

Clinical research

Epidemiology of paediatric head and facial injuries in Queensland, Australia

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Abstract

Introduction: Head and facial injuries in paediatric patients are a major public health problem in Queensland, Australia, where control, minimisation, or prevention play key roles. Although many studies have been reported, few can be found concerning the epidemiology of paediatric maxillofacial injuries in Queensland, Australia. The aim of this study was to retrospectively assess and report the aetiology, patterns, distribution, and associated factors of head and facial injuries in children in Queensland, Australia.

Material and methods: Data were obtained from Queensland Injury Surveillance Unit (QISU). A retrospective study included 10,723 injured children (from less than 1 year old to 12 years old) in the years 2012, 2013, 2014, 2015, and 2016. The analyses involved descriptive statistics and χ^2 test.

Results: The number of patients injured varied among age groups. The nature and mechanism of injuries were different among age groups as well. Boys were more prone to maxillofacial injuries compared to females. The highest rate of injuries was in the 1–2-year age group for both genders. Contact with a static object was the main aetiology of maxillofacial injuries during leisure activity (playing). The home was the main site where the injuries occurred.

Conclusions: Preventive measures should be strengthened both indoors and outdoors to reduce the incidence and severity of paediatric injuries in Queensland, Australia. In addition, children in the growing phase should be monitored periodically. Furthermore, increasing awareness can be attained by increasing safety education.

Key words: injuries, children, paediatric, maxillofacial injuries, risk factors.

Introduction

Head and facial injuries represent a serious public health concern worldwide, according to the World Health Organisation (WHO) [1]. In Australia and other developed countries, paediatric head and facial injuries are common causes of paediatric morbidity and mortality, despite advancements in child safety [2].

Head and face injuries, which are a common presentation to every general practice and every hospital emergency department in Queensland, Australia [3], represent a group of injuries on the head and face commonly resulting from various insults to the head and face by external force, classified as intentional and unintentional injuries [4].

These injuries, comprising hard tissue as well as soft tissue injuries, exhibit different patterns and clinical features based on the severity and mechanism of the injury [5]. Additionally, they occur as isolated injuries or in combination with other severe injuries, including spinal, brain, and upper and lower body injuries, depending also on the aetiology and severity of the injuries [3].

Injuries to these regions may be particularly disabling because they are regions of specialised functions such as vision, hearing, olfaction, respiration, mastication, and speech [6]. Additionally, important vascular and neural structures that are closely associated are present in these regions and might be affected by such injuries. For example, damage to the central nervous system may occur, and injuries in this region can result in serious dysfunction and might cause disability [6]. Also, the psychological impact of scars or disfigurement in the face after recovery may add to the level of resulting morbidity [7].

Moreover, severe head and face injuries can expose patients to life-threatening complications such as airway obstruction and haemorrhagic shock or intracranial and brain injuries [8].

The incidence and an aetiology of maxillofacial injuries varies from one country to another, and even from one region to another in the same country, depending on prevailing socio-economic, cultural environmental factors, lifestyle, and legislative measures [9]. Additionally, there are other factors (injury risk factors) affecting the incidence and the outcome of head and facial injuries. For example, the type and part of place where the child is injured, the activity being undertaken when the injury occurred, the temporal influence factor, the severity of the injuries, the nature of the injuries, and the management of the patient (admission status). Thus, an understanding of these factors can aid in establishing clinical and research priorities for effective treatment of these injuries. Also, such factors can help to guide the development of new methods of injury prevention and preventative measures [10].

However, head and face injuries in paediatric patients are different from those in adults, although both children and adults are subjected to similar types of injuries [5]. Children are more susceptible to craniofacial trauma due to their greater cranial mass-to-body ratio [11]. Additionally, the head and face of children are not fully formed, and future growth will be a factor in how the child heals and recovers. There are certain types of injuries that may cause a delay in the growth or further complicate recovery [12]. Furthermore, difficult cases of such injuries require physicians and surgeons with great skill to make a repair that will grow with the child [12].

Moreover, the management of paediatric patients with head and facial injuries should take into consideration the differences in anatomy and physiology between children and adults, the presence of concomitant injuries, the particular stage in growth and development (anatomic, physiology, and psychology), the specific injuries, and anatomic sites that the injuries affect [12, 13]. Further, clear diagnosis and early treatment are keys to prevent complications and undesirable results [5].

Paediatric head and face injuries are not only a leading cause of morbidity and mortality, but also have negative effects on quality of life, functional status, and social functioning. Furthermore, they have a range of economic impacts, including health care costs, productivity, and insurability [14].

Thus, epidemiological analysis of paediatric head and face injuries is important to identify the burden of such injuries and to help develop more efficient ways to plan resource allocation, to deliver care, and guide preventive measures [14, 15]. Furthermore, knowing the epidemiology profile of children with head and face injuries allows us to monitor and control certain risk factors that would prevent or lessen the incidence of such injuries [16–18].

Although many overseas studies have been reported, there are few reports detailing the causes and incidences of paediatric head and face injuries in Queensland, Australia. This retrospective report presents a study investigating the aetiology and incidence of paediatric patients with head and face injuries in Queensland, Australia in a period of time (2012, 2013, 2014, 2015, and 2016).

Material and methods

Data were accessed from the Queensland Injury Surveillance Unit (QISU) database, which collects and collates injury data from a number of Queensland public hospital emergency departments (EDs).

Data were included for children aged from birth to 12 years, with year of presentation 2012–2016 inclusive. To extract information about children with head and facial injuries, the following terms were used: BODY_REGIONS_CODE: 22 (body location not required) or 02 (Face (excludes eye)) or 01 (Head) or 21 (Multiple injuries involving more than one bodily location) and Like “*face*” Or Like “* lip *” Or Like “* lip*” Or Like “*lip *” Or Like “*nose*” Or Like “*eye*” Or Like “*mandibular*” Or Like “*VERMIL*” Or Like “*nare*”.

Statistical analysis

Data from QISU had already been cleaned – no duplicate entries were present, and all entries were sufficiently complete.

Values within variables were coded and labelled as necessary, using the information contained within the dataset and with reference to National Data Standards for Injury Surveillance, Version 2.1 (Ref).

Some variables were collapsed to reduce the number of categories to allow meaningful summarisation and for purposes of statistical analysis. Decisions about collapsing were based on combining logically similar categories, using information contained within the dataset, the National Data Standards for Injury Surveillance, Version 2.1 (Ref), and information about ICD coding from the World Health Organisation ICD-10 Online Version (Ref).

The patients were grouped into five age bands: < 1, 1–2, 3–4, 5–9, and 10–12 years.

The time of presentation was grouped into 3-hour periods, except for 9 p.m.–6 a.m., which was analysed as one block due to a lower number of presentations.

Some values were coded as ‘missing’ for the purpose of conducting statistical tests. For example, indigenous status coded as ‘not stated/unknown’ was recoded as ‘missing’ for the purpose of statistical analyses, leaving two collapsed categories of ‘not indigenous’ and indigenous and/or Torres Strait Islander’.

Descriptive and analytical analyses were conducted using Statistical Package for Social Sciences (SPSS) version 25.

The majority of variables were categorical; therefore χ^2 tests were performed when investigating associations between two variables. The

assumptions for a valid χ^2 test were considered to be fulfilled when the following criteria were met:

- Assumption 1: No more than 20% of cells can have an expected count of less than 5, and
- Assumption 2: The minimum expected count is 1 or greater.

If assumptions were not fulfilled, the test was not conducted. No Exact tests were performed. A χ^2 test for trend was used with cross-tabulations involving age groups. The χ^2 tests for goodness of fit were also conducted to compare time data on time of day, day of week, month of year, season of year, and calendar year against a uniform distribution. When analysing calendar year, month of year, and season of year, data from 2016 were excluded because only 6 months of data were available for this year (Table I).

Results

Sample characteristics

Demographic characteristics

Gender

There were a total of 10,723 head and facial injury cases over the duration of the study. Males comprised 62.5% of cases ($n = 6702$) (Table II), yielding a male-to-female ratio of 1.7 : 1.

Age

Mean age was 4.34 ± 3.38 years. Figure 1 shows the distribution of age in years. The most commonly presenting age was 1-year-olds ($n = 1976$,

Table I. Variables analysed in this study

Age group	Infant (0 years), 1–2, 3–4, 5–9, and 10–12 years age groups
Indigenous status	Not indigenous; indigenous (Aboriginal and/or Torres Strait Islander)
Country	Country of birth
Language	Preferred language
Time	Time of day of presentation to emergency department on which the injury was sustained
Day	Day of week of presentation to emergency department
Weekend and weekdays	Weekend and weekdays of presentation to emergency department
Season	Season of presentation to emergency department
Calendar of year	Year of presentation to emergency department (2012, 2013, 2014, 2015, and 2016)
Triage	Triage score
Mechanism of injury	The way the injury was sustained (aetiology)
ICD of injury	International classification of diseases applied for injury
Mode of separation	Management of patient following emergency department attendance (Admission status)
Nature of injuries	Type of injury sustained
Body regions	The region or part of the body where the injury is located
Intent	The role of the patient in case of injury
Type of place	Type of place where the child was injured (first tier classification)
Part of place	Part of place where the child was injured (second tier classification to ‘Type of place’)
Activity	The activity the injured child was engaged in when the injury occurred

Table II. Demographic characteristics

Demographic characteristics	Number	%
Total number	10723	100
Gender:	Male	6702
	Female	4021
Age groups:	Infants (0 years)	695
	1–2 years	3511
	3–4 years	2201
	5–9 years	3120
	10–12 years	1196
Indigenous status:	Not Indigenous	9832
	Aboriginal and/or TSI	777
	Indigenous status not stated/unknown	114
Country of birth:	Australia	9956
	Not stated	259
	New Zealand	97
	England	72
	India	39
	United States of America	35
	Other countries	265
Spoken language	English only	10,493
	Language(s) in addition to English	169
	Not stated	61

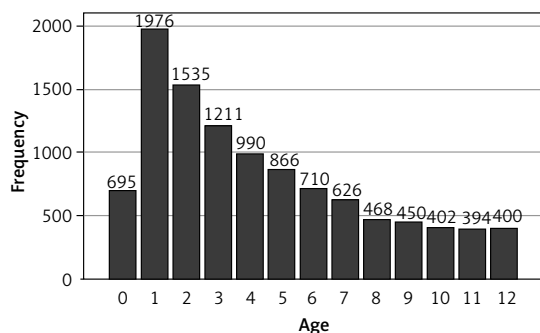


Figure 1. Distribution of ages in years

18.4%), followed by 2-year-olds ($n = 1535$, 14.3%) and 3-year-olds ($n = 1211$, 11.3%), with the number of cases decreasing with each year of age until 10–12-years-olds (each approximately 400 cases and 3.7%). There were 695 (6.5%) children who presented as infants less than 1 year old.

The majority of cases were non-indigenous – 9832 (91.7%), while 777 (7.2%) identified as Aboriginal or Torres Strait Islander or both, and 114 (1.1%) had unknown indigenous status (Table II). Of the 10,609 children reported, 9832 (91.7%) were non-indigenous, and 777 (7.2%) identified as Aboriginal or Torres Strait Islander or both. Of the 10,723 patients 114 (1.1%) were stated as missing data (indigenous status not stated/unknown), and only 10,609 (98.9%) children were valid.

Additionally, most patients (9956, 92.8%) were born in Australia. The next most frequently represented countries are presented in Table II. For 97.9% of cases ($n = 10,493$), English was the only language spoken, while 1.5% ($n = 169$) spoke additional languages.

Injury characteristics

Mechanism of injury

Figure 2 shows the mechanism of injury for children who sustained head and face injuries. Of the 16 categories, contact with static objects was the leading aetiology, occurring in 2238 (20.9%) patients. Cutting or tearing was the second most frequent aetiology, affecting 1359 (12.7%) patients, and other falls (height not specified) was the third most frequent aetiology (1085, 10.1%). Other causes of injury included fall by stumbling, tripping on the same level (1056, 9.8%), fall/jump from a lesser height (less than 1 m) (980, 9.1%), contact with a moving object (956, 8.9%), contact with a person (895, 8.3%), miscellaneous and unspecified mechanism of injury (469, 4.4%), bite, sting by animal, human, or insect (380, 3.5%), fall on or from stairs (292, 2.7%), other/unspecified contact (231, 2.2%), burns (201, 1.9%), contact with animal (180, 1.7%), fall/jump from a greater height (more than one metre) (139, 1.8%), and

contact, splash, or spill (46, 0.4%). In total, falls of some kind represented 33.63% of head and facial injuries in children aged 0–12 years.

Injury severity (Triage score)

The triage score is the urgency of the person's need for medical and nursing care. The majority of the injury cases in this study needed semi-urgent intervention within 60 min (*n* = 7315, 68.2%) followed by urgent triage within 30 min (*n* = 2284, 21.3%). Only 5.5% of cases required emergency treatment (< 10 min; *n* = 593), and 4.9% required non-urgent treatment (< 120 min; *n* = 530) (Table III).

Intent

Nearly all injuries were unintentional (*n* = 10542, 98.3%). A total of 101 (0.9%) injuries were of unclassified or undetermined intent, and 80 (0.7%) were due to assault/harm by another person, as shown in Table III.

Nature of injuries

The most frequent injuries were open wound (excludes eye) (4527, 42.25%), followed by superficial (incl. bruise; excl. eye) (3303, 30.8%). The third most common injury was eye injury (excl. foreign body in external eye) (1790, 16.7%).

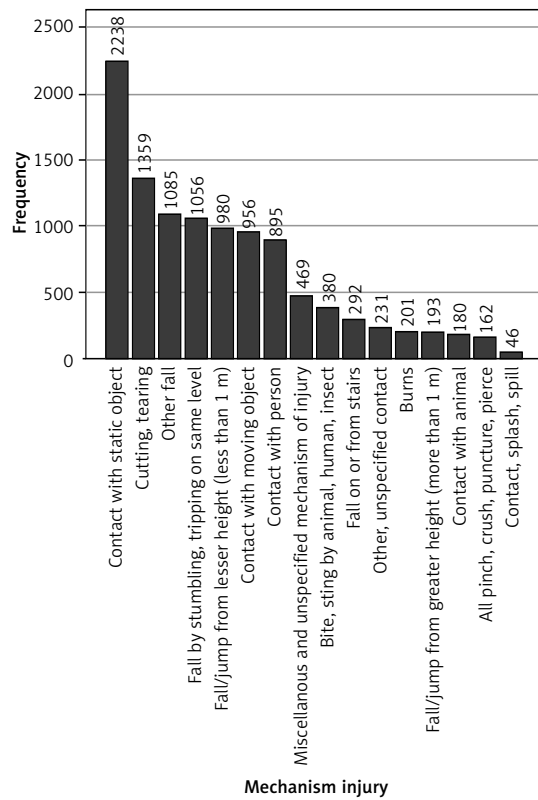


Figure 2. Mechanism of injury

Table III. Injury characteristics

Triage (severity)*	Semi urgent (60 min)	7315, 68.2%
	Urgent (30 min)	2284, 21.3%
	Emergency	593, 5.5%
	Non urgent (120 min)	530, 4.9%
Intent	Accident; injury was not intended	10542, 98.3%
	Event of unclassified or undetermined intent	101, 0.9%
	Assault/harm by another person	80, 0.7%
Nature of injury	Open wound (excludes eye)	4527, 42.2%
	Superficial (incl. bruise; excl. eye)	3303, 30.8%
	Eye injury (excl. foreign body in external eye; includes burns)	1790, 16.7%
	Miscellaneous, esp. foreign body	313, 2.9%
	Fracture and dislocation (excludes tooth)	237, 2.2%
	Dental injury (incl. fractured tooth)	227, 2.1%
	Burn or corrosion (excl. eye)	176, 1.6%
	Intracranial injury (includes concussion)	94, 0.9%
	Effect of venom; any insect bite	56, 0.5%
	Mode of separation	ED service event completed discharged
Admitted to same or other hospital		1661, 15.5%
Did not wait/left after treatment commenced		158, 1.5%
Body regions injured	Face (excludes eye)	4391, 40.9%
	Head (excludes face)	4082, 38.1%
	Body location not required	2082, 19, 4%
	Multiple injuries (involving more than one body location)	168, 1.6%

*Total valid responses for triage score, *n* = 10,722.

Fracture (excludes tooth) and dental injury (incl. fractured tooth) amounted to 237 (2.2%) and 227 (2.1%), respectively, of the total number (Table III).

The mode of separation describes how the episode of treatment ended. Most cases were treated in the ED and were discharged home ($n = 8904$, 83.0%). Approximately 1 in 6 cases ($n = 1661$, 15.5%) were admitted to the same or another hospital. Additionally, 158 (1.5%) patients did not wait or left after treatment commenced.

Body region injured

Because this study examines paediatric head and facial injury, the majority of the injuries were coded as involving the face (4391, 40.9%) and head (excluding the face) (4082, 38.1%). Eye injuries are not coded within the 'face' code, instead falling within 'body location not required' (2082, 19.4%). The 'body location not required' code is a grouping that includes injuries for which the injury location is evident from the nature of the injury, such as eye injury or concussion. Also included in the study were 168 (1.6%) cases with multiple injuries (involving more than one bodily location).

Distribution of injury by time, month, season, year, time of day, and day of week

Table IV shows the temporal characteristics of head and face injuries. Injuries most frequently occurred in the three-hour time period between 3 and 6 p.m. ($n = 3016$, 28.1%), and least frequently between 6 and 9 a.m. ($n = 765$, 7.1%).

The frequency of presentation of head and facial injuries by day of week varied significantly from a uniform distribution ($\chi^2 = 201.67$, $df = 6$, $p < 0.001$). The greatest number of cases present-

ed on Sundays ($n = 1925$, 18.0%), and the least on Tuesdays ($n = 1289$, 12.0%). Additionally, significantly more injuries on a per-day basis occurred on weekend days ($n = 3683$, equivalent to 17.2% per day) than weekdays ($n = 7040$, equivalent to 13.1% per day; $\chi^2 = 175.08$, $df = 1$, $p < 0.001$).

Calendar year, month, and season

Of the four complete calendar years in the study period, there were significance differences in the number of presentations per year, with the greatest number of cases occurring in the year 2015 ($n = 2529$, 26.9%) and the least in 2012 ($n = 2099$, 22.3%) ($\chi^2 = 52.46$, $df = 3$, $p < 0.001$). Also, when analysed with the complete years only, the number of presentations per month differed significantly ($\chi^2 = 31.87$, $df = 11$, $p < 0.001$), with the maximum in August (852, 9.0%) and the minimum in February (665, 7.1%) (Table V).

There was no significant difference in presentations by season, when analysed with complete years only ($\chi^2 = 2.75$, $df = 3$, $p = 0.432$).

Event characteristics

As shown in Table VI, the event characteristics included the activity the child was engaged in when the injury occurred, and the type and part of place where the injury occurred.

Sub-analyses of injury and event characteristics

Injury and event characteristics by gender

The proportion of males and females varied significantly with age group ($\chi^2 = 32.64$, $df = 4$, $p < 0.001$). Males were over-represented in each

Table IV. Head and facial Injuries by time, day, season, and year

Injury characteristics		Number	%
Time of injury: $p < 0.001$	6–9 a.m.	765	7.1
	9 a.m. – midday	1794	16.7
	Midday – 3 p.m.	1902	17.7
	3–6 p.m.	3016	28.1
	6–9 p.m.	2283	21.3
	9 p.m. – 6 a.m.	963	9
Days of week: $p < 0.001$	Mon	1398	13.0
	Tue	1289	12.0
	Wed	1428	13.3
	Thu	1390	13.0
	Fri	1535	14.3
	Sat	1758	16.4
	Sun	1925	18.0
Weekdays and weekends: $p < 0.001$	Weekdays	7040	65.7
	Weekend	3683	34.3

Table V. Head and facial injuries by month and season (analysed for 2012–2015, calendar years with complete data)

Calendar year	Number	%
2012 (12 months)	2099	22.3
2013 (12 months)	2283	24.2
2014 (12 months)	2505	26.6
2015 (12 months)	2529	26.9
Months:		
January	802	8.5
February	665	7.1
March	787	8.4
April	754	8.0
May	790	8.4
June	757	8.0
July	789	8.4
August	852	9.0
September	783	8.3
October	826	8.8
November	778	8.3
December	833	8.8
Total	9416	100
Seasons:		
Spring (Sept–Nov)	2387	25.4
Summer (Dec–Feb)	2300	24.4
Autumn (March–May)	2331	24.8
Winter (June–Aug)	2398	25.5
Total	9416	100

age group, but the over-representation was lowest in the first year of life (57.8% male, 42.2% female). The gender disparity in each age group increased with age, as shown in Table VII.

Mechanism of injury by gender

There was a significant association between gender and mechanism of injury ($\chi^2 = 79.036$, $df = 15$, $p < 0.001$). Table VIII shows that males were particularly overrepresented in the mechanism of 'all pinch, crush, puncture, pierce' (71.0%); 'contact with person' (68.7%); and 'cutting, tearing' (63.6%). Females were overrepresented in 'contact with animal' (53.3%); and less underrepresented in 'bite or sting by animal, human, insect' (47.1%); and 'fall on or from stairs' (46.9%).

Activity by gender

There was a significant association between gender and activity engaged by children at the time of injury ($\chi^2 = 187.29$, $df = 18$, $p < 0.001$). Table IX shows that males were particularly overrepresented in the activity of 'football, rugby, soccer' (94.4%); 'roller blading, skateboarding' (76%); and

'bicycling' (73%). Females were overrepresented in 'horse riding' (92.9%); 'gymnastics & martial arts' (57.5%); and 'basketball, netball' (54%).

Nature of injury by gender

There was a significant association between nature of injury and gender ($\chi^2 = 28.43$, $df = 8$, $p < 0.001$). Table X shows that males were particularly overrepresented in 'dental injury (incl. fractured tooth)' (65.2%), 'eye injury (excl. foreign body in external eye)' (65%), and 'open wound (excludes eye)' (63.9%). Females were less underrepresented in 'effect of venom; any insect bite' (50%), 'superficial' (40.3%), and 'intracranial injury (includes concussion)' (37.2%).

Type of place by gender

There was a significant association between nature of injury and gender ($\chi^2 = 94.92$, $df = 13$, $p < 0.001$). Table XI shows that males were particularly overrepresented in childcare, preschool centre (68.2%); bush, remote or undeveloped place (66.7%); and hospital, medical clinic, or other health service (66.7%), where injuries occurred. Females were overrepresented in farm (excl. farmhouse) (50.0%); other and unspecified sports area (43.6%); and trade or service area, incl. shopping centre, restaurant (41.5%) as the type of place where injuries occurred within children.

Other gender associations:

There were no associations between gender and triage code ($p = 0.110$), mode of separation ($p = 0.539$), body region ($p = 0.073$), or intent (0.134).

Injury and event characteristics by age group

In all age groups, the vast majority of injuries were considered unintentional (98.3%), as shown in Table XII. Also, consistently across all age groups, most cases were triaged as semi-urgent (requiring treatment within 60 min) (68.2%), and in most cases the ED service event was completed and the patient was discharged home (83.0%) (Table XII). There were significant associations between age group and intent ($\chi^2 = 126.67$, $df = 8$, $p < 0.001$), severity ($\chi^2 = 236.63$, $df = 12$, $p < 0.001$), body region ($\chi^2 = 582.44$, $df = 12$, $p < 0.001$), and outcome of visit ($\chi^2 = 36.99$, $df = 8$, $p = 0.003$).

For example, 10–12-year-olds were more likely to have an injury through assault/harm by another person (3.2%), while infants were more likely to have an event of unclassified or undetermined intent (1.6%). 10–12-year-olds were more likely to require emergency (10.1%) or urgent (30.4%) treatment, while infants were less likely to be classified as requiring non-urgent treatment (3.5%). 10–12-year-olds were most likely to have their ED event completed and be discharged (85.6%), while infants were most like-

Table VI. Event characteristics

Activity (10723, 100%)	Type of place (10723, 100%)	Part of place (10723, 100%)
Leisure activity: 4815, 44.9%	Home: 6986, 65.1%,	Unspecified part of place: 4099, 38.2%
Resting, sleeping, eating, other: 1583, 14.8%	Unspecified place: 834, 7.8%.	Garden, park, national park 794, 7.4%
Unspecified activity: 1452, 13.5%	Schools primary or secondary: 741 cases 6.9%	Other interior 784, 7.3%
Being nursed or cared for: 988, 9.2%	Childcare/preschool: 428, 4.0%	Bedroom: 783, 7.3%
Other specified activity: 909, 8.5%	Public parks: 372, 3.5%	Living, family, rumpus room: 747, 7%
Engaged in formal education activity as a student: 507, 4.7%	Oval/field/pitch: 277, 2.6%	Other exterior: 576, 5.4%
Sports activity: 455, 4.2%	Street/highway: 236, 2.2%	Bathroom: 354, 3.3%
Other type of work incl. unpaid housework: 14, 0.1%	Recreation areas, including amusement park, aquatic recreation centre: 229, 2.1%	Playground with or without play equipment: 534, 5%
	Miscellaneous specified place: 229, 2.1%	Stairs: 335, 3.1%
	Trade or service area, including shopping centre and restaurant: 200, 1.9%	Kitchen: 304, 2.8%
	Other and unspecified sports areas: 78, 0.7%	Oval/field: 278, 2.6
	Farm excluding farmhouse: 44, 0.4%	Swimming pool: 180, 1.7%
	Bush, remote or undeveloped place: 42, 0.4%	Car park/driveway: 164, 1.5%
	Hospital, medical clinic or other health service: 27, 0.3%	Road, sealed or unsealed: 158, 1.5%
		Footpath/path/foot track: 117, 1.1%
		Classroom: 103, 1%
		Veranda or balcony, ramp: 67, 0.6%
		Court tennis, squash, etc.: 57, 0.5%
		Paddock/field/camping ground: 40, 0.4%
		Miscellaneous: 38, 0.4%
		Skate park/ice rink: 37, 0.35
		Hall foyer: 33, 0.3%
		Garage, workshop, shed: 29, 0.3%
		Area beneath a building or structure: 22, 0.2%
		Beach: 21, 0.2%
		Toilet: 20, 0.2%

Table VII. Presentations of proportions of males and females within age groups

Age group categories	Male	Female	Total
Infants (0 years)	402, 57.8%	293, 42.2%	695
1–2 years	2144, 61.1%	1367, 38.9%	3511
3–4 years	1364, 62.0%	837, 38.0%	2201
5–9 years	1965, 63.0%	1155, 37.0%	3120
10–12 years	827, 69.1%	369, 30.9%	1196
Total	6702, 62.5%	402, 37.5%	10,723, 100%

Table VIII. Mechanism of injury by gender, $p < 0.001$

Mechanism of injury	N, %	Male	Female	Total
Contact with static object	2238, 20.9%	1431, 63.9%	807, 36.1%	2238, 100%
Cutting, tearing	1359, 12.7%	874, 64.3%	485, 35.7%	1359, 100%
Other fall	1085, 10.1%	690, 63.6%	395, 36.4%	1085, 100%
Fall by stumbling, tripping on same level	(1056, 9.8%)	(653, 61.8%)	(403, 38.2%)	(1056, 100%)
Fall/jump from lesser height (less than 1 m)	(980, 9.1%)	(584, 59.6%)	(137, 46.9%)	(980, 100%)
Contact with moving object	(956, 8.9%)	(604, 63.2%)	(352, 36.8%)	(956, 100%)
Contact with person	(895, 8.3)	(615, 68.7%)	(280, 31.3%)	(895, 100%)
Miscellaneous and unspecified mechanism of injury	(469, 4.4%)	(297, 63.3%)	(172, 36.7%)	(469, 100%)
Bite, sting by animal, human, insect	(380, 3.5%)	(201, 52.9%)	(179, 47.1%)	(380, 100%)
Fall on or from stairs	(292, 2.7%)	(155, 53.1%)	(137, 46.9%)	(292, 100%)
Other, unspecified contact	(231, 2.2%)	(145, 62.8%)	(86, 37.2%)	(231, 100%)
Burns	(201, 1.9%)	(112, 55.7%)	(89, 44.3%)	(201, 100%)
Fall/jump from greater height (more than 1 m)	(193, 1.8%)	(117, 60.6%)	(76, 39.4%)	(193, 100%)
Contact with animal	(180, 1.7%)	(84, 46.7%)	(96, 53.3%)	(180, 100%)
All pinch, crush, puncture, pierce	(162, 1.5)	(115, 71.0%)	(47, 29.0%)	(162, 100%)
Contact, splash, spill	(46, 0.4%)	(25, 54.3%)	(21, 45.7%)	(46, 100%)
Total	(10723, 100%)	(6702, 62.5%)	(4021, 37.5%)	(10723, 100%)

Table IX. Activity by gender, $p < 0.001$

Activities	N, %	Male	Female	Total
Playing	3809, 35.5%	2402, 63.1%	1407, 36.9%	3809, 100%
Resting, sleeping, eating, other	1583, 14.8%	951, 60.1%	632, 39.9%	1583, 100%
Unspecified activity	1452, 13.5%	875, 60.3%	577, 39.7%	1452, 100%
Other specified activity	1083, 10.1%	635, 58.6%	448, 41, 4%	1083, 100%
Being nursed or care for	988, 9.2%	577, 58.4%	411, 41, 6%	988, 100%
Engaged in formal education	507, 4.7%	329, 64.9%	178, 35.1%	507, 100%
Roller blading, skateboarding	272, 2.5%	208, 76.5%	64, 23.5%	272, 100%
Bicycling	262, 2.4%	193, 73.7%	69, 26.3%	262, 100%
Football, rugby, soccer	216, 2%	204, 94.4%	12, 5.6%	216, 100%
Swimming	162, 1.5%	101, 62.3%	61, 37.7%	162, 100%
Trampolining	141, 1.3%	85, 60.3%	56, 39.7%	141, 100%
Ball sport with racquet, bat (baseball, cricket, hockey)	99, 0.9%	65, 65.7%	34, 34.3%	99, 100%
Gymnastics and martial arts	40, 0.4%	17, 42.5%	23, 57.5%	40, 100%
Basketball, netball	31, 0.3%	14, 45.2%	17, 54.8%	31, 100%
Motorised sports (go-kart, minibike, motor cross)	30, 0.3%	21, 70%	9, 30%	30, 100%
Fishing and boating	21, 0.2%	15, 71.4%	6, 28.6%	21, 100%
Horse riding	14, 0.1%	1, 7.1%	13, 92.9%	14, 100%
Logging, walking	9, 0.1%	5, 55.6%	4, 44.4%	9, 100%
Water skiing	4, 0%	4, 100%	0, 0%	4, 100%
Total	10,723, 100%	6702, 62.5%	4021, 37.5%	10,723, 100%

Table X. Nature of injury by gender, $p < 0.001$

Nature of injury	N, %	Male	Female	Total
Open wound (excludes eye)	4527, 42.2%	2895, 63.9%	1632, 36.1	4527, 100%
Superficial (incl. bruise; excl. eye)	3303, 30.8%	1971, 59.7%	1332, 40.3%	3303, 100%
Eye injury (excl. foreign body in external eye [14.1]; includes burn)	1790, 16.7	1164, 65.0%	626, 35.0%	1790, 100%
Miscellaneous or unspecified	313, 2.9%	188, 60.1%	125, 39.9%	313, 100%
Fracture and dislocation (excludes tooth)	237, 2.2%	150, 63.3%	87, 36.7%	237, 100%
Dental injury (incl. fractured tooth)	227, 2.1%	148, 65.2%	79, 34.8%	227, 100%
Burn or corrosion (excl. eye)	176, 1.6	99, 56.3%	77, 34%	176, 100%
Intracranial injury (includes concussion)	94, 0.9%	59, 62.8%	35, 37.2%	94, 100%
Effect of venom; any insect bite	56, 0.5%	28, 50%	28, 50%	65, 100%
Total	10,723, 100%	6702, 62.5%	4021, 37.5%	10,723, 100%

Table XI. Type of place by gender, $p < 0.001$

Type of place	N, %	Male	Female	Total
Home (includes farmhouse)	9686, 65.1%	4257, 60.9%	2729, 39.1%	6986, 100%
Unspecified place	834, 7.8%	499, 59.8%	335, 40.2%	834, 100%
Primary, secondary school	741, 6.9%	485, 65.5%	256, 34.5%	741, 100%
Childcare, preschool centre	428, 4.0%	292, 68.2%	136, 31.8%	428, 100%
Public park	372, 3.5%	249, 66.9%	123, 33.1%	372, 100%
Miscellaneous specified place	229, 2.1%	148, 64.6%	81, 35.4%	229, 100%
Recreation area (informal), specified, incl. amusement park, aquatic recreation centre	299, 2.1%	151, 65.9%	78, 34.1%	299, 100%
Oval, fields, pitch	277, 2.6%	238, 85.9%	39, 14.1%	277, 100%
Street or highway (Public road)	236, 2.2%	154, 65.3%	82, 34.7%	236, 100%
Trade or service area, incl. shopping centre, restaurant	200, 1.9%	117, 58.5%	83, 41.5%	200, 100%
Other and unspecified sports area	78, 0.7%	44, 56.4%	34, 43.6%	78, 100%
Farm (excl. farmhouse)	44, 0.4%	22, 50.0%	22, 50.0%	44, 100%
Bush, remote or undeveloped place	42, 0.4%	28, 66.7%	14, 33.3%	42, 100%
Hospital, medical clinic, or other health service	27, 0.3%	18, 66.7%	9, 33.3%	27, 100%
Total	10,723, 100%	6702, 100%	4021, 100%	10,723, 100%

ly to be admitted (20.0%). Infants were more likely to have head injuries compared to face injuries (55.7%), while 10–12-year-olds were more likely to have injuries coded as ‘body location not required’ (31.9%), which are injuries specific to a part of the body such as foreign body in eye, or concussion.

Mechanisms of injuries by age groups

There was an association between mechanism of injury and age group ($\chi^2 = 1873.67$, $df = 60$, $p < 0.001$). Fall/jump from lesser height (less than 1 m) was the most common mechanism of injury among infants, whereas contact with static object was the most frequent cause of injuries in 1–2, 3–4, and 5–9 years age groups. Contact with another person was the most common mechanism of injury in the 10–12 years age group. Cutting and tearing was the second most

common mechanism of injury in both the 1–2 years and 3–4 years age groups, while contact with a moving object was the second most common mechanism of injury in both the 5–9 years and 10–12 years age groups. Contact with a static object was the second mechanism of injury in infants (Table XIII).

Type of place where the injuries occurred

The association between type of place where the children were injured and age group was significant ($\chi^2 = 2713.20$, $df = 52$, $p < 0.001$). The primary area where injury occurred was found to be in the home in all age groups, followed by unspecified place for both infants and the 1–2 years age group, whereas ‘childcare preschool’ centre was the second main type of place for the 3–4 years age group. ‘Primary, secondary school’ was

Table XII. Intent, triage, mode of separation, and body region by age groups

Variables		Infants (0 years)	1–2 years	3–4 years	5–9 years	10–12 years	Total
Intent <i>p</i> < 0.001	Accident; injury was not intended	679, 97.7%	3481, 99.1%	2179, 99%	3059, 98%	1144, 95.7%	10542, 98.3%
	Event of unclassified or undetermined intent	11, 1.6%	22, 0.6%	17, 0.8%	37, 1.2%	14, 1.2%	101, 0.9%
	Assault/harm by other person	5, 0.7%	8, 0.2%	5, 0.2%	24, 0.8%	38, 3.2%	80, 0.7%
Severity (Triage) <i>p</i> < 0.001	Emergency	43, 6.2%	151, 4.3%	87, 4%	191, 6.1%	121, 10.1%	593, 5.5%
	Urgent (30 min)	190, 27.3%	611, 17.4%	387, 17.6%	733, 23.5%	363, 30.4%	2284, 21.3%
	Semi urgent (60 min)	438, 63%	2581, 73.5%	1604, 72.9%	2035, 65.2%	657, 54.9%	7315, 68.2%
	Non urgent (120 min)	24, 3.5%	168, 4.8%	123, 5.6%	160, 5.1%	55, 4.6%	530, 4.9%
Outcome or ED visit (mode- of separation) <i>p</i> < 0.001	ED service event completed- discharged	543, 78.1%	2863, 81.5%	1824, 82.9%	2650, 84.9%	1024, 85.6%	1661, 15.5%
	Admitted to same or other hospital	139, 20.0%	582, 16.6%	352, 16%	435, 13.9%	153, 12.8%	8904, 83.0%
	Did not wait/left after treatment commenced	13, 1.9%	66, 1.9%	25, 1.1%	35, 1.1%	19, 1.6%	158, 1.5%
Body region <i>p</i> < 0.001	Head (excludes face)	387, 55.7%	1499, 42.7%	863, 39.2%	987, 31.6%	346, 28.9%	4082, 38.1%
	Face (excludes eye)	232, 33.4%	1555, 44.3%	977, 44.4%	1193, 38.2%	434, 36.3%	4391, 40.9%
	Multiple injuries (involving more than one bodily location)	11, 1.6%	45, 1.3%	13, 0.6%	63, 2.1%	35, 2.9%	168, 1.6%
	Body location not required	65, 9.4%	412, 11.7%	348, 15.8%	876, 28.1%	381, 31.9%	2012, 19.4%

the second most frequent type of place for both 5–9 years and 10–12 years age groups (Table XIV).

Part of place where injuries occurred

There was an association between part of place and age group ($\chi^2 = 2490.74$, $df = 116$, $p < 0.001$, but χ^2 assumptions were not fulfilled, and it was not possible to perform an exact test). Children sustained most head and facial injuries in 'unspecified part of place' for all age groups, followed by the bedroom for both infants and 3–4 years age groups, while 'living, family, rumpus room' and 'garden, park, national park/backyard' were the second most common part of place where injury occurred for both 1–2 years and 5–9 year age groups, respectively, as shown in Table XV. Oval/field was the second most common part of place where children sustained injury for 10–12 years age group.

Activities when injuries occurred

The association between activity during which children were injured and age group was significant ($\chi^2 = 4165.61$, $df = 72$, $p < 0.001$, but χ^2

assumptions were not fulfilled, and it was not possible to perform an exact test). The majority of children were injured during playing in the 1–2 years, 3–4 years, 5–9 years, and 10–12 years age groups, and most infants were injured when being nursed or cared for. 'Resting, sleeping, eating, other' was the second most common activity when injury occurred for infants in the 1–2 years and 3–4 years age groups, while unspecified activity was the second most common activity for children aged 5–9 and 10–12 years (Table XVI).

Nature of injuries by age group

The association between nature of injury and age group was significant ($\chi^2 = 1173.10$, $df = 32$, $p < 0.001$). For infants and 10–12-year-olds, superficial injuries were the most common (59.6%, 29.85%), while for 1–2- and 3–4-year-olds open wounds were the most common nature of injury (49.0%, 51.7%, 38.85%). 10–12-year-olds had proportionally the most eye injuries and fractures (27.4%, 6.1% of total injuries among 10–12-year-olds) (Table XVII).

Table XIII. Mechanism of injury by age group, $p < 0.001$

Ranking	< 1 year	1–2 years	3–4 years	5–9 years	10–2 years	Total
1	Fall/jump from lesser height (less than 1 m) (160, 23%)	Contact with static object (857, 24.4%)	Contact with static object (542, 24.6%)	Contact with static object (585, 18.8%)	Contact with person (275, 23%)	2419
2	Contact with static object (125, 18%)	Cutting, tearing (539, 15.4%)	Cutting, tearing (337, 15.3%)	Contact with moving object (399, 12.8%)	Contact with moving object (235, 19.6%)	1635
3	Other falls (115, 16.5%)	Fall by stumbling, tripping on same level (521, 14.8%)	Fall by stumbling, tripping on same level (225, 10.2%)	Contact with person (388, 12.4%)	Contact with static object (129, 10.8%)	1378
4	Fall by stumbling, tripping on same level (64, 9.2%)	Fall/jump from lesser height (less than 1 m) (402, 11.4%)	Other fall (222, 10.1%)	Cutting, tearing (343, 11%)	Other fall (105, 8.8%)	1136
5	Cutting, tearing (51, 7.3%)	Other falls (337, 9.6%)	Fall/jump from lesser height (less than 1 m) (213, 9.7%)	Other fall (306, 9.8%)	Cutting, tearing (89, 7.4%)	996
6	Contact with moving object (31, 4.5%)	Fall on or from stairs (138, 3.9%)	Contact with moving object (153, 7%)	Miscellaneous and un-specified mechanism of injury (220, 7.1%)	Miscellaneous and un-specified mechanism of injury (85, 7.1%)	627
7	Contact with person (30, 4.3%)	Contact with moving object (138, 3.9%)	Contact with person (112, 5.1%)	Fall by stumbling, tripping on same level (190, 6.1%)	Fall by stumbling, tripping on same level (56, 4.7%)	526
8	Fall on or from stairs (29, 4.2%)	Burns (95, 2.7%)	Bite, sting by animal, human, insect (91, 4.1%)	Fall/jump from lesser height (less than 1 m) (169, 5.4%)	Bite, sting by animal, human, insect (50, 4.2%)	434
9	Burns (28, 4%)	Contact with person (90, 2.6%)	Miscellaneous and un-specified mechanism of injury (61, 2.8%)	Bite, sting by animal, human, insect (140, 4.5%)	Other, unspecified contact (37, 3.1%)	356
10	Fall/jump from greater height (more than 1 m) (18, 2.6%)	Bite, sting, by animal, human, insect (90, 2.6%)	Fall on or from stairs (54, 2.4%)	Other, unspecified contact (75, 2.4%)	Fall/jump from lesser height (less than 1 m) (36, 3%)	273
11	Miscellaneous and un-specified mechanism of injury (17, 2.4%)	Miscellaneous and un-specified mechanism of injury (86, 2.4%)	Other, unspecified contact (47, 2.1%)	Fall on or from stairs (65, 2.1%)	All Pinch, crush, puncture, pierce (26, 2.2%)	241
12	Other, unspecified contact (11, 1.6%)	Fall/jump from greater height (more than 1 m) (77, 2.2%)	Contact with animal (46, 2.1%)	Contact with animal (64, 2.1%)	Contact with animal (23, 1.9%)	221
13	Bite, sting, by animal, human, insect (9, 1.3%)	Other, unspecified contact (61, 1.7%)	All pinch, crush, puncture, pierce (40, 1.8%)	All pinch, crush, puncture, pierce (62, 2%)	Burns (22, 1.8%)	194
14	Contact with animal (3, 0.4%)	Contact with animal (44, 1.3%)	Fall/jump from greater height (more than 1 m) (38, 1.7%)	Fall/jump from greater height (more than 1 m) (48, 1.5%)	Fall/jump from greater height (more than 1 m) (12, 1%)	145

Table XIII. Cd.

Ranking	< 1 year	1–2 years	3–4 years	5–9 years	10–2 years	Total
15	All Pinch, crush, puncture, pierce (2, 0.3%)	All Pinch, crush, puncture, pierce (32, 0.9%)	Burns (17, 0.8%)	Burns (39, 1.3%)	Contact, splash, spill (10, 0.8%)	100
16	Contact, splash, spill (2, 0.3%)	Contact, splash, spill (4, 0.1%)	Contact, splash, spill (3, 0.1%)	Contact, splash, spill (27, 0.9%)	Fall on or from stairs (6, 0.5%)	42
Total	695	3511	2201	3120	1196	10,723

Table XIV. Type of place where the injuries occurred, $p < 0.001$

Ranking	< 1 year age group <i>n</i> = 695	1–2 years age group <i>n</i> = 3511	3–4 years age group <i>n</i> = 2201	5–9 years age group <i>n</i> = 3120	10–12 years age group <i>n</i> = 1196	Total 10723
1	Home (includes farmhouse) (596, 85.8%)	Home (includes farmhouse) (2714, 77.3%)	Home (includes farmhouse) (1524, 69.2%)	Home (includes farmhouse) (1709, 54.8%)	Home (includes farmhouse) (443, 37%)	6986
2	Unspecified place (45, 6.5%)	Unspecified place (237, 6.8%)	Childcare preschool centre (187, 8.5%)	Primary, secondary school (480, 15.5%)	Primary, secondary school (240, 20.1%)	1189
3	Trade or service area, incl. shopping centre, restaurant (18, 2.6%)	Childcare, preschool centre (202, 5.8%)	Unspecified place (168, 7.6%)	Unspecified place (263, 8.4%)	Oval, fields, pitch (165, 13.8%)	816
4	Public park (8, 1.2%)	Public park (94, 2.7%)	Public park (97, 4.4%)	Public park (125, 4%)	Unspecified place (121, 10.1%)	445
5	Childcare, preschool centre (6, 0.9%)	Trade or service area, incl. shopping centre, restaurant (85, 2.4%)	Trade or service area, incl. shopping centre, restaurant (52, 2.4%)	Street or highway (Public road) (108, 3.5%)	Street or highway (Public road) (52, 4.3%)	303
6	Street or highway (Public road) (6, 0.9%)	Miscellaneous specified place (67, 1.9%)	Recreation area (informal), specified, incl. amusement park, aquatic recreation centre (43, 2%)	Oval, fields, pitch (99, 3.2%)	Public park (48, 4%)	263
7	Miscellaneous specified place (6, 0.9%)	Recreation area (informal), specified, incl. amusement park, aquatic recreation centre (43, 1.2%)	Street or highway (Public road) (43, 2%)	Recreation area (informal), specified, incl. amusement park, aquatic recreation centre (98, 3.1%)	Recreation area (informal), specified, incl. amusement park, aquatic recreation centre (43, 3.6%)	233
8	Bush, remote or undeveloped place (4, 0.6%)	Street or highway (Public road) (27, 0.85)	Miscellaneous specified place (42, 1.9%)	Miscellaneous specified place (84, 2.7%)	Other and unspecified sports area (32, 2.7%)	189
9	Recreation area (informal), specified, incl. amusement park, aquatic recreation centre (2, 0.3%)	Hospital, medical clinic, or other health service (15, 0.4%)	Primary, secondary school (16, 0.7%)	Trade or service area, incl. shopping centre, restaurant (40, 1.3%)	Miscellaneous specified place (30, 2.5%)	103
10	Primary, secondary school (1, 0.1%)	Farm (excl. farmhouse) (12, 0.3%)	Oval, fields, pitch (10, 0.5%)	Other and unspecified sports area (36, 1.2%)	Bush, remote or undeveloped place (8, 0.7%)	67

Table XIV. Cd.

Ranking	< 1 year age group n = 695	1–2 years age group n = 3511	3–4 years age group n = 2201	5–9 years age group n = 3120	10–12 years age group n = 1196	Total 10723
11	Hospital, Medical clinic or other health service (1, 0.1%)	Bush, remote or undeveloped place (5, 0.1%)	Bush, remote or undeveloped place (6, 0.3%)	Childcare, preschool centre (31, 1%)	Farm (excl. farmhouse) (6, 0.5%)	49
12	Oval, fields, pitch (1, 0.1%)	Primary, secondary school (4, 0.1%)	Hospital, Medical clinic or other health service (6, 0.3%)	Farm (excl. farmhouse) (24, 0.8%)	Trade or service area, incl. shopping centre, restaurant (5, 0.4%)	40
13	Other and unspecified sports area (1, 0.1%)	Other and unspecified sports area (4, 0.1%)	Other and unspecified sports area (5, 0.2%)	Bush, remote or undeveloped place (19, 0.6%)	Childcare, preschool centre (2, 0.2%)	31
14	Farm (excl. farmhouse) (0, 0%)	Oval, fields, pitch (2, 0.1%)	Farm (excl. farmhouse) (2, 0.1%)	Hospital, Medical clinic or other health service (4, 0.1%)	Hospital, medical clinic, or other health service (1, 0.1%)	9

Table XV. Part of place where the injuries occurred, $p < 0.001$

Ranking	Infants (0 years) n = 695	1–2 years age group n = 3511	3–4 years age group n = 2201	5–9 years age group n = 3120	10–12 years age group n = 1196	Total 10723
1	Unspecified part of place (247, 35.5%)	Unspecified part of place (1357, 38.6%)	Unspecified part of place (884, 40.2%)	Unspecified part of place (1221, 39.1%)	Unspecified part of place (390, 32.6%)	4099
2	Bedroom (133, 19.1%)	Living, family, rumpus room (365, 10.4%)	Bedroom (175, 8%)	Garden, park, national park/ backyard (294, 9.4%)	Oval/field (161, 13.5%)	1128
3	Living, family, rumpus room (83, 11.9%)	Other, interior (358, 10.2%)	Garden, park, national park/ backyard (173, 7.9%)	Other, exterior (226, 7.2%)	Other, exterior (159, 13.3%)	999
4	Other, interior (78, 11.2%)	Bedroom (308, 8.8%)	Other, interior (165, 7.5%)	Playground with or without play equipment (207, 6.6%)	Garden, park, national park/ backyard (98, 8.2%)	856
5	Kitchen (45, 6.5%)	Garden, park, national park/ backyard (211, 6%)	Living, family, rumpus room (162, 7.4%)	Bedroom (150, 4.8%)	Playground with or without play equipment (51, 4.3%)	619
6	Bathroom (30, 4.3%)	Bathroom (191, 5.4%)	Playground with or without play equipment (148, 6.7%)	Other, interior (133, 4.3%)	Other, interior (50, 4.2%)	552
7	Stairs (29, 4.2%)	Stairs (162, 4.6%)	Other, exterior (89, 4%)	Oval/field (113, 3.6%)	Swimming pool (36, 3%)	429
8	Garden, park, national park/ backyard (18, 2.6%)	Kitchen (149, 4.2%)	Bathroom (85, 3.9%)	Living, family, rumpus room (112, 3.6%)	Roadway, sealed or unsealed (36, 3%)	400
9	Car park/ Driveway (9, 1.3%)	Playground with or without play equipment (127, 3.6%)	Stairs (66, 3%)	Swimming pool (94, 3%)	Court (tennis, squash, etc.) (35, 2.9%)	331

Table XV. Cd.

Ranking	Infants (0 years) n = 695	1–2 years age group n = 3511	3–4 years age group n = 2201	5–9 years age group n = 3120	10–12 years age group n = 1196	Total 10723
10	Other, exterior (7, 1%)	Other, exterior (95, 2.7%)	Kitchen (52, 2.4%)	Roadway, sealed or unsealed (73, 2.3%)	Living, family, rumpus room (25, 2.1%)	252
11	Roadway, sealed or unsealed (4, 0.6%)	Car park/ Driveway (33, 0.9%)	Car park/ Driveway (44, 2%)	Stairs (70, 2.2%)	Classroom (21, 1.8%)	172
12	Footpath/path/ foot track (4, 0.6%)	Veranda or balcony, ramp (31, 0.9%)	Swimming pool (31, 1.4%)	Car park/ Driveway (69, 2.2%)	Footpath/path/ foot track (19, 1.6%)	154
13	Veranda or balcony, ramp (3, 0.4%)	Roadway, sealed or unsealed 920, 0.6%)	Footpath/path/ foot track (30, 1.4%)	Classroom (63, 2%)	Bedroom (17, 1.4%)	133
14	Laundry (1, 0.1%)	Swimming pool (19, 0.5%)	Roadway, sealed or unsealed (25, 1.1%)	Footpath/path/ foot track (47, 1.5%)	Skate park/ice rink (16, 0.5%)	108
15	Gymnasium (1, 0.1%)	Footpath/path/ foot track (17, 0.5%)	Veranda or balcony, ramp (19, 0.9%)	Kitchen (46, 1.5%)	Kitchen (12, 1%)	95
16	Playground with or without play equipment (1, 0.1%)	Miscellaneous (15, 0.4%)	Toilet (9, 0.4%)	Bathroom (39, 1.3%)	Car park/ Driveway (9, 0.8%)	73
17	Oval/field (1, 0.1%)	Hall foyer (13, 0.4%)	Classroom (7, 0.3%)	Court (tennis, squash, etc.) (21, 0.7%)	Bathroom (9, 0.8%)	51
18	Beach (1, 0.1%)	Classroom (12, 0.3%)	Hall foyer (6, 0.3%)	Paddock/field/ camping ground (19, 6%)	Stairs (8, 0.7%)	46
19	Classroom (0, 0%)	Garage, workshop, shed (8, 0.2%)	Garage, workshop, shed (6, 0.3%)	Skate park/ ice rink (16, 0.5%)	Paddock/field/ camping ground (8, 0.7%)	38
20	Miscellaneous (0, 0%)	Paddock/field/ camping ground (7, 0.2%)	Paddock/field/ camping ground (6, 0.3%)	Miscellaneous (15, 0.5%)	Beach (6, 0.5%)	34
21	Hall foyer (0, 0%)	Area beneath a building or structure (5, 0.1%)	Skate park/ ice rink (5, 0.2%)	Area beneath a building or structure (13, 0.4%)	Hall foyer (5, 0.4%)	28
22	Toilet (0, 0%)	Toilet (3, 0.1%)	Miscellaneous (5, 0.2%)	River/creek/lake/ reservoir (13, 0.4%)	River/creek/lake/ reservoir (4, 0.3%)	25
23	Garage, workshop, shed (0, 0%)	Beach (3, 0.1%)	Oval/field (3, 0.1%)	Garage, workshop, shed (13, 0.4%)	Veranda or balcony, ramp (4, 0.3%)	23
24	Court (tennis, squash, etc.) (0, 0%)	Laundry (2, 0.1%)	Gymnasium (2, 0.1%)	Beach (10, 0.3%)	Area beneath a building or structure (4, 0.3%)	18
25	Area beneath a building or structure (0, 0%)	Gymnasium (0, 0%)	Laundry (1, 0%)	Veranda or balcony, ramp (10, 0.3%)	Gymnasium (4, 0.3%)	15
26	Paddock/field/ camping ground (0, 0%)	Court (tennis, squash, etc.) (0, 0%)	Court (tennis, squash, etc.) (1, 0%)	Hall foyer (9, 0.3%)	Sea/surf/bay/ ocean (3, 0.3%)	13
27	Skate park/ice rink (0, 0%)	Skate park/ice rink (0, 0%)	River/creek/lake/ reservoir (1, 0%)	Gymnasium (9, 0.3%)	Miscellaneous (3, 0.3%)	13

Table XV. Cd.

Ranking	Infants (0 years) n = 695	1–2 years age group n = 3511	3–4 years age group n = 2201	5–9 years age group n = 3120	10–12 years age group n = 1196	Total 10723
28	River/creek/lake/ reservoir (0, 0%)	Oval/field (0, 0%)	Beach (1, 0%)	Toilet (7, 0.2%)	Garage, workshop, shed (2, 0.2%)	10
29	Sea/surf/bay/ ocean (0, 0%)	River/creek/lake/ reservoir (0, 0%)	Area beneath a building or structure (0, 0%)	Sea/surf/bay/ ocean (7, 0.2%)	Toilet (1, 0.1%)	8
30	Swimming pool (0, 0%)	Sea/surf/bay/ ocean (0, 0%)	Sea/surf/bay/ ocean (0, 0%)	Laundry (1, 0%)	Laundry (0, 0%)	1

Table XVI. Activities when injuries occurred, $p < 0.001$

Ranking	< 1 year age group n = 695	1–2 years age group n = 3511	3–4 years age group n = 2201	5–9 years age group n = 3120	10–12 years age group n = 1196	Total 10723
1	Being nursed or care for (330, 47.5%)	Playing (1423, 40.5%)	Playing (1006, 54.7%)	Playing (1020, 32.7%)	Playing (244, 20.4%)	4023
2	Resting, Sleeping, eating, other (130, 18.7%)	Resting, Sleeping, eating, other (9670, 19.1%)	Resting, Sleeping, eating, other (375, 17%)	Unspecified activity (453, 14.5%)	Unspecified activity (161, 13.5%)	1789
3	Playing (116, 16.7%)	Being nursed or care for (501, 14.3%)	Unspecified activity (296, 13.4%)	Other specified activity (355, 11.4%)	Engaged in formal education (150, 12.5%)	1418
4	Unspecified activity (72, 10.4%)	Unspecified activity (470, 13.4%)	Other specified activity (199, 9%)	Engaged in formal education (343, 11%)	Football, rugby, soccer (139, 11.6%)	1223
5	Other specified activity (45, 6.5%)	Other specified activity (347, 9.9%)	Being nursed or care for (117, 5.3%)	Resting, sleeping, eating, other (321, 10.3%)	Other specified activity (137, 11.5%)	967
6	Bicycling (1, 0.1%)	Trampolining (29, 0.8%)	Bicycling (67, 3%)	Bicycling (128, 4.1%)	Resting, sleeping, eating, other (87, 7.3%)	312
7	Trampolining (1, 0.1%)	Bicycling (22, 0.6%)	Roller blading, skateboarding (55, 2.5%)	Roller blading, skateboarding (124, 4%)	Roller blading, skateboarding (77, 6.4%)	279
8	Football, rugby, soccer (0, 0%)	Roller blading, skateboarding (16, 0.5%)	Trampolining (28, 1.3%)	Swimming (89, 2.9%)	Ball sport with racquet, bat (baseball, cricket, hockey (53, 4.4%)	186
9	Jogging, walking (0, 0%)	Swimming (14, 0.4%)	Swimming (26, 1.2%)	Football, rugby, soccer (76, 2.4%)	Bicycling (44, 3.7%)	160
10	Gymnastics and martial arts (0, 0%)	Engaged in formal education (6, 0.2%)	Gymnastics and martial arts (10, 0.5%)	Trampolining (63, 2%)	Swimming (33, 2.8%)	112
11	Ball sport with racquet, bat (baseball, cricket, hockey) (0, 0%)	Gymnastics and Martial arts (5, 0.1%)	Engaged in formal education (8, 0.4%)	Ball sport with racquet, bat (baseball, cricket, hockey) (40, 1.3%)	Basketball, netball (22, 1.8%)	75

Table XVI. Cd.

Ranking	< 1 year age group n = 695	1–2 years age group n = 3511	3–4 years age group n = 2201	5–9 years age group n = 3120	10–12 years age group n = 1196	Total 10723
12	Motorised sports (go-kart, minibike, motor cross) (0, 0%)	Jogging, Walking (4, 0.1%)	Ball sport with racquet, bat (baseball, cricket, hockey) (6, 0.3%)	Being nursed or care for (32, 1%)	Trampolining (20, 1.7%)	62
13	Basketball, netball (0, 0%)	Motorised sports (go-kart, minibike, motor cross) (3, 0.1%)	Motorised sports (go-kart, minibike, motor cross) (3, 0.1%)	Motorised sports (go-kart, minibike, motor cross) (21, 0.7%)	Being nursed or care for (8, 0.7%)	35
14	Roller blading, skateboarding (0, 0%)	Fishing and boating (1, 0%)	Basketball, netball (2, 0.1%)	Gymnastics and martial arts (18, 0.6%)	Gymnastics and martial arts (7, 0.6%)	28
15	Horse riding (0, 0%)	Ball sport with racquet, bat (baseball, cricket, hockey) (0, 0%)	Football, rugby, soccer (1, 0%)	Fishing and boating (16, 0.5%)	Horse riding (6, 0.5%)	23
16	Fishing and boating (0, 0%)	Basketball, netball (0, 0%)	Horse riding (1, 0%)	Basketball, netball (7, 0.2%)	Fishing and boating (3, 0.3%)	11
17	Swimming (0, 0%)	Football, rugby, soccer (0, 0%)	Fishing and boating (1, 0%)	Horse riding (7, 0.2%)	Motorised sports (go-kart, minibike, motor cross) (3, 0.3%)	11
18	Water skiing (0, 0%)	Horse riding (0, 0%)	Jogging, walking (0, 0%)	Jogging, walking (4, 0.1%)	Jogging, walking (1, 0.1%)	5
19	Engaged in formal education (0, 0%)	Water skiing (0, 0%)	Water skiing (0, 0%)	Water skiing (3, 0.1%)	Water skiing (1, 0.1%)	4

Table XVII. Nature of injury by age group

Nature of injury	Less than 12 months	1–2 years	3–4 years	5–9 years	10–12 years	Total
Open wound (excludes eye)	(165, 23%)	(1719, 49.0%)	(1138, 51.7%)	(1209, 38.85)	(296, 24.7%)	(4527, 42.25)
Superficial (incl. bruise; excl. eye)	(414, 59.6%)	(1172, 33.4%)	(593, 26.9%)	(768, 24.6%)	(356, 29.85)	(3303, 30.8%)
Eye injury (excl. foreign body in external eye [14.1]; includes burn)	(59, 8.5%)	(378, 10.8%)	(310, 14.15)	(715, 22.9%)	(328, 27.4%)	(1790, 16.7%)
Miscellaneous or unspecified	(11, 1.6%)	(32, 0.9%)	(44, 2.0%)	(167, 5.4%)	(59, 4.9%)	(313, 2.9%)
Fracture and dislocation (excludes tooth)	(2, 0.3%)	(26, 0.7%)	(36, 1.6%)	(100, 3.2%)	(73, 6.1%)	(237, 2.2%)
Dental injury (incl. fractured tooth)	(5, 0.7%)	(72, 2.1%)	(46, 2.1%)	(81, 2.6%)	(23, 1.9%)	(227, 2.1%)
Burn or corrosion (excl. eye)	(27, 3.9%)	(89, 2.5%)	(13, 0.6%)	(28, 0.9%)	(19, 1.6%)	(176, 1.6%)
Intracranial injury (includes concussion)	(10, 1.4%)	(14, 0.4%)	(12, 0.5%)	(27, 0.9%)	(31, 2.6%)	(94, 0.9%)
Effect of venom; any insect bite	(2, 0.3%)	(9, 0.3%)	(9, 0.4%)	(25, 0.8%)	(11, 0.9%)	(56, 0.5%)
Total	(695, 100%)	(3511, 100%)	(2201, 100%)	(3120, 100%)	(1196, 100%)	(10723, 100%)

Table XVIII. *P*-values of variables

Variables	Triage	Admission status	Mechanism of injury	Body region injured	Nature of injury
Mechanism of injury	$p < 0.001$ Test valid	$p < 0.001$ χ^2 assumptions not fulfilled	X	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled
Nature of injury	$p < 0.001$ Test valid	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	X
Body of region	$p < 0.001$ Test valid	$p < 0.001$ Test valid	$p < 0.001$ χ^2 assumptions not fulfilled	X	$p < 0.001$ χ^2 assumptions not fulfilled
Activity	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled
Type of place	$p < 0.001$ Test valid	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled
Part of place	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled	$p < 0.001$ χ^2 assumptions not fulfilled
Time of day	$p < 0.049$ Test valid	$p < 0.001$ Test valid	$p < 0.001$ Test valid	$p < 0.001$ Test valid	$p < 0.001$ Test valid
Day of week	$p = 0.784$	$p = 0.655$	$p = 0.044$	$p = 0.560$	$p < 0.001$ Test valid
Season	$p = 0.021$	$p = 0.891$	$p < 0.001$ Test valid	$p = 0.333$	$p = 0.311$
Indigenous status	$p = 0.308$	$p < 0.001$ Test valid	$p = 0.030$ Test valid	$p = 0.002$ Test valid	$p = 0.062$
Gender	$p = 0.110$	$p = 0.539$	$p < 0.001$ Test valid	$p = 0.073$	$p < 0.001$ Test valid

Other associations between injury and event characteristics

As shown in Table XVIII, the associations between injury and event characteristics were different; some relations were significant, but others were not.

Injury and event characteristics by indigenous status

Associations between age, gender, and Indigenous status

There was not a significant association between indigenous status and age group ($p = 0.111$), and the association between indigenous status and gender approached significance ($p = 0.050$). Table XIX shows the relationship between indigenous status and other variables in the study.

Mechanism of injury by indigenous status

Mechanism of injury was significantly associated with indigenous status ($\chi^2 = 26.89$, $df = 15$, $p = 0.030$). As shown in Table XX, 'contact with a static object' followed by 'cutting and tearing' were the leading mechanisms in both indigenous

and non-indigenous cases. The third most common mechanism was 'stumbling, tripping on the same level' for Indigenous children and 'other fall' for non-Indigenous children.

Body region of injury by indigenous status

There was an association between body region of injury and indigenous status ($\chi^2 = 14.72$, $df = 3$,

Table XIX. The associations of indigenous status with other variables

Triage	$p = 0.308$
Mechanism of injury	$p = 0.030$
Nature of injury	$p = 0.062$
Body of region	$p = 0.002$
Admission status	$p < 0.001$
Activity	Unable to conduct χ^2 test
Part of place	Unable to conduct χ^2 test
Type of place	$p < 0.001$
Time of day	$p < 0.001$
Day of week	$p = 0.873$
Season	$p = 0.602$
Gender	$p = 0.050$
Age group	$p = 0.111$

Table XX. Mechanism of injury by indigenous status

Mechanism of injury <i>p</i> = 0.030	Indigenous status		Total
	Aboriginal and/or TSI	Not indigenous	
Contact with static object	152, 19.6%	2063, 21%	2215, 20.9%
Cutting and tearing	103, 13.3%	1247, 12.75%	1350, 12.7%
Other fall	70, 9%	999, 10.2%	1069, 10.1%
Fall by stumbling, tripping on same level	87, 11.2%	957, 9.7%	1044, 9.8%
Fall/jump from lesser height (less than 1 m)	70, 9%	900, 9.2%	970, 9.1%
Contact with moving object	49, 6.3%	897, 9.1%	946, 8.9%
Contact with person	74, 9.5%	814, 8.3%	888, 8.4%
Bite or sting by animal, human, insect	42, 5.4%	333, 3.4%	375, 3.5%
Miscellaneous and unspecified mechanism of injury	25, 3.2%	438, 4.5%	463, 4.4%
Fall on or from stairs	24, 3.1%	266, 2.7%	290, 2.7%
Other, unspecified contact	18, 2.3%	211, 2.1%	229, 2.2%
Burns	13, 1.7%	181, 1.8%	194, 1.8%
Fall/jump from greater height (more than 1 m)	12, 1.5%	179, 1.8%	191, 1.8%
Contact with animal	19, 2.4%	159, 1.6%	178, 1.7%
All pinch, crush, puncture, pierce	15, 1.9%	146, 1.5%	161, 1.5%
Contact, splash, spill	4, 0.5%	42, 0.4%	64, 0.4%
Total	777, 100%	9832, 100%	10,609, 100%

Table XXI. Body region injury by indigenous status

Body regions <i>p</i> = 0.002	Indigenous status		Total
	Aboriginal and/or TSI	Not indigenous	
Face (excludes eye)	316, 40.7%	4021, 40.9%	4337, 40.9%
Head (excludes face)	331, 42.6%	3713, 37.8%	4044, 38.1%
Body location not required	115, 14.8%	1951, 19.8%	2066, 19.5%
Multiple injuries (involving more than one bodily location)	15, 14.8%	147, 1.5%	162, 1.5%
Total	777, 100%	9832, 100%	10,609, 100%

Table XXII. Mode of separation by indigenous status

Outcome of ED visit (Mode of separation) <i>p</i> < 0.001	Indigenous status		Total
	Aboriginal and/or TSI	Not indigenous	
ED service event completed – discharged	667, 85.8%	8114, 82.8%	8811, 83.1%
Admitted to same or other hospital	90, 11.6%	1556, 15.8%	1646, 15.5%
Did not wait/left after treatment commenced	20, 2.6%	132, 1.3%	152, 1.4%
Total	777, 100%	9832, 100%	10,609, 100%

p = 0.002). Table XXI shows that the proportion of children with facial injuries was very similar for both indigenous and non-indigenous children (40%). However, indigenous children had higher proportions of head injuries (42.6%) and multiple injuries than non-indigenous children.

Mode of separation by indigenous status

There was an association between mode of separation and indigenous status ($\chi^2 = 16.76$, *df* = 2, *p* < 0.001). As shown in Table XXII, indigenous patients were more likely to have the ED service event completed and be discharged (85.8%),

Table XXIII. Type of place by indigenous status

Type of place <i>p</i> < 0.001	Indigenous status		Total
	Aboriginal and/or TSI	Not indigenous	
Home (includes farmhouse)	537, 69.1%	6367, 64.8%	6904, 65.1%
Unspecified place	93, 12%	731, 7.4%	824, 7.8%
Primary, secondary school	30, 3.9%	707, 7.2%	737, 6.9%
Childcare, preschool centre	14, 1.8%	412, 4.2%	426, 4%
Public park	27, 3.5%	340, 3.5%	367, 3.5%
Oval, fields, pitch	18, 2.3%	256, 2.6%	274, 2.6%
Street or highway (public road)	16, 2.1%	219, 2.2%	235, 2.2%
Miscellaneous specified place	11, 1.4%	217, 2.2%	228, 2.1%
Recreation area (informal), specified, incl. amusement park, aquatic recreation centre	12, 1.5%	215, 2.2%	227, 2.1%
Trade or service area, incl. shopping centre, restaurant	10, 1.3%	187, 1.9%	197, 1.9%
Other and unspecified sports area	1, 0.1%	77, 0.8%	78, 0.7%
Farm (excl. farmhouse)	1, 0.1%	42, 0.4%	43, 0.4%
Bush, remote or undeveloped place	3, 0.4%	39, 0.4%	42, 0.4%
Hospital, medical clinic, or other health service	4, 0.5%	23, 0.2%	27, 0.3%
Total	777, 100%	9832, 100%	10,609, 100%

or to leave before completion of the event (2.6%). Non-indigenous patients were more likely to be admitted to hospital (15.8%).

Activity by indigenous status

There was a relationship between indigenous status and type of activity the injured child was engaged in when the injury occurred ($\chi^2 = 66.97$, $df = 18$, $p < 0.001$, but χ^2 assumptions were not fulfilled, and it was not possible to perform an exact test). Additionally, it was found that the highest frequency of injuries occurred when the children were playing, for both indigenous and non-indigenous children. Interestingly, there was a higher incidence of injury among children engaged in the activity of rollerblading/skateboarding in aboriginal and/or TSI than in children engaged in formal education (as student); whereas, the opposite was true with non-indigenous children.

Type of place by indigenous status

In this study, there was an association between indigenous status and type of place ($\chi^2 = 56.17$, $df = 13$, $p < 0.001$). As shown in Table XXIII, the primary areas where injury occurred were the home, followed by 'unspecified place', and then primary/secondary school, for both indigenous and non-indigenous children, but the proportion in each place varied by indigenous status.

Time of day by indigenous status

There was relationship between indigenous status and time of day of injury ($\chi^2 = 63.03$, $df = 5$, $p < 0.001$). The greatest proportion of injuries occurred in the 3-hour time period of 3–6 p.m. for both indigenous and non-indigenous cases. More indigenous cases presented overnight from 9 p.m. – 6 a.m., while less presented in the morning 6–9 a.m. and 9 a.m. – midday (Table XXIV).

Gender by indigenous status

The association between indigenous status and gender approached significance ($\chi^2 = 3.85$, $df = 1$, $p < 0.050$). As shown in the Table XXV below, males were more overrepresented among indigenous children (males 65.8%) than among non-indigenous children (males 62.2%).

Injury and event characteristic by time

Table XXVI demonstrates associations between time of day and other variables in the dataset.

Triage by time of injury

There was an association between triage (severity of the injury) and time of injury ($\chi^2 = 25.06$, $df = 15$, $p = 0.049$). As shown in the Table XXVII, semi urgent (60 min) was the most common triage for each coded temporal period in the present study.

Table XXIV. Injury time by indigenous status

Injury time <i>p</i> < 0.001	Indigenous status		Total
	Aboriginal and/or TSI	Not indigenous	
3–6 p.m.	218, 28.1%	2764, 28.1%	2982, 28.1%
6–9 p.m.	165, 21.2%	2091, 21.3%	2256, 21.3%
Midday – 3 p.m.	148, 19%	1739, 17.7%	1887, 17.8%
9 a.m. – midday	93, 12%	1689, 17.2%	1782, 16.3%
9 p.m. – 6 a.m.	120, 15.4%	822, 8.45	942, 8.9%
6–9 a.m.	33, 4.2%	727, 7.4%	760, 7.2%
Total	777, 100%	9832, 100%	10,609, 100%

Table XXV. Gender by indigenous status

Gender <i>p</i> < 0.001	Indigenous status		Total
	Aboriginal and/or TSI	Not indigenous	
Male	511, 65.8%	6118, 62.2%	6629, 62.5%
Female	266, 34.2%	3714, 37.8%	3980, 37.5%
Total	777, 100%	9832, 100%	10,609, 100%

Mechanism of injury by time

There was strong evidence of an association between the mechanism of injury and time of injury ($\chi^2 = 306.58$, *df* = 75, *p* < 0.001). The most frequent mechanism of injury was ‘contact with a static object’ at each coded temporal time of injury in this study, but this category was overrepresented at 6–9 a.m. and 6–9 p.m. Interestingly, more cases of injuries as result of ‘fall/jump from lesser height (less than 1 m)’ than cases occurred from ‘fall by stumbling, tripping on same level’ occurred at 6–9 a.m., but the opposite was true in the rest of temporal hours, as shown in the Table XXVIII.

Nature of injury by injury time

There was an association between nature of injury and time of injury ($\chi^2 = 306.58$, *df* = 75, *p* < 0.001). Open wound was the predominant injury at all coded times of injury in this study, but it was most represented in the 6–9 p.m. time period. Interestingly, there were more burn or corrosion

Table XXVI. The associations of injury time (time-block of day) with other variables

Triage	<i>p</i> = 0.049
Mechanism of injury	<i>p</i> < 0.001
Nature of injury	<i>p</i> < 0.001
Body of region	<i>p</i> < 0.001
Admission status	<i>p</i> < 0.001
Activity	χ^2 test not valid
Part of place	χ^2 test not valid
Type of place	<i>p</i> < 0.001
Gender	<i>p</i> = 0.007
Age group	<i>p</i> < 0.001
Day of week	<i>p</i> < 0.001
Season	<i>p</i> < 0.001
Month	<i>p</i> < 0.001

(excl. eye) cases occurred at 6–9 a.m. than miscellaneous or unspecified, fracture and dislocation (excludes tooth), and dental injury (incl. fractured

Table XXVII. Triage by time of injury

Triage <i>p</i> = 0.049	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	8–9 p.m.	9 p.m. – 6 a.m.	
Semi-urgent (60 min)	554, 72.4%	1199, 66.8%	1272, 66.9%	2032, 67.4%	1601, 70.2%	657, 68.2%	7315, 68.2%
Urgent (30 min)	143, 18.7%	400, 22.3%	423, 22.2%	663, 22%	452, 19.8%	203, 21.1%	2284, 21.3%
Emergency	44, 5.85	111, 6.25	111, 5.8%	172, 5.7%	103, 4.5%	52, 5.4%	593, 5.5%
Non-urgent (120 min)	24, 3.15	84, 4.7%	96, 5%	149, 4.9%	126, 5.5%	51, 5.3%	530, 4.9%
Total	765, 100%	1794, 100%	1902, 100%	3016, 100	2282, 100%	963, 100%	10,722, 100%

Table XXVIII. Mechanism of injury by time

Mechanism of injury <i>p</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	6–9 p.m.	9 p.m. – 6 a.m.	
Contact with static object	198, 25.9%	341, 19%	366, 19.2%	567, 18.8%	580, 25.4%	186, 19.3%	2238, 20.9%
Cutting and tearing	89, 11.6%	219, 12.2%	217, 11.4%	397, 13.2%	338, 14.8%	99, 10.3%	1359, 12.7%
Other fall	73, 9.5%	181, 10.1%	190, 10.0%	362, 12.0%	189, 8.3%	90, 9.3%	1085, 10.1%
Fall by stumbling, tripping on same level	68, 8.9%	187, 10.45	163, 8.6%	297, 9.8%	258, 11.3%	83, 8.6%	1056, 9.8%
Fall/jump from lesser height (less than 1 m)	79, 10.3%	156, 8.7%	154, 8.1%	278, 9.2%	199, 8.7%	114, 11.8%	980, 9.1%
Contact with moving object	54, 7.1%	185, 10.3%	193, 10.1%	289, 9.6%	170, 7.4%	65, 6.7%	956, 8.9%
Contact with person	41, 5.4%	174, 9.7%	219, 11.5%	225, 7.5%	140, 6.1%	96, 10%	895, 8.3%
Miscellaneous and unspecified mechanism of injury	42, 5.5%	70, 3.9%	104, 5.5%	99, 3.3%	87, 3.8%	67, 7%	469, 4.4
Bite, sting by animal, human, insect	30, 3.9%	40, 2.2%	67, 3.5%	128, 4.2%	78, 3.4%	37, 3.8%	380, 3.5%
Fall on or from stairs	21, 2.7%	57, 3.2	45, 2.4%	91, 3%	60, 2.6%	18, 1.9%	292, 2.7%
Other, unspecified contact	9, 1.2%	39, 2.2%	52, 2.75	73, 2.4%	34, 1.5%	24, 2.5%	231, 2.2%
Burns	26, 3.4%	36, 2%	27, 1.4%	32, 1.1%	56, 2.5%	24, 2.5%	201, 1.9%
Fall/jump from greater height (more than 1 m)	12, 1.6%	43, 2.4%	32, 1.7%	65, 2.2%	27, 1.2%	14, 1.5%	193, 1.8%
Contact with animal	11, 1.4%	28, 1.6%	27, 1.4%	59, 2%	27, 1.2%	28, 2.9%	180, 1.7%
All pinch, crush, puncture, pierce	11, 1.4%	30, 1.7%	38, 2%	42, 1.4%	27, 1.2%	14, 1.5%	162, 1.5%
Contact, splash, spill	1, 0.1%	8, 0.4%	8, 0.4%	12, 0.4%	13, 0.6%	4, 0.4%	46, 0.4%
Total	765, 100%	1794, 100%	1902, 100%	3016, 100%	2283, 100%	963, 100%	10,723, 100%

tooth), compared to the other temporal periods, as shown in the Table XXIX.

Body region injury by injury time

There was a significant relationship between body region or injury and time of injury ($\chi^2 = 43.48$, $df = 15$, $p < 0.001$). The face was coded as being the predominant body region of injury for each coded time of injury, except for 6–9 a.m., when more head injuries compared to face injuries occurred, as shown in Table XXX.

Mode of separation by injury time

There was an association between mode of separation and time of injury ($\chi^2 = 60.04$, $df = 10$, $p <$

0.001). As shown in the Table XXXI, the vast majority of cases were ED service event completed-discharged. However, discharge was less likely in the 6–9 a.m. timeslot, with admission more likely.

Type of place by injury time

The association between type of place where children were injured and time of injury was significant ($\chi^2 = 1399.90$, $df = 65$, $p < 0.001$). Additionally, it was found that the vast of majority of injuries occurred in the home, although the proportion occurring at home decreased during school hours (9 a.m. – 12 noon, and 12 noon – 3 p.m.), while the proportion of injuries occurring at primary or secondary school increased during these times, as shown in Table XXXII.

Table XXIX. Nature of injury by time

Nature of injury <i>p</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	6–9 p.m.	9 p.m. – 6 a.m.	
Open wound (excludes eye)	313, 40.9%	727, 40.5%	725, 38.1%	1333, 44.2%	1063, 46.6%	366, 38%	4527, 42.2%
Superficial (incl. bruise; excl. eye)	227, 29.7%	575, 32.1%	609, 32%	926, 30.7%	656, 28.7%	310, 32.2%	3303, 30.8%
Eye injury (excl. foreign body in external eye [14.1]; includes burn)	136, 17.8%	306, 17.1%	363, 19.1%	455, 15.1%	352, 15.4%	178, 18.5%	1790, 16.7%
Miscellaneous or unspecified	17, 2.2%	47, 2.6%	63, 3.3%	88, 2.9%	63, 2.8%	35, 3.6%	313, 2.9%
Fracture and dislocation (excludes tooth)	14, 1.8%	47, 2.6%	55, 2.9%	67, 2.2%	37, 1.6%	17, 1.8%	237, 2.2%
Dental injury (incl. fractured tooth)	14, 1.8%	34, 1.9%	35, 1.8%	81, 2.7%	46, 2%	17, 1.8%	227, 2.1%
Burn or corrosion (excl. eye)	25, 3.3%	30, 1.7%	23, 1.2%	29, 1%	48, 2.1%	21, 2.2%	176, 1.6%
Intracranial injury (includes concussion)	13, 1.7%	23, 1.3%	19, 1%	19, 0.6%	11, 0.5%	9, 0.9%	94, 0.9%
Effect of venom; any insect bite	6, 0.8%	5, 0.3%	10, 0.5%	18, 0.6%	7, 0.3%	10, 1%	56, 0.5%
Total	765, 100%	1794, 100%	1902, 100%	3016, 100%	2283, 963, 100%	963, 100%	10,723, 100%

Table XXX. Body region injury by time

Body region <i>p</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	8–9 p.m.	9 p.m. – 6 a.m.	
Face (excludes eye)	277, 36.2%	728, 40.6%	776, 40.8%	1254, 41.6%	954, 41.8%	402, 41.7%	4391, 40.9%
Head (excludes face)	320, 41.8%	689, 38.4%	688, 36.2%	1169, 38.8%	890, 39%	326, 33.9%	4082, 38.1%
Body location NOT REQUIRED	153, 20%	349, 19.5%	418, 22%	535, 17.75	413, 18.1%	214, 22.2%	2082, 19.4%
Multiple injuries (involving more than one bodily location)	15, 2%	28, 1.6%	20, 1.1%	58, 1.9%	26, 1.1%	21, 2.2%	168, 1.6%
Total	765, 100.0%	1794, 100.0%	1902, 100.0%	3016, 100.0%	2283, 100.0%	963, 100.0%	10,723, 100.0%

Table XXXI. Mode of separation by injury time

Mode of separation <i>p</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	8–9 p.m.	9 p.m. – 6 a.m.	
ED service event completed – discharged	605, 79.1%	1470, 81.9%	1571, 82.6%	2508, 83.2%	1936, 84.8%	814, 84.5%	8904, 83%
Admitted to same or other hospital	152, 19.9%	302, 16.8%	317, 16.7%	472, 15.6%	291, 12.7%	127, 13.2%	1661, 15.5%
Did not wait/left after treatment commenced	8, 1.0%	22, 1.2%	14, 0.7%	36, 1.2%	56, 2.5%	22, 2.3%	158, 1.5%
Total	765, 100%	1794, 100%	1902, 100%	3016, 100%	2283, 963, 100%	963, 100%	10,723, 100%

Gender by injury time

The relationship between gender and time of injury was significant ($\chi^2 = 16.022$, $df = 5$, $p = 0.007$). Males were proportionally more likely to present to ED at 6–9 a.m., whereas females were proportionally more likely to present in the evening (6–9 p.m.), or overnight (9 p.m. – 6 a.m.), as shown in the Table XXXIII.

Age group by injury time

There was a significant association between age group and time of injury ($\chi^2 = 229.157$, $df = 20$, $p < 0.001$). Infants were overrepresented at 6–9 a.m., infants and 1–2-year-olds were overrepresented at 6–9 a.m., and 5–9-year-olds were overrepresented at midday – 3 p.m. and 3–6 p.m., as shown in the Table XXXIV.

Day of week of injury by time

According to the day of the week with the time, the association of the day of the week and

the time of injury was significant ($\chi^2 = 95.027$, $df = 30$, $p < 0.001$). Additionally, it was found that the majority of injuries occurred on a Sunday and for all the coded temporal periods. However, the distribution of injury according to temporal hours of days were fairly heterogeneous within the days, with a peak found at 3–6 m on Sundays. However, more cases of injuries occurred on Fridays for all the coded temporal periods, as shown in the Table XXXV.

Season of injury by injury time

The association between season and time of injury was significant ($\chi^2 = 83.359$, $df = 15$, $p < 0.001$). Furthermore, the injury incidence peaked in autumn (March–May) at all the coded temporal hours. However, the distribution of injuries was fairly heterogeneous in months of seasons with a peak found at 3–6 p.m. in months of autumn, as

Table XXXII. Type of place by time of injury

Type of place $p < 0.001$	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	8–9 p.m.	9 p.m. – 6 a.m.	
Home (includes farmhouse)	594, 77.6%	919, 51.2%	927, 48.7%	1968, 65.3%	1881, 82.4%	697, 72.4%	6986, 65.1%
Unspecified place	34, 4.4%	109, 6.1%	146, 7.7%	246, 8.2%	185, 8.1%	114, 11.8%	834, 7.8%
Primary, secondary school	36, 4.7%	231, 12.9%	319, 16.8%	110, 3.6%	14, 0.6%	31, 3.2%	741, 6.9%
Childcare, preschool centre	36, 4.7%	162, 9%	96, 5%	106, 3.5%	5, 0.2%	23, 2.4%	428, 4%
Public park	11, 1.4%	71, 4%	91, 4.8%	152, 5%	29, 1.3%	18, 1.9%	372, 3.5%
Oval, fields, pitch	8, 1%	82, 4.6%	61, 3.2%	75, 2.5%	35, 1.5%	16, 1.7%	277, 2.6%
Street or highway (public road)	21, 2.7%	34, 1.9%	38, 2%	97, 3.2%	33, 1.4%	123, 1.3%	236, 2.2%
Miscellaneous specified place	13, 1.7%	58, 3.2%	58, 3%	70, 2.3%	13, 6%	17, 1.8%	229, 2.1%
Recreation area (informal), specified, incl. amusement park, aquatic recreation centre	6, 0.8%	40, 2.2%	63, 3.3%	75, 2.5%	29, 1.3%	16, 1.7%	229, 2.1%
Trade or service area, incl. shopping centre, restaurant	3, 0.4%	48, 1.9%	63, 3.3%	44, 1.5%	39, 1.7%	3, 0.3%	200, 1.9%
Other and unspecified sports area	1, 0.1%	11, 0.6%	16, 0.8%	31, 1%	12, 0.5%	7, 0.7%	78, 0.7%
Farm(excl. Farm house)	1, 0.1%	12, 0.7%	5, 0.3%	20, 0.7%	4, 0.2%	2, 0.2%	44, 0.4%
Bush, remote or undeveloped place	1, 0.1%	10, 0.6%	10, 0.5%	16, 0.5%	2, 0.1%	3, 0.3%	42, 0.4%
Hospital, Medical clinic or other health service	0, 0%	7, 0.4%	9, 0.5%	6, 0.2%	2, 0.1%	3, 0.3%	27, 0.3%
Total	765, 100%	1794, 100%	1902, 100%	3016, 100%	2283, 963, 100%	963, 100%	10,723, 100%

Table XXXIII. Gender injury by time

Gender <i>p</i> = 0.007	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	6–9 p.m.	9 p.m. – 6 a.m.	
Male	507, 66.3%	1165, 64.9%	1167, 61.4%	1896, 62.9%	1393, 61%	574, 59.6%	6702, 62.5%
Female	258, 33.7%	629, 35.1%	735, 38.6%	1120, 37.1%	890, 39%	389, 40.4%	4021, 37.5%
Total	765, 100%	1794, 100%	1902, 100%	3016, 100%	2283, 963, 100%	963, 100%	10,723, 100%

Table XXXIV. Age groups by time of injury

Age group <i>p</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	6–9 p.m.	9 p.m.– 6 a.m.	
Infant (0 years)	90, 11.8%	103, 5.7%	112, 5.9%	165, 5.5%	144, 6.3%	81, 8.4%	695, 6.5%
1–2 years	317, 41.4%	664, 37%	512, 26.9%	897, 29.7%	826, 36.2%	295, 30.6%	3511, 32.7%
3–4 years	142, 18.6%	342, 19.1%	366, 19.2%	640, 21.2%	513, 22.5%	198, 20.6%	2201, 20.5%
5–9 years	163, 21.3%	458, 25.5%	632, 33.2%	986, 32.7%	610, 26.7%	271, 28.1%	3120, 29.1%
10–12 years	53, 6.9%	227, 12.7%	280, 14.7%	328, 10.9%	190, 8.3%	118, 12.3%	1196, 11.2%
Total	765, 100.0%	1794, 100.0%	1902, 100.0%	3016, 100.0%	2283, 100.0%	963, 100.0%	10,723, 100.0%

Table XXXV. Day of week injury by time

Day of week <i>p</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – mid-day	Midday – 3 p.m.	3–6 p.m.	8–9 p.m.	9 p.m.–6 a.m.	
Sun	113, 14.8%	384, 21.4%	382, 20.1%	555, 18.4%	384, 15.2%	143, 14.8%	1925, 18%
Mon	105, 13.7%	215, 12%	221, 11.6%	409, 317, 13.9%	317, 13.9%	131, 13.6%	1398, 13%
Tue	97, 12.7%	204, 11.4%	209, 11%	365, 12.1%	309, 13.3%	105, 10.9%	1289, 12%
Wed	116, 15.2%	246, 13.7%	238, 12.5%	401, 13.3%	326, 14.3%	101, 10.5%	1428, 13.3%
Thu	104, 13.6%	205, 11.4%	255, 13.4%	387, 12.8%	300, 13.1%	139, 14.4%	1390, 13%
Fri	122, 15.9%	225, 12.5%	263, 13.8%	414, 13.7%	355, 15.5%	156, 16.2%	1535, 14.3%
Sat	108, 14.1%	315, 17.6%	334, 17.6%	485, 16.1%	328, 14.4%	188, 19.5%	1758, 16.4%
Total	765, 100.0%	1794, 100.0%	1902, 100.0%	3016, 100.0%	2283, 100.0%	963, 100.0%	10,723, 100.0%

shown in the Table XXXVI. However, this analysis was not conducted with 2016 removed.

Month of injury by time

According to month of injury, it was found that there was a strong evidence of an association between month and time of injury ($\chi^2 = 133.89$, *df* = 55, *p* < 0.00). Additionally, the majority of injuries occurred in January in the total sample. However, the distribution of injuries was fairly heterogeneous according to the time of injury over the months, with peaks in May at 3–6 p.m. and March 3–6 p.m., as shown in Table XXXVII. However, this analysis was not conducted with 2016 removed.

Age-specific analyses

As previously described, the majority of head and facial injuries occurred in children aged 1–2 years (*n* = 3511, 32%), followed by children aged 5–9 years (*n* = 3120, 29.1%), then 3–4 years (*n* = 2201, 20.5%), and 10–12 years (*n* = 1196, 11.2%). The fewest injuries occurred in infants less than 1 year old (*n* = 695, 6.5%). Because so many of the injury and event characteristics varied with age, as described in section 3.2, the epidemiology of head and facial injuries will now be described in further detail by age group.

Table XXXVI. Season by time of injury

Season <i>P</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	8–9 p.m.	9 p.m.–6 a.m.	
Autumn (March – May)	225, 29.5%	542, 30.2%	538, 28.3%	846, 28.1%	598, 26.2%	231, 24%	2980, 27.8%
Summer (Dec – Feb)	175, 22.9%	377, 21%	466, 24.5%	764, 25.3%	683, 29.9%	291, 30.2%	2756, 25.7%
Spring (Sept – Nov)	207, 27.1%	398, 22.2%	394, 20.7%	674, 22.3%	483, 21.2%	231, 24%	2387, 22.3%
Winter (June – Aug)	158, 20.7%	477, 26.6%	504, 26.5%	732, 24.3%	519, 22.7%	210, 21.8%	2600, 24.2%
Total	765, 100.0%	1794, 100.0%	1902, 100.0%	3016, 100.0%	2283, 100.0%	963, 100.0%	10,723, 100.0%

Table XXXVII. Injury month by time

Month <i>p</i> < 0.001	Time of injury						Total
	6–9 a.m.	9 a.m. – midday	Midday – 3 p.m.	3–6 p.m.	8–9 p.m.	9 p.m.–6 a.m.	
January	60, 7.8%	129, 7.2%	169, 8.9%	277, 9.2%	283, 12.4%	110, 11.4%	1028, 9.6%
February	68, 8.9%	133, 7.4%	148, 7.8%	242, 8.0%	209, 9.2%	94, 9.8%	894, 8.3%
March	70, 9.2%	177, 9.9%	168, 8.8%	282, 9.4%	213, 9.3%	89, 9.2%	999, 9.3%
April	76, 9.9%	162, 9.0%	166, 8.7%	268, 8.9%	195, 8.5%	67, 7.0%	934, 8.7%
May	79, 10.3%	203, 11.3%	204, 10.7%	296, 9.8%	190, 8.3%	75, 7.8%	1047, 9.8%
June	70, 9.2%	164, 9.1%	206, 10.8%	254, 8.4%	196, 8.6%	69, 7.2%	959, 8.9%
July	45, 5.9%	138, 7.7%	145, 7.6%	241, 8.0%	158, 6.9%	62, 6.4%	789, 7.4%
August	43, 5.6%	175, 9.8%	153, 8.0%	237, 7.9%	165, 7.2%	79, 8.2%	852, 7.9%
September	63, 8.2%	141, 7.9%	137, 7.2%	205, 6.8%	149, 6.5%	88, 9.1%	783, 7.3%
October	74, 9.7%	125, 7.0%	127, 6.7%	256, 8.5%	177, 7.8%	67, 7.0%	826, 7.7%
November	70, 9.2%	132, 7.4%	130, 6.8%	213, 7.1%	157, 6.9%	76, 7.9%	778, 7.3%
December	47, 6.1%	115, 6.4%	149, 7.8%	245, 8.1%	191, 8.4%	87, 9.0%	834, 7.8%
Total	765, 100.0%	1794, 100.0%	1902, 100.0%	3016, 100.0%	2283, 100.0%	963, 100.0%	10,723, 100.0%

Infants (0 years old)

There were a total of 695 children in this age group. Overall in this infant age group, most injuries occurred at home ($n = 596, 85.8\%$) (Table XIV), when infants were being nursed or cared for (330, 47.5%) (Table XVI).

The first three most common mechanisms of injury within this age group were fall/jump from lesser height (less than 1 m) (160 cases, 23.0%); contact with a static object (125 cases, 18%); and other falls (115 cases, 16.5%).

The most common ICD diagnosis for each of the three mechanisms of injury was 'superficial injury of head part not otherwise specified'. Other frequent diagnoses were 'superficial injury of other parts of head' and open wound of head or of 'lip and oral cavity'.

For all of the three most common mechanisms of injury in this age group, the bedroom was the

main part of the place where the infants were injured, and for the two fall-related mechanism categories, bed (excludes bunkbed and cot) was the most common injury factor. For the contact with a static object mechanism category, 'living, family, and rumpus room' was coded as being the most predominant place where injuries occurred, when the children were being nursed, resting, sleeping, eating, other, and playing, for the three most common mechanisms of injury. 'Table, desk, bench, etc.' was the main major injury factor.

The highest frequency of injuries occurred at 3–6 p.m. for the most common mechanism of injury, whereas for the second most common mechanism of injury, the greatest incidence of injury occurred at 3–6 p.m. For the third most common mechanism of injury, the highest incidence of injury occurred at 6–9 p.m. (Table XXXVIII).

Table XXXVIII. Injury characteristics by mechanism of injury in the 0–1 years age group ($n = 695$, 6.5%)

Mechanism of injury 1: fall/jump from lesser height (less than 1 m) ($n = 160$)	Mechanism of injury 2: contact with static object ($n = 125$)	Mechanism of injury 3: other falls ($n = 115$)
ICD: – Superficial injury of head part not otherwise specified (100, 62.5%) – Superficial injury of other parts of head (12, 7.5%) – Open wound of lip and oral cavity (10, 6.3%)	ICD: – Superficial injury of head part not otherwise specified (37, 29.6%) – Open wound of other parts of head (16, 12.8%) – Superficial injury of other parts of head (12, 9.6%)	ICD: – Superficial injury of head part not otherwise specified (69, 60%) – Superficial injury of other parts of head (8, 7%) – Superficial injury of head, and open wound of lip and oral cavity (7, 6.1%) for each
Gender: Male: (90, 56.25%) Female: (70, 43.75%)	Gender: Male: (79, 63.2%) Female: (46, 36.8%)	Gender: Male: (64, 55.65%) Female: (51, 44.35%)
Type of place: home (139, 86.9%)	Type of place: home (109, 87.2%)	Type of place: home (94, 81.7%)
Activity: – Being nursed or care for (78, 48.8%) – Resting, sleeping, eating, other (36, 22.5%) – Playing (27, 16.9%)	Activity: – Being nursed or cared for (55, 44%), – Plying (28, 22.4%) – Resting, sleeping, eating, other (15, 12%)	Activity: – Being nursed or cared (73, 63.5%) – Resting, sleeping, eating, other (23, 20%) – Playing (9, 7.8%)
Major injury factor: – Bed (excludes bunk bed and cot) (61, 38.1%) – Sofa, couch, lounge, divan, etc. (21, 13.1%) – Table, desk, bench, etc. (11, 6.9%)	Major injury factor: – Table, desk, bench, etc. (27, 21.6%) – Bed (excludes bunk bed and cot) (14, 11.2%) – Table and cabinet, rack, room divider, shelf (11, 8.8%) for each	Major injury factor: – Bed (excludes bunk bed and cot) (27, 23.5%) – Baby pram, pusher etc. (13, 11.3%) – Floor (10, 8.7%)
Part of place: – Bed room (62, 38.8%) – Unspecified part of place (45, 28.1%) – Other, interior (14, 8.8%)	Part of place: – Unspecified part of place (31, 24.8%) – Other, interior (30, 24%) – Living, family, rumpus room and bedroom with (23, 18.4%) for each	Part of place: – Bedroom (94, 81.7%)
Time: 3–6 p.m. (42, 26.3%) $p = 0.020$	Time: 3–6 p.m. (32, 25.6%) $p = 0.007$	Time: 6–9 p.m. (26, 22.6%) $p = 0.210$

In total, 55.54% of injuries in this age group were caused by falls ($n = 386$).

1–2-years age group

Overall in this 1–2-years age group, most injuries occurred at home ($n = 2714$, 38.8%) (Table XIV), when children were engaged in playing (1423, 37.4%) (Table XVI).

The first three most common mechanisms of injury within this age group were contact with static object (857, 24.4%), cutting and tearing (539, 15.4%), and falling/stumbling/tripping on same level (521, 14.8%). There were a total of 3511 children in this age group within the dataset.

Open wound of other parts of head, open wound of the lip and oral cavity were the most common ICDs for the first and second mechanisms of injury. However, open wound of the lip and oral cavity was the most common mechanism of injury with the third most common mechanism with this age group.

For all of the three most common mechanisms of injury in this age group, unspecified part of

place was the main part of place where the children were injured for the three most common mechanisms of injury. Table, desk, bench, etc. was the most common injury factor (Table XXXIX) for the most common mechanism of injury, whereas other unspecified factor was the most common injury factor for the second and third most common mechanisms of injury.

The highest frequency of injuries occurred at 6–9 p.m. for the most common mechanism of injury, whereas for the second most common mechanism of injury the greatest incidence of injury occurred at 3–6 p.m. For the third most common mechanism of injury, the highest incidence of injury occurred at 6–9 p.m. (Table XXXIX).

3–4-years age group

Overall in this 3–4-years age group, most injuries occurred at home ($n = 1524$, 21.8%) (Table XIV), when children were playing (1006, 26.4%) (Table XVI).

The first three most common mechanisms of injury within this age group were contact with

Table XXXIX. Injury characteristics by mechanism of injury, with age group 1–2 years ($n = 3511$, 32.7%)

Mechanism of injury 1: contact with a static object ($n = 857$)	Mechanism of injury 2: cutting tearing ($n = 539$)	Mechanism of injury 3: falling/stumbling/tripping on same level ($n = 521$)
ICD: – Open wound of other parts of head (211, 24.6%) – Open wound of lip and oral cavity (113, 13.2%) – Superficial injury of head part no otherwise specified (108, 12.6%)	ICD: – Open wound of other parts of head (176, 32.7%) – Open wound of lip and oral cavity (167, 31%) – Open wound of eyelid and periocular area (62, 31%)	ICD: – Open wound of lip and oral cavity (97, 18.6%) – Open wound of other parts of head (95, 18.2%), – Superficial injury of head parts of no otherwise specified (94, 18%)
Gender: Male: 540, 63.01% Female: 317, 36.99%	Gender: Male: 337, 62.52% Female: 202, 37.48%	Gender: Male: 322, 61.80% Female: 199, 38.20%
Type of place: home (700, 81.7%)	Type of place: home (440, 81.6%)	Type of place: home (400, 76.8%)
Activity: – Playing (428, 49.9%) – Resting, sleeping, eating, and other (138, 16.1%) – Unspecified activity (92, 10.7%)	Activity: – Playing (214, 39.7%) – Resting, sleeping, eating, and other (107, 19.9%) – Unspecified activity (102, 18.9%)	Activity: – Playing (181, 34.7%) – Resting, sleeping, eating, and other (140, 26.9%) – Being nursed or care for (105, 20.2%)
Major injury factor: – Table, desk, Bench. Etc. (245, 28.6%) – Other or unspecified factor (30, 3.5%) – Floor (29, 3.4%)	Major injury factor: – Other unspecified factor (145, 26.9%) – Table, desk, bench, etc. (61, 11.3%) – Other toy (28, 5.2%)	Major injury factor: – Other or unspecified factor (120, 23%) – Floor (106, 20.3%) – Bathtub, shower (61, 11.7%)
Part of place: – Unspecified part of place (239, 27.9%) – Living, family, rumpus room (142, 16.6%) – Bedroom (126, 14.7%)	Part of place: – Unspecified part of place (286, 53.1%) – Living, family, rumpus room (52, 9.6%) – Bedroom (40, 7.4%)	Part of place: – Unspecified part of place (203, 39%) – Bathroom (97, 18.6%) – Living, family, rumpus room (64, 8.8%)
Time: 6–9 p.m. (221, 25.8%) $p < 0.001$	Time: 3–6 p.m. (146, 27.1%) $p = 0.090$	Time: 6–9 p.m. (136, 26.1%) $p < 0.001$

static object (542, 25.6%), cutting and tearing (337, 15.3%), and falling/stumbling/tripping on the same level (225, 16.2%). There were a total of 2201 children in this age group within the dataset.

Open wound of other parts of head was the most frequent ICD for the three most common mechanisms of injury within this age group, followed by open wound of other parts of head, and superficial injury of head part not otherwise specified, for the most common mechanism of injury. However, open wound of the lip and oral cavity was the second ICD for both the second and third most common mechanisms of injury, followed by open wound of the eyelid and periocular area for the second mechanism of injury, and superficial injury of head part not otherwise specified for the third common mechanism of injury.

For all of the three most common mechanisms of injury, unspecified part of place was the main part of place where the children were injured. Table, desk, bench, etc. was the most common injury factor for the first and second most common mechanisms of injury, whereas other or unspeci-

fied factor was the main major factor for the third mechanism of injury category.

The highest frequency of injuries occurred at 6–9 p.m. for the most common mechanism of injury, whereas for the second most common mechanism of injury, the greatest incidence of injury occurred at 3–6 p.m. For the third most common mechanism of injury, the highest incidence of injury occurred at 3–6 p.m. (Table XL).

5–9-years age group

Overall in this age group, most injuries occurred at home ($n = 1709$, 24.5%) (Table XIV), when children were engaging in playing (1020, 26.8%) (Table XVI).

The first three most common mechanisms of injury within this age group were contact with static object (585, 18.8%), contact with moving object (399, 12.8%), and contact with person (388, 12.4%). There were a total of 3120 children in this age group within the dataset.

Open wound of other parts of head was observed to be the most common ICD for the most common of injury mechanism category, followed

Table XL. Injury characteristics by mechanism of injury for the 3–4-years age group ($n = 2201$, 20.5%)

Mechanism of injury 1: contact with static object ($n = 542$)	Mechanism of injury 2: cutting and tearing ($n = 337$)	Mechanism of injury 3: falling/stumbling/tripping on the same level ($n = 225$)
ICD: – Open wound of other parts of head (162, 29.9%) – Open wound of other parts of head (71, 13.1%) – Superficial injury of head part no otherwise specified (63, 11.6%)	ICD: – Open wound of other parts of head (133, 39.5%) – Open wound of lip and oral cavity (84, 24.9%) – Open wound of eyelid and periocular area (33, 9.8%)	ICD: – Open wound of other parts of head (51, 22.7%) – Open wound of lip and oral cavity (50, 22.2%) – Superficial injury of head part no otherwise specified (21, 9.3%)
Gender: Male: 337, 62.18% Female: 205, 37.82%	Gender: Male: 215, 63.80% Female: 122, 36.20%	Gender: Male: 141, 62.67% Female: 84, 37.33%
Type of place: home (418, 77.1%)	Type of place: – Unspecified place (22, 6.5%) – Public park (14, 4.2%) – Trade or service area, incl. shopping centre, restaurant (12, 3.6%)	Type of place: – Recreation area (informal), specified, incl. amusement park, aquatic recreation center (8, 3.6%) – Street or highway (public road) (7, 3.1%) – Public park (5, 2.2%)
Activity: – Playing (305, 56.3%) – Resting, sleeping, eating, other (76, 14%) – Unspecified activity (53, 9.8%)	Activity: – Playing (139, 41.2%) – Resting, sleeping, eating, other (64, 19%) – Unspecified activity (53, 15.7%)	Activity: – Playing (95, 42.2%) – Resting, sleeping, eating, other (58, 25.8%) – Unspecified activity (29, 12.9%)
Major injury factor: – Table, desk, bench, etc. (129, 23.8%) – Wall (41, 7.6%) – Other or unspecified structure and fixture (23, 4.2%)	Major injury factor: – Table, desk, bench, etc. (44, 13.1%) – Other playground equipment (15, 4.5%) – Sofa, couch, lounge, divan, etc. (12, 3.6%)	Major injury factor: – Other or unspecified factor (48, 21.3%) – Floor (43, 19.1%) – Bathtub, shower (21, 9.3%)
Part of place: – Unspecified part of place (154, 28.4%) – Living, family, rumpus room (71, 13.1%) – Other, interior (68, 12.5%)	Part of place: – Unspecified part of place (162, 48.1%) – Living, family, rumpus room (31, 9.2%) – Bedroom (27, 8%)	Part of place: – Unspecified part of place (78, 34.7%) – Bathroom (40, 17.8%) – Garden, park, national park, backyard (17, 7.6%)
Time: 6–9 p.m. (166, 30.6%) $p < 0.001$	Time: 3–6 p.m. (105, 31.2%) $p < 0.001$	Time: 3–6 p.m. (74, 32.9%) $p < 0.001$

by superficial injury of head part not otherwise specified and superficial injury of other part of the head. However, injury conjunctive corneal abrasion without fb was the most common ICD for the second and third most common mechanisms of injury within this age group, followed by open wound of other parts of head and contusion of the eyelid and periocular area for the second most common mechanism of injury, and contusion of the eyelid and periocular and open wound of other parts of the head area for the third most common mechanism of injury.

Unspecified part of place was the main part of place where children were injured for the first and third mechanisms injury category, whereas, garden, park, national park, and backyard were coded as being the main part of place for the second most common mechanism of injury category. Table, desk,

bench, etc. was the most common injury factor for the most common mechanism of injury category, while ball was the most common injury factor for the second common mechanism of injury category, and person was the most common injury factor for the third most common mechanism of injury category.

The highest frequency of injuries occurred at 3–6 p.m. for the most common mechanism of injury, whereas for the second most common mechanism of injury, the greatest incidences of injury occurred at 3–6 p.m. For the third most common mechanism of injury, the highest incidences of injury occurred at 3–6 p.m. (Table XLI).

10–12-years age group

Overall in this age group, most injuries occurred at home ($n = 443$, 6.3%) (Table XIV) when children were playing (244, 6.4%) (Table XVI).

Table XLI. Injury characteristics by mechanism of injury in the 5–9-years age group ($n = 3120$, 29.1%)

Mechanism of injury 1: Contact with static object ($n = 585$)	Mechanism of injury 2: Contact with moving object ($n = 399$)	Mechanism of injury 3: Contact with person ($n = 388$)
ICD: – Open wound of other parts of head (136, 23.2%) – Superficial injury of head part no otherwise specified (58, 9.9%) – Superficial injury of other part of head (58, 9.9%)	ICD: – Inj. Conjunctiva corneal abrasion wo FB (71, 17.8%) – Open wound of other parts of head (56, 14%) – Contusion of eyelid and periocular area (44, 11%)	ICD: – Inj. conjunctive corneal abrasion WO fb (72, 18.6%) – Contusion of eyelid and periocular area (39, 10.1%) – Open wound of other parts of head (36, 9.3%)
Gender: Male: 385, 19.6% Female: 200, 17.3%	Gender: Male: 244, 12.4% Female: 155, 13.4%	Gender: Male: 266, 68.56% Female: 122, 31.44%
Type of place: – Home (347, 59.3%) – Primary, secondary school (93, 15.9%) – Unspecified place (42, 7.2%)	Type of place: – Home (193, 48.4%) – Primary, secondary school (69, 17.3%) – Unspecified place (31, 7.8%)	Type of place: – Home (173, 44.6%) – Primary, secondary school (100, 25.8%) – Oval, fields, pitch (43, 11.1%)
Activity: – Playing (211, 36.1%) – Unspecified activity (76, 13%) – Engaged in formal education activity (71, 12.1%)	Activity: – Playing (135, 33.8%) – Other specified activity (64, 16%) – Unspecified activity (52, 13%)	Activity: – Playing (128, 33%) – Engaged in formal education activity (77, 19.8%) – Unspecified activity (49, 12.6%)
Major injury factor: – Table, desk, bench, etc. (97, 16.6%) – Other or unspecified structure or fixture (51, 8.7%) – Wall (26, 4.4%)	Major injury factor: – Ball (55, 13.8%) – Bat, racquet, hockey stick, etc. (49, 12.3%) – Other toy (41, 10.3%)	Major injury factor: Person (339, 87.4%)
Part of place: – Unspecified part of place (162, 27.7%) – Bedroom (53, 9.1%) – Other, interior (45, 7.7%)	Part of place: – Other, exterior (49, 12.3%) – Garden, park, national park, backyard (41, 10.3%) – Oval/field (40, 10%)	Part of place: – Unspecified part of place (177, 45.6%) – Oval/field (47, 12.1%) – Garden, park, national park, backyard (32, 8.2%)
Time: 3–6 p.m. (160, 27.4%) $p < 0.001$	Time: 3–6 p.m. (139, 34.8%) $p < 0.001$	Time: 3–6 p.m. (105, 27.1%) $p < 0.001$

The first three most common mechanisms of injury within this age group were contact with a person (275, 23%), contact with a moving object (235, 19.6%), and contact with a static object (129, 10.8%). There were a total of 1196 children in this age group within the dataset.

Superficial injury of other parts of head was verified as being the most common ICD for the most common injury mechanism category, followed by superficial injury of head part not otherwise specified and fracture of nasal bones as the second and third most common ICDs, respectively. However, injury conjunctiva corneal abrasion without FB was the most common ICD for the second most common mechanism of injury, followed by contusion of the eyelid and periocular area and open wound of other parts of head, respectively, as the second and third most common injury mechanisms. Superficial injury of head part not otherwise specified and superficial injury of other parts of head were the second and third ICD for the third most common

injury mechanism within this age group (Table XLII). Oval/field was the was the main part of place where the children were injured for the first and second most common mechanisms of injury, whereas unspecified part of place was the most common part of place for injuries that occurred in the third mechanism of injury category within this age group. Another person was the most common injury factor for the first mechanism of injury, whereas a ball was the most common injury factor for the second most common mechanism of injury, and other or unspecified structure or fixture was the most common factor for the third most common mechanism of injury in this age group.

The highest frequency of injuries occurred at midday – 3 p.m. for the most common mechanism of injury, whereas for the second most common mechanism of injury, the greatest incidence of injury occurred at 9 a.m. – midday. For the third most common mechanism of injury, the highest incidences of injury occurred at 3–6 p.m. (Table XLII).

Table XLIII. Injury characteristics by mechanism of injury in the 10–12-years age group ($n = 1196$, 11.2%)

Mechanism of injury 1: Contact with person ($n = 275$)	Mechanism of injury 2: Contact with moving object ($n = 235$)	Mechanism of injury 3: Contact with static object ($n = 129$)
ICD: – Superficial injury of other parts of head (37, 13.5%) – Superficial injury of head part no otherwise specified (34, 12.4%) – Fracture of nasal bones (27, 9.8%), and contusion of eyelid and periocular area	ICD: – Injury conjunctiva corneal abrasion without FB (36, 15.3) – Contusion of eyelid and periocular area (25, 10.6%) – Open wound of other parts of head (23, 9.8%)	ICD: – Open wound of other parts of head (28, 21.7%) – Superficial injury of head part no otherwise specified (14, 10.9%) – Superficial injury of other parts of head (14, 10.9%)
Gender: Male: 213, 77.45% Female: 62, 22.55%	Gender: Male: 158, 67.23% Female: 77, 32.77%	Gender: Male: 90, 69.77% Female: 39, 30.23%
Type of place: – Oval, field, pitch (87, 31.6%) – Primary, secondary school (72, 26.2%) – Home (69.25.1%)	Type of place: – Home (72, 30.6%) – Primary, secondary school (65, 27.7%) – Oval, fields, pitch (43, 18.3%)	Type of place: – Home (60, 46.5%), – Primary, secondary school (22, 17.1%) – Unspecified place (10, 7.8%)
Activity: – Football, rugby, soccer (102, 37.1%) – Engaged in formal education (38, 13.8%) – Playing (38, 13.8%)	Activity: – Playing (52, 22.1%) – Ball sport with racquet, bat (baseball, cricket, hockey) (47, 20%) – Engaged in formal education (33, 14%)	Activity: – Playing (37, 28.7%) – Other specified activity (19, 14.7%) – Resting, sleeping, eating, other (17, 13.2%)
Major injury factor: person (252, 91.6%)	Major injury factor: – Ball (84, 35.7%) – Bat, racquet, hockey stick, etc. (34, 14.5%) – Tree (includes branch stick, twig) (15, 6.4%)	Major injury factor: – Other or unspecified structure or fixture (19, 14.7%) – Wall (9, 7%) – Table, desk, bench, etc. (19, 14.7%)
Part of place: – Oval/field (85, 30.9%) – Unspecified part of place (74, 26.9%) – Other, exterior (34, 12.4%)	Part of place: – Oval/field (57, 24.3%) – Unspecified part of place (55, 23.4%) – Other, exterior (42, 17.9%)	Part of place: – Unspecified part of place (36, 27.9%) – Garden, park, national park, backyard (15, 11.6%) – Other, interior (912, 9.3%)
Time: midday – 3 p.m. (96, 34.9%) $p < 0.001$	Time: 9 a.m. – midday (64, 27.2%) $p < 0.001$	Time: 3–6 p.m. (36, 27.9%) $p < 0.001$

Discussion

The number of injury cases varied among age groups with head and facial injuries, and the mechanism, severity, nature, and type of injury sustained were also different. This might be due to the difference in the activities in which the children were engaged at the time of injury. In addition, the degree of osseous maturity of the developing paediatric structures determine the characteristics and nature of injuries. This results of the present study are consistent with previous reports [11, 19]. We suggest that injury prevention strategies need to be age and mechanism focused.

Injury literature shows that boys are more likely to sustain injuries than girls. Similarly, our study demonstrated an overrepresentation of males with a male : female ratio of 1.7 : 1. This might be

because boys are generally more boisterous, or it could be related to their greater tendency for risk taking and spending more time taking part in activities compared to girls. However, a recent report shows a trend toward a more equal male : female ratio [20]. This changing trend can be attributed to the same activities shared by both genders, although their abilities are different.

We have clearly demonstrated that the young age groups are most likely to sustain head and facial injuries. One- and two-year-olds accounted for one-third of all presentations in this study. This finding may be due to toddlers (1–2 years old) are still learning how to walk and coordinate that movement with their growing bodies without knowing the risks; hence, they get into a bit of trouble and sustain injuries, especially if there are no effective safety measurements or parents'

attention. Similar studies have reported the same results [21, 22].

Furthermore, we have reported the 'typical' injury in each age group. As an example, in the 1–2-years age group, the most common cause of injury is contact with a static object and is likely to have occurred in the home, through contact with a table, bench etc., or a wall, in contrast to a previous report, which reported that falls were the most common injury in the first year of life [23]. This difference is because the aetiological factor varies significantly depending on the situation, as well as geographically and culturally.

Many studies report over-representation of indigenous children in Australian injury statistics [24, 25], but because we do not have precisely-defined source populations for our ED data, we were unable to explore this in our study. The justification for indigenous over-representation is due to socioeconomic disadvantage, lack of safety education, and living in remote areas with higher risk of injury [26, 27]. There can also be issues with identification of indigenous status, most often under-reporting. However, in our study, we found that many injury characteristics varied with Indigenous status, so culturally specific injury prevention messages and approaches may be required.

Time can be an influence on head and facial injuries by variation in the time of day, weekday, and season. Distribution according to time allows us to observe a greater tendency of injury incidence at the end day (3–6 p.m.) when the parents are at their most tired, in particular with working mothers, who might give a low level of attention to their children at that time. This result was similar to previous reports [28, 29].

Furthermore, it has been observed in the present study that the distribution of frequency of paediatric head and facial injuries was proportionally higher on weekends than on weekdays, similarly to previous reports [10]. The reason for this finding is because on weekends there are more opportunities for activities and recreation, and possibly because primary care centres such as GPs are not open.

In addition, we observed in this study that the highest frequency of injuries occurred in autumn. This finding might be due to differences in seasons according to the latitude and longitude of the north part of Queensland, Australia. However, there are no well-defined four seasons in most parts of Australia. In contrast to other reports, the incidence of injury can be changed according to the latitude of the region or country where the study was conducted [10, 30].

Injury review shows that paediatric head and facial injuries are constantly changing, and they differ from country to country, as well as in dif-

ferent demographic regions in the same country, because of the impact of social, cultural, and economic factors as well as environmental conditions [10, 31].

Unlike in adults, where traffic accidents are predominant, falls were reported by previous studies as the leading cause of head and facial injuries in children [32]. In the present study, the main reason for injury was a contact with a static object, followed by cutting, tearing, and other falls. This shows that aetiological factors vary significantly depending on the different situations.

According to the severity of head and facial injuries, it has been observed that the majority of cases needed semi-urgent intervention (60 min), followed by urgent triage (30 min). This finding depended on the mechanism of head facial injuries that was the most influential factor in the severity of injuries. This finding was in accordance with other studies [11, 20].

In the present study, home (indoor) was the most common place of occurrence of injuries to children, followed by garden park and national park (outdoor). In addition, it has been found that the vast majority of paediatric injuries occurred during leisure activity in young age, whereas sport activities-related injuries occurred in older age groups. Furthermore, playing injuries were predominant among all types of activities. This may reflect the difference in the trend of injuries between young and old age groups. Thus, understanding of these injuries and their environment is key for the clinician's role in injury prevention and education. This finding was similar to previous studies [5, 11, 29].

According to the body region variable, the vast majority of head and facial injuries among paediatric age groups were unintentional injuries. It was observed that the face (excludes eye) was more predominant compared to the head. This finding might be because the face is the most exposed unprotected area in the body, as well as being the most sensitive part to injury. However, literature review shows that the injury aetiology is an influential factor in determining the body region involved, as well as the severity of injury [33, 34].

Recommendations

Significant elements and aspects need to be highlighted to improve the epidemiological model of paediatric head and facial injuries in Queensland, Australia, as follows:

- Regarding head and facial injury prevention, knowing the epidemiology profile of children involved in head and face injuries allows us to monitor and control certain risk factors that would prevent or lessen the incidence of such

injuries [10]. Additionally, insight into the epidemiology of head and facial injuries is useful not only in prevention strategies, but also in decision-making for patient care, development of optimal treatment regimens, and appropriate resource allocation [35]. For this reason, hospital records serve the purpose of collecting key information on incidences and consequences [29]. Furthermore, studies showed that prevention programs play many roles in helping to reduce the burden of injury [36, 37].

- Thus, preventive measures should be focused on reducing the incidence and/or minimising the severity of injury. The morbidity of face and head injuries in children can be reduced significantly under instruction and enforcement of safety measures.
- Teaching the public the importance of effective means to minimise the incidence of injury [38].
- Public health specialists should provide professional advice and make suggestions to parents, teachers, and caregivers [39].
- Children should be encouraged to develop healthy habits at an early age (e.g. wearing a helmet and a seat belt), and children in the growing phase should be monitored periodically [5].
- Medical staff could establish databases of paediatric injuries to corroborate high-frequency categories of injury and verify the effectiveness of developed prevention programs. Outcome assessment of such databases in multidisciplinary morbidity and mortality conferences could lead to improved patient care and better-educated health providers [40].

Limitations of the study

The QISU database is not truly representative of EDs and their source populations within Queensland. QISU data captures about 25% of all injury-related ED presentations. However, according to the published paper of Siskind and Scott [23], the results can be considered to be representative in general terms of childhood injuries and the circumstances surrounding them.

Additionally, the researcher had no control over data extraction from the QISU database, so they cannot guarantee the appropriateness, completeness, or specificity of search terms. Furthermore, the injury surveillance data that contributes to the QISU database is collected in busy EDs. Some data may be incomplete or coded inaccurately.

Conclusions

The results of this retrospective study provide important data for the design of future plans for

the prevention of paediatric head and facial injuries. We have demonstrated that the mechanism of injury varies with age, so we suggest that injury-prevention strategies should be age and mechanism focused. Elements need to be highlighted to improve the epidemiological model of paediatric head and facial injuries in Queensland, Australia. Overall, we hope this work contributes to a decrease in the incidence and severity of paediatric head and facial injuries in Queensland, Australia.

Conflict of interest

The author declares no conflict of interest.

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