QUEENSLAND INJURY SURVEILLANCE UNIT

INJURY BULLETIN

c/- Mater Hospital, South Brisbane 4101
Phone: 61 7 38401591 Facsimile: 61 7 38401684
Email: Mail@qisu.qld.gov.au Website: http://www.qisu.qld.gov.au

Validation of Injury Surveillance in Emergency Departments

Richard Hockey: Data Analyst, QISU, Adrian Horth: Manager QISU, Dr W Robert Pitt:Director, QISU

Introduction

Injury Surveillance (IS) is the systematic collection, analysis and interpretation of data describing injury risk factors, previously unrecognised injury events and injury trends. It informs the development and evaluation of preventative strategies, generates hypotheses for causal research and monitors injuries in specific areas of known concern such as consumer related injury.

Experience with the paper ISIS system in the late 80s and early 90s convinced QISU that the future of IS lay with electronic collection as part of an extended medical record in the new emergency department (ED) computer systems being introduced around Australia. The challenge was to insert IS into the software design process so that the majority of EDs in Australia ended up with IS capable computer systems. This outcome has now been achieved with the result that almost 100 EDs in Australia now possess sophisticated IS capable electronic patient management systems.

However, in 1999, only a minority of these EDs collect IS data and only a handful collect the National Data Standards for Injury Surveillance (NDS-IS) Level 2 data for which the system has been designed. There are many reasons for this including the time, cost and difficulty of collecting in the ED. Developing the software was always phase one of a multistage strategy to develop national estimates from ED IS. If this had not been achieved then ED based IS would require another generation of ED software or may never occur at all.

Having developed and deployed the tool, phase two involves demonstrating the feasibility and validity of IS in a cross section of EDs. If the method proves to be both feasible and valid then the next stages involve consultation with both Health Departments and the Emergency Medicine community to develop an ED based sampling plan that meets the epidemiological needs of the former and the operational needs of the latter.

The Queensland Injury Surveillance Unit and Mater Perinatal Epidemiology Unit now comprise the **Mater Clinical Epidemiology Centre**. The Centre is located in the old Medical library, opposite the Administration Centre on the Mater Hospital campus. For general enquires phone 07 3840 1591. All other contact details remain unchanged.

Aim

The aim of the validation study was to assess and validate the Emergency Department Information System (EDIS) as a means of acquiring Level 2 IS data as defined by NDS-IS in public hospital emergency departments (EDs) in Queensland.

Objectives

- To evaluate the completeness of ascertainment of cases.
- To examine the completeness of data recorded for included cases.
- To examine conditions which influence the completeness and the reliability of data.
- To assess the ED staff level of acceptance of the EDIS software.

Methods

- Three hospital emergency departments (an urban, a regional and a remote) using the HASS EDIS injury surveillance system were selected for inclusion in the study.
- Up to 200 patients presenting to each ED for treatment of an injury were interviewed (after obtaining consent) at different times of day and days of week.
- The data resulting from the interviews was compared to the routinely obtained EDIS data.
- ED staff from each of the hospitals were surveyed to determine their attitudes towards the EDIS system and to injury surveillance.

Results

Ascertainment

A total of 572 cases of injury were collected of which 509 (89.0%) corresponded to an injury recorded in the ED injury surveillance system (Table 1). Both Mackay and Logan had ascertainment rates of at least 90% while Mt Isa had a rate of 83%. On further examination of the 63 cases found not to be an injury by the ED most could have had either a traumatic or medical cause and it is not possible to criticise the ED determination that they were not an injury. An additional ten cases were identified by the ED system but not by the validation. The majority of these cases presented with symptoms of non-specific pain not apparently related to an injury.

Demographic details – completeness of coding

Demographic details collected in the ED data were coded correctly in almost all cases (Table 2). The exception is Indigenous status where two of the ED systems recorded only 28.6% and 36.6% of the Indigenous cases correctly.

Injury details – completeness of coding

Injury data fields were better than 85% complete for both Mackay and Logan which is comfortably within the Queensland Health stipulation that EDIS should provide 70% ascertainment on injury items, but only 65% complete for Mt Isa (Table 3).

Injury details - agreement

Coding agreement between EDIS and the validation study for items relating to the injury event varied from 95% for *intent* to 50% for *activity* (Table 4). The NDS-IS provides a rich coding environment with multiple coding options for similar injury events. Therefore, agreement varies widely depending on the specific value of a data item and the specific type of injury event. For example, while *external cause* had an overall agreement of 60%, agreement varied from 100% for motor vehicle passengers to 19% agreement for injury caused by machinery.

Staff satisfaction survey

One hundred and five surveys were distributed to ED staff and forty returned. The main results of the survey are presented in Table 5.

Discussion

Ascertainment

Overall, the study shows that EDIS is achieving excellent ascertainment (sensitivity 89%). Also, given that a high proportion of the false negatives may or may not have been injuries this figure may in fact be higher. However when the level of missing IS data is taken into account the ascertainment falls to around 80% for both Mackay and Logan and to only 55% for Mt Isa.

ED system	Mackay	Logan	Mt Isa	Total
Injury	172(93.5)	181(90.0)	156(83.4)	509(89.0)
No injury	12(6.5)	20(10.0)	31(16.6)	63(11.0)
Total	184(100.0)	201(100.0)	187(100.0)	572(100.0)

Table 1: Case ascertainment Note: Percentages in parentheses.

Item	Mackay	Logan	Mt Isa	Total
Gender	98.8	99.4	100.0	99.4
Age	98.8	96.7	98.1	97.8
Country of birth	95.4	-	85.8	90.8
Postcode	98.8	99.4	91.7	96.9
Language	99.4	98.0	-	98.8
Indigenous Status†	28.6	75.0	36.6	38.5

Table 2: Demographic details, percentage coded correctly (% agreement)

Note: Country of birth was not available for Logan.
Language was not available for Mt Isa. † Percent of indigenous cases correctly identified.

Item	Mackay	Logan	Mt Isa	Total
External cause	86.0	86.7	65.4	80.0
Intent	86.0	-	65.4	23.8
Activity when injured (Level 1)	86.0	86.7	65.4	80.0
Place of injury (Level 1)	86.0	86.7	65.4	80.0
Mechanism of injury (main group)	86.0	86.7	65.4	80.0
Main injury factor (main group)	86.0	86.7	64.7	79.8
Injury description present	86.0	89.0	65.4	80.8

Table 3: Percentage of injury fields with valid Level 2 NDS-IS codes (% complete)

Note: Completeness of data means a valid injury code included in the appropriate injury field on the medical record.
Intent not available for Logan.

Item	Mackay	Logan	Mt Isa	Total
External cause	56.1	63.1	61.8	60.2
Intent	96.0	-	93.1	94.8
Activity when injured (Level 1)	64.2	35.7	51.0	49.9
Place of injury (Level 1)	75.0	80.9	75.5	77.4
Mechanism of injury (main group)	70.3	77.7	67.6	72.5
Main injury factor (main group)	47.3	59.2	59.4	54.9

Table 4: Injury details, percentage with exact match of NDS-IS codes (% agreement)

Note: Agreement requires an exact match between the NDS-IS code selected by the ED nurse or doctor and the NDS-IS code selected by a QISU coder. Intent was not available for Logan.

Item	% agreement
Total EDIS system easy to use	85.0
Injury Surveillance within EDIS easy to use	62.5
Takes 2 minutes or less to complete the IS screen	40.0
Easy to find appropriate codes	40.0
Not enough codes to cover all categories	75.0
Injury Surveillance an important function for the ED	95.0
No significant patient complaints re IS	80.0

Table 5: Staff satisfaction survey

Note: 105 survey forms were distributed and 40 were returned with data

Validity of data

Demographic data items, except for indigenous status, were found to be recorded accurately in almost all cases. A larger sample of ED presentations was analysed to better understand the problems with identifying Indigenous status. Routine data downloads from Mackay and Logan EDIS systems indicate 1% of presentations are coded as Aboriginal or Torres Strait Islander but this validation study suggests the real proportion is higher (3% of presentations). Therefore, only one third of Indigenous persons are being identified as such at hospital registration. The problems associated with assigning Indigenous status at hospital registration are well known and this is further evidence that Indigenous status data and associated analysis based on the inpatient or outpatient record may be unreliable[1,2].

On the other hand, items relating to the actual injury had, except for one site, valid injury codes in approximately 85% of cases. When an injury is not identified at triage, the EDIS software provides a trigger for the doctor to complete the injury surveillance screen when an injury diagnosis is entered. Further investigation is needed into the reasons for failure to complete the IS screen in the remaining 15% of cases.

Whether the level of agreement between EDIS and the validation for the items relating to the injury is acceptable is open to conjecture. The NDS-IS provides for more than one way to code any given injury event. The exact choice of codes is not important as long as the codes adequately describe the injury event and permit subsequent retrieval of that record when the database is searched for the injury scenario of interest. Further investigation is planned to measure this "real world" functionality.

Staff satisfaction

Ninety-five per cent of staff identified IS as an important function for the ED. While there were high levels of satisfaction with the ease of use of EDIS, dissatisfaction was expressed with the adequacy of IS codes. Time for completion of IS met expectations with forty percent of ED staff stating that IS took an average of two minutes or less. Improving basic computer and keyboard skills and additional training in coding protocols would likely increase the percentage of staff completing IS screens in less than two minutes.

Conclusion

This analysis concludes that IS is a viable proposition for EDs using a computerised system designed with IS in mind. Overall ascertainment of 80% in community hospitals with marginal resourcing by Australian standards is a good result. Mt Isa is a very busy ED in a remote Australian mining town that has difficulty attracting and retaining ED staff. At the time this study was performed, the ED had no clerical support at night. In these circumstances 55% overall ascertainment for Mt Isa is a reasonable outcome.

Whether the level of agreement between ED data and the validation for the items relating to the injury is acceptable needs further study. The NDS-IS provides for more than one way to code any given injury event. We believe the exact choice of codes is not important as long as the codes adequately describe the injury event and permit subsequent retrieval of that record when the database is searched for the injury scenario of interest.

ED staff were highly supportive of the need to collect IS data. While there were high levels of satisfaction with the ease of use of the HASS EDIS software, dissatisfaction was expressed with the adequacy of IS codes. Increasing computer literacy and keyboard skills and a greater familiarisation with codes and coding protocols would be beneficial.

The support for IS by ED staff combined with acceptable data quality should encourage Government to action those sections of The National Health Priority Areas Report relating to collection of injury data. The modest cost of ED IS must be recognised and EDs appropriately reimbursed for IS. Computerised systems lend themselves to sampling plans using rotating sites and intermittent collection to minimise costs. If these issues can be resolved then Australia has the software tools to develop and maintain national estimates of injury incidence based on a national probability sample of ED cases.

1. Shannon C, Brough M, and Haswell-Elkins M (1997) *Identifying Aboriginal and Torres Strait Islander People on Hospital Records: Problem and Solution in Public Health Information*. Brisbane: University of Queensland.

2. Communicable Diseases Unit, Queensland Health (1998) *Public Health Systems, Indigenous Identifiers Project: Phase 1*. Brisbane:QH

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