
Pergamon

Journal of Safety Research
32 (2001) 377–389

JOURNAL OF SAFETY RESEARCH

www.elsevier.com/locate/jsr

Validating narrative data on residential child injury

Charles C. Chan[a,*], Ben P.K. Luis[a], C.B. Chow[b], Jack C.Y. Cheng[c], T.W. Wong[d], Kevin Chan[a], Sandra Chui[c]

[a]*Department of Applied Social Sciences, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China*
[b]*Department of Paediatrics, Princess Margaret Hospital, Hong Kong, China*
[c]*Department of Orthopaedics and Traumatology, Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, Hong Kong, China*
[d]*Department of Family and Community Medicine, School of Public Health, Chinese University of Hong Kong, Shatin, Hong Kong, China*

Received 23 June 2000; received in revised form 15 March 2001; accepted 15 June 2001

Abstract

Problem: Devising a systematic method for analyzing and disseminating narrative descriptions of residential child injuries in Hong Kong. **Method:** Narrative descriptions of the injury events, sampled from a university teaching hospital, were categorized by three variables related to a residential child injury event. Four raters coded the descriptions. Results were tested on multirater reliability. **Results:** Satisfactory multirater kappa in coding ''child's action (CA)'' and ''object becoming hazard (OBH)'' variables confirms stability within these categories. Low agreement in coding the ''other human agent (OHA)'' variable revealed the conceptual and technical complexity in the definition of appropriate child supervision. **Impact on industry:** This study presented a systematic method for the analysis and dissemination of narrative injury data on residential child injuries, offering empirically derived content for local injury prevention programs. Results from this study address the etiology of residential childhood injuries from a process analytic perspective and bring forth intervention that acknowledges the effect of a person's environment interaction.

Keywords: Residential child injury; Narrative description; Coding; Classification; Hong Kong

* Corresponding author. Tel.: +852-2766-7744; fax: +852-2773-6558.
E-mail address: sschchan@polyu.edu.hk (C.C. Chan).

0022-4375/01/$ – see front matter
PII: S0022-4375(01)00060-3

1. Introduction

Injuries are a major health risk in Hong Kong. They are the leading cause of death among 1–4-year-olds (25.6%), 5–14-year-olds (31.9%), and 15–44-year-olds (36.9%; Department of Health, 1998). In terms of morbidity, unintentional injuries among 0–15-year-olds in Hong Kong are characterized by a mild to moderate severity and a large proportion of falls (Chan et al., 2000).

Given the immense health impact of injury, systematic collection of injury data has been a priority in many developed countries, and narrative description of injury is one of the common sources of injury data (Australian Institute of Health and Welfare, 1998; Health Canada, 1997; McCraig, 1999). This type of data is often obtained by asking caregivers of injured children questions like "What went wrong?" (Health Canada, 1997) or imperatives like "Describe events that preceded injury" (McCraig, 1999). Inclusion of narrative injury statements guide the transcription of injury data into standardized classification systems, including the International Classification of Diseases (ICD) External causes of injury (E-code; World Health Organization [WHO, 1978]), the Nordic Medico-Statistical Committee (NOMESCO) External Causes of Injury Classification (NOMESCO, 1997), as well as the International Classification of External Causes of Injury (ICECI) by WHO (1998). Narratives offer flexibility in injury data collection as well as convenience in terms of administration since training in injury coding in narrative is minimal compared to categorical classification. Though the material cost of implementing compulsory injury coding is reasonable (Rivara, Morgan, Bergman, & Maier, 1990), the hidden staff cost, such as time physicians and nurses spent on coding training, could be enormous.

Despite the widespread use of narratives in injury research, little is known about the methods and processes involved in analyzing these statements and their reliability in such transcription. For instance, narrative descriptions were included in the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP), and the National Hospital Ambulatory Medical Care Survey (NHAMCS), yet the method of analyzing and transcribing these descriptions were not disclosed in either programs' reports (Health Canada, 1997; McCraig, 1999). Among studies that reported their methods of analyzing narrative descriptions, disclosures of methodology were mostly inadequate in terms of unveiling the transcription of narrative descriptions into a priori categories (Gable & Peterson, 1998; Green & Hart, 1998; Peterson, Bartelstone, Kern, & Gillies, 1995; Schofer et al., 1995). Moreover, none of them were about injuries during early childhood, especially among preschool children.

Rich in contextual information, narrative injury data allows examination of determinants and consequences of injury in a broader context. This approach, also known as the process-analytic approach, provides an alternative to traditional approaches in which injury events are represented in a molar level comprising interactions among antecedents, stages of responses, and consequences of injury from both perspectives of the injured child and his or her family. This type of representation could lead to in-depth understanding of

injury in terms of the interaction between the injured person and the environment (Peterson, Farmer, & Mori, 1987). The process-analytic approach has been widely applied in many facets of injury research, including peer socialization (Christensen & Morrongiello, 1997; Green & Hart, 1998), parental socialization, proactive prevention (Gable & Peterson, 1998; Peterson et al., 1995), attitude toward injury, risk appraisal, and injury attribution (Peterson et al., 1995).

Though cognitive processes play a significant role in mediating injury events, behavioral antecedents of child injury that involve both the injured child and caregiver should not be overlooked in the study of child injuries. Despite previous experimental efforts in examining the behavior–injury relationship (Cataldo et al., 1992; Potts & Swisher, 1998; Wills et al., 1997), this relationship remains rather unexplored within the context of unintentional residential injuries in an applied setting.

The present study aims at establishing a systematic method to analyze and disseminate narrative data concerning injury context from a behavioral perspective, in particular, those among residential child injuries. Narrative injury data were collected in a format called "event descriptor" (Chan et al., 1998). To assess the validity and reliability of these narrative descriptions, each description is divided and transcribed into three explicit classes, namely: (a) child's action (CA), (b) other human agent (OHA), and (c) object becoming hazard (OBH). The goals of the study are to (a) evaluate the perceptiveness and utility for this type of narrative data and (b) examine the extent to which the event descriptor structure could complement existing major injury classifications (ICECI, NOMESCO, E-code, etc.).

2. Methods

2.1. Participants

Participants were informants of 413 injuries sustained by 0–15-year-old children who were admitted into the Accident and Emergency Department of Prince of Wales Hospital, Hong Kong between April 17, 1997 and February 11, 1998 for at least an overnight observation at the hospital. Sixteen cases were excluded due to insufficient or ambiguous information supplied. A total of 397 injury scenarios were brought into the analysis.

2.2. Material

An experienced research nurse, over the same period, had completed a questionnaire with each participant. Information such as the child's demographic information, parent(s) demographic information, type of injury, context of injury, and pathological coding were obtained in the questionnaire. In particular, informants were asked to describe the immediate situation prior to

the injury. For the interest of our present study, we will only look into the event stage situations.

2.3. Procedure

2.3.1. Questionnaire coding procedure

Extracting from descriptions gathered in the questionnaire, a statement-form event descriptor captures the event stage situation of each documented injury (Table 1).

With a minimum set of criteria adopted for transcription, an adequate event descriptor contains the following information: (a) the injured-child's age, (b) his/her action prior to the accident, (c) other human interaction involved in the accident, and (d) the object responsible for the injury.

Four individual raters, including three research assistants from the Hong Kong Polytechnic University and a research nurse, transcribed those obtained situations into 397 event descriptors. A total of 16 cases were excluded because of insufficient information or no response. All raters coded the cases over a 2-day period, with each working individually to minimize multirater interference during the coding process.

With reference to the established coding strategy (Chan et al., 1998), each event descriptor broke down into three classes of components, namely: (a) CA, (b) OHA, and (c) OBH. Various categories are nested within each class.

2.3.2. Evaluation of classes and categories

Multirater agreement is evaluated with two procedures: item agreement proportions and multirater κ (Siegel & Castellan, 1988). Confidence level is set at 95% for all κ measurements. Postcoding feedback from raters forms the qualitative evaluation. Raters were asked to comment on coding ambiguity in a particular category or inadequacy of categories in a particular class.

Table 1
Samples of event descriptor[a]

Child (f/1–3, m/0–6) fell from bed while sleeping in adult bed, unguarded.
Child (m/2–2) fell from upper deck of bunk bed while playing with his cousin.
Child (m/4–0) slipped and fell when trying to kick his buddy.
Child (m/4–0) fell from height while jumping between levels of furniture arrangement.
Child (m/3–8) was scalded while preparing instant cup noodle with accessible hot water in living room.
Child (f/8–3) fell from ladder of bunk bed when trying to get down.
Child (m/2–8) fell by stepping on a football, suffering head injury.
Infant (m/0–6, f/0–7, f/0–4, f/0–9, m/0–5, m/0–4, m/0–5, m/0–5) turned and fell while being put on sofa by carer momentarily.
Child (m/1–10) swallowed coin found in bed, suffered from suffocation.
Child (m/9–6) shreded wood with knife, slipped hand and cut his own finger.

[a] (m/1–10) = male, 1 year and 10 months old.

3. Results

3.1. Overall agreement of classes

The average overall multirater κ in coding event descriptors is 0.4576. OBH emerged as the most stable class with 46.6% of cases transcribed in perfect agreement among raters, followed by CA (40.55%) and OHA (26.95%). Table 2 illustrates the structure of classification employed and overall agreement.

3.1.1. Child's action

Multirater κ on coding CA is 0.602. Playing with other(s) (Category 2) exhibits highest stability among codes in this class with 54.55% of usage falling into perfect agreement among raters. Detailed breakdown of other CA items is shown in Table 3.

The 15-category CA coding was later collapsed with the following specifications: *sitting* and *standing* were collapsed into *without motion*; *reaching for something*, *walking*, *crawling*, and *climbing* was combined into *in motion*; *holding object* and *using object* were collapsed into *manipulating object*. All other categories remained unchanged. The collapsed coding yield a multirater κ of 0.632. Recoded categories and proportions of endorsement are listed in Table 4.

3.1.2. Other human agent

Multirater κ of OHA coding agreement is the lowest among all classes at 0.106. Usage of "Peer's stimulated action" and "Peer's intentional action" yield no perfect agreement among cases (Table 5).

OHA endorsements were recoded with an alternative grouping that collapsed six OHA categories into three categories, namely: (a) *no agent involved*, (b) *caregiver*, and (c) *peer*. The recoded endorsements yielded a higher multiraters κ at 0.356. Recoded categories and proportions of endorsement are listed in Table 6.

3.1.3. Object becoming hazard

Multirater κ yielded in this class (0.665) is the highest among all classes. Animal (100%), fishbone (80%), and bunk bed (67.5%) are the top three items in terms of coding consistency (Table 7).

Table 2
Overall case agreement

Agreement	Child's action	Other human agent	Object becoming hazard
No agreement among all coders	10 (2.52%)	0 (0%)	14 (3.53%)
One pair of coders agree	78 (19.65%)	26 (6.55%)	57 (14.36%)
Two pairs of coders agree	29 (7.3%)	54 (13.6%)	38 (9.57%)
Three coders agree with each other	119 (29.97%)	210 (52.9%)	103 (25.94%)
All coders agree on this coding	161 (40.55%)	107 (26.95%)	185 (46.6%)
Total	397 (100%)	397 (100%)	397 (100%)

Table 3
Item agreement — child's action

Item	One coder agrees	Two coders agree	Three coders agree	All coders agree	Mean # of agreement	S.D.	Total
Playing with others	14 (21.21%)	8 (12.12%)	8 (12.12%)	36 (54.55%)	3	1.24	66.00
Climbing	11 (27.5%)	2 (5%)	7 (17.5%)	20 (50%)	2.9	1.3	40.00
Sleeping	14 (29.17%)	10 (20.83%)	1 (2.08%)	23 (47.92%)	2.69	1.34	48.00
Sitting	13 (30.23%)	11 (25.58%)	6 (13.95%)	13 (30.23%)	2.44	1.22	43.00
Eating	8 (21.05%)	5 (13.16%)	14 (36.84%)	11 (28.95%)	2.74	1.11	38.00
Playing alone	42 (38.53%)	20 (18.35%)	21 (19.27%)	26 (23.85%)	2.28	1.21	109.00
Walking	31 (37.35%)	13 (15.66%)	22 (26.51%)	17 (20.48%)	2.3	1.18	83.00
Standing	13 (38.24%)	7 (20.59%)	9 (26.47%)	5 (14.71%)	2.18	1.11	34.00
Being held by others	8 (44.44%)	4 (22.22%)	4 (22.22%)	2 (11.11%)	2	1.08	18.00
Bathing	6 (60%)	0 (0%)	3 (30%)	1 (10%)	1.9	1.2	10.00
Reaching for something or someplace	33 (50.77%)	15 (23.08%)	11 (16.92%)	6 (9.23%)	1.85	1.02	65.00
Holding objects	19 (70.37%)	5 (18.52%)	2 (7.41%)	1 (3.7%)	1.44	0.8	27.00
Action unknown	54 (59.34%)	29 (31.87%)	8 (8.79%)	0 (0%)	1.49	0.66	91.00
Using objects	14 (63.64%)	6 (27.27%)	2 (9.09%)	0 (0%)	1.45	0.67	22.00
Crawling	4 (66.67%)	1 (16.67%)	1 (16.67%)	0 (0%)	1.5	0.84	6.00

3.1.4. Qualitative evaluation: postcoding feedback on CA categories

Regarding two CA categories, holding (Category 9) and using (Category 10) objects, raters agreed that these categories are overlapping and vague in nature and recommended merging them into *manipulating objects* or removing *using objects*. Raters also revealed that action unknown (Category 11) was frequently endorsed as a "wastebasket category" (Good & Watts, 1996). According to the postcoding

Table 4
Recoded child's action

Item	One coder agrees	Two coders agree	Three coders agree	All coders agree	Mean # of agreement	S.D.	Total
Playing with others	14 (21.21%)	8 (12.12%)	8 (12.12%)	36 (54.55%)	3	1.24	66
Eating	8 (21.05%)	5 (13.16%)	14 (36.84%)	11 (28.95%)	2.74	1.11	38
Sleeping	14 (29.17%)	10 (20.83%)	1 (2.08%)	23 (47.92%)	2.69	1.34	48
Moving (reaching, walking, crawling, climbing)	51 (30.91%)	20 (12.12%)	31 (18.79%)	63 (38.18%)	2.64	1.27	165
No motion (sitting, standing)	22 (29.73%)	19 (25.68%)	13 (17.57%)	20 (27.03%)	2.42	1.18	74
Playing alone	42 (38.53%)	20 (18.35%)	21 (19.27%)	26 (23.85%)	2.28	1.21	109
Being held by others	8 (44.44%)	4 (22.22%)	4 (22.22%)	2 (11.11%)	2	1.08	18
Bathing	6 (60%)	0 (0%)	3 (30%)	1 (10%)	1.9	1.2	10
Manipulating objects (holding/ using objects)	23 (56.1%)	9 (21.95%)	6 (14.63%)	3 (7.32%)	1.73	0.98	41
Action unknown	54 (59.34%)	29 (31.87%)	8 (8.79%)	0 (0%)	1.49	0.66	91

Table 5
Item agreement — other human agent

Item	One coder agrees	Two coders agree	Three coders agree	All coders agree	Mean # of agreement	S.D.	Total
No human agent involved	125 (38.11%)	54 (16.46%)	73 (22.26%)	76 (23.17%)	2.30	1.20	328
Carer stimulated action	13 (65%)	3 (15%)	1 (5%)	3 (15%)	1.70	1.13	20
Carer inattentive action	88 (31.32%)	57 (20.28%)	112 (39.86%)	24 (8.54%)	2.26	1.00	281
Peer inattenive action	13 (27.66%)	14 (29.79%)	16 (34.04%)	4 (8.51%)	2.23	0.96	47
Peer intentional action	6 (30%)	6 (30%)	8 (40%)	0 (0%)	2.10	0.85	20
Peer stimulated action	4 (100%)	0 (0%)	0 (0%)	0 (0%)	1.00	0.00	4

feedback, a similar problem occurs when raters put all unspecified actions under as *playing* or *playing with other(s)*, depending on the presence of a peer or caregiver at the time of the accident. Raters admitted that when they could not accurately code the CA in a case, they tended to adopt such strategy. With respect to this methodological problem, splitting the CA class into two levels is a plausible solution. The NOMESCO classification is an example of such organization. Activity at the time of injury is described in two levels, first, on the intention of the activity and, second, on the pattern of movement (NOMESCO, 1997).

3.1.5. On OHA categories

The majority of OHA categories led to discord in coding. Conferring with raters' feedback, this is in part due to the insufficient definitions of class and categories. For instance, while one rater endorsed "caregiver's inattentive action" in cases where a child was left unattended, others endorsed this category only in cases where caregivers were present in the household but not supervising the injured children. Caregiver's inattentive action (Category 2), especially, should be further clarified. Caregivers' vigilance during supervision and negligence should either be excluded from this category or stated clearly in the transcription protocol. This amendment is necessary for our results to be validly interpreted since categories should be defined sufficiently and explicitly for the transcription to be a reliable process (Good & Watts, 1996). In addition, low agreement on

Table 6
Recoded other human agent

Item	One coder agrees	Two coders agree	Three coders agree	All coders agree	Mean # of agreement	S.D.	Total
Peer(s) involved	8 (14.81%)	9 (16.67%)	23 (42.59%)	14 (25.93%)	2.8	1	54
Carer(s) involved	87 (30.42%)	51 (17.83%)	113 (39.51%)	35 (12.24%)	2.34	1.04	286
No human agent involved	125 (38.11%)	54 (16.46%)	73 (22.26%)	76 (23.17%)	2.3	1.2	328

Table 7
Item agreement — object becoming hazard

Item	One coder agrees	Two coders agree	Three coders agree	All coders agree	Mean # of agreement	S.D.	Total
Animal	0 (0%)	0 (0%)	0 (0%)	2 (100%)	4	0	2
Fishbone	1 (10%)	0 (0%)	1 (10%)	8 (80%)	3.6	0.97	10
Bunk bed	4 (10%)	5 (12.5%)	4 (10%)	27 (67.5%)	3.35	1.05	40
Small nonedible object	1 (8.33%)	1 (8.33%)	2 (16.67%)	8 (66.67%)	3.42	1	12
Door	0 (0%)	4 (15.38%)	6 (23.08%)	16 (61.54%)	3.46	0.76	26
Staircase	0 (0%)	0 (0%)	4 (40%)	6 (60%)	3.6	0.52	10
Toy	2 (16.67%)	2 (16.67%)	1 (8.33%)	7 (58.33%)	3.08	1.24	12
Cot side	4 (30.77%)	2 (15.38%)	0 (0%)	7 (53.85%)	2.77	1.42	13
Adult bed	8 (21.62%)	6 (16.22%)	4 (10.81%)	19 (51.35%)	2.92	1.26	37
Slippery floor	10 (25.64%)	7 (17.95%)	4 (10.26%)	18 (46.15%)	2.77	1.29	39
Sitting furniture	14 (23.33%)	7 (11.67%)	14 (23.33%)	25 (41.67%)	2.83	1.21	60
Own bed other than bunk bed	4 (30.77%)	2 (15.38%)	2 (15.38%)	5 (38.46%)	2.62	1.33	13
Defective door	2 (66.67%)	0 (0%)	0 (0%)	1 (33.33%)	2	1.73	3
Others body part	7 (50%)	1 (7.14%)	3 (21.43%)	3 (21.43%)	2.14	1.29	14
Nonsitting furniture	15 (45.45%)	8 (24.24%)	3 (9.09%)	7 (21.21%)	2.06	1.2	33
Accessible hot water or soup	9 (20.45%)	13 (29.55%)	13 (29.55%)	9 (20.45%)	2.5	1.05	44
Inaccessible hot water or soup	15 (36.59%)	13 (31.71%)	6 (14.63%)	7 (17.07%)	2.12	1.1	41
Household chemical	11 (78.57%)	0 (0%)	1 (7.14%)	2 (14.29%)	1.57	1.16	14
Pillow or bed clothes in others bed	1 (14.29%)	4 (57.14%)	1 (14.29%)	1 (14.29%)	2.29	0.95	7
Gap between furniture	3 (37.5%)	3 (37.5%)	1 (12.5%)	1 (12.5%)	2	1.07	8
Pillow or bed clothes in own bed	5 (62.5%)	2 (25%)	0 (0%)	1 (12.5%)	1.63	1.06	8
Stacked sitting furniture	7 (63.64%)	2 (18.18%)	1 (9.09%)	1 (9.09%)	1.64	1.03	11
Others hand	6 (42.86%)	3 (21.43%)	4 (28.57%)	1 (7.14%)	2	1.04	14
Self	29 (56.86%)	11 (21.57%)	8 (15.69%)	3 (5.88%)	1.71	0.94	51
Article of use	27 (67.5%)	10 (25%)	3 (7.5%)	0 (0%)	1.4	0.63	40
Fixtures	16 (80%)	4 (20%)	0 (0%)	0 (0%)	1.2	0.41	20
Dry floor	19 (95%)	1 (5%)	0 (0%)	0 (0%)	1.05	0.22	20
Human force	9 (50%)	7 (38.89%)	2 (11.11%)	0 (0%)	1.61	0.7	18
Domestic tools	11 (73.33%)	4 (26.67%)	0 (0%)	0 (0%)	1.27	0.46	15
Medicine	0 (0%)	1 (9.09%)	10 (90.91%)	0 (0%)	2.91	0.3	11
Ladder	3 (37.5%)	3 (37.5%)	2 (25%)	0 (0%)	1.88	0.83	8
Domestic appliances	2 (33.33%)	3 (50%)	1 (16.67%)	0 (0%)	1.83	0.75	6
Folding chair	0 (0%)	2 (66.67%)	1 (33.33%)	0 (0%)	2.33	0.58	3
Own clothes	1 (33.33%)	2 (66.67%)	0 (0%)	0 (0%)	1.67	0.58	3

coding peer's stimulated action (Category 4) may suggest informants' reporting biases. An explicit and descriptive protocol for transcribing OHA categories is recommended for future replication studies. However, such recommendation might be impossible in practice due to the conceptual and technical complexity involved in the definition of appropriate supervision. Further details on this issue is documented in the 'discussion'.

3.1.6. On OBH categories

Confirmed with raters' feedback, human force (Category 14) and self (Category 22) should be eliminated from the OBH class for they are not really objects. The wastebasket category in this class, article of use (Category 19), should be replaced with ad-hoc categories, as in the solution suggested in the CA class. Raters also revealed that endorsement of accessible hot fluid (Category 1) and inaccessible hot fluid (Category 2) are mostly decided upon idiosyncratic judgment, leading to evidence that the qualifier "accessible/inaccessible" might propose ambiguity in coding. Apart from the agreement analysis, raters also suggested adding sofa as a new category.

4. Discussion

The event descriptor transcription procedure, in general, yielded substantial multiraters agreement. The estimated overall κ of 0.4576 can be interpreted as fair agreement among raters (Landis & Koch, 1977). Such result should be put into the context that the taxonomy attempted in this validation is relatively more specific than other similar attempts of its nature (Annest, 2000). Nonetheless, the OHA class revealed high discordance among raters despite the collapsed coding that improved κ from 0.106 to 0.356. The "OHA" class was introduced in the present study to assess the effect of person–environmental interaction involved in unintentional residential child injuries. Low multirater agreement on coding the OHA class, as reported in the postcoding comments, could be attributed to differing conceptions of this class among raters. Subsequently, this phenomenon reveals the problem in conceiving intent of an injury event. Distinction between unintentional injury and neglect has long been a disputable issue in the field of child injury research. Child supervision has an integral role in unintentional injuries, yet researchers in the field have yet to reach consensus on the classification of neglect (Peterson, Ewigman, & Kivlahan, 1993). It is because in most circumstances, especially in a residential setting, classification of adequate supervision seldom yields precision and reliability (Peterson, 1994). Unlike the study of traffic-related injuries, where supervision upon pedestrian accident could be inferred from eyewitness reports (Wills et al., 1997), classification of supervision in residential child injuries is often restrained by the lack of eyewitnesses at the household during an injury. In many circumstances, the caregiver would be the sole witness of the injury event. Reports from this type of source, naturally, would be volatile in terms of reliability. Other than collecting data from eyewitnesses, the source of recounting supervision at home is often limited to judgments and indirect observation from physicians, social workers, and law enforcement personnel. Consequently, the validity of claims concerning supervision at home is subjected to heightened doubt. For example, "neglect" was included (in "intent" and "reason for contact" axes, respectively), but not operationally defined in both ICECI and NOMESCO classification manuals (NOMESCO, 1997; WHO, 1998). In short, results from the present study

suggested that reporting person–environment interaction in residential child injury on a behavioral level remains an entangled issue to be tackled.

Discrepancy in coding OBH revealed the need for multifactor coding in the classification. Raters often encounter the problem of classifying two or more objects involved in the development of an injury, and find it difficult to assign them into one structured classification. In general, raters are confused with whether they should endorse an object involved based on its temporal proximity with the injury event or its relationship with the impact encountered. The advent of standardized coding scheme such as the ICECI should resolve these problems.

It has been addressed that existing coding systems like the ICECI are insufficient in providing detailed breakdowns of specific activities that necessitate the development of prevention initiatives (Overpeck et al., 1999). The reduced set of CA items in this study could become a blueprint for such expansion in a residential context.

4.1. Limitation of the study

Results from this study should not be interpreted as an accurate estimate of all residential child injuries in Hong Kong since all participants came from one major university teaching hospital. Because the procedure of coding narrative data is very labor-intensive and time-consuming, it would not be practical to apply the technique employed in this study on a large scale, such as a national injury surveillance program. However, this data-mining technique would be a more appropriate method in preparing injury prevention material presentation for its high ecological validity.

Compared with ICECI (WHO, 1998) and NOMESCO (1997) classifications, classes and categories in the present study might appear to be moderately embroiled and crude. Nevertheless, it would be acceptable to overlook those flaws in the documented classification since the objective of this study is an exercise of reducing narrative data into a precise and classified breakdown of an injury event, rather than an attempt to exhaust all possibilities for the description of injury situation.

5. Conclusion

The present study proposed a documented method for the transcription and classification of narrative data in injury research. Nevertheless, the primary purpose of this method is not to transform narratives into categorical data. Rather, this method is devised to assist researchers in studying these narratives systematically with the aid of explicit categories. Classes and categories documented in the present study were, therefore, intermediate outcomes rather than the final ones.

Contrasting with the traditional and modular approach in conceptualizing and classifying injury, such as Haddon's Host–Agent–Environment matrix (Haddon, 1972), the presented method provides an alternative for understanding an injury event, with a focus on the person–environment interaction. Arranging residential

child injury data in modular form enables public health professionals to access them conveniently. Such convenience, however, does not necessarily apply to the audience of injury prevention, including parents and caregivers of children. Moreover, interactions between matrix components are sacrificed at the price of parsimony. Take an example from the event descriptors in the present study. Sofa is apparently not a visibly dangerous piece of furniture, yet it becomes hazardous only when parents, even for a split second, place their infants on a sofa unattended and unrestrained. By encapsulating the injury event in a short narrative form, a balance is struck between ecological validity of injury data and manageability in terms of data consolidation and analyses.

In terms of devising injury prevention program and material, narrative descriptions could also be instrumental. It has been suggested that priming of thematically related knowledge and injury prevention have a significant relationship (Potts & Swisher, 1998). Inclusion of contextual determinants, consequentially, should lead to a form of injury data with higher ecological validity. Furthermore, presenting injury prevention material in scenario form provides a focus for participants who had no personal experience of injury (Barter & Renold, 2000), which is often the case given the low base rate of injury in the population.

In addition, the process in which parents were trained to record narrative description could be in itself a form of intervention. Recent findings on the application of narrative description have suggested that exposure to narrative descriptions of injury could, in itself, lead the audience or reader to increase awareness and derive intervention practices (Green & Hart, 1998; Peterson, Saldana, & Heiblum, 1996).

To sum up, the present study featured a documented method for transcribing and classifying empirically derived narrative descriptions of unintentional residential child injuries. Injury data collected with this method provide the means for devising an evidence-based intervention on unintentional residential child injuries. Demonstrated in theoretical framework (Green & Kreuter, 1991) and applications (Howat, Jones, Hall, Cross, & Stevenson, 1997; Peterson & Schick, 1993; Stevenson, Iredell, Howat, Cross, & Hall, 1999), evidence-based injury prevention intervention offers knowledge and behavioral modification to the target population while addressing the ecological need in the community. It is hoped that event descriptors, presented in this study, could form the foundation for this type of intervention in the near future.

References

Annest, J. L. (2000). *CDC's short version of the International Classification of External Causes of Injury (ICECI): a pilot test*. Atlanta, GA: Office of Statistics and Programming, National Center for Injury Prevention and Control (NCIPC), Centers for Disease Control and Prevention (CDC).

Australian Institute of Health and Welfare, NISUA (1998). *Australian National Data Standards for Injury Surveillance, version 2.1c*. Australian Institute of Health and Welfare, National Injury

Surveillance Unit AIH. Available at: http://www.nisu.flinders.edu.au/pubs/manuals/ndsis/ndsis-man.html (January).

Barter, C., & Renold, E. (2000). "I wanna tell you a story": exploring the application of vignettes in qualitative research with children and young people. *International Journal of Social Research Methodology*, *3* (4), 307–323.

Cataldo, M. F., Finney, J. W., Richman, G. S., Riley, A. W., Hook, R. J., Brophy, C. J., & Nau, P. A. (1992). Behavior of injured and uninjured children and their parents in a simulated hazardous setting. *Journal of Pediatric Psychology*, *17* (1), 73–80.

Chan, C. C., Cheng, J. C., Wong, T. W., Chow, C. B., Luis, B. P., Cheung, W. L., & Chan, K. (2000). An international comparison of childhood injuries in Hong Kong. *Injury Prevention*, *6* (1), 20–23.

Chan, C. C., Lui, P. K., Chow, C. B., Cheng, J. C. Y., Wong, T. W., Sze, Y. H., Ho, W. C., & Tsui, S. (1998). *Child injury situation as prevention: a shift of paradigm*. Paper presented at the Fourth World Conference on Injury Prevention and Control, Amsterdam, Netherlands.

Christensen, S., & Morrongiello, B. A. (1997). The influence of peers on childrens judgments about engaging in behaviors that threaten their safety. *Journal of Applied Developmental Psychology*, *18*, 547–562.

Department of Health. (1998). *Public health report*, (3). Hong Kong: Author.

Gable, S., & Peterson, L. (1998). School-age children's attributions about their own naturally occurring minor injuries: A process analysis. *Journal of Pediatric Psychology*, *23* (5), 323–332.

Good, D. A., & Watts, F. N. (Eds.). (1996). *Qualitative research* (2nd ed.). East Sussex, UK: Erlbaum (UK) Taylor and Francis.

Green, J., & Hart, L. (1998). Children's views of accident risks and prevention: A qualitative study. *Injury Prevention*, *4* (1), 14–21.

Green, L. W., & Kreuter, M. W. (1991). *Health promotion planning: An educational and environmental approach* (2nd ed.). Mountain View, CA: Mayfield Pub.

Haddon, W. J. (1972). A logical framework for categorizing highway safety phenomena and activity. *Journal of Trauma*, *12* (3), 193–207.

Health Canada. (1997). *For the safety of Canadian children and youth: From injury data to preventive measures*. Ottawa, Canada: Minister of Public Works and Government Services, Canada.

Howat, P., Jones, S., Hall, M., Cross, D., & Stevenson, M. (1997). The PRECEDE–PROCEED model: Application to planning a child pedestrian injury prevention program. *Injury Prevention*, *3* (4), 282–287.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, *33* (1), 159–174.

McCraig, L. (1999). *National Hospital Ambulatory Medical Care Survey: 1997 outpatient department summary*. Hyattsville, MD: National Center for Health Statistics.

Nordic Medico-Statistical Committee (NOMESCO). (1997). *NOMESCO classification of external causes of injuries: third revised edition*. Copenhagen, Denmark: Author.

Overpeck, M. D., Pickett, W., King, M. A., Garner, M., Marshall, L., Trifiletti, L. B., Currey, A., Boyce, W. F., & Scheidt, P. C. (June 4, 1999). *Application of the ICECI Classification of External Cause of Injury to the WHO Health Behavior in School-Aged Children Survey.* Paper presented at the International Collaborative Effort on Injury Statistics, Washington, DC.

Peterson, L. (1994). Integrating child injury and abuse–neglect research: Common histories, etiologies, and solutions. *Psychological Bulletin*, *116* (2), 293–315.

Peterson, L., Bartelstone, J., Kern, T., & Gillies, R. (1995). Parents' socialization of children's injury prevention: Description and some initial parameters. *Child Development*, *66* (1), 224–235.

Peterson, L., Ewigman, B., & Kivlahan, C. (1993). Judgments regarding appropriate child supervision to prevent injury: The role of environmental risk and child age. *Child Development*, *64* (3), 934–950.

Peterson, L., Farmer, J., & Mori, L. (1987). Process analysis of injury situations: a complement to epidemiological methods. *Journal of Social Issues*, *43* (2), 33–44.

Peterson, L., Saldana, L., & Heiblum, N. (1996). Quantifying tissue damage from childhood injury: the minor injury severity scale. *Journal of Pediatric Psychology*, *21* (2), 251–267.

Peterson, L., & Schick, B. (1993). Empirically derived injury prevention rules. *Journal of Applied Behavior Analysis*, *28* (4), 451–460.

Potts, R., & Swisher, L. (1998). Effects of televised safety models on children's risk taking and hazard identification (see comments). *Journal of Pediatric Psychology*, *23* (3), 157–163.

Rivara, F. P., Morgan, P., Bergman, A. B., & Maier, R. V. (1990). Cost estimates for statewide reporting of injuries by E coding hospital discharge abstract data base systems. *Public Health Reports*, *105* (6), 635–638.

Schofer, J. L., Christoffel, K. K., Donovan, M., Lavigne, J. V., Tanz, R. R., & Wills, K. E. (1995). Child pedestrian injury taxonomy based on visibility and action. *Accident Analysis and Prevention*, *27* (3), 317–333.

Siegel, S., & Castellan, J. N. (1988). *Nonparametric statistics for the behavioral sciences* (2nd ed.). New York: McGraw-Hill.

Stevenson, M., Iredell, H., Howat, P., Cross, D., & Hall, M. (1999). Measuring community/environmental interventions: the child pedestrian injury prevention project. *Injury Prevention*, *5* (1), 26–30.

Wills, K. E., Tanz, R. R., Christoffel, K. K., Schofer, J. L., Lavigne, J. V., Donovan, M., & Kalangis, K. (1997). Supervision in childhood injury cases: A reliable taxonomy. *Accident Analysis and Prevention*, *29* (1), 133–137.

World Health Organization (WHO). (1978). *International Classification of Diseases, ninth revision (ICD-9)*. Geneva, Switzerland: Author.

World Health Organization (WHO). (1998). *International classification for external causes of injuries (ICECI): guidelines for counting and classifying external causes of injuries for prevention and control* (208). Amsterdam, Netherlands: Author.

Dr. Charles C. Chan is Associate Professor, Department of Applied Social Sciences, Hong Kong Polytechnic University.

Ping Keung Luis is Principal Lecturer, Department of Applied Social Sciences, Hong Kong Polytechnic University.

Dr. Chun Bong Chow is a Consultant Paediatrician, Princess Margaret Hospital.

Prof. Jack Chun Yiu Cheng is with the Department Orthopaedics & Traumatology, The Chinese University of Hong Kong, Prince of Wales Hospital.

Prof. Tze Wai Wong is with the Dept. of Community & Family Medicine, The Chinese University of Hong Kong.

Kevin Hin Wang Chan is Research Assistant, Department of Applied Social Sciences, Hong Kong Polytechnic University.

Sandra Fung Ming Chui is Research Nurse, Dept. of Orthopaedics & Traumatology, The Chinese University of Hong Kong, Prince of Wales Hospital.