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A community-wide surveillance of childhood injury in Hong Kong

ABSTRACT

The study aims to establish a community-wide child injury surveillance system to contribute to the study of childhood injury patterns in Hong Kong. Circumstances of domestic injuries were examined through identifying the external causes and natures of injury. In addition, clinical information of those who suffered from such injuries were analyzed. Between October 24, 1996 and October 23, 1997, attendance records from the Accident & Emergency Department (A&E) were retrieved from the Prince of Wales hospital (PWH) for analysis. Cases selected for this study were 1) children who were below the age of sixteen, and 2) those who suffered a traumatic injury. Patients' demography, as well as their respective clinical diagnosis and received treatments, were documented in the study. Supplementing data from attendance records, ICD E-code, N-code, AIS, and ISS scores were coded from all cases by an M.D. and a research nurse.

Descriptive statistics of all measures employed were tabulated and interpreted in the result section. A correspondence analysis was performed on 32 major groups of external causes and their relationship with 6 age groups namely infancy, 2nd year, age 2 to 4, age 5 to 7, age 8 to 11, and age 12 to 15. Furthermore, results from this study were compared with three international surveillance programmes.

The present study demonstrated the utility of routine medical data in public health research. Findings from this study suggests that fall, as an external cause, commands a significant amount of injuries in the local scene. Age-external cause relationship shed light in identifying focus of prevention intervention at particular developmental stages. Differences arose from international comparison points out peculiar needs and attention in the study and prevention of domestic injuries in Hong Kong.

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INTRODUCTION

- Injury was the leading cause of death among children age one to fourteen in Hong Kong between 1996 and 1997. In particular, among all traumatic injuries, unintentional injuries accounted for approximately 76% of the total in 1996 (Department of Health, 1998).
- Different types of injury, such as poisoning (Chan, Critchley, Chan, Tomlinson, Lau, Anderson, Lau, So, et al., 1994), burns (Cheng, Leung, Lam, & Leung, 1990), and head injuries (Hsiang, Goh, Zhu, & Poon, 1996) had been separately investigated. Results from these studies have directly benefited physicians on understanding characteristics among certain types of injuries and their respective treatment.
- While the above local studies have high clinical utility, general surveillance of childhood injuries should not be overlooked. General surveillance programs have advantages over specific ones in several ways. A general surveillance program could: a) provide relative rates of different injury nature and external causes, b) unveil underlying factors across different types of injury, and c) centralize resources and reduce redundancy in surveying different types of injury.
- The present study aims at identifying:

1. demography of childhood injuries victims along with the nature of injury, external cause, and severity
2. relationship between age and external cause of injury
3. characteristics of childhood injury that are unique in Hong Kong

METHODS AND PROCEDURE

- Participants selection criteria

-Attendance records from the Accident & Emergency Department of the Prince of Wales Hospital in Shatin, Hong Kong were collected between the period from 24 October, 1996 to 23 October, 1997. Children aged below the age of 16 (e.g. 15 years and 11 months old), who suffered from traumatic injuries or poisoning, were included in this study. Of all attendance records observed, 7813 cases fulfilled the selection criteria of this study.

- Material

The following fields on the PWH A&E attendance records were analyzed in this study:

1. Age of participant
2. Gender
3. A&E admission time and date
4. Triage (i.e. priority for treatment)
5. Specialty attended or transferred
6. Discharge destination
7. Level of consciousness upon arrival
8. Nature of injury (A&E classification, e.g. domestic, sports, assault)

In addition, four measures were derived from comments on the attendance records when available, including:

1. ICD-9 External causes of injury (E-code) (WHO, 1978)
   -describes the mechanism and object involved in an injury event

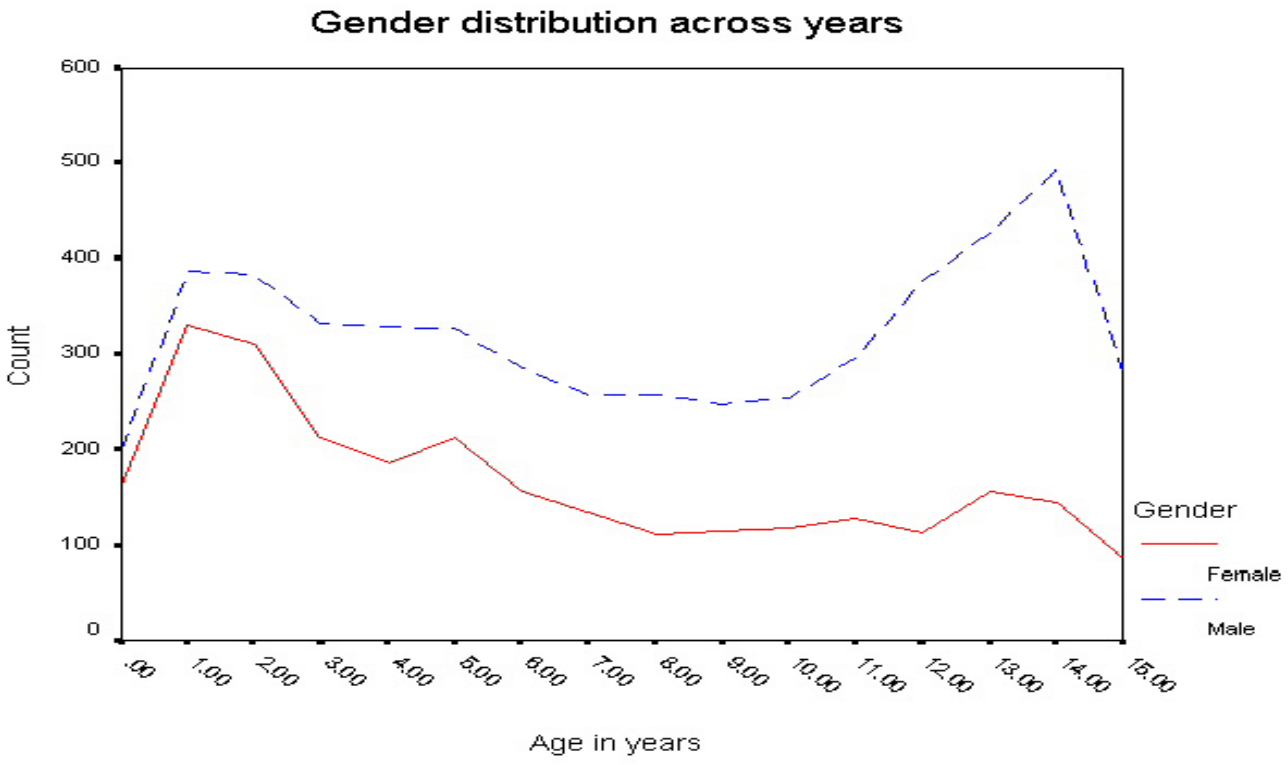
2. ICD-9 Nature of injury (N-code) (WHO, 1978)
   -describes the damage from the injury

3. Abbreviated Injury Scale (AIS) (AAAM, 1990)
   -An 1 to 6 scale of severity and mortality risk by anatomical location of injury

4. Injury Severity Scale (ISS) (AAAM, 1990)
   -Sum of square of the most severe AIS from three different body regions

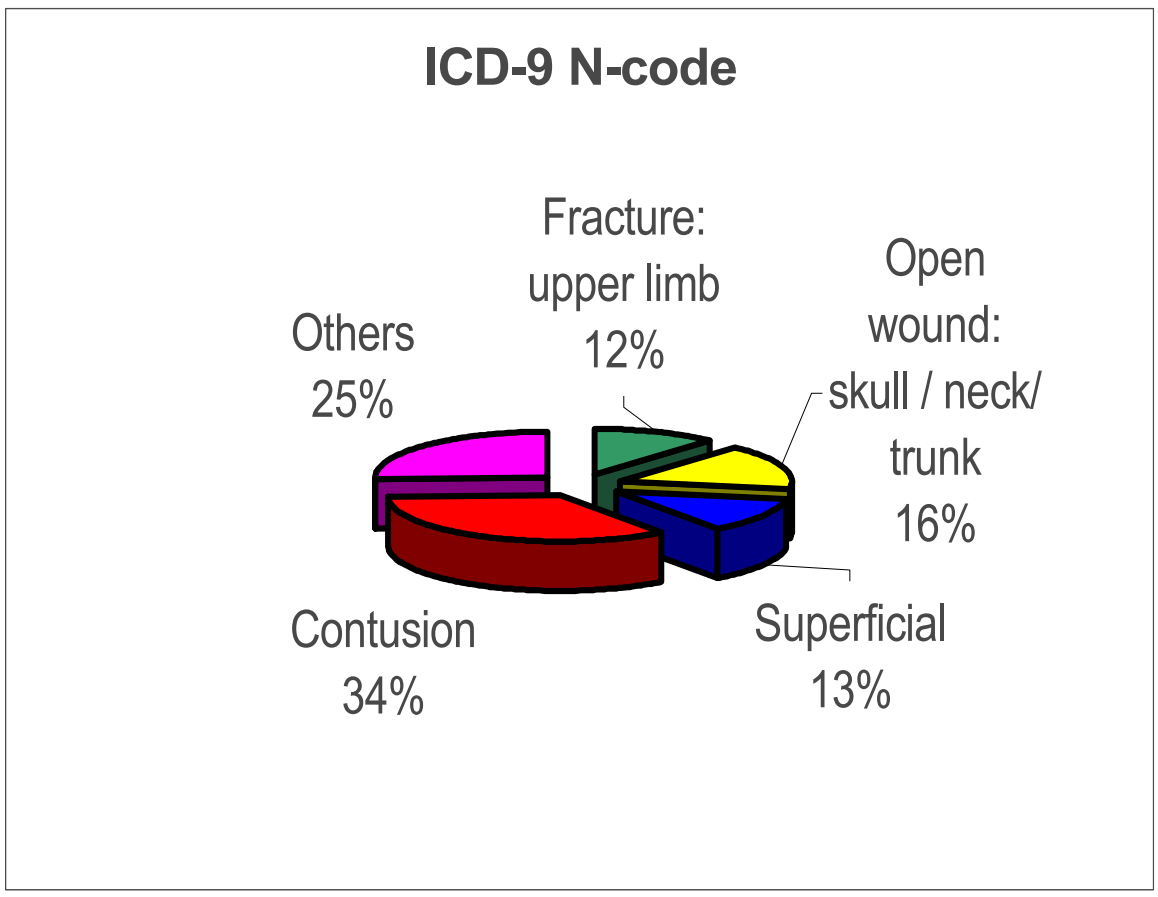
All the above measures were coded by a research nurse and validated by a medical doctor on a random sample of 200 cases. Coding agreement on E-code, N-code, AIS, and ISS were respectively 80.5%, 69%, 59.5%, and 93%. Overall, the inter-rater reliability of coding was satisfactory.

RESULTS



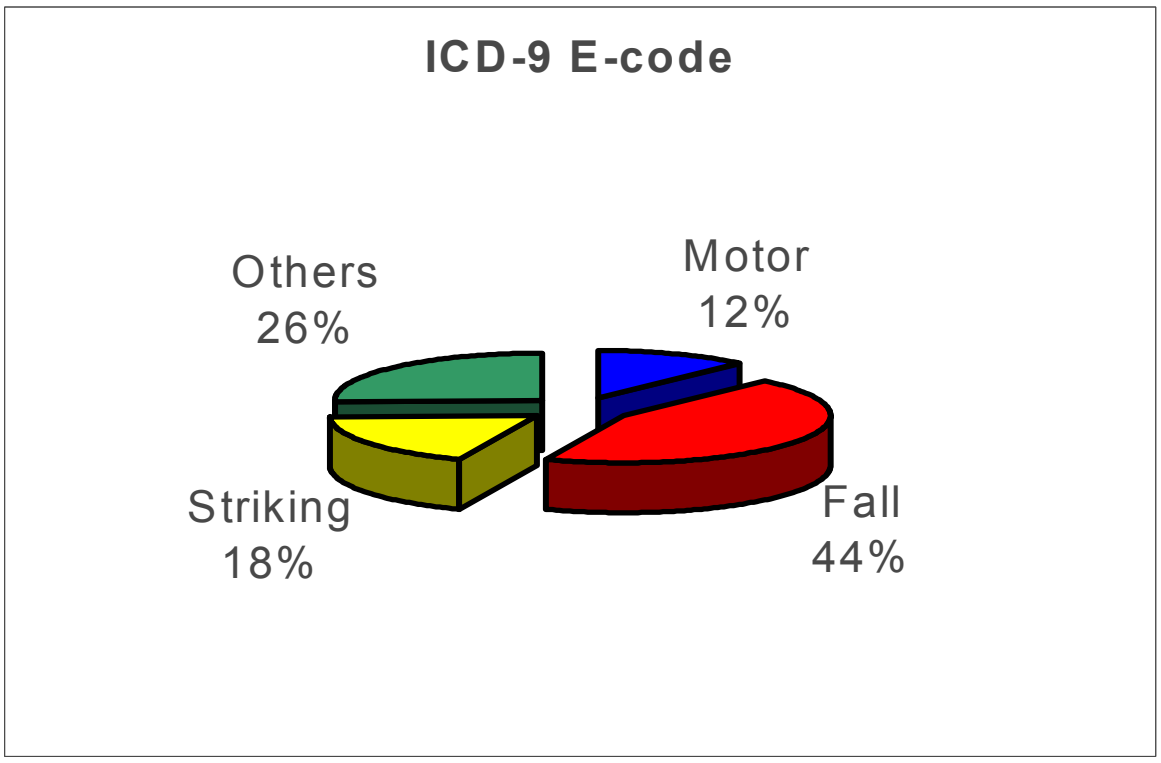
- Distribution of males is bimodal at age 1 and age 14
- Discrepancy in gender ratio increases as children age
- 43.6% of valid cases were domestic injuries
- Most cases were classified as semi-urgent in triage (85%)

- 80.1% of the cases scored one on the Injury Severity Scale (ISS) and 14% scored four. 65% of the patients were discharged home, 15% were admitted into PWH, and 14% were admitted into orthopedic department for further treatment or observation.



- The average maximum AIS* and ISS in fracture cases are 1.95 (S.D. = 0.37) and 3.99 (S.D. = 1.69) respectively. In addition, number of fracture increases along with age.
- The N-code contusion yields an average MAIS at 1.02 (S.D. = 0.18) and ISS at 1.17 (S.D. = 0.87). Age distribution of contusions is bimodal at age 1 and age 14.
- Results from a correspondence analysis on 32 major groups of E-code and 6 age groups (infancy, 2nd year, age 2 to 4, age 5 to 7, age 8 to 11, and age 12 to 15) revealed two dimensions of age-external cause interactions.

-Two age groups (infancy, 2nd year) and three external causes (poisoning, fall, machinery-related injury, scald) were significantly loaded onto the first dimension



-One age group and three external causes (motor, animal, cut/piercing) were significantly loaded onto the second dimension

*The maximum AIS score in a case. For example, in a case with multiple AIS score of 3,1, and 2, the maximum AIS score is 3

Comparison with data from United States*

Age**	Item of comparison	USA*	HK***
0-5 years old	M : F ratio	1.29 : 1	1.36 : 1
	Fall among all E-code	45.8%	52.9%
	Foreign body entering through orifice	4%	3.6%
6-12 years old	M : F ratio	1.72 : 1	2.32 : 1
	Motor-related injuries	9.6%	15.2%
	Pedal cycle Non-MV	6.1%	8.5%
	MV-Pedal cycle	0.6%	0.3%
	Pedestrian	1.03	1.89%
	MV-Occupant	1.8%	2.8%
Across all ages****	Fractures other than skull among falls	14%	21.3%
	Poisoning	1.5%	0.5%
	Burns	2.3%	0.1%
	Motor-related injuries	9.1%	12%

- Present study shows:

-Higher M:F ratio among 6-12 years old
-More falls that led to fractures
-More motor-related injuries across all ages
-Fewer poisonings and burns across all ages

* from a state-wide surveillance in Boston, MA (SCIPP) (Gallagher et al., 1984)
**Adolescents over the age of 12 were excluded in the comparison because of incompatible age grouping between these two studies
***Refers to data from the present study
****Note that the SCIPP covered children and adolescents aged 0-19 while the CIPRG PWH project studied children and adolescents aged 0-15 only

Comparison with data from Africa*

Age	Item of comparison	Africa*	HK**
0-1	% of falls	28.4%	60.2%
	% of burns	14.9%	0.1%
	% of poisoning	20.3%	1.1%
>1-5	% of >1-5 year-old among	50%	52.9%
	Victims with foreign bodies intrusion		
>5-10	% >5-10 year-old among	58.6%	27.6%
	Motor accident victims		
>10-15	% >10-15 year-old among	31.5%	16.4%
	Motor accident victims		
All ages	Fall among all E-code	25%	44.3%
	Motor-related injuries	26.5%	12%
	Poisoning	3.8%	0.5%
	Burns	7.3%	0.1%

- Present study shows:

-More falls, especially among infants
-Fewer burns and poisoning cases among infants
-Fewer motor-related injuries

*from a community-wide surveillance in Ife Ife, Nigeria (Adesunkanmi & Oyelami, 1998)
**Refers to data from the present study

Comparison with data from Canada*

Age	Item of comparison	CANADA*	HK**
<1	% of falls	29.4%	76%
	% of choking and suffocation	5.7%	0%
	% of poisoning	4.5%	0.3%
1-4	% of poisoning	16.9%	0.8%
5-9	% of falls	41.2%	44.9%
	% of motor related injuries	18%	13.4%
10-14	Decrease in the proportion of falls	12.2%	9.3%
	Within the age group		
All ages***	% of motor-related injuries	14.7%	12%

- Present study shows:

-More falls among infants
-Fewer poisoning cases across all age groups
-Similar rate of falls among 5-9-year-old
-Similar consequent decline of falls upon adolescence

**from a national surveillance across Canada (CHIRPP) (Health Canada, 1997)
**Refers to data from the present study
***Since CHIRPP included adolescents up to age 19, a subset of CHIRPP data (children and adolescents aged 0-14) was drawn for comparison

Summary and conclusion

- Most of the cases in this study were domestic in nature, with mild-to-moderate severity. Though the majority were discharged home, 30% required hospitalisation
- Males accounted for over two-third of all cases in the present study. Moreover, the gender ratio increases with age
- External cause of injury is predominated by falls. This predominance is even more remarkable when compared with other international surveillance programmes. On the other hand, motor accident, poisoning and burn comprise a smaller proportion among non-fatal injuries in Hong Kong than in countries compared.
- Prevalence of certain external causes, such as fall, scald, and motor accident, are developmentally specific. Such age-external cause interaction should be taken into consideration when targeting types of injury prevention intervention to a certain age group. When choosing between the introduction of active or passive intervention (e.g. safety policy Vs prevention education), such interaction could serve as references
- AIS and ISS lack the sensitivity in assessing severity of minor injury. Alternative severity measurement should be sought in future studies.
- The present study has demonstrated the feasibility of applying attendance-record data in a public health research. Such utilization provides an exemplar if the Hospital Authority decided to implement injury surveillance as a routine in all hospitals.
- Experience and knowledge gained during the present study, such as the advances in coding external causes and minor injury severity, have proved to be of value in refining the technology of surveying childhood injury in a local setting.

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