

The quality of injury data from hospital records in Vietnam

Tran Thi Hong, Susan M Walker and Kirsten McKenzie

Abstract

The objective of this research was to examine the level of agreement of coders for ICD-10 coding of injury discharges in Danang General Hospital in Vietnam. Two hundred and five medical records of children hospitalised in this facility due to injury were randomly selected and recoded. Information from medical records abstracted by two trained staff was recoded by external coders in Hanoi and in Australia, using ICD-10. The completeness and detail of external cause of injury recorded in medical records was poor. Agreement between coders for injury coding was average, with 32% to 40% discrepancy in the main diagnosis codes at three character level, and 57% to 60% discrepancy at four character level, depending on which coders were being compared. It was concluded that as hospital data represent a cost-effective source of information regarding injuries, with significant costs incurred in collecting such information through special studies and censuses (especially for a developing country such as Vietnam), it is important to establish the quality and value of hospital data for injury surveillance and prevention research and to explore ways in which these data can be improved.

Keywords (MeSH):

Data Quality; ICD-10; Trauma; Surveillance; Hospital Information Systems; Health Information Management

In Vietnam, as in many countries worldwide, injuries have been recognised as an important public health problem, resulting in an urgent need to develop injury surveillance systems to assist with the prevention and control of injury in this country (Le, Le & Pham 2003; Ministry of Health 2003; World Health Organization 2004; Le & Nguyen 2005; Ministry of Health 2005). The first nationwide survey of injury in Vietnam was conducted in 2001, covering 27,000 households and 128,000 residents in eight regional areas. Through this survey, it was estimated that there were about 200 fatal injuries and over 10,000 non-fatal injuries occurring daily in Vietnam. The incidence of fatal injury in children was very high, with 84 deaths per 100,000 children, four times higher than deaths from non-communicable diseases. It was also estimated that in the year 2001, non-fatal injuries occurred in nearly 5% of Vietnamese children (Le et al. 2005).

Using hospital data is considered a cost-effective and feasible method to collect health information (Snizek, Finklea & Graitcer 1989;

Ozonoff, Tan-Torres & Barber 1993; Katcher et al. 1999; Horan and Mallonee 2003; Coben, Steiner et al. 2006). According to the Ministry of Health (2005), injuries accounted for 8.3% of hospitalised cases and 16% of deaths in hospitals in 58 provinces in Vietnam in 2005. Statistics from VietDuc hospital indicated that from June to August 2005, of all 12,592 cases visiting the emergency department, 44% (5,585 cases) were injury cases; and of all hospitalised cases, 32% (1,462 cases) were due to injuries (Ministry of Health and World Health Organization 2006).

Morbidity data are used at an international level to compare the health status of countries in a region or globally (World Health Organization 2002). At the local level, the coded information provides evidence to inform hospital management about the numbers and types of patients attending a health care facility, the number of admissions to each department for various diseases and the requirements for staff and facilities to treat such patients. For injury surveillance, routinely collected information about injuries

that result in hospitalisation, and the causes of those injuries, can be obtained from the analysis of coded data. Medical records are coded to enable the retrieval of information on diseases and injuries treated in hospitals and to facilitate its analysis. It has been suggested that coded morbidity data obtained from medical records can provide an easy and cost effective way to collect injury surveillance data. In most countries, these coded data are used to produce morbidity statistics on the types and incidence of diseases and injuries resulting in hospitalisation and death (Alamgir et al. 2006). However, Vietnamese hospital data have not been used effectively to date for injury research or as a source of data for injury surveillance.

To address the growing problem of injuries in Vietnam, the Ministry of Health established an Injury Prevention Steering Committee, while domestic and international non-government organisations such as Atlantic Philanthropies (AP), United Nation Children's Fund (UNICEF) and The Alliance for Safe Children (TASC) increased funding and support for research and programs on injury prevention. At an Injury Prevention Steering Committee meeting held in Hanoi in 2005, several reports about the patterns of injury in specific hospitals based on hospital data were produced (Nguyen, D.H. 2005; Nguyen, K.S. 2005; Nguyen & Tran 2005; Nguyen, T.L. 2005; Nguyen & Cao 2005; Nguyen & Nguyen 2005). None of these studies assessed the reliability or validity of the hospital data underpinning the statistics reported and the literature is also silent on this issue.

The *Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems* (ICD-10) has been used in hospitals in Vietnam to code morbidity data since 1996 (Ha 2006). Between 2000 and 2004, training courses for hospital staff to teach them about coding with the ICD-10 took place across the country. Volume 1 of the ICD-10 (the Tabular list) was translated into Vietnamese and the accompanying guidelines for coding (Volume 2) were also published and delivered to the hospitals. Volume 3 (the Index volume) has not yet been translated. Therefore, coding of diseases and injuries is mainly based on the translated

Tabular list, an issue which may result in coding quality problems.

ICD coding is not new to hospitals in Vietnam, but the level and specificity of coding varies across hospitals and staff. Almost all hospitals only assign three-character ICD codes. While some hospitals do provide more detailed four-character codes, some hospitals do not use ICD-10 at all to code medical records. This is despite a 2001 directive from the Ministry of Health requiring the use of four-character ICD codes (Ministry of Health 2001). Every quarter, hospitals are required to send to the Ministry of Health a report detailing hospital morbidity and mortality categorised into 312 ICD-10 disease/injury categories proposed by the Ministry of Health. In hospitals that do not code, such information is captured by means of check box data collection sheets which contain text descriptions based on the ICD-10 codes.

To be confident about the appropriateness of hospital injury data for injury research and surveillance, it is necessary to examine the quality of the information recorded in hospitals as well as injury coding issues, to ascertain the usefulness of the data and identify weaknesses or constraints to using hospital injury data. This study examined the quality of injury coding using ICD-10 in Danang General Hospital.

Method

Setting

This pilot study was based on a random sample of medical records obtained from Danang General Hospital, Danang City, Vietnam, from 1 May to 31 December 2005. Danang City is the site of a long-term project on childhood injury prevention conducted by the Hanoi School of Public Health. As such, the results reported in this study will form a useful basis for a longer-term project, comparing injury data at the hospital level with injury data obtained through the childhood injury prevention study. Due to limitations of resources and timeline, the current study could only be conducted in one hospital with a limited sample size. Danang General Hospital was selected because it is one of the largest hospitals, it is located in the centre of Danang City, and it has a considerably larger injury caseload than the

other hospitals. It encompasses 21 treatment and specialty departments, and like any other hospital in Vietnam, the Statistics, Synthesizing and Planning Department is in charge of managing the hospital information system.

Participants

A random sample of all medical records of children living in Danang City, who were aged 0 to 18 years, and who were hospitalised at Danang General Hospital between 1 May 2005 and 31 December 2005 due to injury was selected. To allow for the possibility that not all records selected would be available and to ensure a minimum sample size of 200 cases for the study, data collectors oversampled by 10%, retrieving 220 medical records from the list of medical record IDs of valid cases. After an initial review of the 220 medical records, 15 records were excluded as they did not satisfy the three participant selection criteria. The final sample size consisted of 205 medical records.

The sampling process was assisted by staff in the Medical Record Department. First, all valid cases from the Admission, Discharge and Transfer books were identified. Valid cases were defined as medical records of children aged 0 to 18 years, living in Danang, and hospitalised due to injuries from 1 May 2005 to 31 December 2005. If these three criteria (age, residence, injury) were satisfied, the ID of the medical record was copied to a medical record sheet to be used to identify relevant medical records for the sampling phase.

Data extraction process

As medical records were being recoded by both an Australian coder and local coders in Hanoi, it was necessary to extract information for off-site coding of these data. For confidentiality reasons, it was not possible to photocopy the original records. Hence, it was necessary to abstract key information from the medical records for the coders to assign the appropriate codes off-site.

To ensure the extraction of data was complete, the chief investigator (TTH, who is a lecturer in health information management and clinical coding at the Hanoi School of Public Health) and an experienced nurse worked together to read and abstract each selected medical record, and then to record all clinical and injury-related

information from the medical record for the coding phase of the study. Information in the abstracted record included: date of admission, date of discharge or transfer, age, sex, diagnosis at admission, diagnosis at discharge or transfer, hospital ICD codes, overall status of patients at discharge, reason for attendance, information about the external cause of injuries, information about surgical operations and procedures, X-ray results and CT scan information (if applicable). Information about medical treatment such as daily medicine intake and glucose transfusion was not included in the medical record abstract as it was considered unnecessary for the coding process. Each medical record was read carefully by both the chief investigator and the experienced nurse. The information describing the nature of injury and the external cause of injury was thoroughly reviewed to ensure the abstracted information accurately reflected information in the medical record. This information was obtained by combining the information on the cover sheet, medical examination form and doctors' notes to ensure the comprehensiveness of the abstract.

Coding process

Abstracted medical records were recoded using ICD-10 by a senior coder from Australia and a group of external coders from Hanoi. The Australian coder could read, write and speak Vietnamese and had more experience and more professional education in coding, while the external coders were nurses who coded and worked in other hospitals in Hanoi. The codes assigned were compared with the original codes that had been assigned by the hospital coders.

To examine the completeness of information documented in the medical records and assess whether the documentation was sufficiently comprehensive to enable high quality coding to be performed, for each abstracted medical record the senior coder (Australian coder) was required to rank whether: (a) there was sufficient information to code using ICD-10; (b) the information was provided but was insufficient to code using ICD-10; or (c) if no information was provided to enable coding.

Ethics approval

The study was approved by the Ethics Committee at the Queensland University of Technology in Australia and the Ethics Committee in the Hanoi School of Public Health in Vietnam. Medical record abstraction was carried out with the permission of the director of the Danang General Hospital.

Statistical analysis:

Data were stored and analysed using SPSS Version 12 and Stata 9.0. Descriptive statistics were examined to explore the similarities and differences between ICD codes assigned between two comparison coders (Australian and Hanoi coders) and the originally coded data (hospital coder) by nature of injury, body site and specificity of the codes assigned. Kappa statistics were used to measure the extent of agreement in the coding between the three coders regarding nature of injury, body sites, mechanism, intent of injury, and place of occurrence.

Results

Completeness and coder agreement for external causes of injuries

It was found that the external cause of injury was not recorded completely or in enough detail to code using ICD-10 (see Table 1). Of the 205 medical records, over 90% did not include documentation about the extent of the injury, 85% did not record the activity of the victim when the injury happened, and 67% did not record the place of occurrence of the injury. The mechanism of injury (i.e. what specifically caused the injuries) was reported more often than other related external cause information, with over

80% of medical records recording this information sufficiently.

External cause codes were not assigned at all by the hospital coders. A comparison of external cause codes was made between the Hanoi coder and the Australian coder, which showed 12% of the codes were assigned the same complete code, and 40% of cases were assigned the same code at three character level.

Number of additional diagnosis codes

The number of additional diagnosis codes (i.e. codes assigned in addition to the main diagnosis which reflect the totality of diagnoses treated in the hospital) were compared between the hospital coder, the Hanoi coder and the Australian coder. The hospital coder generally did not assign additional diagnosis codes at all, whilst 24% of medical records were assigned one or up to three auxiliary codes by the Hanoi coder and over 40% of medical records were coded with one or up to four auxiliary codes by the Australian coder, based on the abstracted details from the medical record. The number of diagnosis codes assigned by the hospital coder was significantly less than the number of diagnosis codes assigned by the Hanoi coder (Wilcoxon test = -6.368; p-value <0.001) and the Australian coder (Wilcoxon test = -8.255; p-value <0.001). The number of diagnosis codes assigned by the Hanoi coder was significantly lower than those assigned by the Australian coder (Wilcoxon test = -4.594; p-value <0.001).

Coding agreement

Discrepancy levels ranged from 32% to 39% discrepancy in the main diagnosis codes at the three character level, and between 41% and 49%

Table 1: The completeness and details of external causes of injuries recorded in medical records in Danang General Hospital, Vietnam

EXTERNAL CAUSE OF INJURY	SUFFICIENT INFORMATION TO CODE		INFORMATION AVAILABLE, BUT NOT SUFFICIENT TO CODE		NO INFORMATION GIVEN	
	N	%	N	%	N	%
	Intent	19	9.3%	1	0.5%	185
Cause of injury	167	81.5%	38	18.5%	0	0%
Place of occurrence	13	6.4%	55	26.8%	137	66.8%
Activity when injured	28	13.6%	2	1.0%	175	85.4%

discrepancy at the four character level between the hospital coder and external coders compared to the codes assigned by Hanoi coders and the Australian coder, respectively (see Table 2).

Table 2: Level of agreement measurement of main diagnosis codes by the Hospital, Hanoi and Australian coders in pairs

CODER COMPARISONS	LEVEL OF AGREEMENT		
	SAME AT 4 CHARACTER	SAME AT 3 CHARACTER	DIFFERENT AT 3 CHARACTER
	LEVEL	LEVEL	LEVEL
Hospital – Australia	43%	18%	39%
Hospital – Hanoi	41%	26.8%	32.2%
Hanoi – Australia	48.8%	27.8%	23.4%

In comparing the complete set of diagnosis codes (including the main diagnosis and the additional diagnoses) between the hospital coder and the two external coders, there was 46% or 53% discrepancy at three character level and about 64% discrepancy at four character level.

The agreement between the original hospital coder and the Australian coder was significant though slightly less than the agreement level between the original hospital coder and the Hanoi coder. The Hanoi coder and the Australian coder seemed to have more commonality with the agreement level ranging from substantial to almost perfect agreement.

There was 10% error in sequencing between the main diagnosis code and auxiliary codes. Hospital coders tended to use non-specific codes, or use one code to describe multiple injuries, rather than the more specific codes for each injury.

Coding agreement by nature of injury

Agreement in the main diagnosis codes by nature of injury (or type of trauma) between hospital coders and external coders was around 80% for both pairs (Hospital-Australian coders and Hospital – Hanoi coders) (see Table 3).

Table 3: Agreement measurement of main diagnosis codes by nature of injury assigned by the Hospital, Hanoi and Australian coders in pairs

CODER COMPARISONS	KAPPA		
	AGREEMENT	STATISTIC	95% CI
Hospital – Australia	79.0%	0.71	(0.64 – 0.78)
Hospital – Hanoi	81.0%	0.73	(0.66 – 0.80)
Hanoi – Australia	88.8%	0.84	(0.77 – 0.91)

Coding agreement by body region

The level of agreement was almost perfect between all three coder groups for main diagnosis by body region of injury. Hospital coders had an agreement level of 95% with the Australian coder and the Hanoi coders (k=0.92) (see Table 4). The only difference was the situation where the hospital coders assigned codes that indicated injuries to ‘multiple sites’ but Hanoi and Australian coders assigned to each specific body site. Comparing Hanoi coders and the Australian coder, the agreement is very high, 98% agreement. However, the strength of the kappa is not as substantial (k=0.69).

Table 4: Agreement measurement of main diagnosis codes by body region assigned by the Hospital, Hanoi and Australian coders in pairs

CODER COMPARISONS	KAPPA		
	AGREEMENT	STATISTIC	95% CI
Hospital – Australia	94.7%	0.92	(0.84 – 1.00)
Hospital – Hanoi	94.7%	0.92	(0.84 – 1.00)
Hanoi – Australia	98.4%	0.69	(0.56 – 0.82)

Discussion

The completeness and detail of external cause of injury recorded in medical records in Danang Hospital was poor. While all of the medical records contained sufficient information about the nature of injury to assign an ICD code, information about the external cause of injury was recorded with general statements and most of them did not provide sufficient information to code using the full level of specificity available in the ICD-10 or for utility as a routine injury surveillance system. The agreement of the diagnosis codes by nature of injury was moderate. However, the hospital coder tended to assign the nature of injury to the ‘other and unspecified’

category more often than did the Australian coder or Hanoi coders. The agreement of the diagnosis codes by body region was good. Although the hospital coder could potentially use the full medical records to assign the diagnosis codes, there were 8.3% of cases where body site was not described in enough detail, with the number of 'other and unspecified codes' assigned by hospital coders larger than that assigned by the Australian or Hanoi coders.

Thus, although the Australian and Hanoi coders assigned codes based on the medical record abstraction rather than the full medical record, they still managed to assign a more specific code for nature of injury and body site than that assigned by hospital coders who had access to the full medical record. Given that the Hanoi coders had similar levels of coding knowledge to the hospital coder (being nurses from other hospitals in Hanoi who also code), this may be a reflection of the fact that the hospital coder did not code using the ICD-10 Index volume (as there is no Vietnamese translation of the ICD-10 index), which is used to pinpoint specific codes to reflect the detail available in the clinical documentation. It may also mean that the hospital coder did not use the full medical record as the source document (relying only on the front summary sheet), or it may indicate that further training in data abstraction and coding is needed. Lack of experience and skills in coding using ICD-10 by the hospital coders in Danang may result in poor code selection. Clinical coding is a complex activity, particularly injury coding where multiple injuries may be documented to varying degrees of detail.

There is no guideline from the Ministry of Health relating to the recording of information about the cause of injury in medical records or on the medical examination form, and there is no requirement for the coding of external cause information in Vietnam hospitals. In Vietnam, it is understood that there are few full-time coders employed in hospitals and nurses and/or attending doctors are mainly responsible for the coding in addition to their patient care responsibilities. The doctors and nurses may not be aware of the importance of accurate and detailed coding, as there are no quality audits to assess if the codes were assigned correctly and they have

little knowledge of what the coded data are used for beyond reporting it to the Ministry of Health. As a result, there is no opportunity or incentive to spend adequate time and attention to the coding process.

Recommendations

There are some issues of concern regarding the quality of medical records documentation of injuries. To improve the collection of cause of injury information in hospital records in Vietnam the use of a standard data collection form could be explored. Such a form would outline what information about the external cause of injury needs to be collected by the doctors and nurses. In addition, the coding of external cause of injury information should be introduced in Vietnamese hospitals to allow these data to be used for routine injury surveillance.

It is strongly recommended that the translation of the Index volume of the ICD-10 be investigated. Furthermore, the Ministry of Health should strongly advocate for the use of the full medical record when coding and training coders. Furthermore, in order to gather further evidence in support of these recommendations, the Injury Prevention Steering Committee could advocate for funding for an extension of the current pilot study to explore the quality of records on a larger scale across multiple sites with a larger sample size.

Conclusions

A literature search indicates that there has been no research conducted in Vietnam examining the quality of coded data in hospital records, despite the regular use of hospital data for Ministry of Health reports. As hospital data represent a cost-effective source of information regarding injuries, with significant costs incurred in collecting information about injuries through special studies and censuses (especially for a developing country such as Vietnam), it is important to establish the quality and value of hospital data for injury surveillance and prevention research and to explore ways which these data can be improved. While it may not be possible to collect detailed external cause information such as that collected in a developed country, even broad data captured to the three-character level would assist in iden-

tification of injury trends and priority areas and inform future prevention work.

References

- Alamgir, H., Koehoorn, M., Ostry, A., Tompa, E. and Demers, P. (2006). An evaluation of hospital discharge records as a tool for serious work related injury surveillance. *Occupational and Environmental Medicine* 63: 290-296.
- Coben, J.H., Steiner, C.A., Barrett, M., Merrill, C.T. and Adamson, D. (2006). Completeness of cause of injury coding in healthcare administrative databases in the United States 2001. *Injury Prevention* 12: 199-201.
- Ha, T. S. (2006). *Implementation status of classifications/ICD in Vietnam*. Tunis, WHO-FIC.
- Horan, J. M. and Mallonee, S. (2003). Injury surveillance. *Epidemiologic Review* 25: 24-42.
- Katcher, M. L., Agran, P., Laraque, D., Pollack, S.H., Smith, G.A., Spivak, H.R., Tenenbein, M. and Tully, S.B. (1999). The hospital record of the injured child and the need for external cause-of-injury codes. *Pediatrics* 103(2): 524-526.
- Le, C. L., Pham, V. C., Nguyen, T. Q. and Nguyen, T. H. (2005). *Bao cao dieu tra lien trung ve thuc trang chan thuong o Viet Nam 2001 - Report on Vietnam Multi-Center Injury Survey about the reality of injury in Vietnam 2001*. Hanoi, The Hanoi School of Public Health.
- Le, V. A., Le, C. L. and Pham, V. C. (2003). *Vietnam Multi-center Injury Survey: preliminary results* (Edited version). Hanoi, Hanoi School of Public Health: 76.
- Le, V. A. and T. Q. Nguyen (2005). *A baseline survey on actual injury situation and injury associated factors in children under 18 years of age in 6 provinces: Hai Phong, Hai Duong, Quang Tri, Thua Thien Hue, Can Tho and Dong Thap*. Hanoi, The Hanoi School of Public Health.
- Ministry of Health (2001). *Mau ho so benh an dung trong benh vien - The Medical Record forms using in Vietnam hospitals*. Hanoi, Medical Publishing House.
- Ministry of Health (2003). *Health Statistics Yearbook 2003*. Hanoi, Medical Publishing House.
- Ministry of Health (2005). *Health Statistics Year Book 2005*. Hanoi, Medical Publishing House.
- Ministry of Health (2006). *Training on accident and injury statistics and reporting - Tai lieu tap huan thong ke bao cao tai nan thuong tich*. Available at: <http://www.moh.gov.vn/homebyt/vn/portal/index.jsp> (accessed August 2006).
- Ministry of Health and World Health Organization (2006). *Tai lieu tap huan giam sat thuong tich tai benh vien - Training course's materials on hospital injury surveillance*. Hanoi, Medical Publishing House.
- Nguyen, D. H. (2005). *The status of traffic injuries receiving emergency treatment at the Cuba-Vietnam Friendship Hospital, Dong Hoi, From 1/1/2004 to 30/6/2005*. Emergency Department, Vietnam-Cuba Friendship Hospital, Dong Hoi Town, Quang Binh Province.
- Nguyen, K. S. (2005). *Incidence, etiologies and determinant factors relating to accident-injury of children in Hai Phong City*. Hai Phong Medical College.
- Nguyen, T. H. T. and Tran, T.N.L. (2005). *Preliminary study on child injury supervision at hospitals*. Hanoi, Vietnam Administration of Preventive Medicine.
- Nguyen, T. L. (2005). *Injuries in children under 15 years of age in Yen Bai City in 2004*. Yen Bai Provincial Preventive Medicine Center.
- Nguyen, V. T. and Cao, T.N.B. (2005). *A study on epidemiologic characteristics of injuries in children admitted to the National Pediatric Hospital During the two year period of 2002-2003*. National Pediatric Hospital.
- Nguyen, V. T. and N. A. Nguyen (2005). *Remark on road traffic injuries in children admitted to the National Pediatric Hospital from 2002 to 2004*. National Pediatric Hospital.
- Ozonoff, V. V., Tan-Torres, S. and Barber, C.W. (1993). Assessment of E-coding practices and costs in Massachusetts hospitals. *Public Health Report* 108(5): 633-636.
- Snieszek, J. E., Finklea, J.F. and Graitcer P.L. (1989). Injury coding and hospital discharge data. *The Journal of the American Medical Association* 262(16): 2270-2.
- World Health Organization (2002). *Medical records manual: a guide for developing countries*. Manila, WHO.
- World Health Organization (2004). *Injury surveillance guideline*. Available at: <http://whqlibdoc.who.int/publications/2001/9241591331.pdf> (accessed October 2006).

Tran Thi Hong BSc, MPH

Researcher

Centre for Injury Policy and Prevention Studies

Hanoi School of Public Health

Hanoi

VIETNAM

Susan M Walker BAppSc(MRA), GradDipPubHlth, MHLthSc

Associate Director

National Centre for Classification in Health

Queensland University of Technology

School of Public Health

Queensland University of Technology

Kelvin Grove QLD 4059

AUSTRALIA

Corresponding author:

Kirsten McKenzie BSSc(Hons)(Psych),MPHAA, PhD

Research Fellow

National Centre for Classification in Health

School of Public Health and Institute for Health and

Biomedical Innovation

Queensland University of Technology

Victoria Park Road

Kelvin Grove QLD 4059

AUSTRALIA

Tel: +61 7 3138 9753

Fax: 61 7 3138 5515

email: k.mckenzie@qut.edu.au

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