Intentional self-harm and assault hospitalisations and treatment cost of children in Australia over a 10-year period

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Abstract

Objective: To examine the magnitude, 10-year temporal trends and treatment cost of intentional injury hospitalisations of children aged ≤16 years in Australia.

Method: A retrospective examination of linked hospitalisation and mortality data for children aged ≤16 years during 1 July 2001 to 30 June 2012 with self-harm or assault injuries. Negative binomial regression examined temporal trends.

Results: There were 18,223 self-harm and 13,877 assault hospitalisations, with a treatment cost of $64 million and $60.6 million, respectively. The self-harm hospitalisation rate was 59.8 per 100,000 population (95%CI 58.96-60.71) with no annual decrease. The assault hospitalisation rate was 29.9 per 100,000 population (95%CI 29.39–30.39) with a 4.2% annual decrease (95%CI -6.14– -2.31, p<0.0001). Poisoning was the most common method of self-harm. Other maltreatment syndromes were common for children ≤5 years of age. Assault by bodily force was common for children aged 6-16 years.

Conclusions: Health professionals can play a key role in identifying and preventing the recurrence of intentional injury. Psychosocial care and access to support services are essential for self-harmers. Parental education interventions to reduce assaults of children and training in conflict de-escalation to reduce child peer-assaults are recommended.

Implications for public health: Australia needs a whole-of-government and community approach to prevent intentional injury.

Key words: intentional injury; hospitalisation; cost; self-harm; assault

Intentional injury, whether self-inflicted or as a result of interpersonal violence, is a substantial population health issue.[1,2] Both self-harm and interpersonal violence are leading causes of injury mortality and hospitalised morbidity,[3,4] with a significant economic and societal cost.[1] The impact of intentional injury on individuals, friends, family and the community can be extensive.[5]

Self-harm behaviours can include ingesting medications in excess of the prescribed dose, ingesting illicit or toxic substances, or self-destructive behaviours intending to cause harm.[6,7] Interpersonal violence can include maltreatment and neglect, assault using bodily force or assault using other objects,[1] while violent acts between children often involve physical fighting.[8] Risk factors for both self-harming behaviour and interpersonal violence are multifactorial and can include psychosocial, biological, familial, environmental (including socioeconomic status) and cultural, and can involve alcohol and/or substance use by the injured individual or assailant.[1,9]

While intentional injury is preventable, it needs a multifaceted approach involving collaborative efforts from multiple sectors and stakeholders to be effectively addressed.[1] To identify where preventive resources need to be focused, the magnitude and trend of health service use and health outcomes, including treatment costs, need to be established. There are also various factors that can play a part in survival and treatment cost for children, including experience of comorbid health conditions[10] and severity of the injury sustained.[11] In Australia, there has been no comprehensive examination of hospitalised intentional injury among children that has estimated hospital costs or considered health outcomes post-discharge for different age profiles. The aim is to examine the magnitude, 10-year temporal trends and treatment cost of intentional injury hospitalisations of children aged ≤16 years in Australia.

Method

A retrospective analysis was conducted of hospitalised injuries of children aged ≤16 years using linked hospitalisation and mortality records during 1 July 2002 to 30 June 2012. Ethics approval was obtained from eight health ethics committees in each state and territory and the Australian Institute of Health and Welfare (AIHW).

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Linked hospitalisation and mortality data sources

Information on hospitalisations within each Australian state and territory is provided for inclusion within a National Hospital Morbidity Database. Information for this study was obtained from the National Hospital Morbidity Database and state and territory hospital data collections. These include information on all patient admissions from public and private hospitals in Australia. Data were only available from 1 July 2004 in the Australian Capital Territory (ACT). Within the hospital data, diagnoses and external cause codes were classified using the International Classification of Diseases, 10th Revision, Australian Modification (ICD-10-AM).[12] Injury-related admissions were identified using a principal diagnosis classification of injury (ICD-10-AM: S00-T78) and self-harm (ICD-10-AM: X60-X84) and assault (ICD-10-AM: X85-Y09) were identified using external cause classifications, including information on the assailant. There were 55 hospitalisations indicated to be self-harm of children aged ≤5 years and there were 4,217 injury hospitalisations of undetermined intent (ICD-10-AM: Y10-Y34) that were not considered further.

The National Death Index mortality data was probabilistically linked to the hospital records by the AIHW to identify mortality post-discharge, excluding Western Australia and Tasmania. The Western Australian Data Linkage Branch linked Western Australian hospital and mortality records and Tasmanian hospital records were linked using a unique patient identifier, with mortality post-discharge recorded within the hospital data. In Victoria, 20.4% (n=41,482) of the injury hospitalisation records were not able to be linked by the AIHW as they did not include patient names. A review of these unlinked records did not identify any consistent bias by financial year or hospital.

Identification of chronic health conditions

A number of pertinent chronic health conditions for children were identified.[10,13] A chronic condition was considered to be a condition that would reasonably be expected to last 12 months, that resulted in limitations for self-care, independent living or social interactions, and/or resulted in the need for ongoing health care using medical services or specialist equipment.[14] Chronic health conditions were categorised as none, one or ≥2 conditions.

Injury severity

The International Classification of Disease Injury Severity Score (ICISS) was used to estimate injury severity by applying survival risk ratios (SRRs) to each injury diagnosis.[15] The ICISS is derived by multiplying the probability of survival for each injury diagnosis using SRRs calculated for each injury diagnosis.[15] Minor (>0.99), moderate (0.941-0.99) and serious (<0.941) injuries were identified.[16]

Geographic location and socioeconomic status identification

The Australian Statistical Geographical Standard identified residential location, with remoteness based on distance to service centres.[17] The five remoteness categories were categorised as: urban (i.e. major cities) and rural (i.e. inner regional, outer regional, remote, and very remote). A measure of socioeconomic status was assigned to each hospitalisation using the index of relative socioeconomic disadvantage[18] and residential postcode. Socioeconomic disadvantage was partitioned into quintiles from most (i.e. 1) to least disadvantaged (i.e. 5).

Hospital treatment costs

The Australian Refined-Diagnosis Related Groups (AR-DRGs), episode of care length of stay (LOS) and episode of care type (e.g. acute, non-acute) were used to estimate hospital treatment costs. Using estimates of hospital costs,[19] the average daily cost per AR-DRG was multiplied by the episode of care LOS up to 120 days, then a flat rate of $200 per day was applied thereafter, excluding long hospital stays for 19 select AR-DRGs.[20] No treatment costs were able to be calculated for two years of hospitalisations in the ACT and in Tasmania (i.e. 2002-03 and 2003-04) as no AR-DRGs were available.

Data management and analysis

All analyses were performed using SAS version 9.4. All hospital episodes of care related to the one injury were linked to form a period of care (i.e. all episodes of care related to an injury until discharge from the health system). Descriptive statistics were conducted, including chi-square tests of independence. Denominator data for the number of children aged ≤16 years were obtained from the Australian Bureau of Statistics population estimates for each state and territory. Age-standardised incidence rates were calculated using PROC STDRATE using the estimated Australian residential population at 30 June 2001 as the standard population. All incidence rate calculations excluded the ACT. Negative binomial regression was used to examine change in temporal trends in the incidence of injury hospitalisation by age group. The calculation of hospital LOS included transfers between hospitals and hospital LOS was truncated to three standard deviations (SD) in order to exclude extreme outliers.[21] Hospital readmission was considered as readmission within 28 days of hospital discharge for any cause, excluding deaths. Thirty-day mortality was calculated from the date of admission of the index injury hospitalisation.

Results

During the 10-year period, there were 32,100 intentional injury hospitalisations of children (i.e. 18,223 (56.8%) self-harm and 13,877 (43.2%) assault). The estimated hospital treatment cost for self-harm and assault was $64 million and $60.6 million, respectively. Self-harm had a mean cost per injured person of $3,527 (median $1,262) and the mean cost of assault per person of $4,422 (median $1,266).

Self-harm

There were 124 (0.7%) children aged 6-10 years and 18,099 (99.3%) aged 11-16 years who were hospitalised following self-harm. Of those aged 6-10 years, the majority were male (75.6%) while for those aged 11-16 years the majority were female (82.0%). The self-harm age-standardised hospitalisation rate was 59.8 per 100,000 population (95%CI 58.96-60.71) and there was no change in trend over time (p=0.9). The aged-standardised rate for males was 21.4 per 100,000 population (95%CI 20.65-22.11) and this rate significantly increased annually (2.5%; 95%CI 0.36-4.78, p=0.02). Females had a higher aged-standardised rate than males at 100.4 per 100,000 population (95%CI 98.76-102.00), but the rate did not change over time (p=0.3) (Figure 1). Females aged 11-16 years had the highest hospitalisation rate at 184.4 per 100,000 population (95%CI 181.42-187.38).

Children aged 11-16 (50.3%) who self-harmed had a slightly higher proportion of chronic health conditions than those

aged 6-10 years (43.5%), but this was not significant (χ^2=5.70, df=2, p<0.06). There was a higher proportion of children who were hospitalised following self-harm from urban (71.8%) compared to rural (27.5%) areas, and a higher proportion of children from areas of socioeconomic disadvantage hospitalised following self-harm (χ^2=17.4, df=4, p<0.002). Poisoning was the most common method of self-harm, with poisoning using 'non-opioid analgesics, antipyretics and antirheumatics' the most common mechanism for children aged 11-16 years (41.8%). The highest overall hospital treatment costs were for poisoning by 'non-opioid analgesics, antipyretics and antirheumatics' ($25.0 million), by 'anti-epileptic, sedative, hypnotic, anti-parkinsonism and psychotropic drugs' ($16.3 million), by other poisoning ($8.4 million) and sharp objects ($7.1 million).

More than half the self-harm incidents occurred in the home for children aged 6-10 (59.7%) and 11-16 (54.8%) years. Just less than two-thirds of the injuries sustained were minor for children aged 11-16 years compared to just less than half for children ≤10 years. Twenty-per cent of injuries of children aged 6-10 years were classified as serious compared to 3.5% for those aged 11-16 years (Table 1). The mean hospital LOS for self-harm was 2.1 days (SD=2.7). There were 1,520 (8.3%) hospital readmissions within 28 days during the study timeframe, with injury (83.8%) the most common principal readmission diagnosis (including 788 (51.8%) poisoning) and self-harm (73.5%) the most common injury mechanism for readmissions. There were 66 (0.4%) deaths within 30 days of the index admission and 50 (75.8%) deaths had an underlying cause of self-harm.

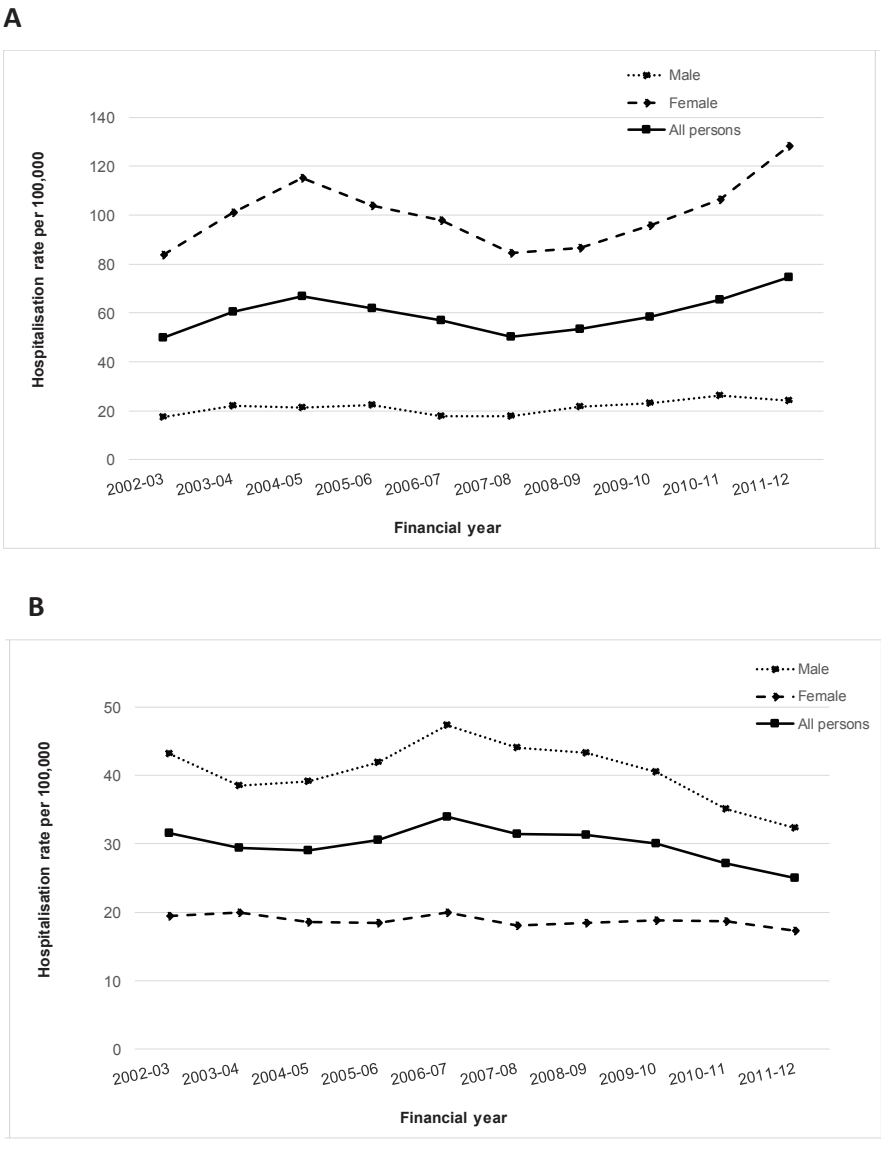
Assault

Three-quarters of children who were hospitalised following an assault were aged 11-16 years. There was a higher proportion of males aged 6-10 (63.7%) and 11-16 (74.2%) years assaulted than females in the same age groups. The age-standardised hospitalisation rate for assault was 29.9 per 100,000 population (95%CI 29.39-30.39) and there was a significant annual decrease of 4.2% (95%CI -6.14– -2.31, p<0.0001). The aged-standardised rate for males was 40.5 per 100,000 population (95%CI 39.66–41.29) and the rate was significantly decreasing annually by 4.1% (95%CI -5.85– -2.32, p<0.0001). The aged-standardised rate for females was 18.7 per 100,000 population (95%CI 18.17–19.31) and it was also significantly decreasing at 2.9% per year (95%CI -4.74– -1.12, p=0.002) (Figure 1). Children aged 11-16 years were the only age group that did not have a decreasing hospitalisation rate over the period (p=0.4).

Two-thirds of children aged 11-16 years who were assaulted and hospitalised resided in urban areas. At least twice the proportion of assault hospitalisations were of children from areas of socioeconomic disadvantage. Where the place of occurrence was specified, the home was a common location of the assault for all ages, and schools and administrative areas were also common assault locations for those aged 6-16 years. The weekend had a higher proportion of assault hospitalisations of children aged 11-16 years. Children aged <1 year (31.1%) had the highest proportion of serious injuries of all ages (Table 2).

'Other maltreatment syndromes' were the most common form of assault for children ≤5 years, with the assailant most commonly a parent. Assault by bodily force was the most common type of assault for those aged 6-16 years. Assailants were most commonly either parents, other family members or an acquaintance/friend for children aged 6-10 years, with children aged 11-16 years most commonly assaulted by an acquaintance/friend or an other/unknown person (Table 3). The highest hospital treatment costs were for assault by bodily force ($22.2 million), other maltreatment syndromes ($16.3 million), assault by sharp object ($6.1 million), assault

Figure 1: Hospitalised injury rates for self-harm for children aged 6-16 years (A) and assault for children aged ≤16 years (B) by year, linked hospitalisation and mortality data, Australia, 1 July 2002 to 30 June 2012.[a]



Note:
a: Incidence rate excludes Australian Capital Territory.

by blunt object ($5.3 million), and neglect and abandonment ($1.9 million). The mean hospital LOS for children who were assaulted was 1.9 days (SD=2.5) and this varied by age group with mean hospital LOS for <1 year olds 4.0 days (SD=4.6) and for 1-5 year olds 2.6 days (SD=3.2). There were 654 (4.7%) hospital readmissions during the study timeframe, with head injury (48.5%) the most common principal readmission diagnosis. There were 32 (0.2%) deaths within 30 days of the index admission and these were predominately of children aged 11-16 years (n=16; 0.2%) and children <1 year (n=11; 0.9%). In 27 deaths (84.4%) the underlying cause of death was due to injuries.

Table 1: Characteristics of self-harm injury hospitalisation by age group, linked hospitalisation and mortality data, Australia, 1 July 2002 to 30 June 2012

	6-10 years (n=124)		11-16 years (n=18,099)		Total (n=18,223)	
	n	%	n	%	n	%
Gender						
Male	90	75.6	3,262	18.0	3,352	18.4
Female	34	27.4	14,837	82.0	14,871	81.6
Number of chronic health conditions						
No conditions	70	56.5	9,003	49.7	9,073	49.8
1 condition	33	26.6	6,714	37.1	6,747	37.0
≥2 conditions	21	16.9	2,382	13.2	2,403	13.2
Location of residence[a]						
Urban	65	52.4	12,998	71.8	13,063	71.7
Rural	55	44.4	4,984	27.5	5,039	27.7
Socioeconomic disadvantage						
1 Most disadvantaged	39	31.5	3,647	20.2	3,686	20.2
2	30	24.2	4,025	22.2	4,055	22.3
3	24	19.4	3,697	20.4	3,721	20.4
4	16	12.9	3,150	17.4	3,166	17.4
5 Least disadvantaged	10	8.1	3,359	18.6	3,369	18.5
Not known	5	4.0	221	1.2	226	1.2
Injury mechanism						
Poisoning	74	59.7	14,891	82.3	14,965	82.1
Poisoning by non-opioid analgesics, antipyretics and antirheumatics	8	6.5	7,558	41.8	7,566	41.5
Poisoning by anti-epileptic, sedative, hypnotic, anti-parkinsonism, and psychotropic drugs not elsewhere classified	33	26.6	4,810	26.6	4,843	26.6
Other poisoning	33	26.6	2,523	13.9	2,556	14.0
Hanging, strangulation, suffocation	26	21.0	493	2.7	519	2.8
Drowning and submersion	0	-	10	0.06	10	0.1
Smoke, fire and flames	0	-	30	0.2	30	0.2
Steam, hot vapours, hot objects	0	-	7	0.04	7	0.0
Sharp object	10	8.1	2,371	13.1	2,381	13.1
Blunt object	#	#	#	#	30	0.2
Jumping from high place	#	#	#	#	48	0.3
Jumping or lying before a moving object	0	-	25	0.1	25	0.1
Crashing of motor vehicle	0	-	6	0.03	6	0.0
Other and unspecified means[b]	10	8.1	192	1.1	202	1.1
Place of occurrence[c]						
Home	74	59.7	9,925	54.8	9,999	54.9
Residential institution					318	1.7
School, other institution and public administrative area	10	8.1	1,034	5.7	1,044	5.7
Sports and athletics area	#	#	#	#	14	0.1
Street and highway	#	#	#	#	120	0.7
Trade and service area	#	#	#	#	151	0.8
Other and unspecified place	33	26.6	6,544	36.2	6,577	36.1
Injury severity						
Minor (ICISS >0.99)	59	47.6	11,224	62.0	11,283	61.9
Moderate (ICISS between 0.942-0.99)	40	32.3	6,244	34.5	6,284	34.5
Serious (ICISS <0.942)	25	20.2	631	3.5	656	3.6

Notes:
a: Location of residents was not known for 121 people
b: There were <5 incidents involving a firearm
c: # refers to cell sizes <5 or to disguise cell sizes <5

Discussion

Intentional injury often affects the most vulnerable groups in society, and is increasingly becoming a major public health issue among children.[9,22] In Australia, the hospitalisation rate following self-harm was found to be increasing in males and was already high for females. Rates of self-harm have also been increasing among children in other high-income countries.[9,23,24] A multi-country survey of children aged 14-17 years found that 8.9% of females and 2.6% of males reported an episode of self-harm in the past year.[25] The current study found that the highest proportion of self-harm was among children aged 11-16 years, particularly females. Hospitalisation following self-harm tends to be higher for females, compared to males, with a female-male ratio of at least 5:1.[9]

Children were most commonly hospitalised for overdosing on medications and for self-cutting, which has been found elsewhere.[6,23,26] The highest proportion of medication overdoses in the current study was due to over-the-counter non-opioid analgesics. In the United States (US), the ingestion of medications, such as antidepressants and opiates, were identified as a common mechanism of self-harm resulting in hospitalisation.[27] In an attempt to prevent the rise of codeine-related overdose deaths in Australia, purchases of the opioid painkiller codeine will no longer be able to be made without a prescription from February 2018.[28] However, non-opioid pharmaceuticals remain a common means of self-harm among children.

Common factors associated with self-harm among children are exposure to self-harm by friends or family members, psychosocial issues, substance abuse, and self-blaming coping strategies,[6,22,23,29] along with experience of mental health conditions, such as depression.[22,23] These self-harm hospitalisations represent just the tip of the iceberg in terms of the full burden of self-harm behaviour as many children who self-harm do not seek treatment from hospital services.[7] In Australia, only 10.3% of children who reported self-harming stated

that they attended a hospital for treatment,[6] which may be due to the high proportion of self-cutting where medical treatment is not often sought.[6,7] In addition, the majority of children who reported self-harming stated that they did not seek assistance for the problems they were having prior to the self-harm attempt and those that did seek assistance did so primarily from friends (81.0%) and family members (13.3%), rather than medical services.[6] This suggests a need to increase awareness among parents, health professionals and those who work with children, such as teachers, to address potential risk factors associated with self-harm. Children who are identified as at risk of self-harm should also be encouraged to seek professional assistance, as therapeutic interventions such as cognitive behaviour-based therapy have been shown to be effective in reducing self-harm among children.[30]

The current study found that assault injury hospitalisations were decreasing over the 10-year period. Similarly, assault hospitalisation rates of children in the US during 2002 to 2012 decreased by almost half.[31] Unfortunately, the decline in assault rates in Australia only represents children that required hospitalisation. Children who were the subject of care and protection orders continue to rise in Australia, with children ≤1 year the most adversely affected.[32]

A higher proportion of males were hospitalised following an assault from age 6-16 years than females. For males aged 11-16 years, the assailant was commonly an acquaintance or other individual. Males are more likely to engage in higher levels of physical conflict than females.[33] Providing training in interpersonal and social skills[33] and methods to try to de-escalate and disengage from conflict[34] would be beneficial for males, such as the PATHS – promoting alternative thinking strategies – program in the United Kingdom (UK).[35] Around one-third of children of all ages who were hospitalised after sustaining an injury from an assault were from the most socioeconomic disadvantaged areas in Australia. Likewise, assault hospitalisation rates of those aged ≤14 years in England were highest in the poorest deprivation quintiles.[36] For children aged ≤10 years, the home was the most common location of the assault and the most common assailant was a parent. In the UK, an examination of orofacial injuries among children aged ≤15 years following an assault also found that the most common assailant was a parent with the assault frequently occurring in the child's home.[37] Thus, the importance of providing parental education interventions and support for parents who are struggling cannot be overlooked, such as knowledge and skills training programs like the Triple P positive parenting program which has demonstrated success in improving parenting styles.[38]

Table 2: Characteristics of assault injury hospitalisation by age group, linked hospitalisation and mortality data, Australia, 1 July 2002 to 30 June 2012.

	<1 year (n=1,278)		1-5 years (n=1,380)		6-10 years (n=903)		11-16 years (n=10,316)	
	n	%	n	%	n	%	n	%
Gender[a]								
Male	700	54.8	722	52.3	575	63.7	7,652	74.2
Female	578	45.2	658	47.7	328	36.3	2,663	25.8
Number of chronic health conditions								
No conditions	1,174	91.9	1,297	94.0	857	94.9	9,922	96.2
1 condition	94	7.4	67	4.9	31	3.4	312	3.0
≥2 conditions	10	0.8	16	1.2	15	1.7	82	0.8
Location of residence[b]								
Urban	702	54.9	721	52.3	515	57.0	6,822	66.1
Rural	525	41.1	627	45.4	366	40.5	3,351	32.5
Socioeconomic disadvantage								
1 Most disadvantaged	455	35.6	561	40.7	291	32.2	3,092	30.0
2	286	22.4	295	21.4	218	24.1	2,208	21.4
3	254	19.9	241	17.5	169	18.7	1,979	19.2
4	144	11.3	136	9.9	106	11.7	1,550	15.0
5 Least disadvantaged	80	6.3	91	6.6	91	10.1	1,273	12.3
Not known	59	4.6	56	4.1	28	3.1	214	2.1
Nature of injury								
Fracture	226	17.7	131	9.5	141	15.6	3,516	34.1
Superficial injuries	203	15.9	403	29.2	177	19.6	1,291	12.5
Open wound	34	2.7	116	8.4	117	13.0	1,697	16.5
Injury to internal organs	196	15.3	87	6.3	65	7.2	1,361	13.2
Injury of eye and orbit	11	0.9	17	1.2	21	2.3	156	1.5
Burns	12	0.9	24	1.7	21	2.3	64	0.6
Other and unspecified nature	596	46.6	602	43.6	361	40.0	2,231	21.6
Place of occurrence[c]								
Home	663	51.9	673	48.8	327	36.2	1,319	12.8
Residential institution	#	–	8	0.6	0	–	59	0.6
School, other institution and public administrative area	27	2.1	41	3.0	189	20.9	1,365	13.2
Sports and athletics area	#	–	5	0.4	14	1.6	212	2.1
Street and highway	22	1.7	17	1.2	19	2.1	738	7.2
Trade and service area	10	0.8	15	1.1	9	1.0	549	5.3
Other and unspecified place	554	43.3	621	45.0	345	38.2	6,074	58.9
Day of week								
Sunday	141	11.0	182	13.2	113	12.5	1,622	15.7
Monday	169	13.2	205	14.9	136	15.1	1,275	12.4
Tuesday	185	14.5	209	15.1	152	16.8	1,256	12.2
Wednesday	218	17.1	194	14.1	135	15.0	1,350	13.1
Thursday	203	15.9	214	15.5	139	15.4	1,421	13.8
Friday	198	15.5	177	12.8	130	14.4	1,576	15.3
Saturday	164	12.8	199	14.4	98	10.9	1,816	17.6
Injury severity								
Minor (ICISS <0.99)	285	22.3	376	27.3	344	38.1	3,099	30.0
Moderate (ICISS between 0.942-0.99)	596	46.6	708	51.3	459	50.8	5,837	56.6
Serious (ICISS <0.942)	397	31.1	296	21.5	100	11.1	1,380	13.4

Notes:
a: Gender missing for one person
b: Location of residents was not known for 248 people
c: # refers to cell sizes <5 or to disguise cell sizes <5

Common factors predictive of an injury from interpersonal violence include being a previous victim of abuse, witnessing violence, involvement in physical fighting, poor behaviour control, poor psychological health, low socioeconomic status and familial violence.[8,33] Violence between peers is also influenced by living in a violent neighbourhood, poor academic achievement and having delinquent peers or siblings.[33] The implications of being a recipient of intentional injury are increasingly associated with a higher risk of poor long-term health outcomes.[5] The reporting of self-harm by females has been found to be strongly associated with self-harm as an adult.[39] In a Danish study, Webb and colleagues[40] identified that for males who were hospitalised following an assault before age 15, one-fifth went on to commit a violent crime by age 25 with one-quarter committing a violent crime by age 35. For females who were hospitalised following self-harm, one-fifth had been re-hospitalised for self-harm by age 25.[40] Therefore, the short- and long-term consequences and health outcomes from self-harm and assault injuries require critical preventive actions in order to help reduce the long-term associated harm.

This research had several limitations. There was no information available on the time that the incident occurred and information was not available from all states and territories to indicate if the hospital readmission was a planned follow-up or an emergency admission. There was an under-enumeration of total injury hospitalisations as there was no information on injury hospitalisations in the ACT prior to 1 July 2004 and up to 3,975 injury hospitalisations each year in Victoria were not able to be linked. For self-harm injuries, it is possible that some children may not be able to confirm their intent due to the ambiguity of their motive or the nature of their injury. An uncertain motive on behalf of the child would affect the certainty of estimates of intended self-harm.[41] Only health conditions relevant to the hospitalisation are recorded, so it is possible that the number of health conditions experienced are also under-enumerated. Only hospital treatment costs were considered, so will underestimate personal (e.g. lost parental earnings), societal and non-hospital treatment costs.

Hospitalisation data provide one piece of the burden of intentional injury among children in Australia, with many children also presenting to emergency departments, primary care/general practitioners or to other health professionals.[24,26] This study suggests that Australia needs a whole-of-government and community approach to tackle intentional injury of children. Evidence suggests that therapeutic interventions should be prioritised for children who self-harm,[24,30] along with support from families and caregivers.[24] Parental education interventions[38] and training of children in interpersonal skills and de-escalation from conflict[33,34] are likely to reduce assault-related hospitalisations of children.

Table 3: Type of assault injury hospitalisation and assailant by age group, linked hospitalisation and mortality data, Australia, 1 July 2002 to 30 June 2012.

	<1 year (n=1,278)		1-5 years (n=1,380)		6-10 years (n=903)		11-16 years (n=10,316)	
	n	%	n	%	n	%	n	%
Injury mechanism								
Assault by drugs, medicaments, chemical or noxious substances	5	0.4	22	1.6	24	2.7	65	0.6
Assault by hanging, strangulation and suffocation	5	0.4	5	0.4	#	#	27	0.3
Assault by firearm	#	#	0	-	#	#	24	0.2
Assault by explosive material	0	-	0	-	0	-	11	0.1
Assault by smoke, fire, flames, steam, hot vapours or hot objects	8	0.6	16	1.2	20	2.2	51	0.5
Assault by sharp object	9	0.7	37	2.7	57	6.3	985	9.5
Assault by blunt object	21	1.6	71	5.1	117	13.0	1,068	10.4
Assault by bodily force	140	11.0	231	16.7	378	41.9	6,773	65.7
Sexual assault by bodily force	#	#	98	7.1	51	5.6	178	1.7
Neglect and abandonment	228	17.8	188	13.6	50	5.5	32	0.3
Other maltreatment syndromes	773	60.5	612	44.3	153	16.9	201	1.9
Assault by other and unspecified means	85	6.7	100	7.2	47	5.2	901	8.7
Assailant								
Spouse or domestic partner	19	1.5	27	2.0	#	#	290	2.8
Parent	896	70.1	774	56.1	311	34.4	654	6.3
Other family member	64	5.0	162	11.7	150	16.6	641	6.2
Carer	21	1.6	20	1.4	6	0.7	11	0.1
Acquaintance or friend	8	0.6	63	4.6	114	12.6	1,052	10.2
Official authorities	#	#	0	-	#	#	32	0.3
Person(s) unknown to the victim	#	#	14	1.0	27	3.0	1,502	14.6
Other and unspecified person	266	20.8	320	23.2	290	32.1	6,134	59.5

Notes:
 # refers to cell sizes <5 or to disguise cell sizes <5

Conclusion

Health professionals can play a role in identifying and providing referrals to try to prevent the recurrence of intentional injury. For children who are hospitalised following self-harm, the provision of psychosocial care, and access to support and health services are essential, as is the continuity of care post-discharge from outpatient and community-based support services. For assault hospitalisations, effective parental education interventions are needed to reduce parental assaults of children, and training children in conflict de-escalation to reduce assault by peers cannot be overlooked.

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