METHODOLOGIC ISSUES

Quality of hospital discharge data for injury prevention

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Objective: To examine the use of unspecified codes for the circumstances of injury for New Zealand public hospital discharges at a district health board (DHB) level.

Methods: Hospital injury discharges for the period 2000–3 were examined. The use of the International Classification of Diseases unspecified categories was examined for mechanism of injury, activity and place of occurrence.

Results: For all DHBs, the combined age-adjusted and mechanism-adjusted usage of unspecified mechanism codes was 7% and ranged from 3% to 11%. Most (57%) of these cases were unspecified falls. The comparable usage for activity was 39% and ranged from 17% to 52%, and for place of occurrence the respective figures were 23% and 7–36%. Only 50% of hospital discharges were completely specified in terms of mechanism of injury, activity and place of occurrence; this varied from 36% to 74% between DHBs. For several DHBs a significant degree of inconsistency was found in performance across mechanism, activity and place of occurrence coding.

Conclusions: Those DHBs with a high proportion of cases coded as unspecified would serve the prevention efforts of their communities better by making efforts to determine the cause of this situation and implement measures to reduce the problem.

Internationally, analysis of public hospital discharge data is gaining importance in shaping national injury prevention policy and practice. In parallel, there has been an increasing emphasis on encouraging local communities to develop injury prevention strategies that target the particular needs of their communities. This is well illustrated by the rapid growth in “safe communities”. In New Zealand, for example, a frequent starting point for such activities is the analysis of local public hospital discharge data.

In New Zealand, hospitals are managed under district health boards (DHBs). DHBs are responsible for providing (or funding the provision of) health and disability services in their district. There are 21 DHBs in New Zealand, and at the 2001 New Zealand census the populations they served ranged in size from 34 446 to 438 348. One of the objectives of the DHBs is “improving, promoting and protecting the health of people and communities” (<http://www.moh.govt.nz/districthealthboards>). DHBs have several specific functions that force them to collect health information on their resident population that will facilitate an improvement in the health status locally. The hospitals within DHBs are required to provide coded information to the New Zealand Health Information Service on all their discharges for the purposes of maintaining a national database on injury and disease. That database is used extensively by the injury prevention community to identify priorities and evaluate the effect of interventions.

The injury cases in the database have the circumstances of their injury (mechanism, activity and place of occurrence) coded according to various versions of the external cause codes in the World Health Organization's International Classification of Diseases (ICD). A major barrier to developing injury prevention policy is that information on the circumstances of injury is sometimes missing. This is exhibited by the use of unspecified external cause codes for various classes of injury event (eg, ICD-10: W19: unspecified fall). Although anecdotal information suggests that the use of unspecified codes varies substantially by DHB, no published empirical studies have verified this. Internationally we have been unable to locate any studies that have examined utilization by hospitals of these unspecified categories for non-fatal injury.

This study sought to examine the use of unspecified codes for the circumstances of injury for public hospital discharges at a DHB level.

RESEARCH DESIGN AND METHODS

Electronic records of all hospital injury discharges from DHBs for the period 2000–3 were examined. Cases of interest comprised all first admissions with ICD-10-AM¹ diagnosis in the range S00–T99 that also had one or more nights stay in hospital and were not discharged dead. Cases whose external cause code indicated an adverse effect (Y40–Y89) were excluded.

The use of unspecified categories was examined for external cause (hereafter referred to as “mechanism of injury”), activity and place of occurrence. These three dimensions considered in various combinations provide critical information on priorities for injury prevention activity. In determining the percentage of unspecified codes for each of these three dimensions, the denominator was the number of cases where a specific code could theoretically have been used—namely, mechanism (all cases of interest), activity (those with external cause codes V01–Y34) and place of occurrence (those with external cause codes W00–Y34 but not Y06–Y07 for ICD-10-AM 1st edition and V01–Y89 for ICD-10-AM 2nd edition). Cases with missing codes (mechanism 77 (0.05%), activity 92 (0.05%) and place of occurrence 47 (0.03%)) were excluded from the analysis.

Standardization was calculated using the direct method. Age standardization used 5-year age groups except for the last age group, which was ≥85 years. Standardization by mechanism was calculated using the broad categories of falls, exposure to inanimate mechanical forces, transport accidents and others. Hospital injury discharges for the period 2000–3 by age and mechanism group were used as the standard population. Stata V.9.1 and SAS V.9.1 were used for the statistical analysis. Age-standardized and mechanism-standardized percentages with 95% CIs were produced using Stata's direct standardization

Abbreviations: DHB, district health board; ICD, International Classification of Diseases

Table 1 Numbers and percentages of injuries in district health boards classified as unspecified by mechanism, 2000–3

Mechanism code	Mechanism description	All injury discharges (A)	Total (%) (A/D)	Unspecified code	Unspecified (B)	Other and unspecified (C)	Unspecified as % of cause-specific discharges (B/A)	Total unspecified (%) (B/E)
W00–W19	Fall	68018	41	W19	6896	–	10	58
X58–X59	Other/unspecified unintentional	3635	2	X59	3237	–	89	27
X85–Y09	Assault	6607	4	Y09	799	–	12	7
V01–V99	Transport	27131	16	V99*	87	–	0	1
V01–V90	Land transport	26842	16	V†	728	–	3	6
V95–V97	Aviation transport	202	0	V959, V969	2	–	1	0
X00–X09	Smoke, fire, flames	887	1	X09	106	–	12	1
X20–X29	Venomous plants/animals	513	0	X29	19	–	4	0
W65–W74	Drowning and submersion	300	0	W74	14	–	5	0
Y10–Y34	Undetermined intent	1234	1	Y34	10	–	1	0
X60–X84	Self-harm	10666	6	X84	8	–	0	0
W75–W84	Threats to breathing	354	0	W84	2	–	1	0
Y35–Y36	Legal interventions/war	70	0	Y357, Y369	1	–	1	0
X50–X57	Overexertion, travel, privation	6245	4	X57	0	–	0	0
X40–X49	Poisoning	4109	2	X49	–	673	–	–
W20–W49	Inanimate mechanical forces	29345	17	W49	–	337	–	–
X10–X19	Heat, hot substances	1932	1	X19	–	135	–	–
W50–W64	Animate mechanical forces	6268	4	W64	–	22	–	–
X30–X39	Forces of nature	198	0	X39	–	11	–	–
W85–W99	Electric current, radiation, extreme air temperature/pressure	288	0	W99	–	2	–	–
V01–Y36	Total	167800 (D)	100		11909 (E)	1180	7 (E/D)	100

A–E are district health board codes.

*Using V99 only as unspecified.

†Using pedestrian, pedal cyclist and vehicle-specific unspecified codes: V099, V199, V299, V399, V499, V599, V699, V799, V839, V849, V859, V869, V899.

commands. The standardization was undertaken to adjust for known variations in age distribution by DHB and expected variation in mechanism case mix which would reflect the different DHB physical and social environments.

RESULTS

A total of 167 800 discharges met our initial study criteria. Table 1 shows the use of unspecified codes for the major mechanism of injury groups (eg, W00–W19: falls) in the ICD. For most of the mechanism groups, there is a unique unspecified code (table 1). For six mechanism groups, the unspecified classification is combined with “other” to form “other and unspecified” (eg, V94: other and unspecified water transport accidents). In these instances, it is not possible to

determine the number of cases that were “unspecified” as opposed to “other”. Cases coded in this manner ($n = 1180$) have thus been excluded from further analyses. Table 1 shows that overall 7% of discharges were coded as having unspecified mechanism. The majority (58%) of these cases were unspecified falls (W19) and a further 27% were other and unspecified unintentional injuries (X59). Of the other and unspecified unintentional injuries, 39% were fractures. In earlier versions of ICD, these would have been coded as falls (ie, fracture cause unspecified).

Figure 1 shows the use of the combined unspecified mechanism categories by DHBs, after adjusting for age and mechanism. The DHBs are presented on the x axis according to their ranking based on mechanism coding. For all DHBs combined, use of the unspecified mechanism code was 7% and ranged from 3% to 11%. The age-standardized use of the unspecified code for activity for all DHBs combined was 39% and ranged from 17% to 52%, and for place of occurrence the respective figures were 23% and 7%–36%.

Figure 1 also shows that the rankings of DHB by activity and location are not entirely consistent with that displayed by mechanism. For example, compared with other DHBs, DHBs B and C performed well on all three dimensions, whereas DHB F, while having a better than average performance for mechanism, had a good performance for location but a relatively poor performance for activity.

Table 2 shows marked variation in the degree of completion in coding of cases in a DHB. For example, DHB P had only 36% of its cases fully specified on all three dimensions. This contrasts with DHB B where the equivalent was 74%.

DISCUSSION

The results show that substantial numbers of injury hospital discharges have the mechanism of injury classified as unspecified, with “falls” and “other and unspecified” events accounting for the majority of this.

Marked variations in the utilization of unspecified mechanism codes by DHB are evident. Similar findings are evident for

Figure 1 Age-standardized and mechanism-standardized percentage (95% CI) of unspecified mechanism, activity and location codes by district health board (DHB), 2000–3.

Table 2 Age-standardized and mechanism-standardized percentage of hospital discharges with unspecified mechanism, location or activity in district health boards

DHB code	Percentage with			
	All 3 specified	1 of 3 unspecified	2 of 3 unspecified	All 3 unspecified
A	62	29	7	1
B	74	20	5	1
C	73	21	5	1
D	58	31	9	2
E	48	37	12	2
F	50	38	9	2
G	54	38	7	1
H	54	32	11	2
I	58	32	8	2
J	51	35	12	2
K	51	33	12	3
L	60	27	11	2
M	45	38	15	2
N	50	33	14	4
O	56	28	13	3
P	36	38	22	4
Q	60	28	10	3
R	40	41	16	4
S	40	33	22	5
T	51	35	12	2
U	42	36	18	5
Overall	50	34	14	3

DHB, district health board.

the use of unspecified activity and place of occurrence codes. Of interest is the inconsistency of coding performance—for example, a DHB's good performance in coding mechanism did not always translate performance comparable to activity and location coding.

Possible explanations for the findings include poor case history investigation and recording in patient notes of the circumstances of injury, and coders not coding to the degree of specificity possible. The relatively high use of unspecified categories for activity and place of occurrence could also be due to these dimensions not being judged by some hospitals to be as important as the mechanism of injury. Activity coding was introduced into ICD with the tenth revision. Starting in 1998 the Australian Modification to ICD was progressively introduced into New Zealand hospitals. The implementation was completed in 1999. Variation in the lack of familiarity with the coding frame may account for some of the high utilization of the unspecified code. Whatever the explanation, it is clear

Key points

- Hospital discharge data coded according to International Classification of Diseases external cause codes provide a potentially valuable source of information for injury prevention.
- There is substantial use and considerable variability and inconsistency in utilization of “unspecified” codes by hospitals.
- The reason for this variability and inconsistency needs to be determined and rectified.

that some communities have access to substantially better injury prevention information than others.

IMPLICATIONS FOR PREVENTION

DHBs with a high proportion of cases coded as unspecified would serve the prevention efforts of their communities better by making efforts to determine the cause of this situation and implement measures to reduce the problem.

Community-level injury data can provide a powerful stimulus for action and guidance on priority areas. Those in other countries responsible for the quality of data coded under ICD would serve their local communities well by determining the extent to which unspecified codes are used and taking remedial action where necessary.

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