admission cost of \$1.22 billion: this equals an average of \$9060 per injury admission. Injury admissions are grouped and summarised in this report based on patient demographics, funding source for the admission, place of injury occurrence, cause of injury (unintentional), cause of injury (intentional), injury type and severity, region of residence of the patient. These results are described in the following sections. The final section describes five-year trend in injuries (2016/17 to 2020/21) and the associated admission cost.

1. Patient Demographics

Injury admissions, admission rates and admission costs by age group and sex for 2020/21 are summarised in Table 1. Injuries, injury rates and injury costs increased steeply with increasing patient age. This age-gradient was steeper in summed hospital cost than in the number of injuries per age group: for example, people aged 75 years and above accounted for just below one-quarter of all injury admissions (24%) but this group accounted for well over one-third of injury admission costs (37.2%).

Table 1 Injury-related hospital admission incidence and cost by age group and sex; Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Age group						
0-4yrs	5296	3.9	1359.2	\$20,947,205	1.7	\$3,955
5-14yrs	9883	7.3	1226.9	\$48,298,130	4.0	\$4,887
15-24yrs	16716	12.4	2082.2	\$102,099,099	8.4	\$6,108
25-34yrs	16057	11.9	1585.0	\$104,670,132	8.6	\$6,519
35-44yrs	13272	9.8	1446.5	\$93,209,285	7.6	\$7,023
45-54yrs	13870	10.3	1675.8	\$110,398,417	9.0	\$7,960
55-64yrs	13815	10.2	1850.5	\$125,600,224	10.3	\$9,092
65-74yrs	14157	10.5	2394.4	\$162,563,076	13.3	\$11,483
75+yrs	31873	23.6	6782.7	\$454,823,552	37.2	\$14,270
Sex						
Male	72697	53.9	2240.2	\$627,592,844	51.3	\$8,633
Female	62242	46.1	1875.4	\$595,016,275	48.7	\$9,560
Total	134939	100%	2055.8	\$1,222,609,118	100.0	\$9,060

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

Overall, males had more injury admissions than females: this is reflected not only in the number of injuries but also in the injury rates per population and the total cost of injury-related hospital admissions (Table 1). The average cost *per hospital stay*, however, was higher in females than in males. Figure 1 & Figure 2 demonstrate the sex and age group pattern of injury-related admissions and the cost of hospital stay, respectively. Injury rates and total cost of hospital stay was greater in males than females in the age groups below 65 years; in the age groups 65 years and above, rates

and total costs were greater in females than in males. Total hospital costs were skewed towards older females with 31% of injury-related hospital admission costs attributed to females aged 65 years and above.

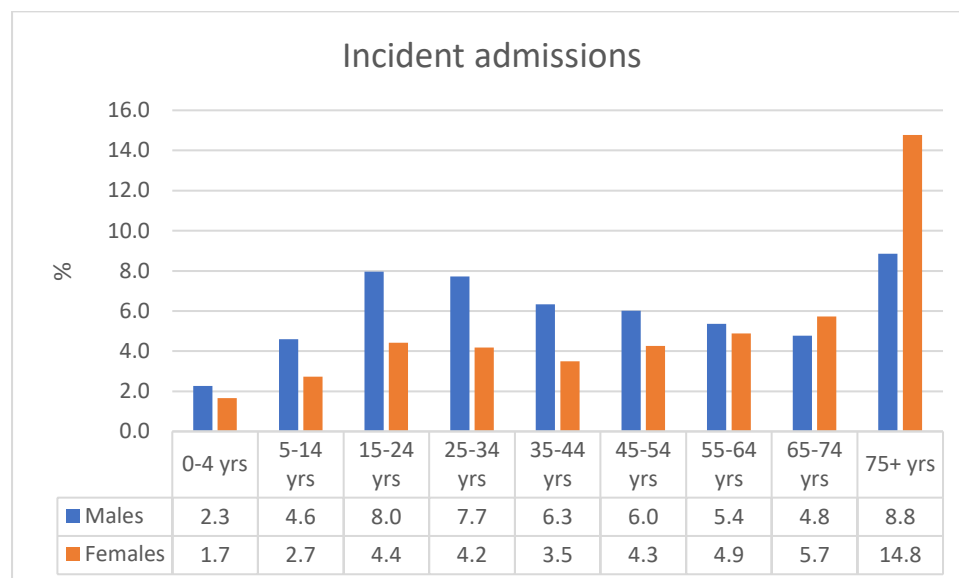


Figure 1 Injury-related hospital admissions by age group and sex (%); Victoria 2020/21

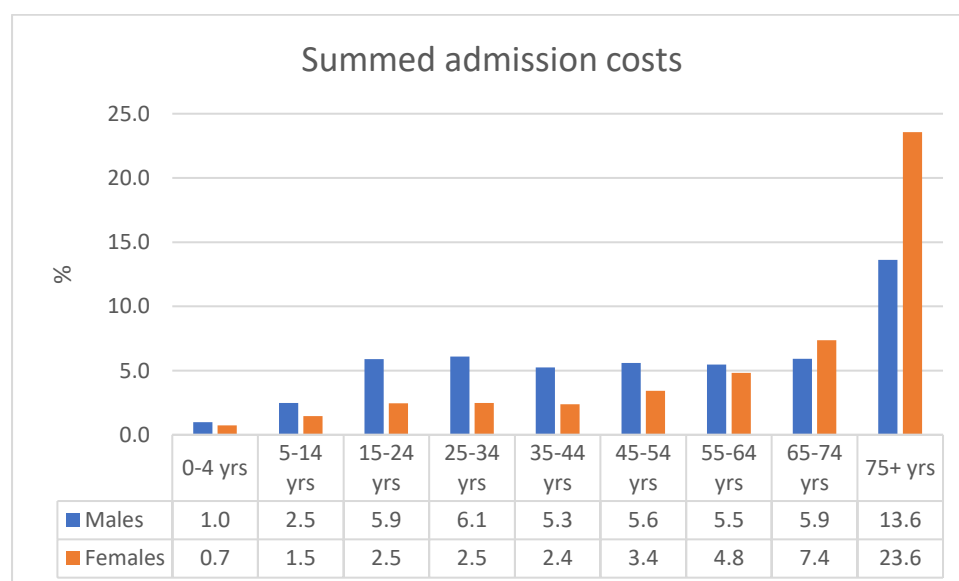


Figure 2 Summed cost of injury-related hospital admissions by age group and sex (%); Victoria 2020/21

2. Hospital admission funding source

The majority of injury-related hospital admissions in 2020/21 in Victoria were in public hospitals, with private hospitals only accounting for 15% of injury admissions (Table 2). The mean cost per hospital stay, however, was 35% higher in private hospitals (not accounting for differences in case complexity or length of stay); therefore, a slightly higher proportion of total injury-related hospital costs was attributed to private hospitals (20%).

Medicare funded most of the injury related hospital admissions ('public' patient type; Table 2), followed by private insurance ('private' patient type); compensable (mostly Victorian WorkCover Authority and the Transport Accident Commission); and Department of Veterans' Affairs (DVA). The latter group had the highest mean cost per hospital stay, and those who were ineligible for funding (0.9% of injury admissions) had the lowest mean cost per hospital stay; however, it must be noted that these are crude means that do not account for patient case mix or length of stay.

Table 2 Injury-related hospital admission incidence and cost by hospital type and funding source; Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Hospital type						
Public	114423	84.8	1743.2	\$973,743,719	79.6	\$8,510
Private	20516	15.2	312.6	\$248,865,400	20.4	\$12,130
Separation account – patient type						
Public	94129	69.8	1434.0	\$738,373,663	60.4	\$7,844
Private	26643	19.7	405.9	\$329,222,261	26.9	\$12,357
Department of Veterans' Affairs	1637	1.2	24.9	\$22,990,872	1.9	\$14,045
Compensable	11322	8.4	172.5	\$123,551,629	10.1	\$10,913
Ineligible	1208	0.9	18.4	\$8,470,694	0.7	\$7,012
Total	134939	100%	2055.8	\$1,222,609,118	100.0	\$9,060

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

Most of the injury admission costs in private hospitals were accrued by private patients (i.e. the admission was funded by private insurance), but private patients admitted to public hospitals were not uncommon (accounting for 17% of all admission costs; Figure 3). The majority of compensable admission costs, however, were accrued in public hospitals, whereas for DVA patients, the costs were divided more equally between public and private hospitals.

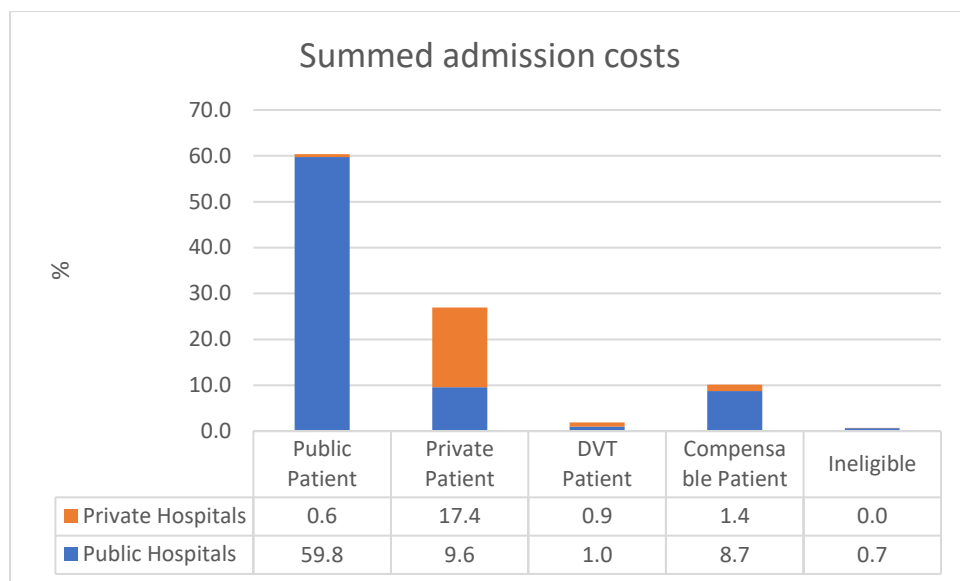


Figure 3 Summed cost of injury-related hospital admissions by hospital type (%); Victoria 2020/21

3. Place of occurrence and activity when injured

An overview of injury-related hospital admission incidence and cost by place of injury occurrence and activity when injured is provided in Table 3. Notably, 43.1% of admissions did not have a specified place of occurrence code and 69% did not have a specified activity when injured code, rendering the presented results to be underestimates of the underlying rates and costs as well as unreliable in their proportional contribution.

The specified place of occurrence information suggests that injuries most commonly took place in the home; followed by road, street and highway; followed by residential institution; followed by sport & athletic areas. These three locations, respectively, also accounted for the greatest proportions of hospital costs. The cost *per injury-related hospital stay* was highest in injuries that occurred in the home and lowest in injuries that occurred in sports & athletic areas, noting that differences in patient age, complexity or length of stay were not accounted for in these averages.

Only a relatively small proportion of injury admissions contained a specified activity when injured code; these coded admissions suggested that injuries commonly took place during sports; 'other types of paid work- unpaid'; vital activities, resting, eating, sleeping; and while working for income (Table 3). The cost *per injury-related hospital stay* was highest in injuries that occurred during vital activities and lowest while engaged in leisure, noting that these are crude averages that did not account for differences in patient case-mix.

Table 3 Injury-related hospital admission incidence and cost by place of occurrence and activity when injured; Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Place of occurrence						
Home	42213	31.3	64.3	\$454,361,036	37.2	\$10,764
Residential Institution	7343	5.4	11.2	\$74,907,004	6.1	\$10,201
School, public buildings	3431	2.5	5.2	\$28,751,779	2.4	\$8,380
Sports & athletic areas	5085	3.8	7.7	\$31,789,999	2.6	\$6,252
Road, street & highway	13327	9.9	20.3	\$135,597,740	11.1	\$10,175
Trade & service area	3166	2.4	4.8	\$26,552,445	2.2	\$8,387
Industrial & construction area	1331	1.0	2.0	\$9,407,570	0.8	\$7,068
Farm	923	0.7	1.4	\$9,235,694	0.8	\$10,006
Other specified places	5106	3.8	7.8	\$42,428,840	3.5	\$8,310
Unspecified places	53014	39.3	80.8	\$409,577,011	33.5	\$7,726
Activity when injured						
Sports	13577	10.1	20.7	\$93,711,811	7.7	\$6,902
Leisure	5056	3.8	7.7	\$30,452,328	2.5	\$6,023
Working for income	7337	5.4	11.2	\$49,042,605	4.0	\$6,684
Other types of work-unpaid	8382	6.2	12.8	\$78,682,623	6.4	\$9,387
Vital activities, resting, eating, sleeping	7905	5.9	12.0	\$88,092,844	7.2	\$11,144
Other specified	10540	7.8	16.1	\$78,201,970	6.4	\$7,420
Unspecified	81576	60.5	124.3	\$800,336,450	65.5	\$9,811

Activity code not required	565	0.4	0.9	\$4,076,063	0.3	\$7,214
Missing	1	0.0	0.0	\$12,425	0.0	\$12,425
Total	134939	100%	2055.8	\$1,222,609,118	100.0	\$9,060

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

The distribution of summed costs of hospital admissions by place of injury occurrence across age groups is shown in Figure 5. Injuries that occurred at home showed a strong age gradient with a pronounced maximum cost in the age group 75+ years. A maximum in the age group 75+ years was also observed in injuries that occurred in residential institutions, as expected. Injuries that occurred in the road, street and highway showed a more levelled age distribution, with an increase at 15+ years which was sustained throughout the adult age groups.

The distribution of summed costs of hospital admissions per activity when injured across age groups is shown in Figure 4. Notably, the cost of sports injuries was centred around younger age groups with a maximum occurring at ages 15-24 years. Injury admission costs related to injuries that occurred during vital activities and during other types of work (unpaid) were most attributed to the older age groups, peaking at ages 75+ years. Hospital admission costs related to injuries that occurred while working for income were, as expected, more evenly spread across the working-age range, peaking at 25-54 years.

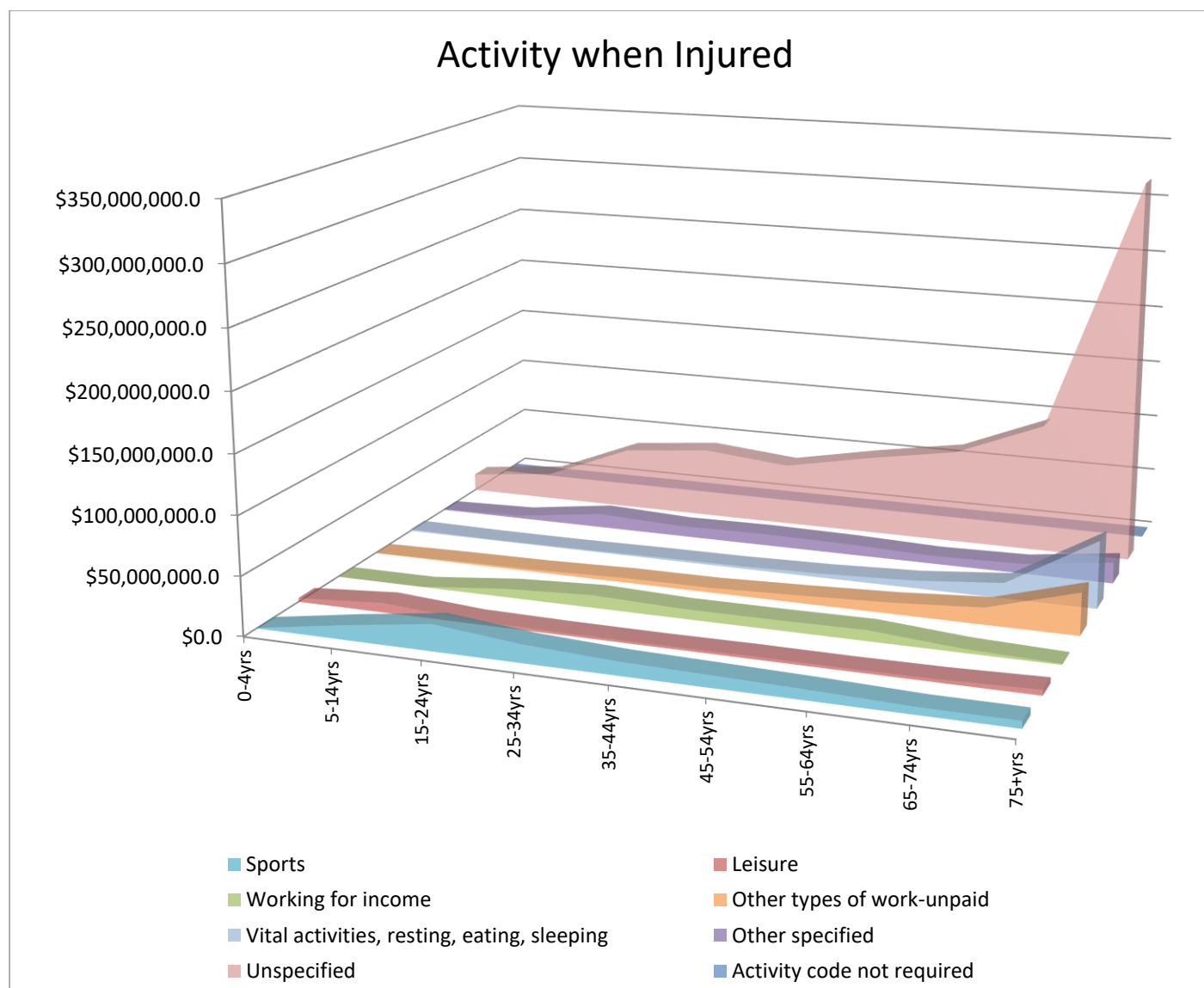


Figure 4 Summed cost of injury-related hospital admissions by activity when injured and age group; Victoria 2020/21

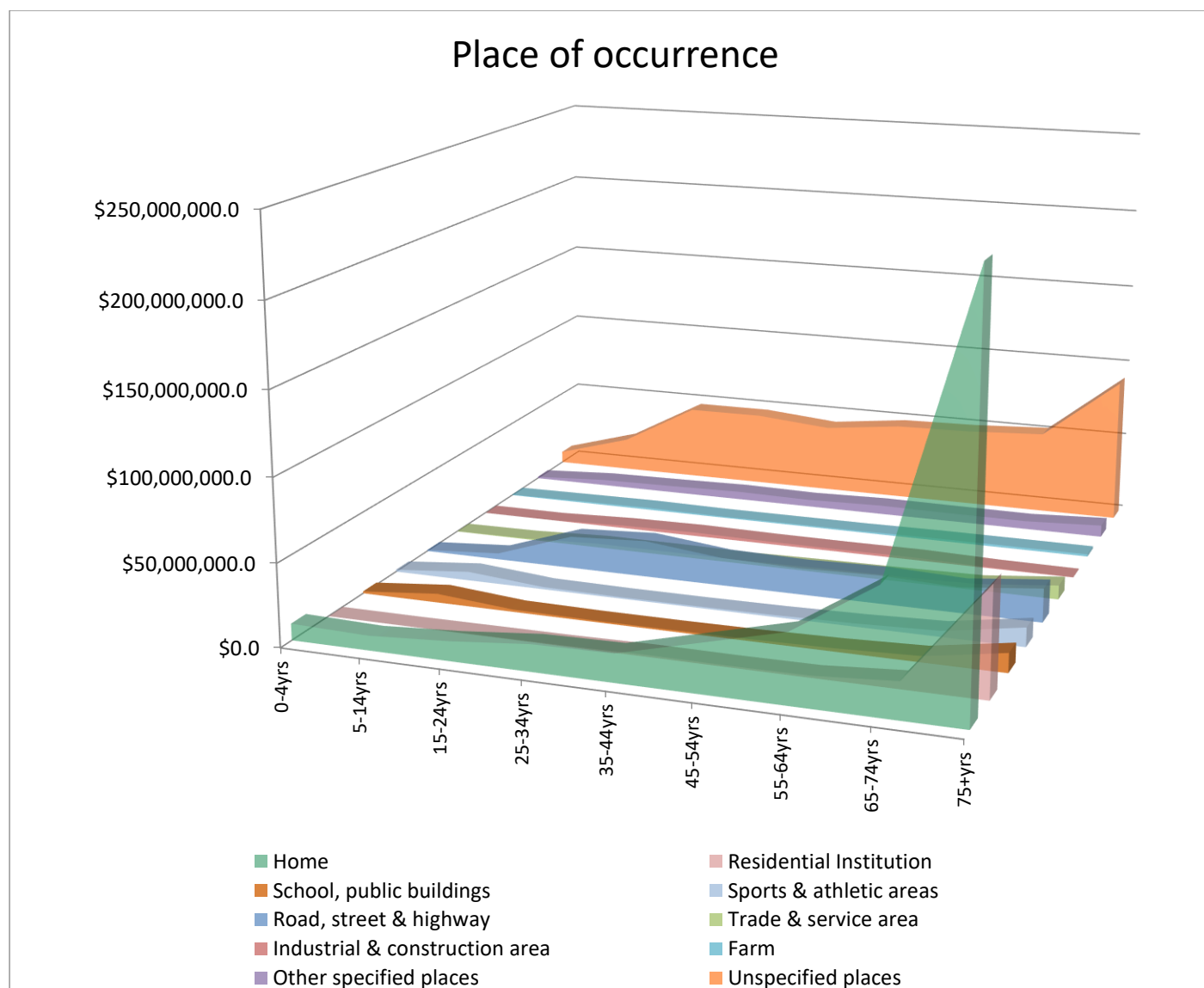


Figure 5 Summed cost of injury-related hospital admissions by place of occurrence and age group; Victoria 2020/21

Due to the relatively high contribution of sports injuries in the specified activity when injured data, a detailed overview of the incidence of specific sports injuries and their associated admission costs are shown in Figure 6 and Figure 7, respectively. The top-listed five sports in terms of injury admissions as well as summed costs of hospital stay were team ball sports; wheeled non-motorised sports; individual athletic sports; wheeled motor sports; and equestrian activities, respectively. The summed cost of injury-related hospital admissions associated with these sports was \$64.1 million, which is likely to be an underestimate considering that over two-thirds of injury admissions did not have a specified activity when injured code.

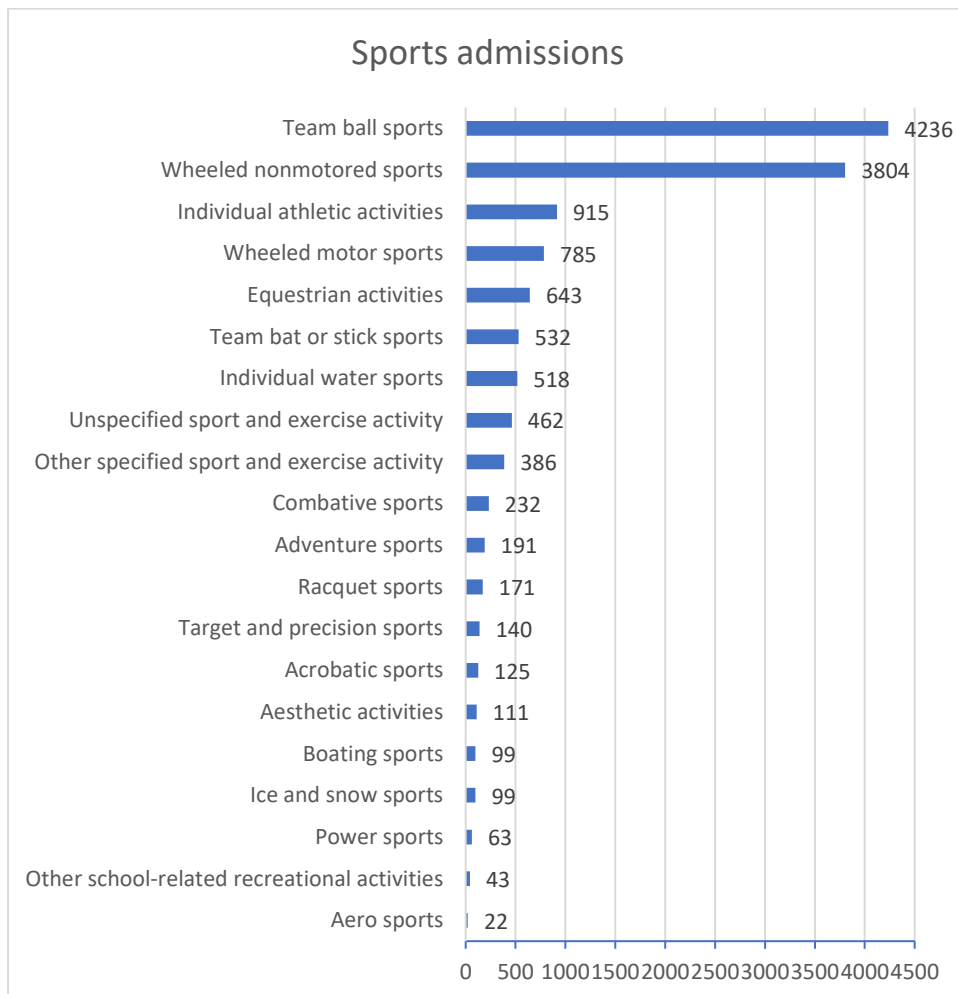


Figure 6 Injury-related hospital admissions related to sport, by type of sport (frequency); Victoria 2020/21

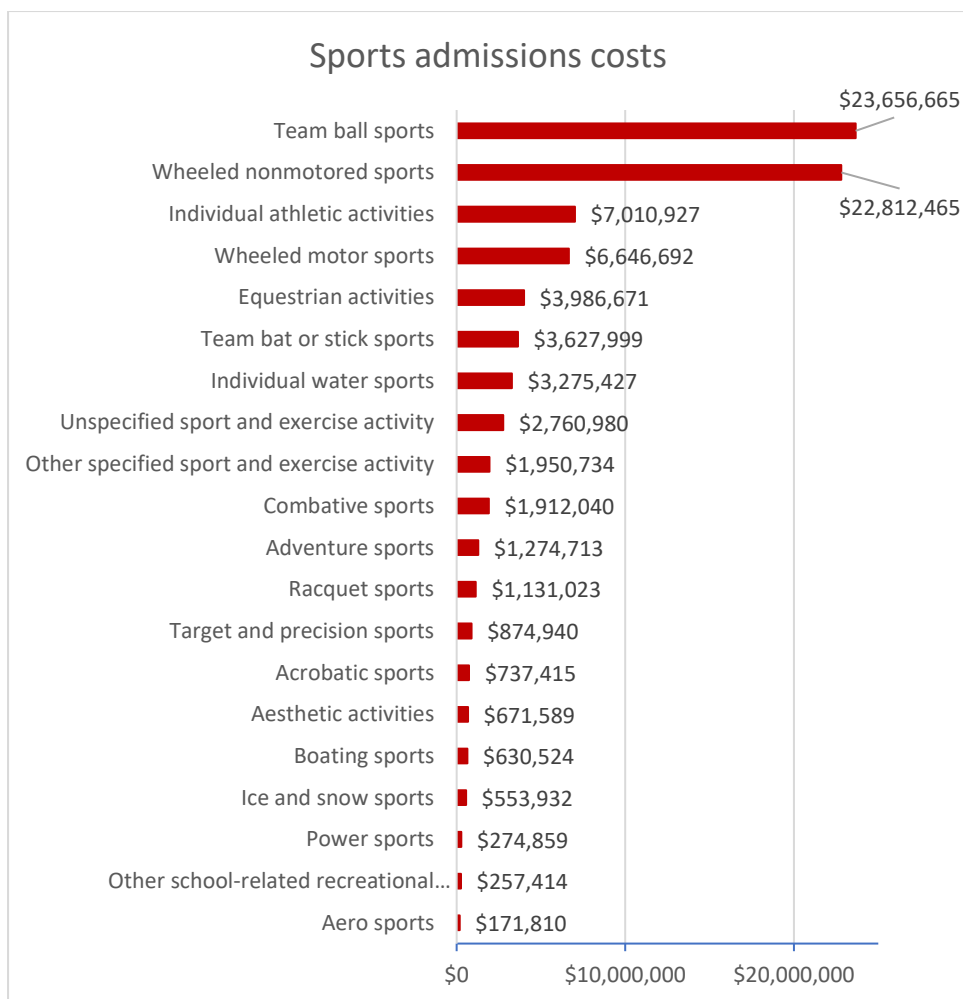


Figure 7 Summed cost of injury-related hospital admissions related to sport, by type of sport (AU\$); Victoria 2020/21

4. Cause of injury: unintentional

Injury admissions, admission rates and admission costs by cause group, for unintentional injuries, are shown in Table 4. The five most common specified causes of unintentional, hospital-admitted injuries were falls, transport, cutting/piercing, hit/struck/crush and natural/environmental/animals. These top-five causes also accounted for the greatest proportions of total injury admission costs. The mean cost per hospital stay, however, was highest in injuries caused by explosions/firearms, followed by fires/burns/scalds and choking/suffocation. These mean costs per hospital stay are crude averages (not adjusted for differences in patient case-mix between cause groups).

Table 4 Injury-related hospital admission incidence and cost by cause of injury (unintentional); Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Cause of injury (unintentional)						
Transport	16883	13.8	257.2	\$161,118,407	14.1	\$9,543
Drowning/near drowning	105	0.1	1.6	\$853,383	0.1	\$8,127
Poisoning	2252	1.8	34.3	\$12,077,234	1.1	\$5,363
Fall	58753	48.0	895.1	\$676,821,794	59.3	\$11,520
Fires/burns/scalds	1294	1.1	19.7	\$22,192,053	1.9	\$17,150
Natural/environmental/animals	4530	3.7	69.0	\$25,399,442	2.2	\$5,607
Choking/suffocate	189	0.2	2.9	\$2,474,582	0.2	\$13,093
Hit/struck/crush	9120	7.5	138.9	\$45,273,605	4.0	\$4,964
Machinery	1290	1.1	19.7	\$9,003,643	0.8	\$6,980
Cutting/piercing	9373	7.7	142.8	\$49,740,045	4.4	\$5,307
Explosions/firearms	105	0.1	1.6	\$1,867,174	0.2	\$17,783
Foreign body - natural orifice	1954	1.6	29.8	\$8,659,774	0.8	\$4,432
Overexertion and/or strenuous movements	3480	2.9	53.0	\$21,198,904	1.9	\$6,092
Other specified unintentional	825	0.7	12.6	\$5,916,811	0.5	\$7,172
Unspecified unintentional	12142	9.9	185.0	\$99,621,348	8.7	\$8,205
Total	122295	100%	1863.1	\$1,142,218,199	100.0	\$9,340

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

4.1 Transport injury related costs

As transport injuries were common and this cause group is heterogeneous, a further breakdown of rates and costs by type of transport is provided in Table 5. The three most common causes of hospital-admitted transport injuries were: car occupant injured in transport accident; pedal cyclist injured in transport accident; motorcycle rider injured in transport accident. These three causes were also the top three contributors to hospital costs, although motorcycles were second and pedal cyclists third in terms of summed costs. The *mean cost per hospital stay*, however, was highest in those injured in air and space transport accidents followed by occupants of heavy transport vehicles; third in terms of mean costs were pedestrians. Notably, mean costs did not account for differences in patient case-mix between cause groups. Furthermore, incidence rates reflect the incidence *per population* without accounting for exposure, i.e. the vehicle fleet; bicycle trends; etc.

Table 5 Injury-related hospital admission incidence and cost by detailed cause of injury (unintentional); transport only; Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Cause of injury (unintentional); transport only						
Pedestrian injured in transport accident	910	5.4	13.9	\$14,333,484	8.9	\$15,751
Pedal cyclist injured in transport accident	4949	29.3	75.4	\$35,191,612	21.8	\$7,111
Motorcycle rider injured in transport accident	3323	19.7	50.6	\$38,951,149	24.2	\$11,722
Occupant of three-wheeled motor vehicle - transport	11	0.1	0.2	\$103,373	0.1	\$9,398
Car occupant injured in transport accident	5588	33.1	85.1	\$51,542,807	32.0	\$9,224
Occupant of pick-up truck or van injured in transport	102	0.6	1.6	\$1,407,711	0.9	\$13,801
Occupant of heavy transport vehicle injured in transport	163	1.0	2.5	\$2,574,102	1.6	\$15,792
Bus occupant injured in transport accident	80	0.5	1.2	\$847,355	0.5	\$10,592
Other land transport accidents	1453	8.6	22.1	\$13,226,673	8.2	\$9,103
Water transport accidents	194	1.2	3.0	\$1,907,474	1.2	\$9,832
Air and space transport accidents	12	0.1	0.2	\$260,289	0.2	\$21,691
Other and unspecified transport accidents	98	0.6	1.5	\$772,378	0.5	\$7,881
Total (transport)	16883	100.0	257.2	\$161,118,407	100.0	\$9,543

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

4.2 Falls-related injury costs

Fall-related injury admissions were common and therefore more detail is provided in pie charts Figure 6 & Figure 7. In terms of both incidence rates and summed admission costs, same level falls were most common, accounting for more than half of each. Of the specified fall types, stairs/step related falls (7% of admissions; 6% of costs) and ladder/scaffold falls (3% of cases; 3% of costs) were also relatively common. Notably, falls accounted for the majority of hospital-admitted injuries in Victoria in 2020/21 yet over 30% of falls admission contained no specified information relating to the type of fall.

Most falls occurred in the home (46% of cases, with another 26% having an unspecified place of occurrence) and most unintentional home injuries were caused by falls (72%). The cost of unintentional injury admissions due to falls was \$425,502,624; the cost of unintentional injury

admissions for *falls that occurred in the home* was \$358,988,380: 31% of all unintentional injury admission costs in Victoria, 2020/21.

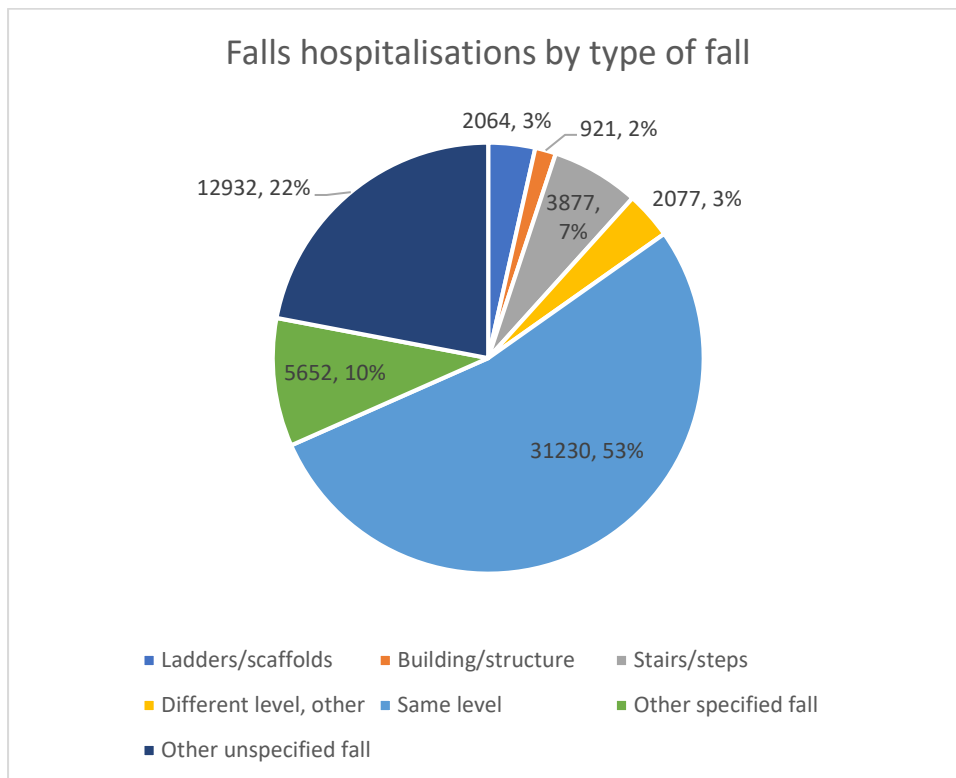


Figure 8 Injury-related hospital admissions related to falls, by type of fall (frequency, %); Victoria 2020/21

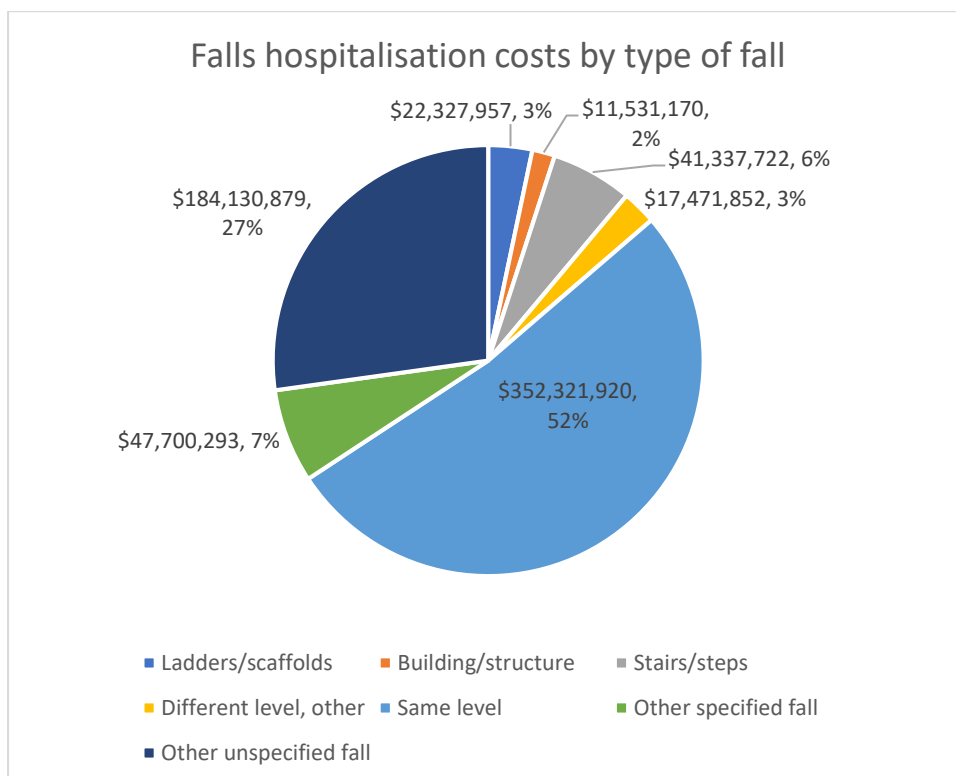


Figure 9 Summed cost of injury-related hospital admissions related to falls, by type of fall (AU\$, %); Victoria 2020/21

Falls injury admissions are most common among older people and therefore a more detailed age group and sex overview of falls admission is shown for patients aged 65 years and above (Figure 10 & Figure 11). In this demographic, females aged 85 years and above accounted for 26% of falls admissions and 28% of falls admission costs. In this oldest age group, a female to male ratio of 1.9 was observed for admissions and a ratio of 2.0 for admission costs.

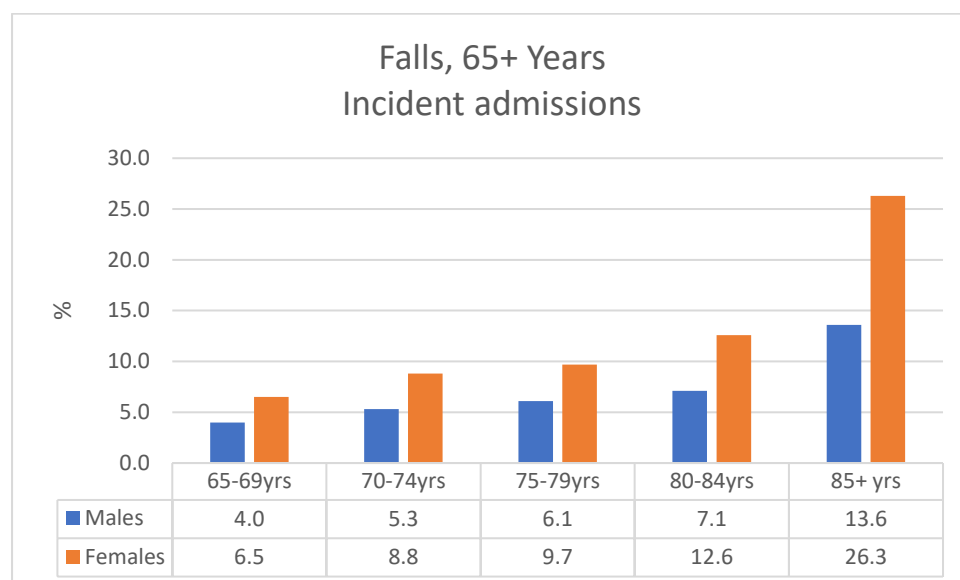


Figure 10 Injury-related hospital admissions related to falls, ages 65+ years (%); Victoria 2020/21

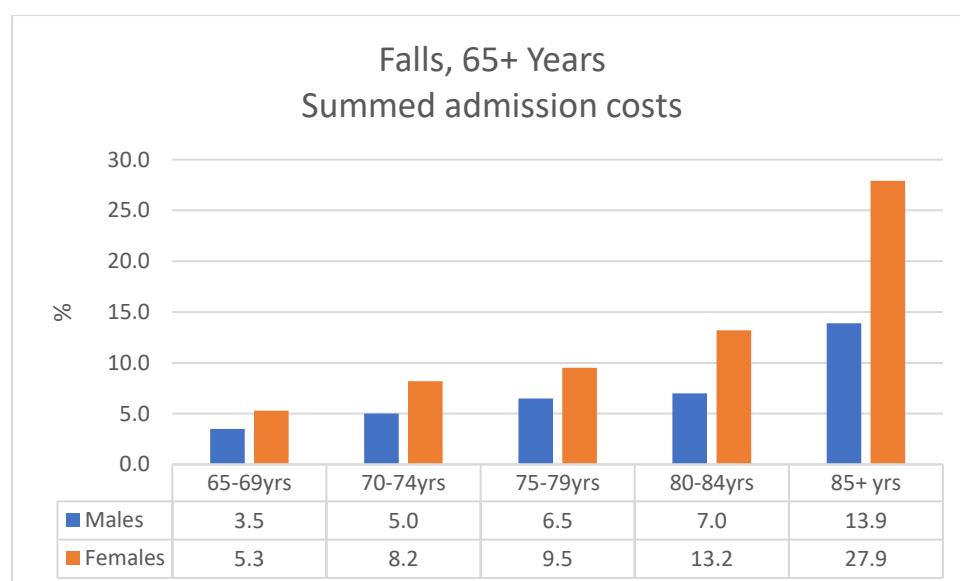


Figure 11 Summed cost of injury-related hospital admissions related to falls, ages 65+ years (%); Victoria 2020/21

The distribution of summed costs of hospital admissions by injury cause groups (unintentional) across age groups is shown in Figure 12. The figure is dominated by falls, which show a steep increase with increasing age, and a maximum at ages 75 years and above. Transport injuries are more levelled out across age groups, increasing from child to adult age and remaining elevated across all adult age groups.

Unintentional - Cause Groups

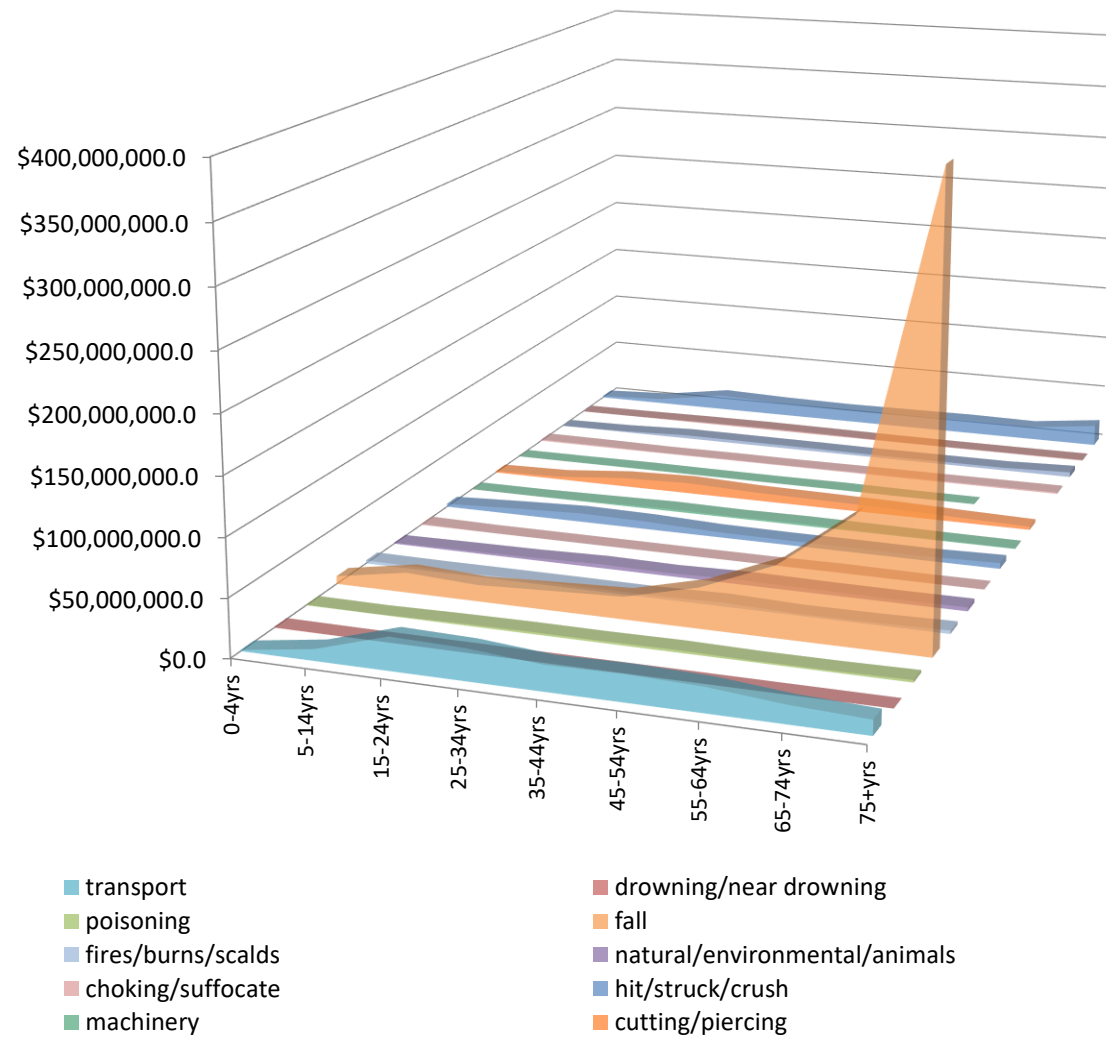


Figure 12 Summed cost of injury-related hospital admissions by injury cause (unintentional) and age group; Victoria 2020/21

5. Cause of injury: intentional

Injury admissions, admission rates and admission costs by cause group, for intentional injuries, are shown in Table 6. Intentional injury includes self-harm, assault, maltreatment and neglect. The rates of intentional self-harm were higher than the rates of assault, maltreatment & neglect, and the rates of other and undetermined intent injuries, respectively. This pattern was also observed in the total hospital cost. The mean cost per injury, however, was relatively similar across the three intent groups, although the highest average cost per injury was recorded for self-harm admissions.

Table 6 Injury-related hospital admission incidence and cost by cause of injury (intentional, undetermined and other intent); Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Cause of injury (intentional, undetermined intent and other intent)						
Intentional self-harm	6202	49.1	94.5	\$40,778,559	50.7	\$6,575
Assault, maltreatment & neglect	4556	36.0	69.4	\$27,567,301	34.3	\$6,051
Other & undetermined intent	1886	14.9	28.7	\$12,045,060	15.0	\$6,387
Total	12644	100%	192.6	\$80,390,920	100.0	\$6,358

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

5.1 Self-harm related injury costs

The incidence and cost of self-harm injury related hospital admissions, by detailed cause group, are shown in Table 7. The three most commonly occurring self-harm causes were all related to pharmaceuticals: namely, antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs; nonopioid analgesics, antipyretics and antirheumatics; and other and unspecified drugs, medicaments and biological substances. The next most common cause, accounting for 10% of self-harm admissions, was self-harm by sharp object. The total cost of self-harm admissions also followed this pattern, the only difference being that self-harm by sharp object was third-ranked in terms of hospital cost (while fourth-ranked in terms of admission frequency). The mean cost per hospital stay differed vastly by intentional self-harm cause, ranging from \$180K for intentional self-harm by jumping or lying before a moving object (which was uncommon) to \$2K for intentional self-harm by blunt object. These averages were not weighted by patient age, clinical complexity or length of stay.

Table 7 Injury-related hospital admission incidence and cost by detailed cause of injury (intentional); self-harm only; Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost† (\$)	(col %)	Mean cost per hospital stay‡ (\$)
Cause of injury; self-harm only						
ISP by and exposure to nonopioid analgesics, antipyretics and antirheumatics	1490	24.0	22.7	\$7,000,039	17.2	\$4,698
ISP by and exposure to antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs, NEC	2475	39.9	37.7	\$14,046,638	34.4	\$5,675
ISP by and exposure to narcotics and psychodysleptics [hallucinogens], NEC	319	5.1	4.9	\$1,945,344	4.8	\$6,098
ISP by and exposure to other drugs acting on the autonomic nervous system	123	2.0	1.9	\$705,633	1.7	\$5,737
ISP by and exposure to other and unspecified drugs, medicaments and biological substances	612	9.9	9.3	\$3,438,209	8.4	\$5,618
ISP by and exposure to alcohol	115	1.9	1.8	\$417,751	1.0	\$3,633
ISP by and exposure to organic solvents and halogenated hydrocarbons and their vapours	14	0.2	0.2	\$70,253	0.2	\$5,018
ISP by and exposure to carbon monoxide and other gases and vapours	28	0.5	0.4	\$163,269	0.4	\$5,831
ISP by and exposure to pesticides	23	0.4	0.4	\$174,994	0.4	\$7,608
ISP by and exposure to other and unspecified chemicals and noxious substances	102	1.6	1.6	\$882,303	2.2	\$8,650
ISH by hanging, strangulation and suffocation	101	1.6	1.5	\$1,886,744	4.6	\$18,681
ISH by drowning and submersion	*	*	*	*	*	\$30,114
ISH by other and unspecified firearm discharge	*	*	*	*	*	\$12,242
ISH by smoke, fire and flames	19	0.3	0.3	\$1,583,475	3.9	\$83,341
ISH by steam, hot vapours and hot objects	*	*	*	*	*	\$5,895

ISH by sharp object	597	9.6	9.1	\$4,633,188	11.4	\$7,761
ISH by blunt object	19	0.3	0.3	\$37,283	0.1	\$1,962
ISH by jumping from a high place	28	0.5	0.4	\$1,260,377	3.1	\$45,013
ISH by jumping or lying before moving object	*	*	*	*	*	\$180,152
ISH by crashing of motor vehicle	27	0.4	0.4	\$799,835	2.0	\$29,624
ISH by other specified means	62	1.0	0.9	\$462,266	1.1	\$7,456
ISH by unspecified means	33	0.5	0.5	\$219,549	0.5	\$6,653
Total (self-harm)	6202	100.0%	94.5	\$40,778,559	100.0%	\$6,575

*Cell counts of five or less are suppressed to maintain data confidentiality. †Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. ‡For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes. ISH=intentional self-harm; ISP=intentional self-poisoning; NEC=not elsewhere classified

The age group and sex distribution of self-harm admissions and admission costs, for ages 10 years and above, is shown in Figure 13 & Figure 14, respectively. Ages below 10 years are not shown, to preserve data confidentiality (as case numbers are low in young children). Females aged 15-24 years accounted for 28% of self-harm admissions. In the age group 15-19 years, the female to male ratio was 3.9: almost one in four self-harm admission in this age group were females. The age distribution for females was bimodal with a prominent peak at ages 15-24 years and a lesser, second peak at ages 45-49 years. This pattern was less pronounced in males. The age group and sex distribution of self-harm admission costs (summed) showed a slightly different pattern: the female to male ratio was 3.2 in the age group 15-19 years and readily decreased with increasing age, reaching a male dominance in summed cost in the age groups between 30 and 44 years. Due to the bimodal distribution in females, the female to male ratio in cost favoured females again in the age groups 45-54 years.

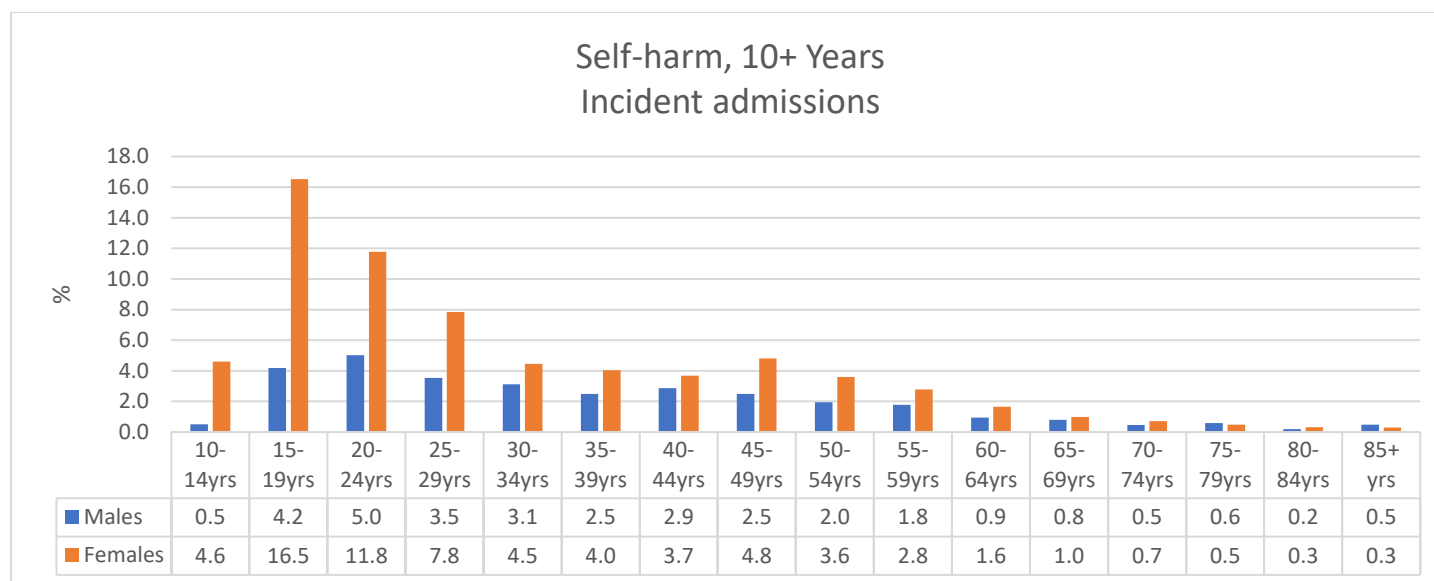


Figure 13 Injury-related hospital admissions related to self-harm (%); ages 10+ years, Victoria 2020/21

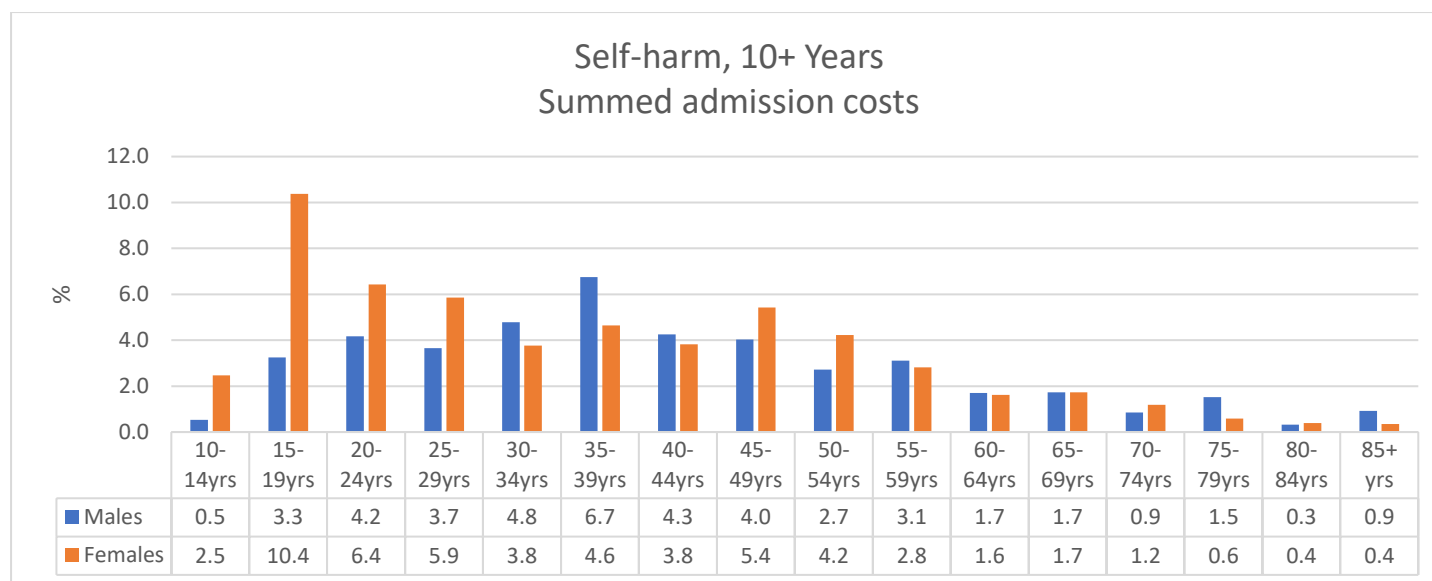


Figure 14 Summed cost of injury-related hospital admissions related to self-harm (%); ages 10+ years, Victoria 2020/21

5.2 Assault-related injury costs

The incidence and cost of assault injury related hospital admissions, by detailed cause group, are shown in Table 8. The three most common causes were assault by bodily force, assault by sharp object and assault by blunt object, respectively. The summed cost of admissions per cause group also followed this pattern. The mean cost per admission, however, showed a different pattern with the highest mean cost observed in admissions for assault by pushing or placing the victim before a moving object, followed by assault by pushing from a high place and assault by smoke, fire and flame: all three of these were rare occurrences. The lowest mean cost per injury admission was for assault by other specified chemicals and noxious substances (also a rare occurrence). Mean costs were not adjusted for patient case-mix.

The distribution of summed costs of hospital admission by broad injury cause groups (intentional only) across age groups is shown in Figure 15. Costs overall were higher for self-harm than for assault admissions, and notably lower for injury admissions of other and undetermined intent. The peak age group for self-harm admissions was 15-24 years, whereas assault injury admission costs were more evenly distributed across the ages of 15-54 years. Self-harm and assault injury admission costs both tapered off at older age groups of 65 years and above.

Table 8 Injury-related hospital admission incidence and detailed cause of injury (intentional); assault only; Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost† (\$)	(col %)	Mean cost per hospital stay‡ (\$)
Cause of injury; assault only						
Assault by drugs, medicaments and biological substances	6	0.1	0.1	\$8,518	0.0	\$1,420
Assault by other specified chemicals and noxious substances	*	*	*	*	*	\$1,158
Assault by unspecified chemical or noxious substance	*	*	*	*	*	\$1,447
Assault by hanging, strangulation and suffocation	68	1.5	1.0	\$102,086	0.4	\$1,501
Assault by handgun discharge	*	*	*	*	*	\$11,341
Assault by other and unspecified firearm discharge	19	0.4	0.3	\$388,913	1.4	\$20,469
Assault by smoke, fire and flames	*	*	*	*	*	\$12,574
Assault by steam, hot vapours and hot objects	8	0.2	0.1	\$167,793	0.6	\$20,974
Assault by sharp object	648	14.2	9.9	\$7,656,998	27.8	\$11,816
Assault by blunt object	512	11.2	7.8	\$3,452,542	12.5	\$6,743
Assault by pushing from high place	*	*	*	*	*	\$31,079
Assault by pushing or placing victim before moving object	*	*	*	*	*	\$49,767
Assault by crashing of motor vehicle	*	*	*	*	*	\$8,849
Assault by bodily force	2738	60.1	41.7	\$11,480,996	41.7	\$4,193
Sexual assault by bodily force	61	1.3	0.9	\$135,552	0.5	\$2,222
Neglect and abandonment	6	0.1	0.1	\$97,844	0.4	\$16,307
Other maltreatment	69	1.5	1.1	\$388,730	1.4	\$5,634
Assault by other specified means	79	1.7	1.2	\$430,826	1.6	\$5,453
Assault by unspecified means	321	7.1	4.9	\$2,899,932	10.5	\$9,034
Total	4556	100%	69.4	\$27,527,537	100.0 %	\$6,042

*Cell counts of five or less are suppressed to maintain data confidentiality. †Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. ‡For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

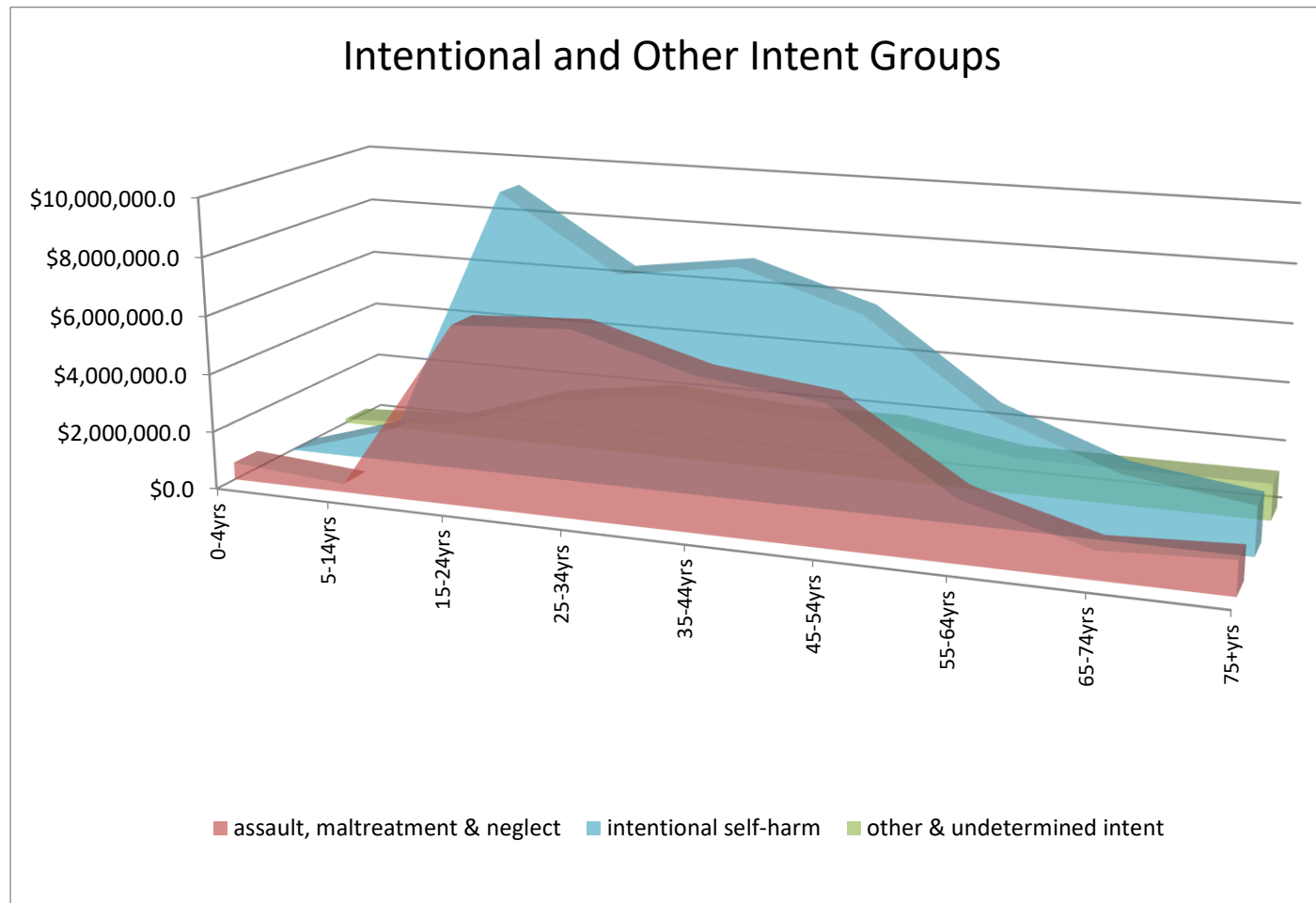


Figure 15 Summed cost of injury-related hospital admissions by cause (intentional) and age group; Victoria 2020/21

6. Injury type and severity

Injury admissions, admission rates per population and admission costs per injury type and level of injury severity are presented in Table 9. The five most commonly occurring specified injury types were fracture; open wound; systemic poisoning/toxic effects; superficial injury; and dislocation, sprain and strain, respectively. Fractures and open wounds were also ranked first and second in terms of summed hospital admission costs, but third-ranked in total cost was intracranial injury, followed by dislocation, sprain and strain; and systemic poisoning/ toxic effects. The mean cost per hospital stay followed a different pattern with the highest mean cost observed for injuries to internal organs, followed by burns and injury to nerves and spinal cord, noting that these are crude averages that did not account for differences in patient case-mix.

Serious injuries, classified as injury admissions with ICD-10 Injury Severity Score (ICISS) less than 0.941⁷, accounted for 8% of incident injuries but one-quarter (25%) of injury admission costs (Table 9): the average cost of serious injury admissions was four-fold the cost of other injury admissions. This is shown in more detail in Figure 16, which depicts cost in deciles, by injury severity. Serious injuries, as per ICISS classification, make up only 0.8% of episodes of care in the lowest cost decile. In higher cost deciles, the proportion that is serious injury increases. In the highest cost decile, 45% of episodes of care are for serious injury.

Table 9 Injury-related hospital admission incidence and cost by injury type and severity; Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Injury type						
Superficial injury	8733	6.5	133.0	\$31,301,737	2.6	\$3,584
Open wound	22638	16.8	344.9	\$103,317,741	8.5	\$4,564
Fracture	50659	37.5	771.8	\$705,239,921	57.7	\$13,921
Dislocation, sprain & strain	7581	5.6	115.5	\$50,709,881	4.1	\$6,689
Injury to nerves & spinal cord	1242	0.9	18.9	\$20,636,096	1.7	\$16,615
Injury to blood vessels	948	0.7	14.4	\$9,887,824	0.8	\$10,430
Injury to muscle & tendon	6176	4.6	94.1	\$42,344,423	3.5	\$6,856
Crushing injury	243	0.2	3.7	\$937,252	0.1	\$3,857
Traumatic amputation	969	0.7	14.8	\$7,003,004	0.6	\$7,227
Eye injury- excl foreign body	588	0.4	9.0	\$2,912,133	0.2	\$4,953
Intracranial injury	6315	4.7	96.2	\$86,631,634	7.1	\$13,718
Injury to internal organs	1135	0.8	17.3	\$22,662,370	1.9	\$19,967
Foreign body	2168	1.6	33.0	\$9,807,856	0.8	\$4,524
Burns	1559	1.2	23.8	\$28,712,181	2.3	\$18,417
Other & unspecified injury	13906	10.3	211.9	\$38,384,927	3.1	\$2,760

⁷ Berecki-Gisolf J, Tharanga Fernando D, D'Elia A. International classification of disease based injury severity score (ICISS): A data linkage study of hospital and death data in Victoria, Australia. Injury. 2022 Mar;53(3):904-911.

Systemic-poisoning/toxic effects	9043	6.7	137.8	\$47,416,309	3.9	\$5,243
Other effects of ext cause/complications/late effects	1036	0.8	15.8	\$14,703,829	1.2	\$14,193
Serious injury (ICISS<0.941)						
Serious injury	10398	7.7	158.4	\$303,771,581	24.8	\$29,214
Other injury	12454	92.3	1897.4	\$918,837,537	75.2	\$7,378
	1					
Total	13493	100.0	2055.8	\$1,222,609,118	100.0	\$9,060

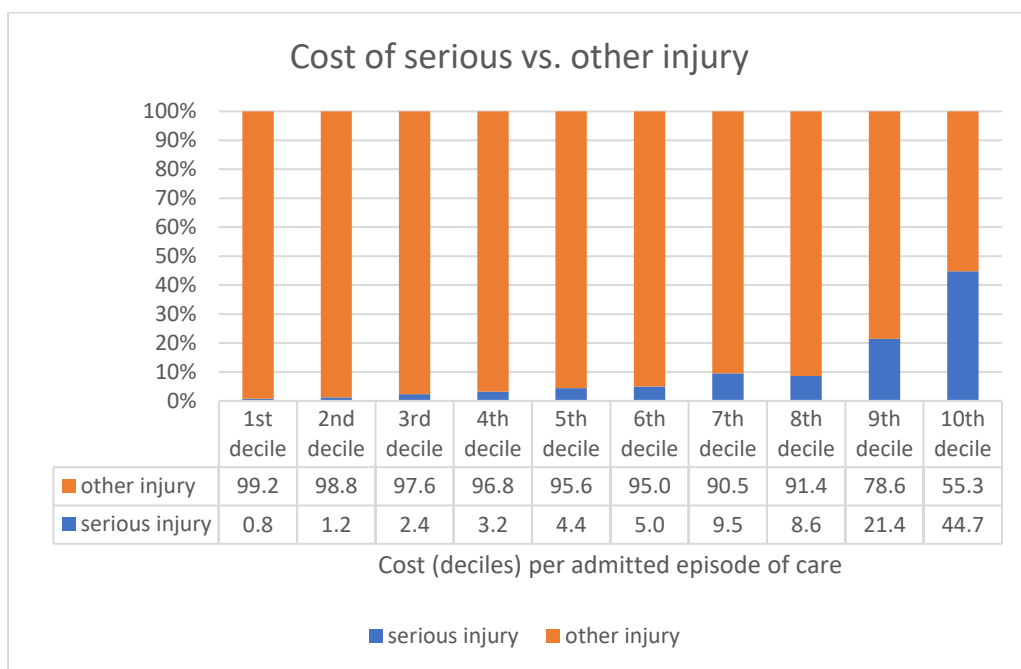


Figure 16 Summed cost of injury-related hospital admissions by injury severity based on ICISS (stacked bars for cost in deciles, column %); Victoria 2020/21

Fractures were the most commonly occurring injury type in injury admission in Victoria, 2020/21, and this injury type is therefore presented in more detail in terms of frequencies and costs (Figure 17 & Figure 18, respectively). The most common types of fracture were forearm fracture, lower leg fracture and femur fracture, respectively. Femur fractures accounted for 13% of all fracture admissions but 32% of fracture admission costs (Figure 18). Overall, femur fractures had the greatest contribution to summed admission costs related to fractures, followed by lower leg fracture and fracture of rib(s), sternum and thoracic spine.

Fracture hospitalisations by type of fracture

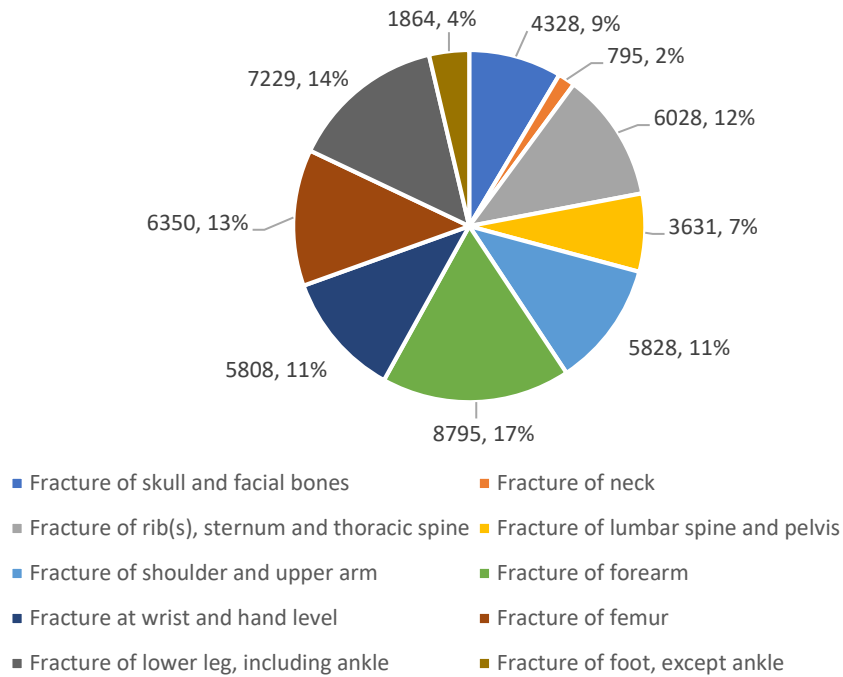


Figure 17 Injury-related hospital admissions related to falls, by fall type (frequency, %); Victoria 2020/21

Fracture hospitalisation costs by type of fracture

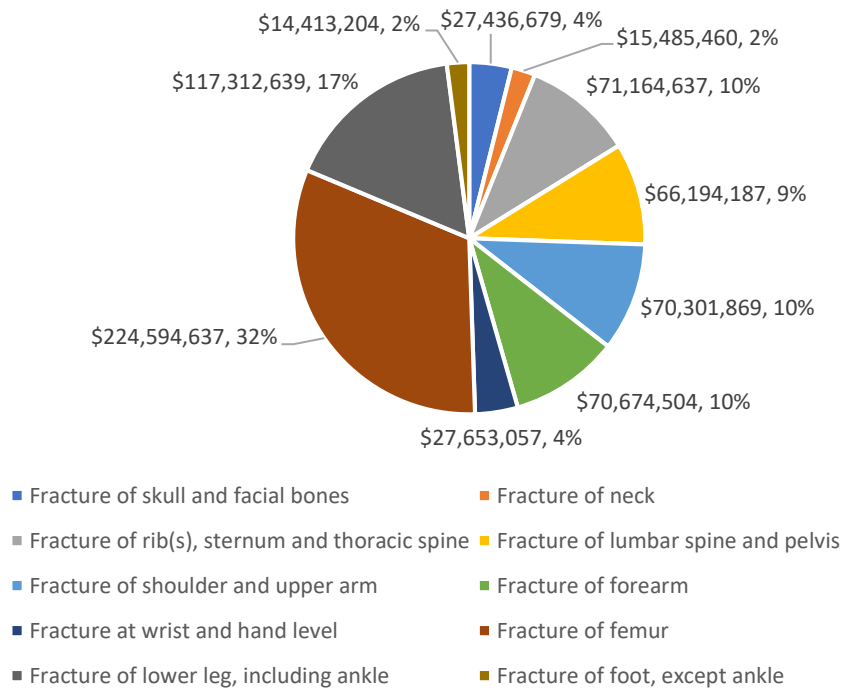


Figure 18 Summed cost of injury-related hospital admissions related to falls, by fall type (AU\$, %); Victoria 2020/21

The distribution of summed costs of hospital admissions by injury type across age groups is shown in Figure 19. This figure clearly demonstrates the dominance of fractures in the overall distribution of injury admission costs in Victoria, 2020/21; in particular, fractures in older age groups (65 years and above), which accounted for a large proportion (36%) of all injury-related hospital costs. A peak in injury costs in the oldest age group(s) was also observed in other injury types such as open wounds, superficial injury, intracranial injury and other & unspecified injury types.

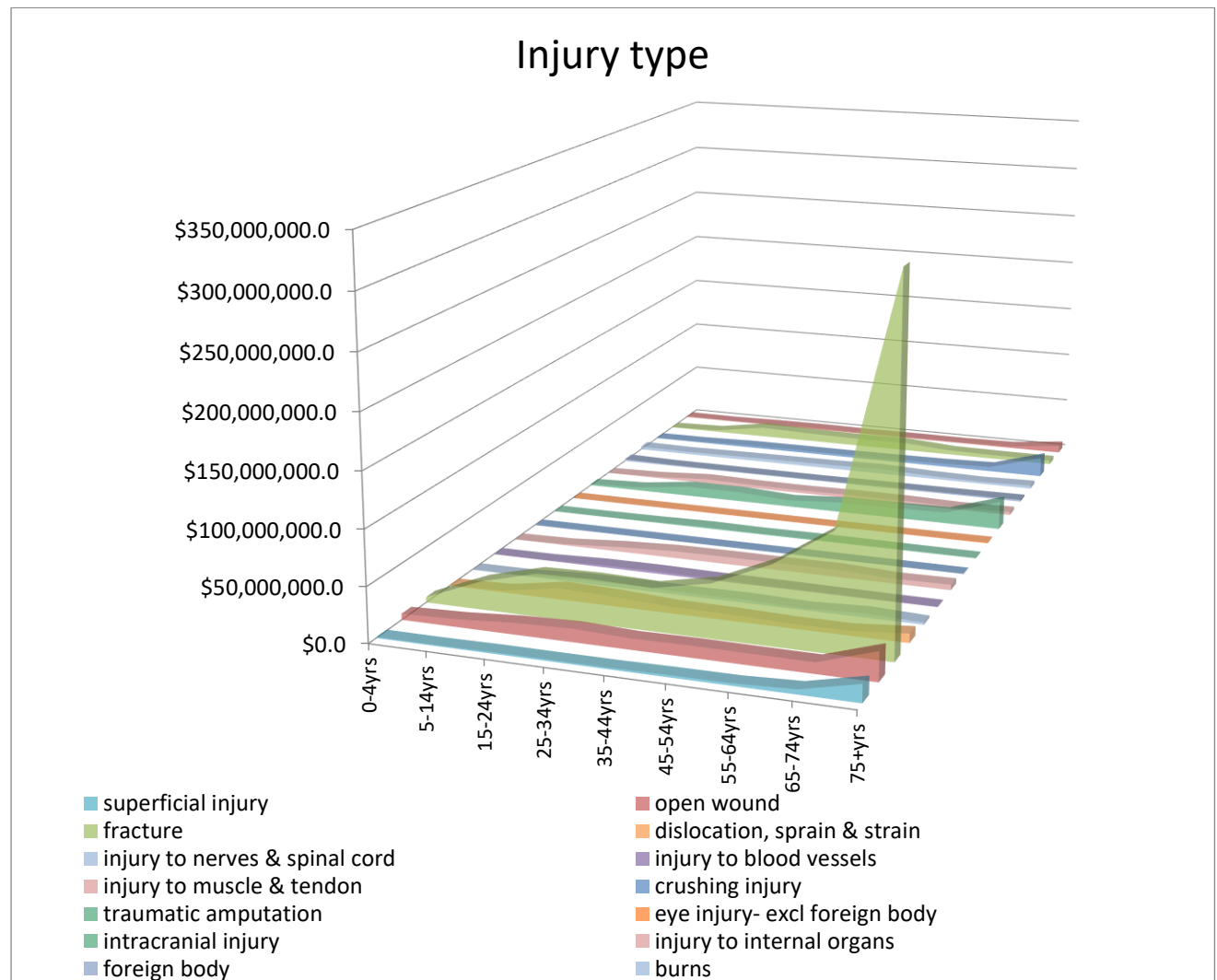


Figure 19 Summed cost of injury-related hospital admissions by injury type and age group; Victoria 2020/21

The distribution of summed costs of hospital admissions by injury severity across age groups is shown in Figure 20. Although other injuries (not severe, by ICISS classification) accounted for the vast majority of hospital costs across all age groups, the difference was less pronounced in the oldest age groups: patients aged 75 years and above with serious injuries accounted for 18% of all injury admission costs whereas patients in this age group with other injuries accounted for only a marginally greater proportion of costs, at 20%.

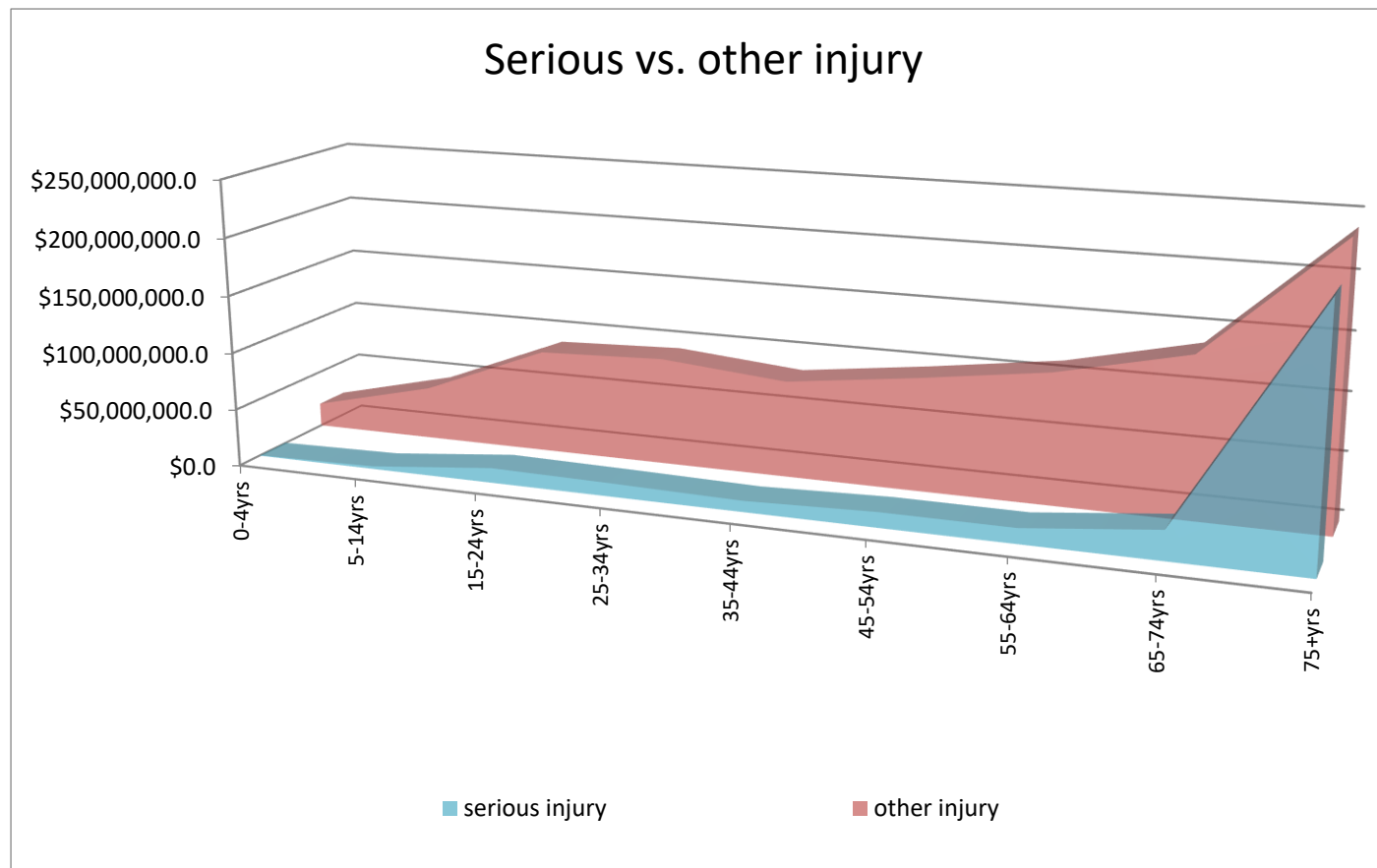


Figure 20 Summed cost of injury-related hospital admissions by injury severity (ICISS: serious vs. other injury) and age group; Victoria 2020/21

7. Region of residence

Injury-related hospital admissions in terms of rates and costs, per patient's area of residence, are presented in Table 10. Although the majority of injury admissions were by patients living in major cities of Australia, rates per population were higher in people living in inner/outer regional Australia. People living in inner/outer regional Australia made up 22% of the Victorian population but they accounted for 30% of the injury admissions. As the mean cost per hospital stay was also higher in people residing in regional areas, they accounted for 32% of the cost of hospital admitted injuries in Victoria, 2020/21.

Regions of Victoria, categorised by Statistical Area Level 4 (SA4), varied in their population size, number of hospital-admitted injuries, and injury rates per population. The largest regions in terms of population were Melbourne-South East; Melbourne-West; and Melbourne-Inner; with smallest populations in Warrnambool and South West; Shepparton; and North West. Although the highest numbers of hospital-admitted injuries were observed in Melbourne-South East, Melbourne West and Melbourne-inner, the highest *population-based rates* were in Mornington Peninsula, Geelong and Shepparton. The total cost of hospital-admitted injury reflected the region's population size with the greatest total costs in Melbourne-South East, Melbourne West and Melbourne- Inner. The average costs per admission (not accounting for differences in patient case-mix) were lowest for residents of Bendigo, North West and Hume. When also including non-residents of Victoria, the average admission costs were highest among interstate patients and lowest among Overseas patients.

Table 10 Injury-related hospital admission incidence and cost by residential area (regionality and SA4); Victoria 2020/21

	Incidence			Cost		
	N	(col %)	Rate per 100,000 population	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)
Regionality						
Major Cities of Australia	90823	67.3	1775.9	\$795,340,001	65.1	\$8,757
Inner/Outer Regional Australia	41133	30.5	2811.8	\$395,981,692	32.4	\$9,627
Unknown, interstate, overseas	2983	2.2		\$31,275,287	2.6	\$10,485
Statistical Area Level 4‡						
Ballarat	3725	2.8	2166.4	\$36,790,711	3.0	\$9,877
Bendigo	3346	2.5	2013.7	\$37,759,979	3.1	\$11,285
Geelong	8325	6.2	2572.8	\$64,317,770	5.3	\$7,726
Hume	3053	2.3	1668.6	\$33,308,720	2.7	\$10,910
Latrobe - Gippsland	7281	5.4	2451.3	\$71,641,580	5.9	\$9,840
Melbourne - Inner	12407	9.2	1911.7	\$98,793,575	8.1	\$7,963
Melbourne - Inner East	6884	5.1	1790.9	\$68,062,269	5.6	\$9,887
Melbourne - Inner South	9431	7	2180.7	\$85,190,308	7.0	\$9,033
Melbourne - North East	10496	7.8	1912.7	\$95,239,655	7.8	\$9,074
Melbourne - North West	8338	6.2	1946.7	\$72,655,130	5.9	\$8,714
Melbourne - Outer East	10327	7.7	1960.9	\$97,117,205	7.9	\$9,404
Melbourne - South East	16523	12.3	1893.2	\$136,669,299	11.2	\$8,271
Melbourne - West	12705	9.5	1474.6	\$109,957,878	9.0	\$8,655
Mornington Peninsula	9490	7.1	3046.1	\$81,472,082	6.7	\$8,585

North West	3278	2.4	2110.0	\$36,779,136	3.0	\$11,220
Shepparton	3421	2.6	2494.6	\$36,827,022	3.0	\$10,765
Warrnambool and South West	3078	2.3	2415.4	\$29,773,323	2.4	\$9,673
Interstate	1387	1		\$20,306,526	1.7	\$14,641
Overseas	777	0.6		\$5,658,920	0.5	\$7,283
Total	134939	100	2055.8	\$1,222,609,118	100.0	\$9,060

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes. ‡667 cases could not be mapped to a statistical area level 4.

The distribution of summed costs of hospital admissions by place of injury occurrence across age groups is shown in Figure 21 and Figure 22. Regional and metropolitan Victorian cost of hospital-admitted injury increased with the onset of adult age and continued to increase slightly over the lifespan until a sharp incline in the age groups 65 years and above. All SA4 areas followed a pattern of highest cost in the oldest age group (75+ years). This pattern was also seen in interstate patients but not in overseas patients who had the highest cost in the age group 25-34 years, presumably at least partly explained by the demographics of overseas visitors. Most regions showed a (mildly) bimodal distribution with a first, lesser peak in the young adult ages. In Melbourne South-East, which had the largest population and also the highest overall hospital cost, the pattern was not bimodal as the earlier increase was sustained throughout the adult age groups; this was also observed in Latrobe-Gippsland and Mornington Peninsula.

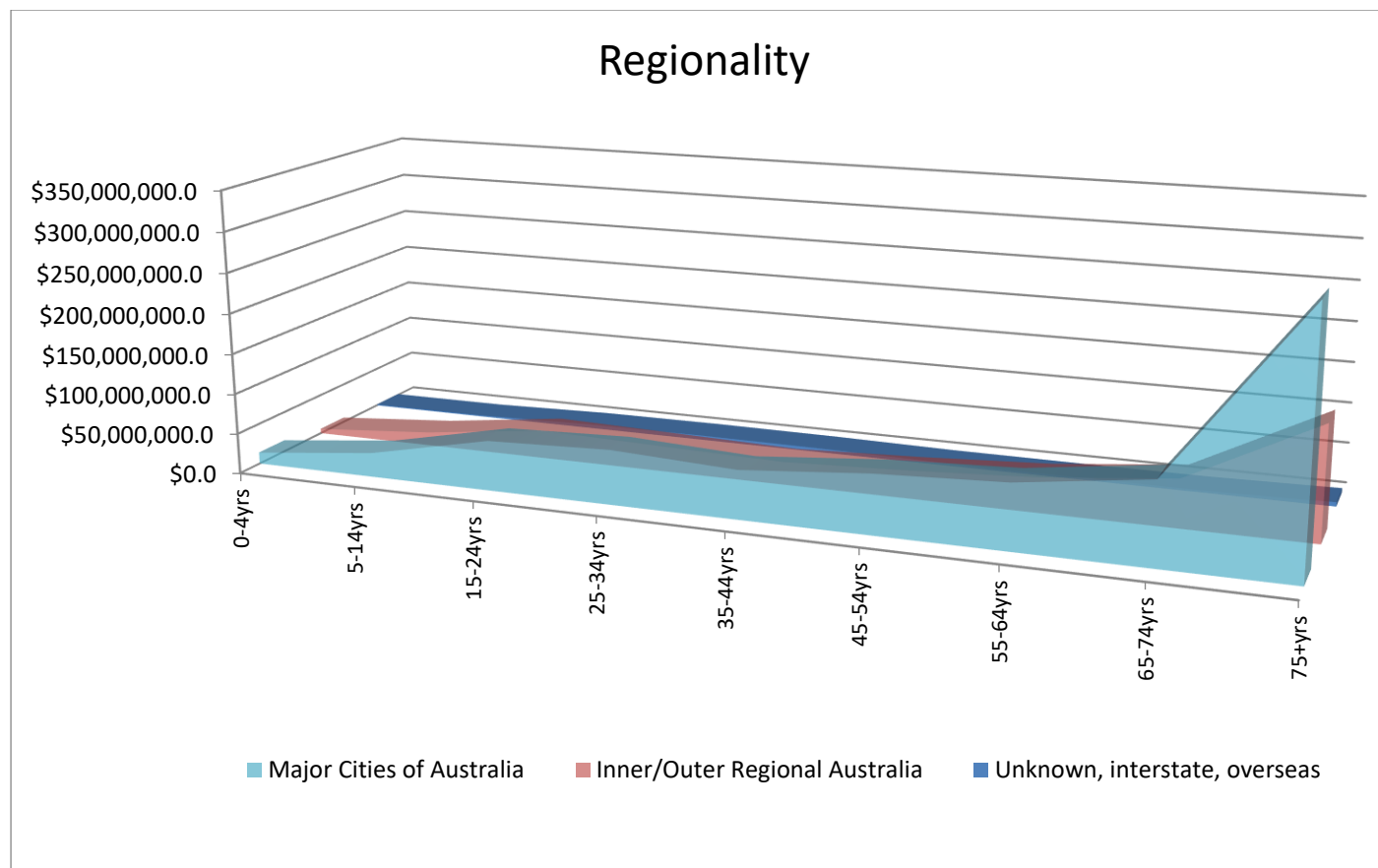


Figure 21 Summed cost of injury-related hospital admissions by regionality (based on patients' residence) and age group; Victoria 2020/21

Statistical Area Level 4

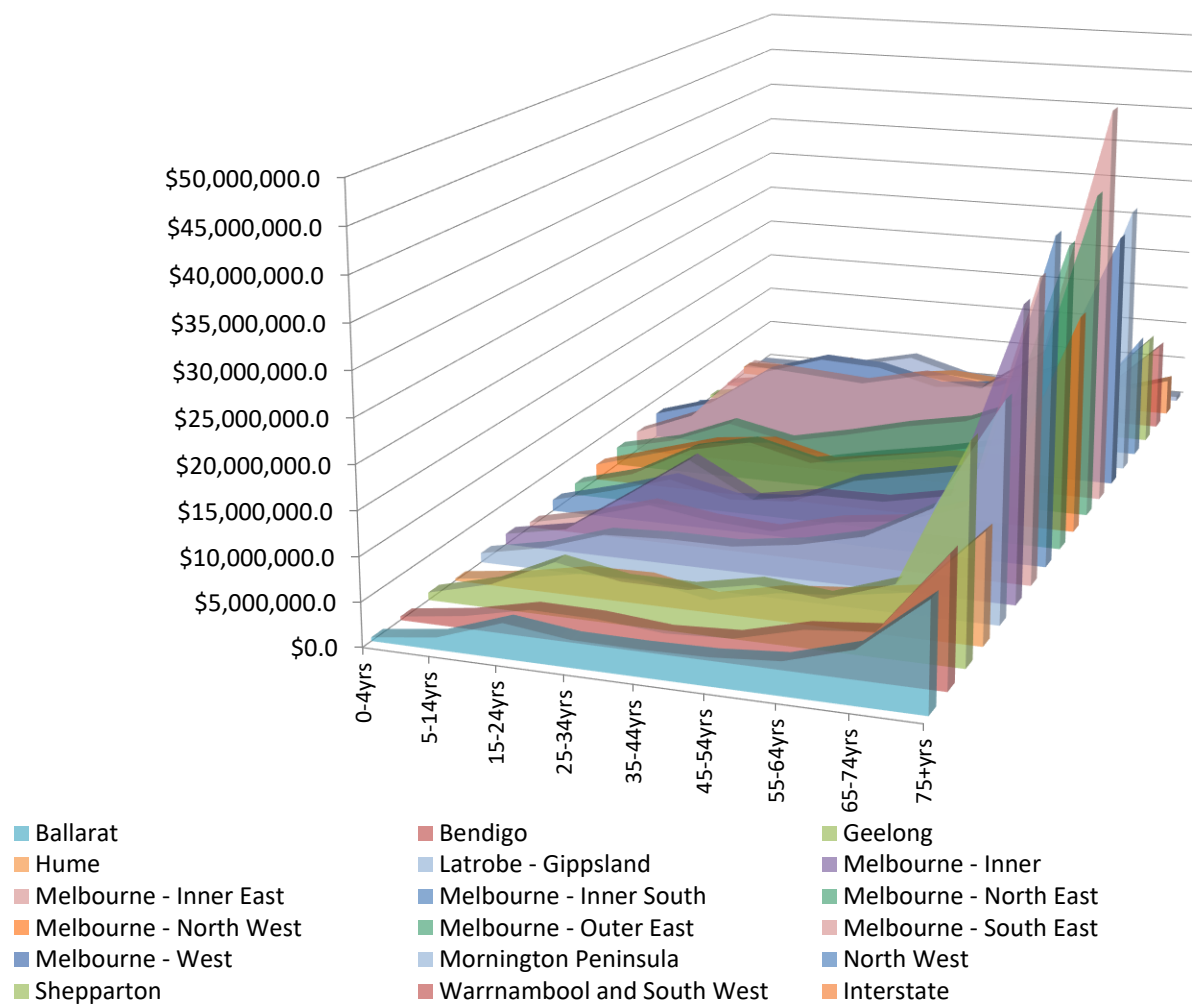


Figure 22 Summed cost of injury-related hospital admissions by locality (based on patients' residence) and age group; Victoria 2020/21

8. Trend analysis over five years, 2016/17 to 2020/21

An overview of five years of injury-related hospital admissions in Victoria, in terms of admissions, rates, total costs, and average hospital stay costs, is shown in Table 11. There were 8, 18, 21, 22 and 49 incident admissions with sex recorded as other than male or female in 2016/17, 2017/18, 2018/19, 2019/20 and 2020/21, respectively. To preserve data confidentiality, these cases are not further reported on in the remainder of this report.

Population-based rates of injury can change over time due to demographic changes, and therefore age-standardised rates are presented alongside crude rates (standardised rates account for changes in the population age distribution over time).

The injury rates did not show any sustained increase (or decrease) over the five-year period. However, the population of Victoria increased during the five-year period from 6.2 to 6.6 million, and when injury rates are steady but the population grows, the number of injuries per year increase, which occurred accordingly. The total cost of injury admissions concomitantly increased steadily over this period: this was due to an increase in the number of injuries as well as an increase in the *mean cost per hospital stay* over time. Although inflation drove up the mean cost of admissions over time, the observed increase in mean cost per hospital stay could not be entirely attributed to inflation: an increase over time was also observed in the *consumer price-indexed costs* (Table 11).

As the five-year period from 2016/17 to 2020/21 includes the onset of the COVID-19 pandemic, linear time trend analysis of the injury rates were not conducted.

Table 11 Five-year trends in injury-related hospital admission incidence and cost; Victoria 2016/17 to 2020/21

	Incidence				Cost			Cost – indexed to 2020/21 ⁸	
	N	(col %)	Rate per 100,000 population (crude)	Rate per 100,000 population (age-standardised)	Total cost* (\$)	(col %)	Mean cost per hospital stay† (\$)	Total cost* (\$)	Mean cost per hospital stay† (\$)
Financial year									
2016/17	123607	18.9	1982.0	1904.3	\$820,166,999	16.7	\$6,635	\$875,080,586	\$7,079
2017/18	130151	20.0	2046.7	1962.4	\$891,555,390	18.2	\$6,850	\$933,244,686	\$7,170
2018/19	134645	20.6	2079.6	1984.6	\$952,594,632	19.4	\$7,075	\$980,974,231	\$7,286
2019/20	129169	19.8	1966.5	1860.8	\$1,024,727,571	20.9	\$7,933	\$1,041,341,183	\$8,062
2020/21	134939	20.7	2051.7	1949.7	\$1,222,609,118	24.9	\$9,060	\$1,222,609,118	\$9,060
Five-year average	130502	-	2025.4	1932.4	\$982,330,742	-	\$7,527	\$1,010,649,961	\$7,731

*Hospital costs capture the incident episode of care as well as statistical separations, transfers and repeat treatments. †For mean cost per hospital stay, the total cost across all admission types is divided by the number of incident episodes.

⁸ CPI indexing was based on the Reserve Bank of Australia Inflation Calculator: <https://www.rba.gov.au/calculator/financialYearDecimal.html> accessed on 14 June 2023.

The hospital admission cost per cause of injury over the five-year period from 2016/17 to 2020/21 is summarised in Figure 23 (top 1-5 most common causes), Figure 24 (causes 6-10), Figure 25 (causes 11-15) and Figure 26 (causes 16-18). The presented costs are non-indexed. Overall, increases in total cost over time is observed for most cause groups: this includes transport, for which a decrease in summed injury admission costs may have been expected at the onset of the Covid-19 pandemic. Notably, steady increases over time were not observed for the four least common injury causes: other specified unintentional; choking/suffocation; drowning/near drowning; and explosions/firearms.

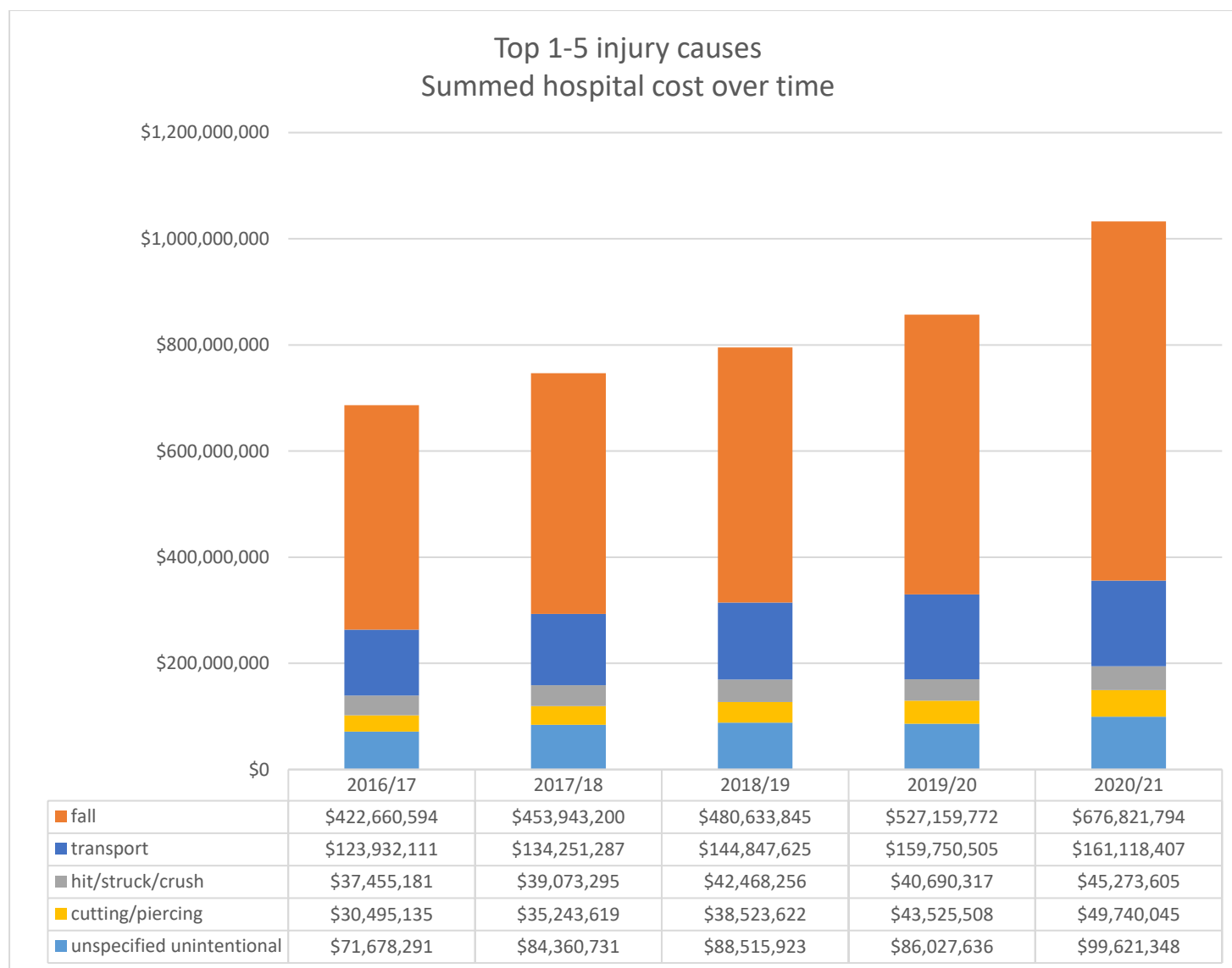


Figure 23 Summed cost of injury-related hospital admissions over five years, for top 1-5 injury causes (AU\$); Victoria 2016/17 to 2020/21

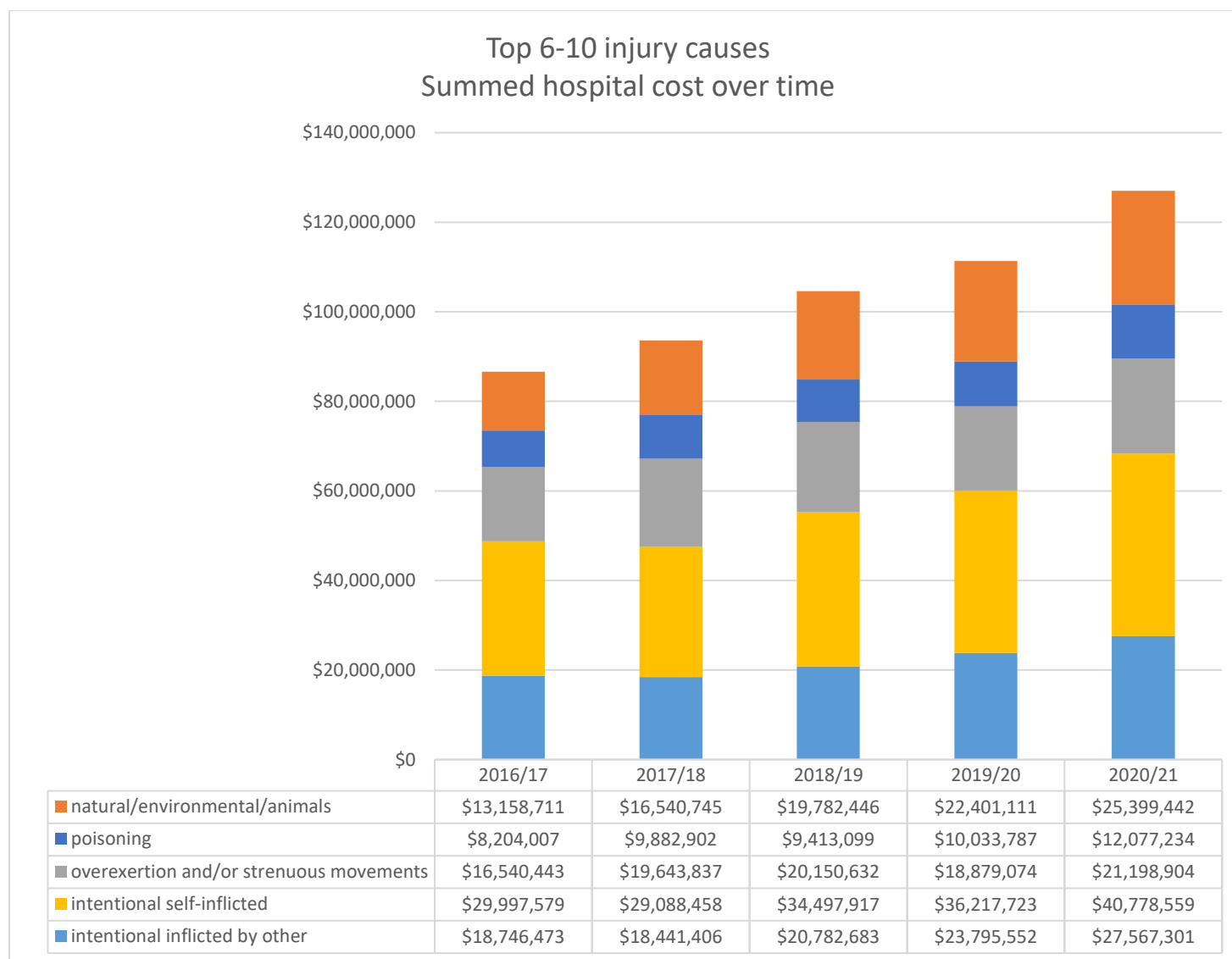


Figure 24 Summed cost of injury-related hospital admissions over five years, for top 6-10 injury causes (AU\$); Victoria 2016/17 to 2020/21

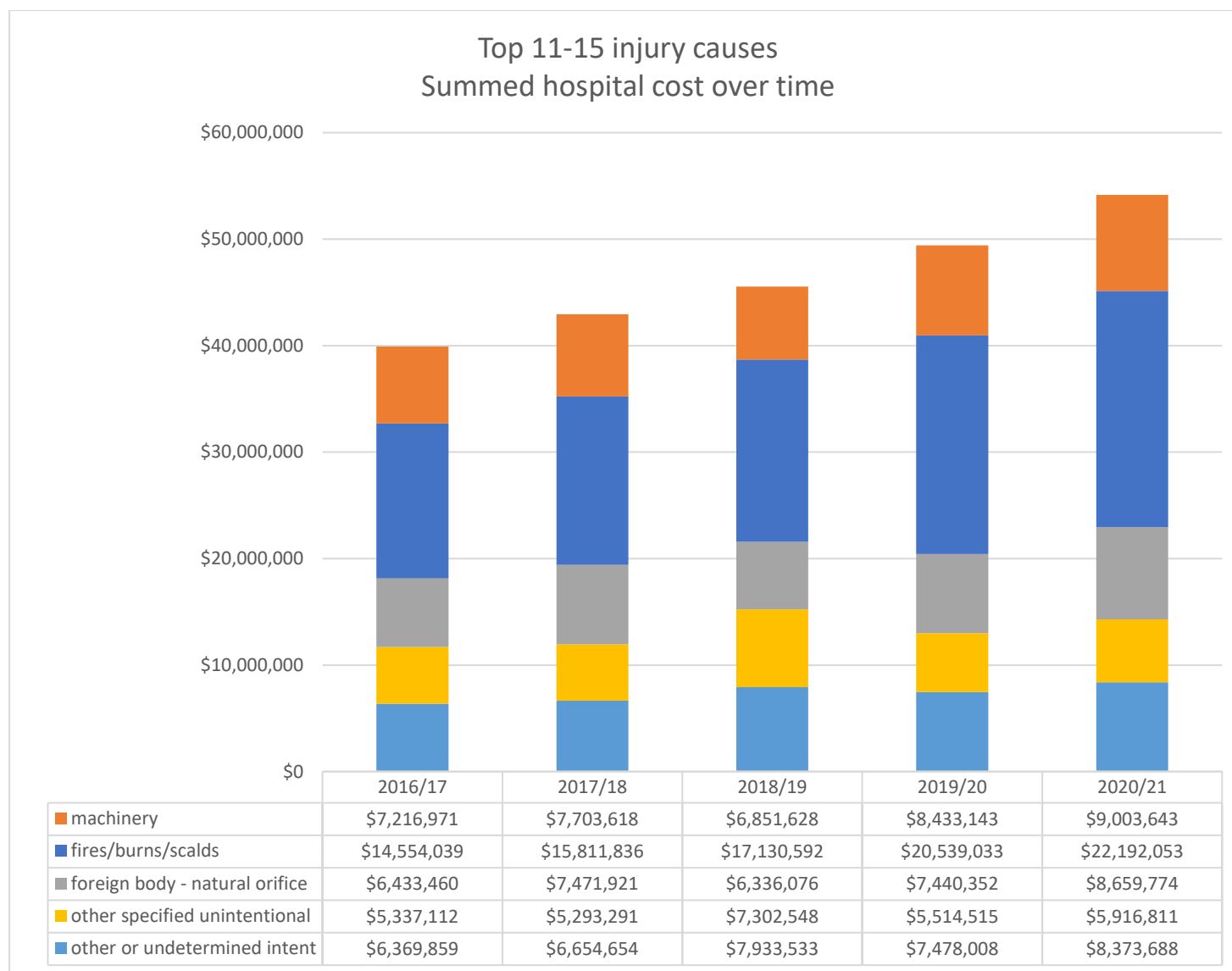


Figure 25 Summed cost of injury-related hospital admissions over five years, for top 11-15 injury causes (AU\$); Victoria 2016/17 to 2020/21

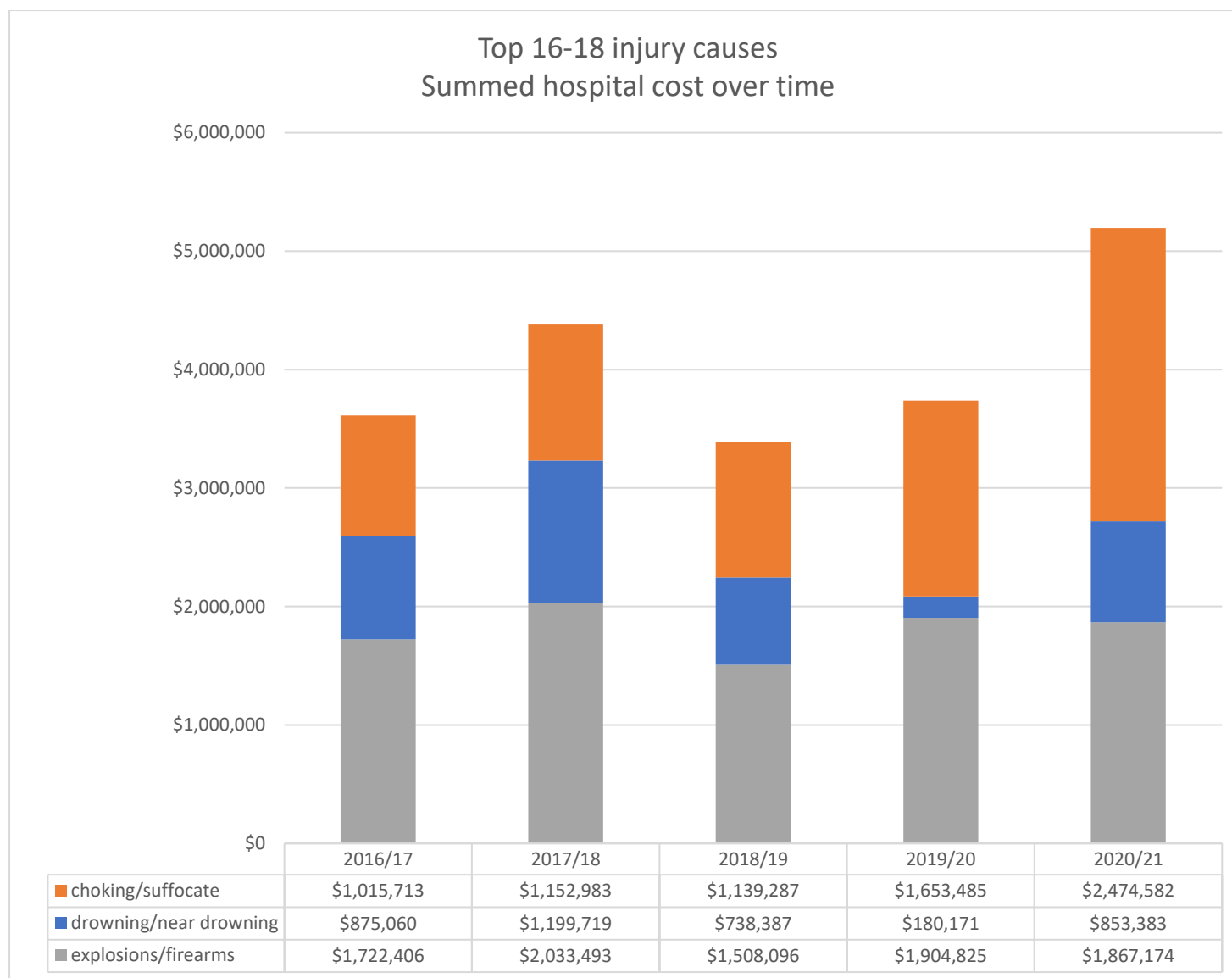


Figure 26 Summed cost of injury-related hospital admissions over five years, for top 16-18 injury causes (AU\$); Victoria 2016/17 to 2020/21

Time trends 2016/17 to 2020/21, Victoria

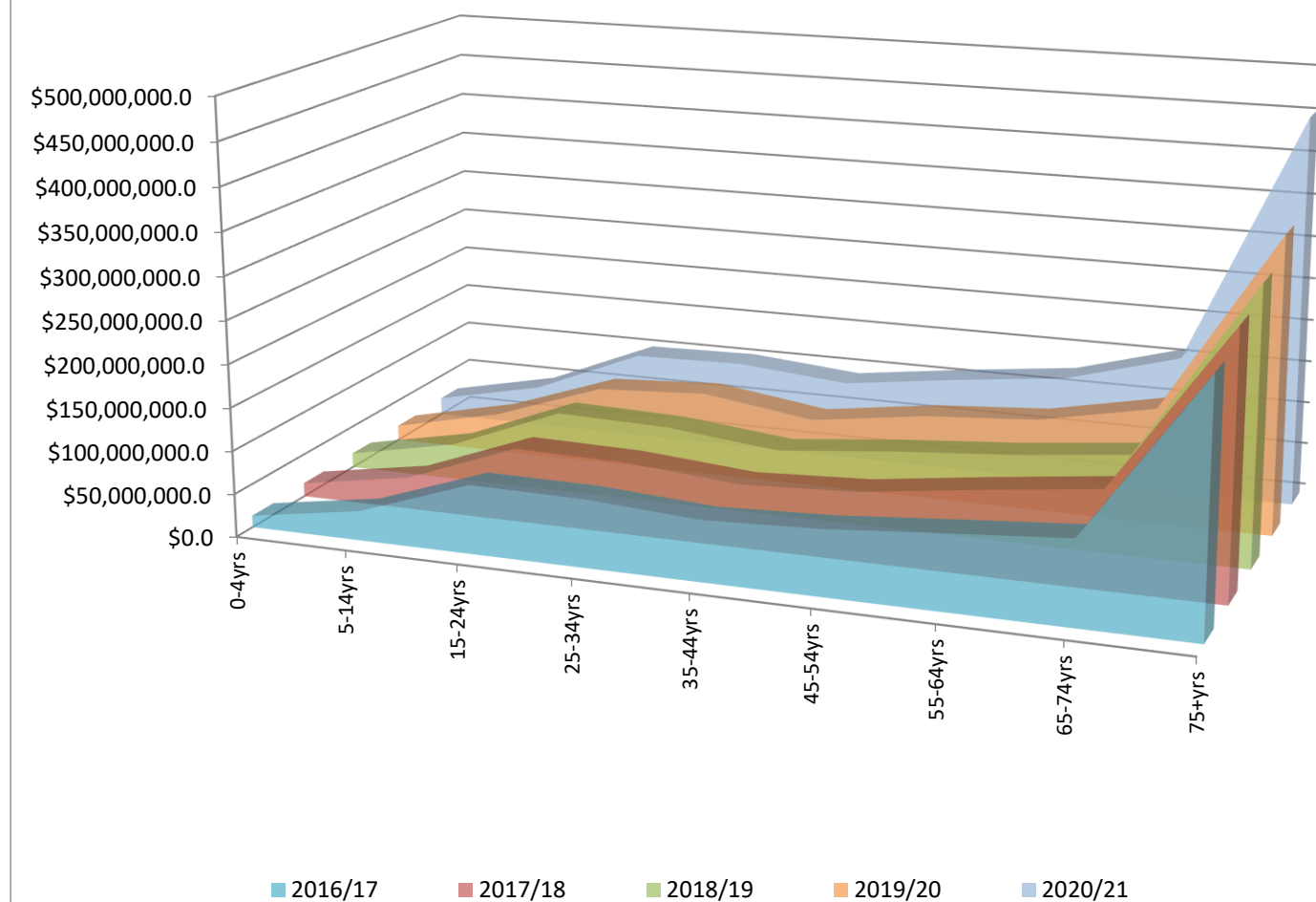


Figure 27 Summed cost of injury-related hospital admissions over time, by age group; Victoria 2016/17 to 2020/21

The distribution of summed costs of hospital admission by financial year across age groups is shown in Figure 27. In each financial year, the pattern across age groups was similar to what was observed for 2020/21: the total cost of hospital admissions increased from child to adult age, and a second, much more pronounced peak was observed in the oldest age group (75+ years).

Although increases over the five-year period were seen in all age groups, the greatest proportional increase from 2016/17 to 2020/21 was observed in the age group 65-74 years, followed by the 75+ years age group. The smallest proportional increases in total injury admission costs were observed in the age groups 15-24 years, 25-34 years and 35-44 years.

More detail is provided on the two most common injury causes: falls and transport. Figure 28 and Figure 29 show the admissions and admission costs (respectively) related to fall injuries, by age group. In each of financial year during the five-year period, falls injuries are most common in the 75+ year age group, accounting for 44-46% of falls admissions. In terms of summed falls admission costs, the age group 75+ years accounted for 57-58% of costs. This pattern was stable over the five-year period.

Admissions and admission costs related to transport injuries by age group in the five-year period from 2016/17 to 2020/21 are shown in Figure 30 and Figure 31. Although the overall number of admissions increased over time, and the associated hospital costs increased more steeply, the proportions attributed to each of the age groups remained relatively stable, both in terms of admission numbers and total costs. The greatest variation was seen in the age group 5-14 years, which accounted for 7.0% of injury admission in 2016/17; this increased to 8.9% in 2019/20 (the year in which the first lockdowns in Victoria occurred) and 10.2% in 2020/21. In terms of admission costs, the proportion that was attributed to the age group 5-14 years increased from 4.7 in 2016/17 to 6.2 in 2020/21. Cost patterns in other age groups were relatively stable over time, except for a proportional decrease in the 75+ year age group which decreased from 9.7% of total injury admission costs in 2016/17 to 8.0% in 2020/21.

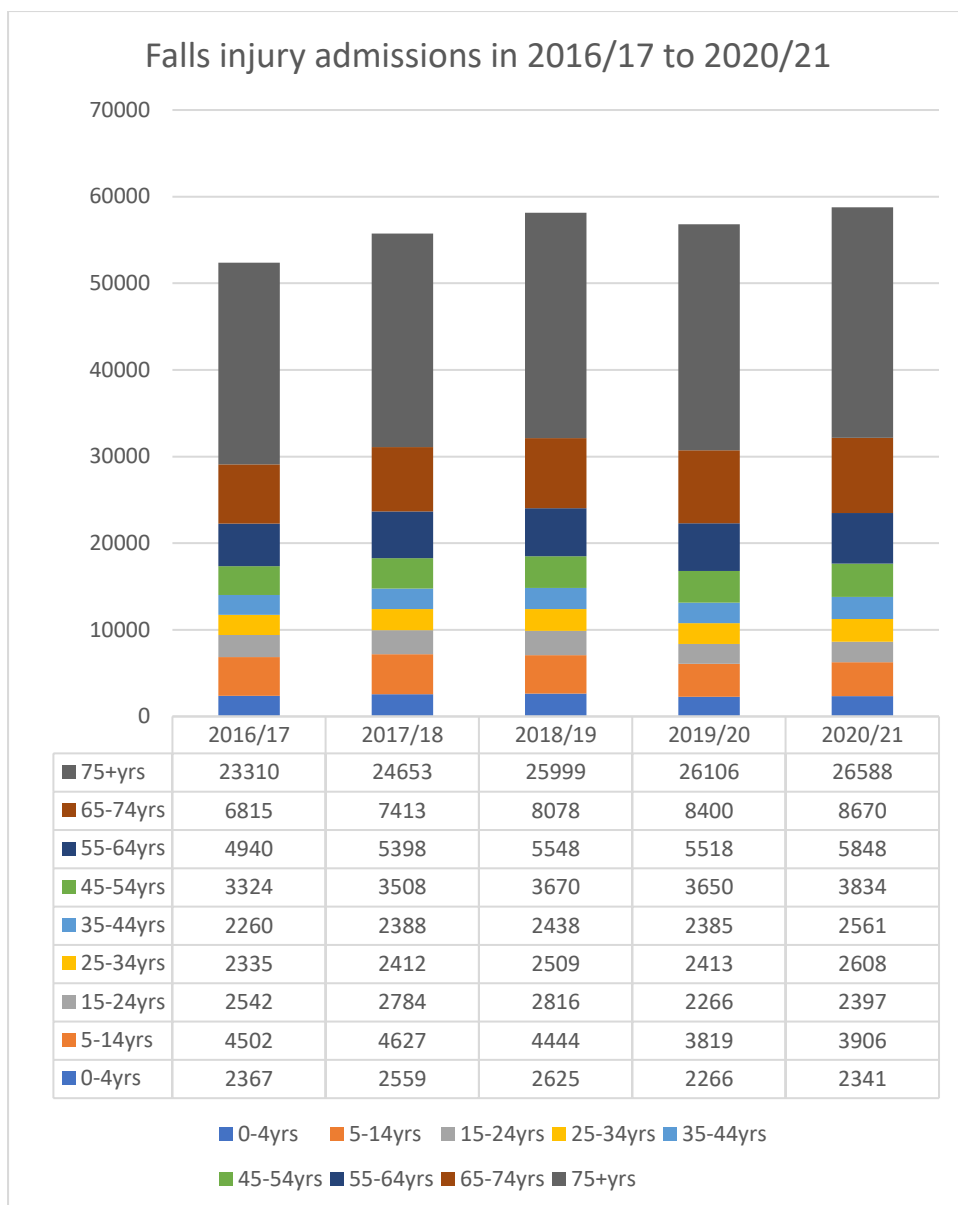


Figure 28 Injury-related hospital admissions over five years, falls injuries only, by age group (frequency); Victoria 2016/17 to 2020/21

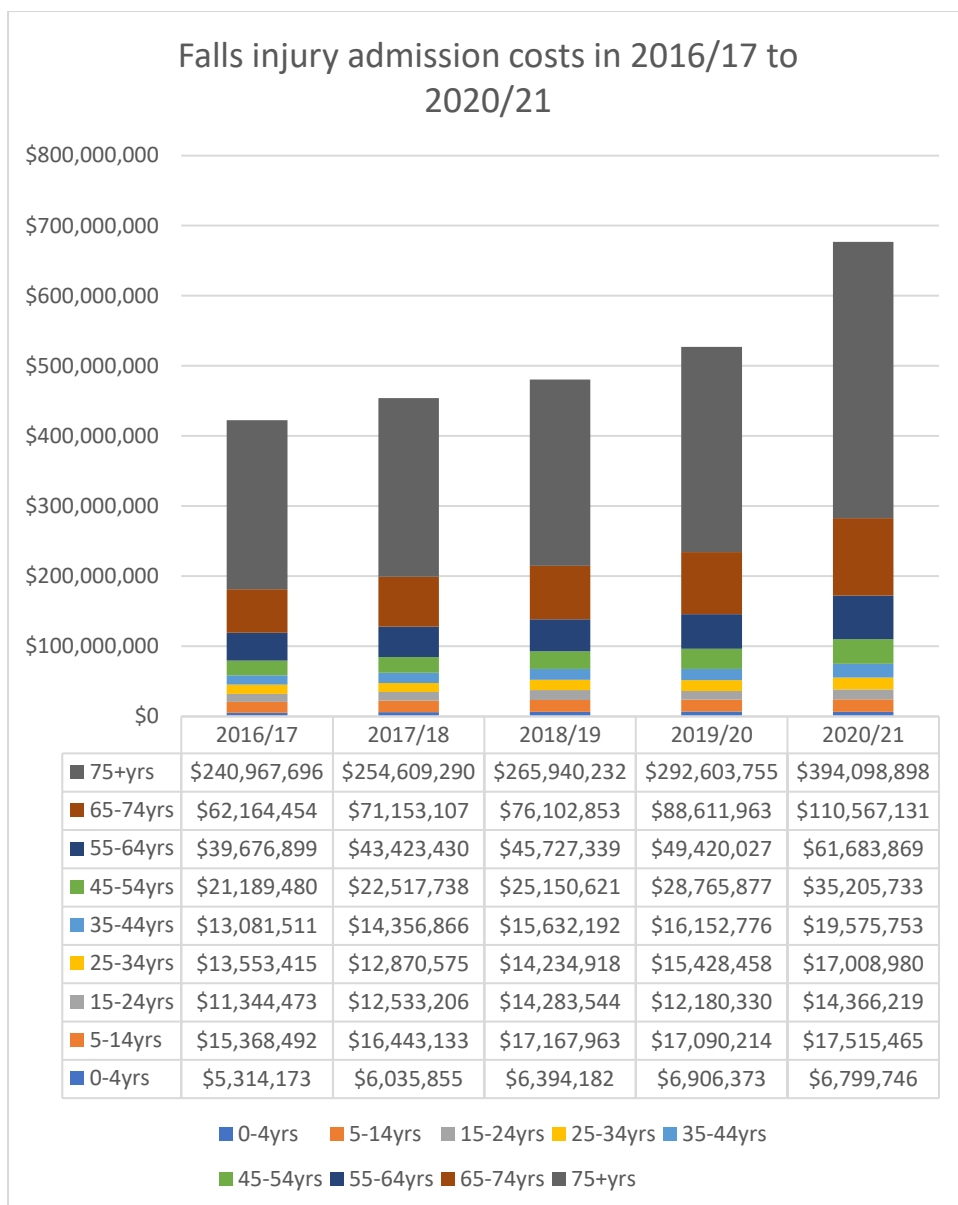


Figure 29 Summed cost of injury-related hospital admissions over five years, falls injuries only, by age group (AU\$); Victoria 2016/17 to 2020/21

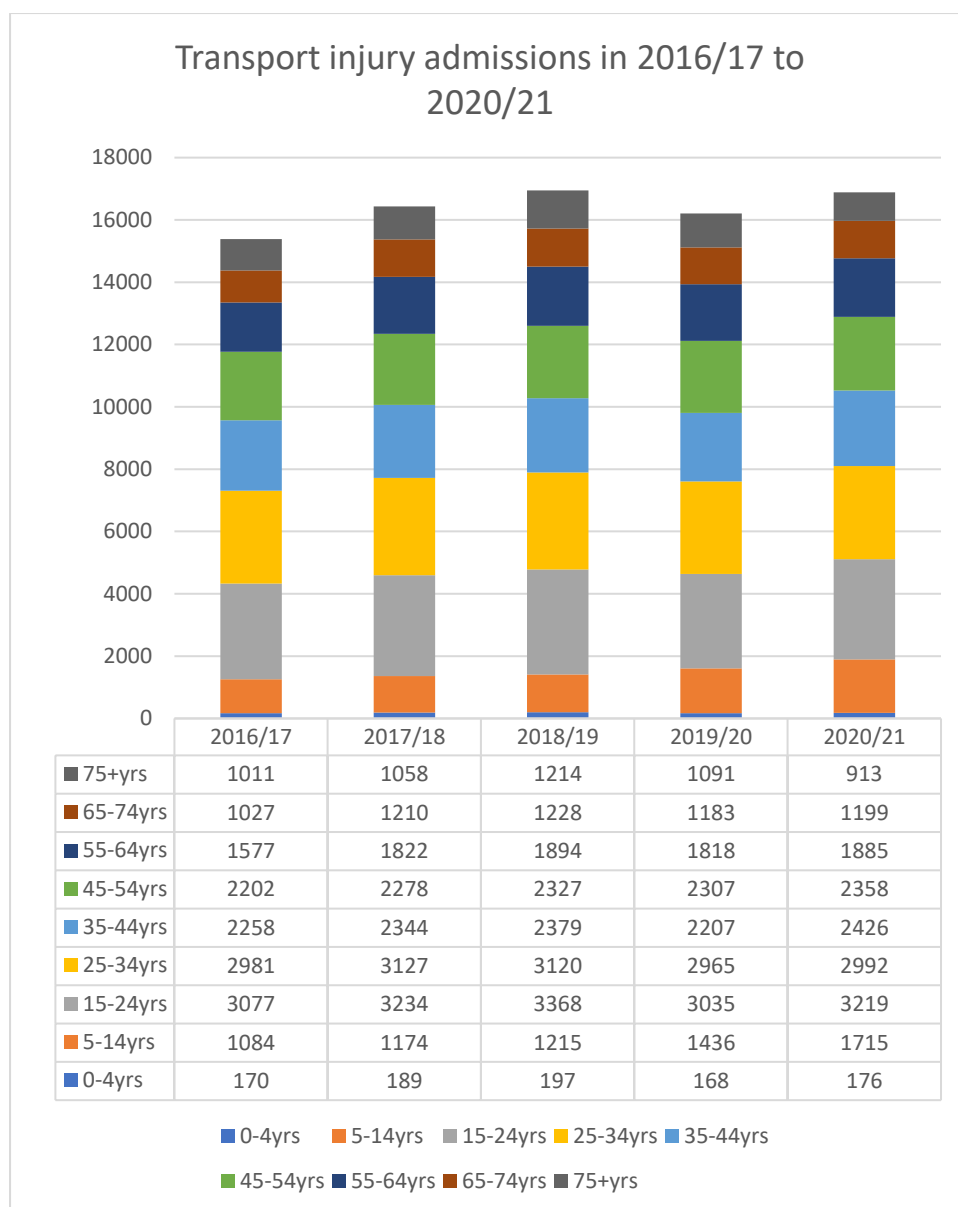


Figure 30 Injury-related hospital admissions over five years, transport injuries only, by age group (frequency); Victoria 2016/17 to 2020/21

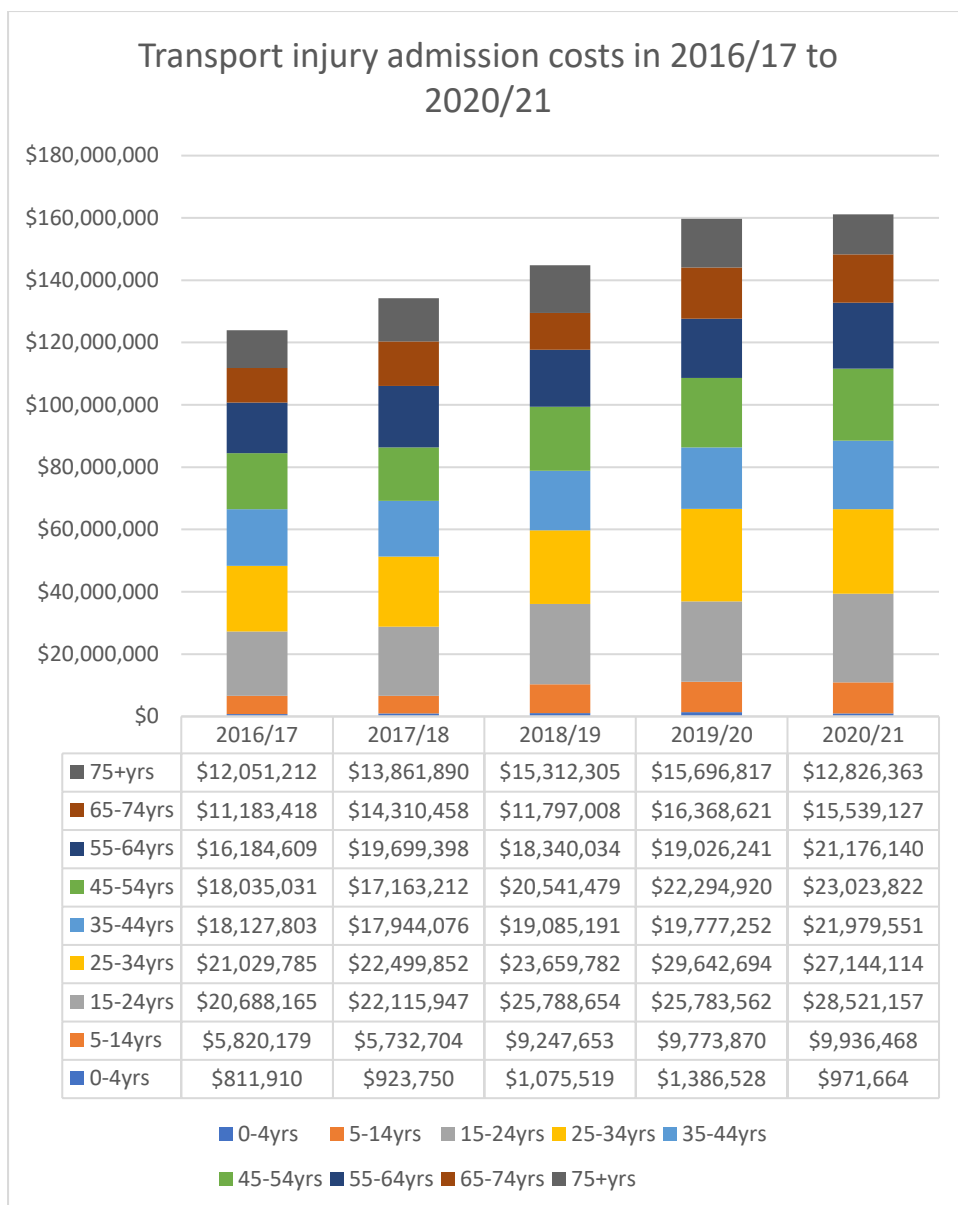


Figure 31 Summed cost of injury-related hospital admissions over five years, transport injuries only, by age group (AU\$); Victoria 2016/17 to 2020/21

Discussion

The cost of hospital-admitted injuries in Victoria is considerable with 134,939 admissions in Victoria in 2020/21 incurring a total cost of \$1.22 billion, across public and private hospitals. Hospital expenditure was dominated by fall-related injuries which accounted for 59% (\$676.8 million) of all admitted injury costs. Of the falls admission costs, 75% (504.7 million) were incurred by people aged 65 years and above. Falls prevention should feature prominently on the public health agenda: even small reductions in falls have the potential to notably reduce health care spending.

Transport injuries were second-ranked in terms of hospital admission costs, noting that transport admission costs were only 24% of falls admission costs in Victoria, 2020/21. Car occupant and motorcycle rider injury costs were the two most common causes however bicycle rider costs were third-ranked, accounting for \$35.2 million (22% of transport admission costs). Pedal cyclist injury rates were not far behind car occupant injury rates (75 and 85 incident admissions per 100,000 population, respectively), but the admission costs per stay were higher for car occupant injuries. This report provides a unique perspective on cycling injuries as most other sources of transport burden estimates do not fully capture cycling injuries, as they are generally limited to police-reported crashes or compensable injuries. Cycling injuries resulting in hospital admission are common and costly and their prevention should be a focus in road safety policy.

Self-harm injury admissions were common with 6202 incident episodes in Victoria in 2020/21, incurring a cost of \$40.8 million. Almost one-quarter (23%) were females aged 15-29 years. The most common means of hospital-admitted self-harm was pharmaceutical poisoning, which accounted for the majority of cases. Pharmaceutical supply and delivery are regulated, and therefore this injury issue is particularly amenable to preventive measures. Self-harm prevention is of particular relevance today, with one in five Australians aged 16-84 years reporting experiencing a mental health disorder in the last 12 months in a 2020/21 survey⁹.

This cost of injury analysis has several limitations. This report is based on VCDC public hospital cost estimates, which were applied to admission data from all public and private hospitals contributing to the VAED. Differences between public and private hospital costs associated with public/private differences in activity profile per AR-DRG (in terms of length of stay and use of hospital resources), are not accounted for. To determine how this may have affected the findings reported in this study would require an in-depth study of patient case-mix differences between public and private hospitals in Victoria, which is beyond the scope of this analysis. It should, however, be noted that the costings presented here are estimates only and their utility lies mainly in the internal comparisons (average costs per injury type, cause, age group) rather than their absolute dollar value.

Another limitation that should be noted is that health care expenditure was only captured in terms of hospital admission spending (which excludes Emergency Department expenditure; general practitioners; outpatient costs and specialist visits; physiotherapist and other allied health spending; outpatient pharmaceutical costs; medical imaging and other diagnostics, to name but a few). Hospital admissions, however, are relatively expensive, accounting for over three-quarters of injury-related health care spending¹⁰, and therefore the presented information is relevant and informative. A second limitation that warrants discussion is the data quality of *place of injury occurrence* and

⁹ <https://www.abs.gov.au/statistics/health/mental-health/national-study-mental-health-and-wellbeing/2020-21>. Viewed 16 June 2023.

¹⁰ Australian Institute of Health and Welfare 2020. Injury expenditure in Australia 2015–16. Cat. no. HWE 78. Canberra: AIHW. Viewed 16 June 2023, <https://www.aihw.gov.au/reports/health-welfare-expenditure/injury-expenditure-in-australia-2015-16>

activity when injured coding. In the injury admissions data, 43.1% of incident admissions did not have a specified place of occurrence code and 69% did not have a specified activity when injured code. Although the remaining coded information can be used, it is uncertain if the findings are representative. This is unfortunate as these variables allow for specification of, for example, working for income; farm injuries; home injuries; sports injuries; residential aged care injuries. In the admission records with specified *activity when injured* coding, sports injuries were most commonly specified, with 13,577 admissions and a cost of \$39.7 million in 2020/21. The sports with the highest admitted injury costs were team ball sports, wheeled non-motored sports, individual athletic activities, wheeled motor sports and equestrian activities, respectively. Given the frequency, cost and incomplete data on hospital-admitted sports injuries, alongside the public health promotion of physical activity and sports involvement for health and wellbeing, more research on sport injury cost and prevention is timely.

In conclusion, this report presents hospital admission costs in 2020/21 in Victoria, as well as trends for the five-year period of 2016/17 to 2020/21, noting that this time period includes the Covid-19 pandemic and associated social restrictions, which may have reduced hospital activity in general. Falls admissions featured prominently in the cost burden, as did injury admissions among older people, with a significant overlap between the two. If guided by hospital cost alone, falls prevention should feature first and foremost on the injury prevention agenda. Cycling injuries were third-ranked in terms of overall transport injury admission costs and merit a prevention focus that may not be apparent when injury rates are derived from police crash reports or compensable injury claims data. Finally, self-harm remains a focus for prevention and the burden associated with pharmaceutical self-poisoning suggests an avenue for prevention.

Online supplement

Data presented in figures 4, 5, 12, 15, 19, 20, 21, 22 & 27 are provided in table format in Excel

Authorship

This is a report by the Victorian Injury Surveillance Unit, authored by Janneke Berecki-Gisolf.

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

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