

INJURY-RELATED HOSPITAL ADMISSIONS
TO SYDNEY CHILDREN'S
HOSPITALS NETWORK 2016-2017



The Sydney
children's
Hospitals Network

care, advocacy, research, education

kids
health

the children's hospital at Westmead
Child Health Promotion Unit

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AT A GLANCE



52,494

Admissions were made to SCHN during the 2016/17 financial year.



13%

Of admissions were due to injury, making it the leading cause of SCHN admissions.



43%

Of injury admissions occurred in children under 5 years of age.



62%

Of children admitted due to injury were males.



43%

Of injury admissions were due to a fall, most often a fall on the same level followed by fall from playground equipment.



19%

Of injuries occurred while participating in a leisure activity followed by a sporting activity.



34%

Of injuries occurred in the home.



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INTRODUCTION

Injury is a leading cause of death and hospitalisation among children and young people throughout the world. In 2015, the deaths of 504 children, aged less than 18 years, were registered in NSW. Of these deaths, 88 (17.5%) were injury-related.¹ Child injuries heavily impact the health system, not only through patient admissions but also through emergency department presentations and visits to general practitioners throughout NSW.



1. NSW Child Death Review Team Annual Report 2016.

A 10 year review of national hospital admissions data, for the period from 1 July 2002 to 30 June 2012, examined the characteristics and health outcomes of injury-related hospitalisations of children.² The report found that child injury hospitalisations had not decreased over the 10 year period and for every severely injured child, there were at least 13 children hospitalised for a minor or moderate injury. The study also found falls to be the most common injury mechanism in children, with sporting activities the most common specified activity at the time of the injury and the child's home as the most common specified place of incident. The review discusses injury mechanism in detail, however given its national scope more specific details were not available for every injury sub-mechanism at a state level. Given that the review examined data up to 2012, we were interested in any differences or similarities between the findings of the 10 year review and our more recent SCHN data.

According to the NSW Admitted Patient Report 2012, in the 2010-11 financial year there were 47,021 hospitalisations in SCHN of which injury and poisoning was the leading cause of hospitalisation, accounting for 5,397 (11.5%) admissions.³ Of those admitted, the majority (91.6%) were aged 14 years and under. The latest published report from the NSW Admitted Patient Data Collection dataset is over six years old and may not reflect current trends. While it includes demographic and admission related information, it does not contain detailed injury-related data to provide greater insight into the circumstances of injury.

The purpose of this report is to gain a better understanding of current child injury statistics within SCHN, utilising data for the period from 1 July 2016 to 30 June 2017. This local injury-related hospitalisation data, presented here in terms of injury mechanisms and their outcomes (mortality or length of stay) will be used to inform priority setting for SCHN health promotion and injury prevention project activity and as a comparison against the 10 year review findings.



2. Mitchell R, Curtis K, Foster K. A 10-year review of the characteristics and health outcomes of injury-related hospitalisations of children in Australia. Day of Difference Foundation. University of Sydney. 5th May 2017.

3. Population and Public Health Division. New South Wales Admitted Patient Report 2012. Sydney: NSW Ministry of Health, 2012.

METHOD

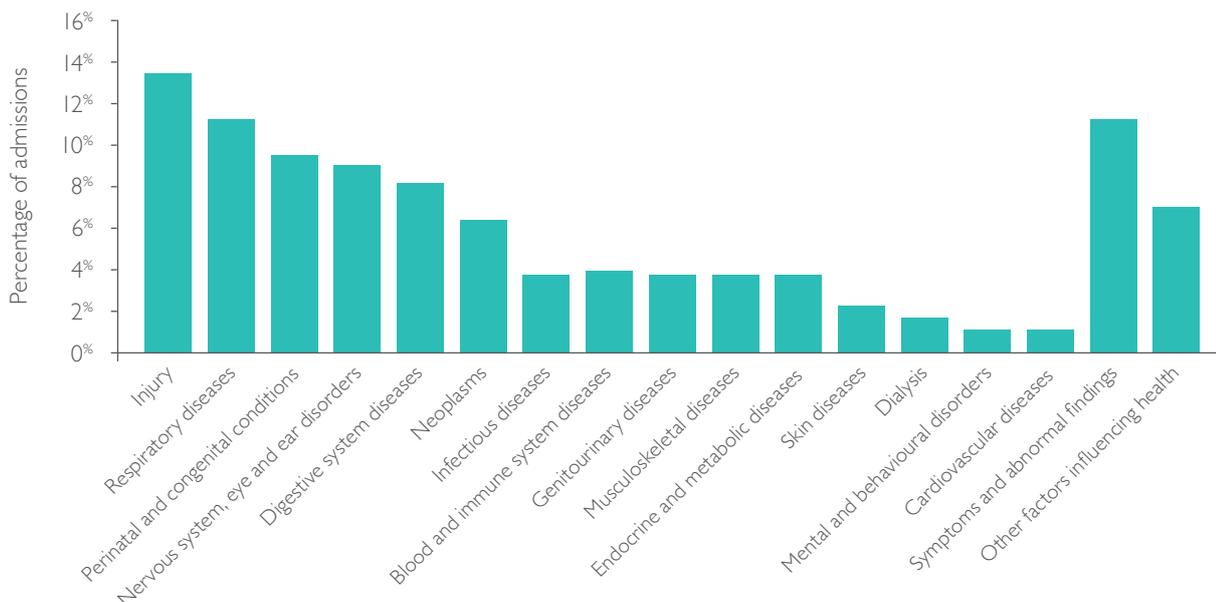
SCHN admissions data was obtained from the Management Support and Analysis Unit for the time period from 1 July 2016 to 30 June 2017. Although hospital treatment costs are of interest for this analysis, these were not available at the time of the data request. This retrospective study comprises of data of children injured and hospitalised at either of the two children's hospitals of SCHN (The Children's Hospital at Westmead and Sydney Children's Hospital, Randwick) from 1 July 2016 to 30 June 2017.

The data includes all injury-related hospital admissions during the given period and contains information on patient demographics, diagnoses, external causes and mode of separation. Each record relates to an individual episode of care in hospital along with information on discharge, transfer or death of a patient. Where a patient returned to hospital for additional episodes of care for the primary injury, the subsequent visits were not counted. Furthermore, complications of medical/surgical care and sequelae were omitted from the dataset. Diagnoses and external cause codes are classified using the International Classification of Diseases, 10th Revision, Australian Modification (ICD-10-AM)⁴

RESULTS

ALL ADMISSIONS TO SCHN IN 2016-2017

FIGURE 1 Admissions by diagnosis



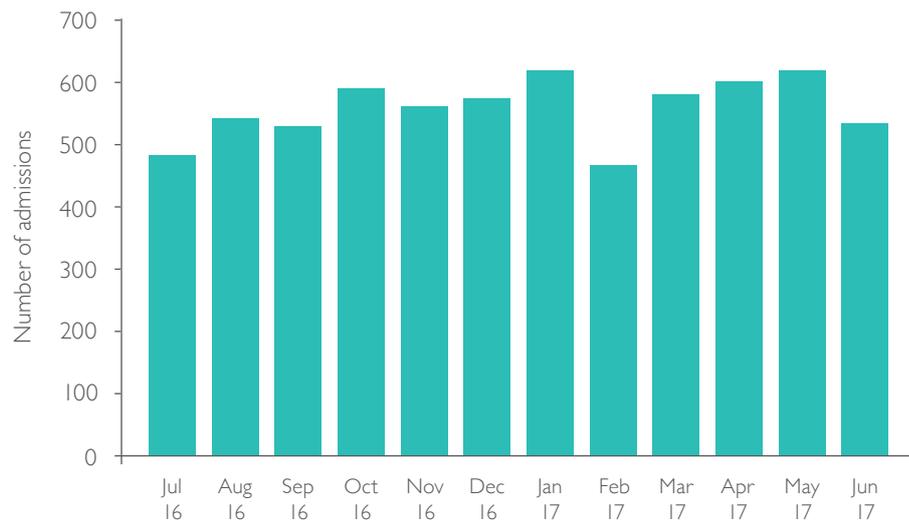
Injury continues to be the leading cause of admissions to SCHN hospitals, greater than respiratory diseases, perinatal and congenital conditions, disorders of the nervous system and eye and ear conditions.

4. National Centre for Classification in Health, ICD-10-AM. Fifth ed. 2006, Sydney: National Centre for Classification in Health.

INJURY-RELATED ADMISSIONS TO SCHN

In the 2016/17 financial year, there were a total of 52,494 admissions to SCHN of which over 10% (n=6693) were due to injuries.

FIGURE 2 Total injury admissions by month



The injury admissions throughout the year were fairly evenly distributed.

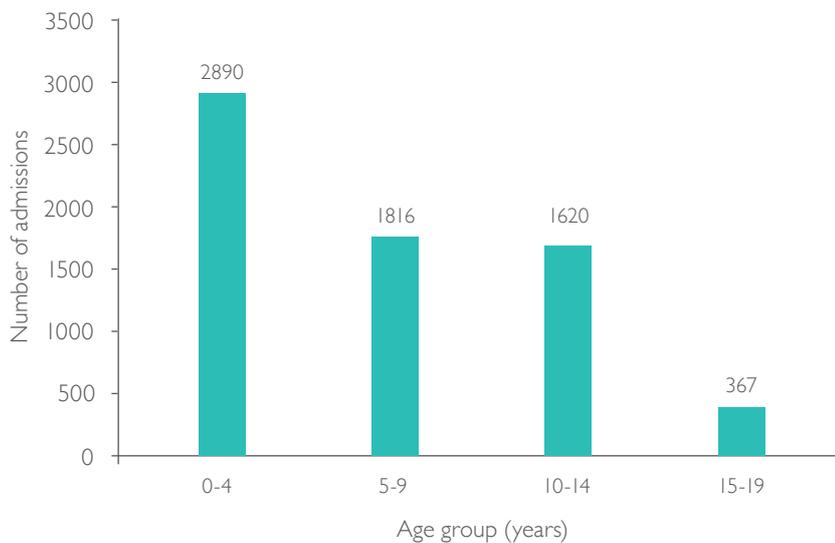


I. INJURY DEMOGRAPHICS

I.1 AGE

Children under five years of age are over represented at 43% of injury admissions. This is followed by those aged 5-9 and 10-14 years, accounting for 27% and 24%, respectively. Children aged 15 years and over represent a small percentage at 6%.

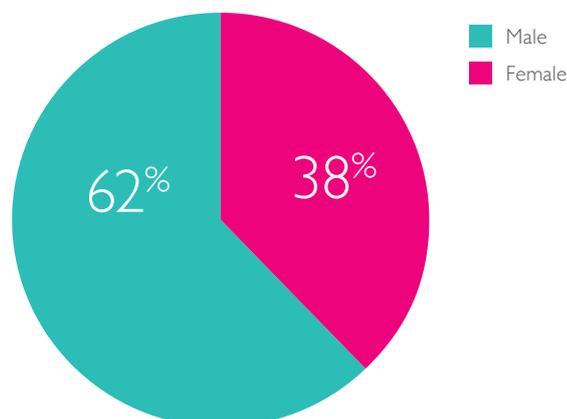
FIGURE 3 Injury by age group



I.2 GENDER

Males are over represented (n=4114) in injury admissions with females representing the remainder (n=2579).

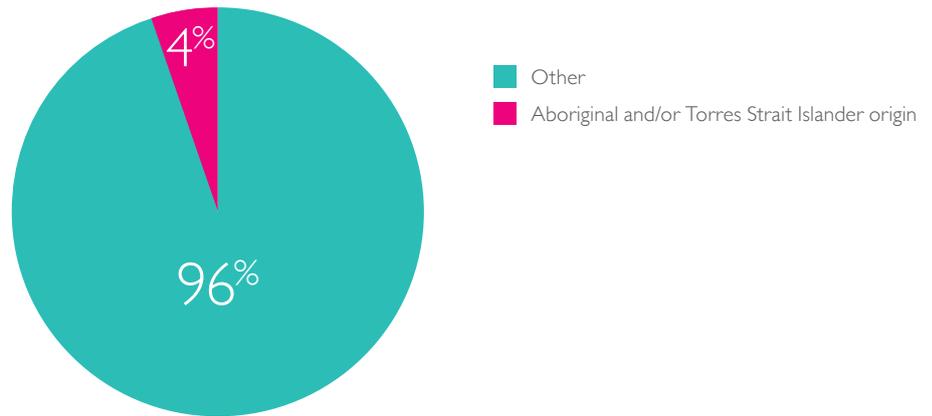
FIGURE 4 Injury by gender



1.3 ABORIGINAL AND TORRES STRAIT ISLANDER STATUS AND CULTURALLY AND LINGUISTICALLY DIVERSE (CALD) FAMILIES

Children of Aboriginal and/or Torres Strait Islander origin represented a very small percentage (n=272) of injury admissions, where the majority (n=6421) were of neither origin.

FIGURE 5 Injury by Aboriginal and/or Torres Strait Islander origin

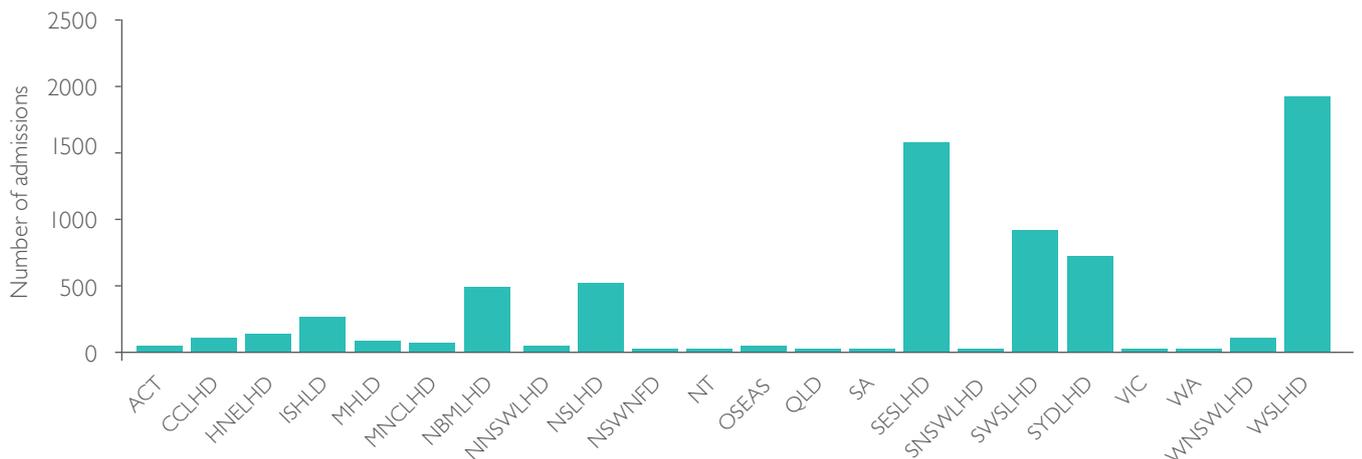


A small number (n=578) of patient families identified themselves as preferring a language other than English. The most popular languages spoken were Arabic (18%), Mandarin (13%), Cantonese (4%), Vietnamese (4%), Bengali (4%) and Turkish (3%).

1.4 LOCAL HEALTH DISTRICT (LHD)/STATE

The majority (53%, n=3573) of children admitted for injury resided in the LHDs where the two SCHN children's hospitals are located, being WSLHLD and SESLHD and the surrounding areas. Approximately 1% of the children resided out of state.

FIGURE 6 Injury by Local Health District (LHD) / State





1.5 ACTIVITY AT TIME OF INCIDENT

TABLE 1 Activity at time of incident by gender

Activity	Male	Female	Total
Leisure activity	789	454	1243
Sports activity	814	258	1072
<i>Team ball</i>	395	64	459
<i>Individual water sport</i>	34	16	50
<i>Individual athletics</i>	33	8	41
<i>Acrobatic sports</i>	12	33	45
<i>Wheeled motor</i>	35	6	41
<i>Wheeled non-motor</i>	196	46	242
<i>Other specified sport and exercise</i>	30	21	51
While resting, sleeping, eating or engaging in other vital activities	133	125	258
Other specified work for income or engaged in other types of work	37	26	63
Other specified activity	49	140	189
Unspecified activity	2292	1576	3868
TOTAL	4114	2579	6693

Where the activity at the time of incident was specified, leisure (19%) and sport (16%) were the most common activities children were engaged in at the time of injury, with a higher proportion of males being injured during sporting activities than females (19.8% vs 10%). The most common sporting activities where injuries occurred were team ball and wheeled non-motor sports, with males having a higher proportion of hospitalised injuries following team ball sports (9.6% vs 2.5%) and wheeled non-motor sport (4.8% vs 1.8%).

1.6 PLACE OF OCCURRENCE

TABLE 2 Place of injury occurrence

Place of occurrence	Total
Home	2241
School, other institution, public administrative area	757
Sports and athletics area	494
Other specified places	445
Street and highway	272
Trade and service area	106
Farm	19
Residential institution	9
Unspecified place	2350
TOTAL	6693

The home (34%), schools and other institutions and public administrative areas (11%), and sports and athletics areas (7%) were the most common specified place of occurrence of the injury that resulted in hospitalisation.

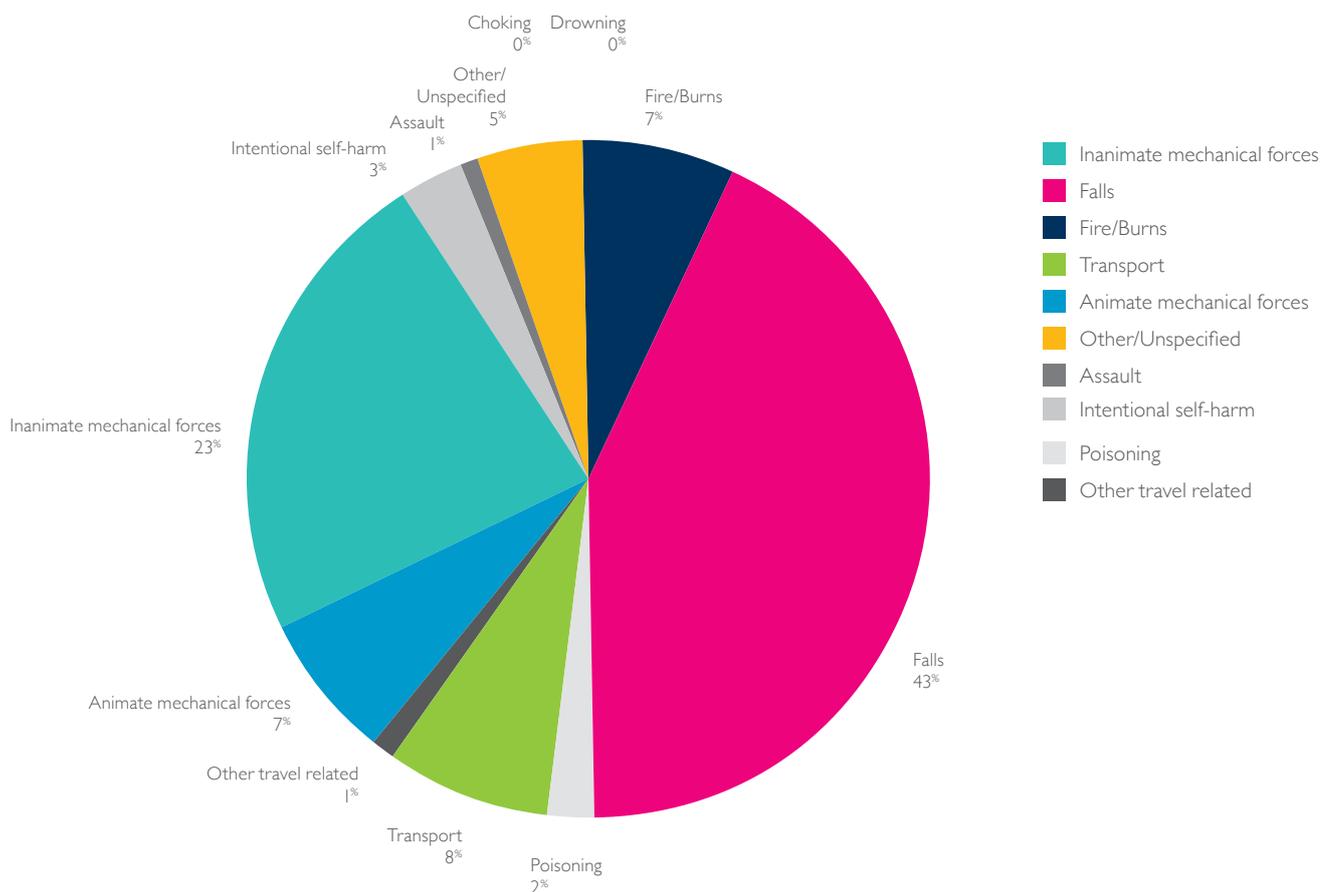


2. INJURY CHARACTERISTICS

2.1 MECHANISM

The leading cause of injury was falls (n=2906). This was followed by inanimate mechanical forces (getting struck by or striking against objects; getting caught, crushed, jammed or pinched in or between objects) (n=1556). Transport accounted for 502 of the hospitalised injuries. Animate mechanical forces (such as getting struck by another person, getting bitten by an animal) accounted for 445 injuries, similar to that of fire and burn injuries (n=388). One hundred and sixty seven admissions were due to self-harm and 129 were due to poisoning. Comparatively, the numbers for drowning (n=31) and choking (n=29) were much lower, and therefore are presented as a zero percentage in the chart below. It should be noted, however, that these mechanisms are often fatal and that non-fatal injury resulting from these mechanisms is often severe and life-long.

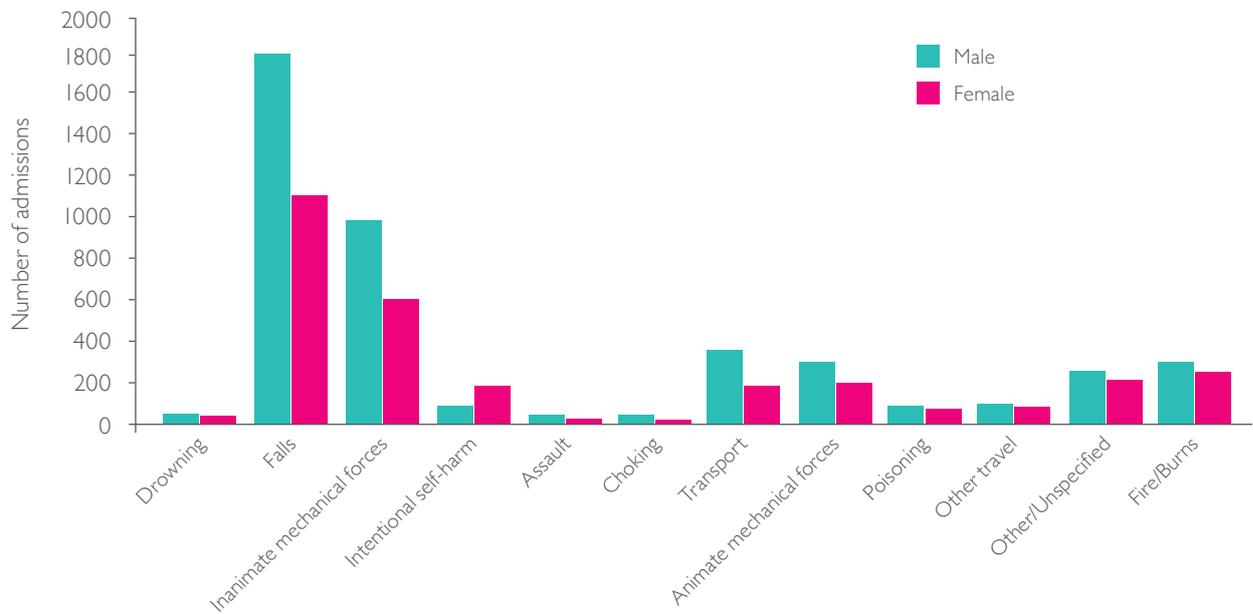
FIGURE 7 Injury by mechanism



The 2016-17 SCHN injury mechanisms were the same as those found in the 10 year review where falls (38.4%), inanimate mechanical forces (17.6%) and transport incidents (13.7%) were the three most common injury mechanisms. The review also found animate mechanical forces accounted for 5.7% and poisoning, 3.7%. intentional self-harm was 2.7%, with females having a higher proportion of injuries than males.

2.2 INJURY MECHANISM BY GENDER

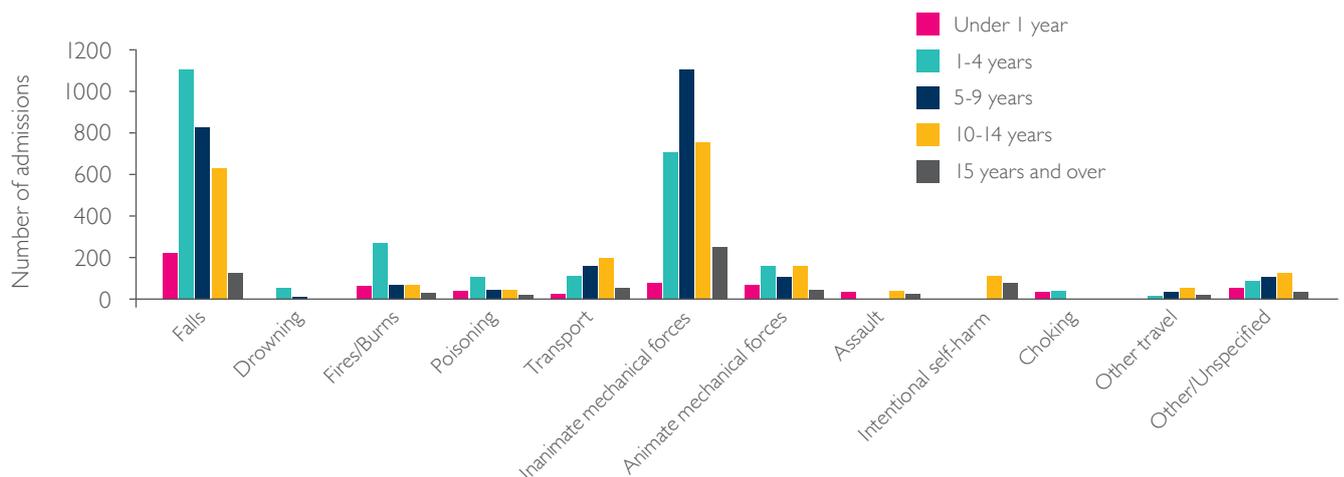
FIGURE 8 Injury mechanism by gender



2.3 INJURY MECHANISM BY AGE GROUP

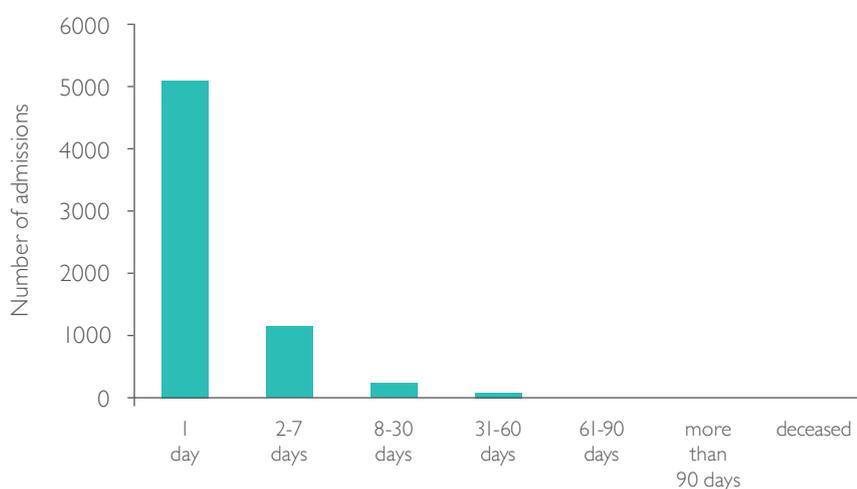
The top injury mechanisms by age group show falls as the most common cause of injury in all age groups. This is followed by injury from inanimate mechanical forces in all age groups except those aged 15 years and over, where intentional self-harm is the second most common cause of injury. In children aged between 1 and 4 years, injuries due to fire/burns is the next most common; in children aged 5 and over, it is injuries related to transport.

FIGURE 9 Injury mechanism by age group



2.4 LENGTH OF STAY AND MORTALITY

FIGURE 10 Admissions by length of stay and mortality



The majority (n=6435) of children admitted to SCHN stayed in hospital for less than a week with 79.1% staying one day only. A small proportion 3% (n=187) stayed for up to one month and the more severe cases for a longer time. Eighteen children died while in hospital due to injuries resulting from transport, drowning, falls, assault, poisoning and fire.

TABLE 3 Length of stay by age group

Age group	Day only	2-7 days	8-30 days	31-60 days	More than 60 days
<1 year old	299	83	16	#	#
1-4 years	2072	361	43	5	#
5-9 years	1481	286	37	7	#
10-14 years	1202	335	63	14	6
15 years and over	239	77	30	10	11

Note: # denotes value less than 5

TABLE 4 Length of stay by injury mechanism

Injury mechanism	Less than 8 days	8-30 days	31-60 days	More than 60 days
Falls	2849	39	12	6
Inanimate mechanical forces	1528	23	#	#
Transport	458	34	#	7
Fire/burns	430	23	#	0
Animate mechanical forces	439	#	#	0
Intentional self-harm	112	35	12	8
Poisoning	120	6	#	#
Assault	28	#	#	#
Other travel related	88	0	0	0
Drowning	29	#	0	0
Choking	23	#	#	#
Other/unspecified	331	16	#	#
TOTAL	6435	189	40	29

Note: # denotes value less than 5



3 INJURY MECHANISMS

The injury mechanisms and sub-mechanisms will be further explored in the tables below.

3.1 FALLS

TABLE 5 Fall injury sub-mechanisms by gender

Fall injury sub-mechanism	Males (n=4114)	Female (n=2579)	Total (n=6693)
Other fall on same level	299	216	515 (7.7%)
Fall on same level from slipping, tripping and stumbling	275	138	413 (6.2%)
Fall involving playground equipment	212	167	379 (5.7%)
Fall involving roller skates, skateboards, water ski, snow ski, snow board, ice-skates, non-powered scooters and other pedestrian conveyances	172	61	233 (3.5%)
Fall involving chair	111	93	204
Fall involving bed	112	83	195
Other fall from one level to another	113	73	186
Other fall on same level due to collision with, or pushing by another person	134	21	155
Fall on and from stairs and steps	78	63	141
Fall from, out of or through building or structure	57	31	88
Fall while being carried or supported by other persons	39	46	85
Fall involving wheelchair/other furniture	50	25	75
Fall from tree/ladder/cliff	43	13	56
Diving or jumping into water causing injury other than drowning or submersion	13	12	25
Unspecified fall	85	71	156
TOTAL	1793	1113	2906

TABLE 6 Top three fall injury sub-mechanisms by age group

Fall injury sub-mechanism	0-4 years	5-9 years	10 years and over
Other fall on same level	223	135	157
Fall on same level from slipping, tripping and stumbling	174	137	102
Fall involving playground equipment	118	189	72

The most common falls were other fall on same level (7.7%), fall on same level from slipping, tripping and stumbling (6.2%), fall involving playground equipment (5.7%) and fall involving roller skates, skateboards, water ski, snow ski, snow board, ice-skates, non-powered scooters and other pedestrian conveyances (3.5%). Of the injuries involving playground equipment, the majority were due to trampolines (35.4%) and climbing apparatus (25.6%) with one injury resulting in death.

The 10 year review also found falls from playground equipment to be the most common fall sub-mechanism followed by fall on the same level and fall involving roller skates and the like.



3.2 INANIMATE MECHANICAL FORCES

TABLE 7 Inanimate mechanical forces sub-mechanisms by gender

Inanimate mechanical forces sub-mechanism	Males (n=4114)	Females (n=2579)	Total (n=6693)
Striking against or struck by other objects	263	128	391 (5.8%)
Caught, crushed, jammed or pinched in or between objects/Contact with lifting and transmission devices, not elsewhere classified	175	129	304 (4.5%)
Contact with sharp glass and other sharp objects	162	103	265 (4%)
Foreign body entering into or through eye or natural orifice	99	118	217
Struck by thrown, projected or falling object	92	41	133
Striking against or struck by sport equipment	79	33	112
Foreign body or object entering through skin	39	35	74
Contact with powered lawn mower, other powered hand tools and machinery	26	7	33
Contact with non-powered hand tool	13	7	20
Discharge from other and unspecified firearms/ explosion and rupture	7	0	7
TOTAL	955	601	1556

The most common injury of this mechanism was striking against or being struck by sporting equipment (5.8%). This was followed by being caught, crushed, jammed or pinched in or between objects or from coming in contact with lifting and transmission devices (4.5%) and coming in contact with sharp glass and other sharp objects (4%).

3.3 TRANSPORT

TABLE 8 Transport incidents by gender

Incident type	Males (n=4114)	Females (n=2579)	Total (n=6693)
Pedal cyclist	147	35	182 (2.7%)
Motor vehicle occupant	58	56	114 (1.7%)
Pedestrian	61	38	99 (1.5%)
Motorcyclist	49	10	59
Other land transport incl. bus occupant	18	18	36
Water, air, other and unspecified transport	#	#	12
TOTAL	342	160	502

In transport incidents, children suffered the most injuries as a pedal cyclist, followed by motor vehicle occupant and pedestrian, with males having a higher proportion of injuries as pedal cyclists (3.6% vs 1.4%) and motorcyclists (1.2% vs 0.4%) compared to females. Information on helmet use was not available for analysis of this data. Twelve of the children injured were occupants of special all-terrain or other motor vehicles designed primarily for off-road use. One of these children died as a result of the injuries sustained.

3.4 FIRE AND BURNS

Four hundred and fifty four children admitted to hospital suffered a burn injury including scalds (n=272), contact burns (n=116) or from being exposed to smoke, fire, flames or electric current, radiation and extreme ambient air temperature and pressure (n=66). The most common cause of scalds was related to hot food and drink. Eighty percent (n=310/388) of scalds and contact burns occurred in the home.

3.5 ANIMATE MECHANICAL FORCES

Four hundred and forty five children were exposed to animate mechanical forces. A majority of children (n=157) were hit, struck, kicked, twisted, bitten or scratched by another person (excluding assaults). One hundred and twenty seven children were bitten by a dog and 68 were bitten or stung by non-venomous insects and other arthropods.

3.6 INTENTIONAL SELF-HARM/ ASSAULT

One hundred and sixty seven children were admitted to hospital for intentional self-harm. These children were all aged 10 years and above with females having a higher proportion of injuries (5.3% vs 0.7%). Thirty four children were injured as a result of an assault. The injuries recorded in this time period occurred in children aged less than 5 years and those aged 10 years and above. Nearly four times as many males as females were affected.

3.7 POISONING

One hundred and twenty nine children were admitted for poisoning injuries. The majority (49%) of these injuries occurred in children aged 1-4 years with more than half of these (n=70) occurring in males.

3.8 DROWNING AND CHOKING

Thirty one children were admitted to hospital due to drowning. A majority of the drowning incidents occurred in the 1-4 year age group (n=21) and most in males (n=20). Ten children were in the swimming pool at the time of the incident and eight fell into the pool. A small number were in a bath-tub. Twenty two percent of injury-related deaths were due to drowning.

Twenty nine children suffered a choking injury. A majority were children aged 1-4 years (n=18) and most injuries occurred in males (n=20).

DISCUSSION

Injury continues to be the leading cause of admissions to SCHN, with the number increasing from 5,397 in 2012 to 6693 in the time period of this report. Children aged 1-4 years, who are exploring the world and are unaware of dangers, make up the majority of admissions. Only a minority (5.5%) of admissions to SCHN hospitals are children aged 15 years and over. This may be indicative of a majority of children in this age group accessing adult services in general.

Injury is not only the leading cause of hospital admission to SCHN but is the leading cause of hospitalisation for children in Australia. Injury can leave children with ongoing disabilities that affect their quality of life and place stress on caregivers and other family members, therefore prevention strategies are needed to reduce the impact on the health system and on individuals and their families.

Our findings are consistent with the findings of the 10 year review which found falls, inanimate mechanical forces and transport incidents to be the top three injury mechanisms in child hospital admissions in Australia. Our study found that among children aged 1-5 years, falls, injuries due to inanimate mechanical forces, burns, poisoning and choking to be the most common. Falls and injuries due to mechanical forces are also common among those aged 6-9 years and 10-14 years, along with transport related incidents, with the latter having a higher incidence of transport related injuries. Males are over represented in almost all injury mechanisms which may be due to their likelihood of engaging in high risk behaviour. Intentional self-harm is prevalent among children aged 10-14 as well as those aged 15 years and above and more common among females. Unfortunately, this suggests that although injury remains a health priority; as noted in the 10 year review, investment in injury prevention has been limited over the last decade. It is anticipated that the federal government's commitment to a new national injury prevention strategy will influence greater investment into the future.

There were a number of minor differences between our data and the findings of the 10 year review. Our report found the child's home, the most common specified place of incident, as was found in the review, however leisure activity was found to be above sporting activity as the most common specified activity during the injury. However, details for 57.8% of activity at time of incident and 35.1% of place of occurrence data were unspecified. If this information was available, it may have altered the statistics reported.

Census data from 2011 suggests that around 5.4% of those aged 0 to 14 years living in NSW were of Aboriginal status. Our data is close at 4% of injury admissions being classified as children from Aboriginal and Torres Strait Islander origin.

Although hospital treatment costs were not available for this analysis, based on the average cost of hospitalisation in the 10 year review of \$3119 per child annually, the cost of injury admissions to SCHN is an estimated \$22 million per annum. This only represents a portion of the burden of child injury, as it only includes injuries occurring mostly within the Local Health Districts of each hospital and the surrounding areas and does not include children admitted to other hospitals, seen by local health practitioners and presenting to other emergency departments across NSW. The current data also presents on 18 deaths which are only those admitted to SCHN and does not account for all injury-related deaths sustained in the community or on the way to hospital.



CONCLUSION

It is promising to note the strategic investment in injury prevention in the 2018-19 Budget whereby the Australian Government has committed \$0.9 million over three years to the development of a new National Injury Prevention Strategy. This is significant, given that the previous national injury prevention strategy expired in 2014. The new strategy will have a whole of population approach inclusive of populations with high rates of injury such as the Aboriginal and Torres Strait Islander people. The national funding would benefit from further support at state level, offering opportunities for local child injury prevention work.





Injury remains a priority health area and is one which is amenable to prevention measures. Prevention strategies need to be aimed at changing the consistent patterns of injury-related admissions to hospitals seen over the past decade. Research to guide the effective implementation of injury prevention strategies is needed; although the issues are known, how to effectively address those issues needs more research with practitioner input.

While our study looked at just 12 months of data, examination of data over a longer period of time offers a better view of trends while emerging issues are best captured using real time surveillance data through the emergency department presentations. Procedures should be put in place to obtain both forms of data to help inform and determine injury prevention and health promotion project activity. Further focused prevention and advocacy efforts are needed to reduce the incidence and impact of child injury which is best achieved as a coordinated approach at both a state and national level, sparking action across the nation to help keep children safe.





