

Assessing the concordance of trauma registry data and hospital records

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Abstract

This study examined the concordance of trauma registry and hospital records in Queensland in 1998. The design involved a retrospective review of records and documentation comparison. Demographic variables from the registry were matched to hospital data to obtain admission/diagnoses data. There were four main types of error identified which included: failure to identify relevant patients, inappropriate inclusion of patients, insufficient/inaccurate data in hospital records, and insufficient/inaccurate data in the trauma registry. Of the 87 cases with data quality issues, 63% were due to Queensland Trauma Registry (QTR) data errors, 5% were due to hospital data errors, and in 32% of cases the source of errors was undetermined. Of the potential 1759 trauma cases from 1998, 12 cases should have been included in the registry that were not, 71 cases should not have been included in the registry, and 4 cases were removed from the study due to insufficient or inaccurate hospital record data. Overall, a concordance rate of approximately 95% was found between the trauma registry records and the hospital records.

Key Words: *Injury; trauma; coding quality; quality control*

Accurate and complete data are integral components of any registry if it is to aid the review of care of patients and facilitate planning for future health services. The Queensland Trauma Registry (QTR) provides these roles in relation to seriously injured patients across the state. The purpose of the QTR is to establish the incidence, cause, location, explanatory variables, treatment and outcomes of serious injury in Queensland through the collection and dissemination of high quality data. Desired outcomes include a reduction in future incidence and burden of injury, as well as improvement in trauma management and outcomes. Data recorded by the QTR are used to review the acute care provided to injured patients within each of the regional and tertiary hospitals in Queensland, as well as to aid planning at a hospital, regional and state level.

A number of registries and hospitals have attempted to demonstrate concordance between data recorded by multiple services within a hospital or between data recorded by a hospital and that of national facilities, such as death registries (Jonansson & West-erling 2002; Rawson & Robson 2000). Incomplete and inaccurate coding has been reported previously in both injury coding (MacIntyre, Ackland & Chandraraj 1997; Curtis, Bollard & Dickson 2002) and other health care fields (Ballaro, Oliver & Emberton 2000; Austin, Daly & Tu 2002), with error rates as high as 28% being reported.

Given the data issues reported nationally and internationally, it is vital to determine the completeness of QTR data, and the type and source of data quality issues, to establish if QTR data can be used with confidence. Identification of the frequency and sources of coding errors will allow targeted education and quality assurance strategies.

The objective of this study was therefore to examine the level of concordance and type and source of data quality issues between the QTR records and hospital records for the 1998 QTR database. This formed part of a larger study conducted in 2003 that examined the mortality and cause of death of injured pa-

tients up to four years post discharge from hospital. The hospital involved in this study was a large teaching facility with an extensive trauma service, located on the north side of Brisbane.

Method

The study design involved a retrospective review of records and a comparison of documentation from the QTR and hospital records using the 1998 QTR database to select cases for the study. These cases included all patients who were admitted to hospital for 24 hours or more following injury and therefore eligible for inclusion on the QTR database in 1998.

The process whereby data for eligible cases was identified and recorded on the QTR database was as follows. Hospital charts were retrieved via the Hospital Based Corporate Information System (HBCIS) using the following QTR inclusion and exclusion criteria. Trauma cases at the hospital were identified through review of a daily report of admissions via the Emergency Department. All trauma cases that were admitted for more than 24 hours were identified. These cases were then reviewed further to identify the major trauma cases. Demographic, injury, treatment and outcome data were collected from the patient's hospital record and entered onto the QTR database by QTR clinical coders.

QTR inclusion criteria required a patient to have an injury that was codeable to an ICD-9-CM (National Coding Centre 1996) category in the code range 800.0 - 959.9 (excluding 820.0 - 820.9) and be admitted to hospital for more than 24 hours. Exclusions were established to reject patients whose reason for hospital admission was something other than for acute treatment of an injury. These exclusions included cases where the patient was transferred within 24 hours to a psychiatric ward for unrelated treatment, cases where the patient was admitted for more than 24 hours for treatment of an unrelated medical condition, where discharge was delayed for longer than 24 hours due to social reasons, transfers for convalescence, patients

referred to a children's hospital, spontaneous joint dislocations, pathological fractures, complications of minor trauma, or patients who were injured while in hospital.

For this study, demographic variables including name, sex, date of birth and available dates of death were selected from QTR 1998 data. Records of QTR cases were matched against hospital records to obtain admission and discharge details and coded diagnoses for all cases in the sample. Hospital information system data were also examined to identify patients who had been admitted to hospital in 1998 for an injury and met QTR inclusion criteria but were not included in the QTR database.

Approval from both the University and hospital human research ethics committees were obtained prior to undertaking this research. The research process complied with the National Health and Medical Research Council guidelines for research involving humans (National Health and Medical Research Council 2002).

Results

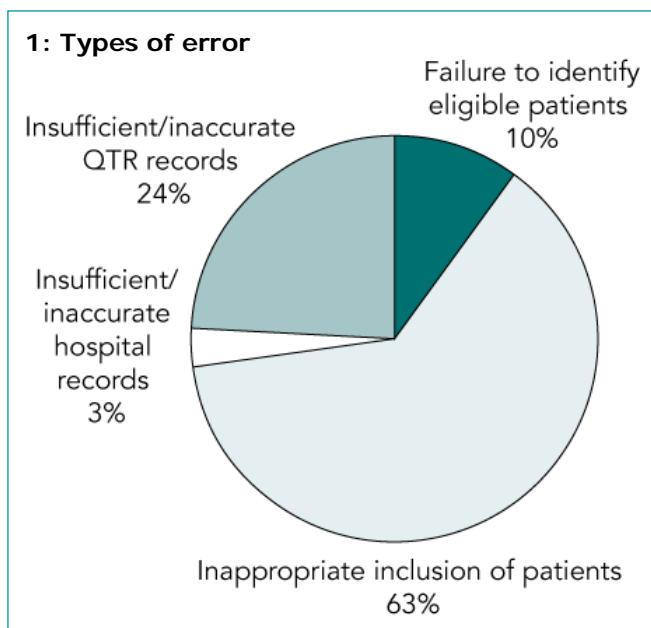
Types of error

A number of data quality issues were identified during the data matching, screening and cleaning process (See Figure 1). These issues constitute four main types of error, which are discussed below, and include:

- failure of the QTR to identify the relevant patients, despite them meeting QTR inclusion criteria
- inappropriate inclusion of patients who did not meet the QTR inclusion criteria
- insufficient or inaccurate hospital record data
- insufficient or inaccurate data recorded by QTR.

Failure to identify eligible patients

There were 12 patients identified through the hospital's information system who were eligible to be registered in the QTR (i.e. met the QTR inclusion criteria) who were not identified in the QTR database. All of



these patients died during hospitalisation as a result of an injury, but were not included in the 1747 sample provided by the QTR, despite these patients meeting the QTR inclusion criteria.

Inappropriate inclusion of patients

Of the 1747 records that were accessed, 71 records did not meet QTR inclusion criteria. The problems identified with these records were as follows:

- 12 cases from QTR had no matching hospital admission or coded diagnostic data.
- 25 additional records from QTR had hospital admission data but no matching coded diagnostic data. Five of these were psychiatric admissions and 20 cases were discharged in less than 24 hours following presentation to the hospital.
- 34 cases had no trauma codes (800-999 or E-codes) in their hospital diagnosis string, with 13 of these cases having no Injury Severity Score (ISS) recorded in the QTR database either. On further investigation it was found that:
 - 18 of these cases should not have been included in the QTR as they were wrongly coded by the QTR as being injury admissions when hospital records identified the admission as due to the treatment of pathological or old injuries, such as osteoporosis.
 - 12 cases met the criteria for a QTR project being conducted at the time, but not the general QTR inclusion criteria. These cases therefore should not have been included as part of the registry dataset.
 - 4 cases were included in the QTR despite being wrongly coded by the hospital, such that traumatic injuries were wrongly coded to a corresponding non-traumatic code.

Insufficient or inaccurate hospital record data

Of the remaining 1676 records which met the QTR inclusion criteria, 4 records had insufficient or inaccurate coding in the hospital record resulting in omission or removal from the final dataset used for the research project. These 4 cases had no matching hospital coded diagnosis data despite being admitted to hospital for longer than 24 hours. A new Unit Record Number (URN) was identified for one of these patients, explaining why coded data was not found using the originally-supplied URN. However there was no such URN discrepancy identified for the remaining 3 cases and it is unclear why hospital data could not be located.

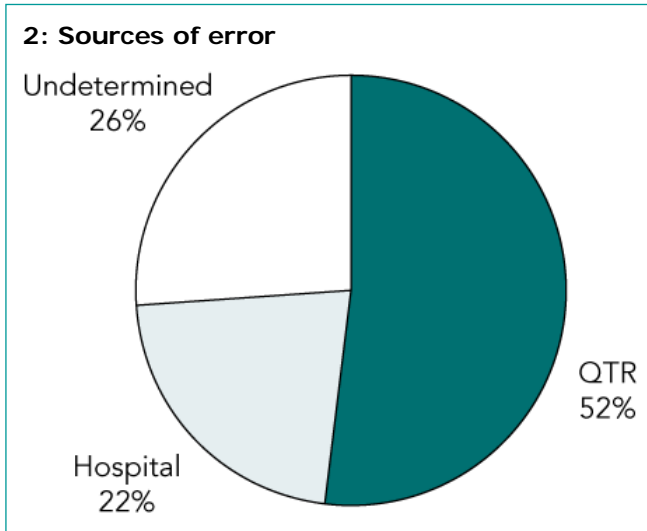
Insufficient or inaccurate QTR data

In addition, there were some data quality issues identified with the remaining 1672 cases, however these issues were not deemed sufficient for removal of the cases from the study. These included:

- 25 cases had different dates of birth in the hospital and QTR records – for the purposes of this study, hospital records were used to calculate age.
- 3 cases had different sex recorded in the hospital and QTR records – again, hospital records were used as hospital sex matched name.

Sources of error

Issues of data quality could be attributed to the QTR in 55 cases, to the hospital in 4 cases, and it was undetermined in 28 cases if the problem was related to the QTR or hospital data (See Figure 2).



Concordance between QTR and hospital records

Of the potential 1759 cases which could have been recorded in the QTR in 1998, 1747 records were accessed and 75 of these records were removed, resulting in a final sample of 1672 records (approximately 95% of the potential sample). Twelve cases should have been included in the registry that were not, 71 cases should not have been included in the registry, and 4 cases were removed due to insufficient or inaccurate hospital record data.

Overall, an approximate concordance level of 95% between the QTR and hospital records (representing an error rate of approximately 5%) was identified. Almost 30% ($n=22$) of the error cases represented data discrepancies due to differences between the QTR and hospital in the assignment of codes for non-traumatic/pathological versus traumatic injuries.

Discussion

This study identified four main types of error in the QTR database, including failure to identify relevant patients, inappropriate inclusion of patients, insufficient/inaccurate data in hospital records, and insufficient/inaccurate data in the trauma registry. These types of error are consistent with those reported in the literature, although none of these studies compared discharge diagnosis codes to an alternative coding source, only to the original clinical record for each patient (Curtis, Bollard & Dickson 2002; Ballaro, Oliver & Emberton 2000; Donoghue 1992).

The identified error rate of 5% is significantly below that reported by other investigators although, as mentioned above, the type of comparison undertaken in this study differed from other studies where overall error rates of 28% to 61% were reported (Curtis, Bollard & Dickson 2002; Ballaro, Oliver & Emberton 2000;

MacIntyre, Ackland & Chandraraj 1997; Donoghue 1992). The current study identified only those errors that were sufficiently significant to impact on classification of an acute injury case. This can be compared with a component of a larger study investigating the accuracy of injury coding in Victoria that identified a 6% error rate for principal diagnoses that were classified to a different group of codes, in other words, coding injury cases to a code other than injury (MacIntyre, Ackland & Chandraraj 1997).

While an error rate of 5% is relatively small, this study has highlighted a number of quality processes that need to be incorporated into registry collection procedures to ensure accurate and complete data are maintained. These strategies can be considered in four categories, including procedures for identification of relevant patients for inclusion in the trauma registry, improved data quality assessment, targeted education of coders and educational strategies for clinicians. Further, clearer communication between the hospital and trauma registry when data quality issues are detected would also improve the quality of both data sources for future research purposes.

In relation to procedures for identification of relevant patients for inclusion in the trauma registry, errors could be minimised through clearer procedures for the selection and inclusion of patients. Processes have now been put in place in the QTR that use an alternative method of identifying eligible cases to facilitate improved coverage.

Additional data quality assessments are being introduced at several time points in the data collection process, and are to be conducted at both the hospital and trauma registry levels. These data quality assessments include identification of inconsistencies between different data fields, as well as dual coding of a predetermined number of cases to assess coding consistency.

The registry's quality assurance and training officer has implemented a program of common exercises to be completed by all QTR coders, whereby consistent errors in coding are able to be easily determined and areas of common coding error identified. Individuals with poor coding practices are being offered additional education and support. Furthermore, as a result of this study it is recommended that coders in both the hospital and trauma registry are provided with continuing education sessions in the assignment of codes for traumatic and non-traumatic or pathological injuries, as over a quarter of the data quality issues were associated with incorrect code selection for such cases.

It is also recommended that clinicians are made aware of the documentation requirements for accurate coding, with various suggestions such as redesigning discharge summaries, development of guidelines for discharge summaries and pocket size guides outlining these requirements being suggested in the past (Curtis, Bollard & Dickson 2002). The *Good Clinical Documentation Guide*, developed by the National Centre for Classification in Health (National Centre for Classification in Health 2003), may be of assistance in this regard.

Conclusion

The aim of this study was to establish the concordance levels and type and source of data quality issues be-

tween the QTR and hospital records for the 1998 QTR database. A concordance rate of approximately 95% (and corresponding error rate of approximately 5%) was identified with four main types of error being failure to identify relevant patients, inappropriate inclusion of patients, insufficient/inaccurate data in hospital records, and insufficient/inaccurate data in the trauma registry.

It is important to regularly monitor and assess the quality and completeness of data in registries used for policy and decision making in order to identify and address data quality problems which may potentially impact on conclusions reached through use of the data. Identification of the frequency and sources of data quality issues allows targeted education and quality assurance strategies, a vital aspect in maintaining the high quality data needed for injury surveillance.

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Biographical information

Kirsten McKenzie is a Research Fellow at the Brisbane office of the National Centre for Classification in Health, where she has worked since the start of 2001. She has completed an Honours degree and PhD in Psychology. She is involved in research on the quality of morbidity and mortality coding. She was recently awarded a three-year Australian Research Council grant to examine the quality of national injury-related hospital morbidity data. Some

examples of her previous research include a survey of the Australian Clinical Coder workforce, examining the effects of classification change on long-term mortality trends, the impact of the change from ICD-9 to ICD-10 on mortality statistics, and the international comparability of the World Health Organisation's mortality databases.

Sue Walker is an Associate Director of the National Centre for Classification in Health and is responsible for managing the work program, staff and finances of the Brisbane office of the centre. Sue has qualifications in health information management, public health and health services management. She has extensive experience in developing and presenting education and training programs about health classifications for international and Australian audiences. The NCCH is part of the Australian World Health Organization Collaborating Centre for the Family of International Classifications. Sue contributes to the work of WHO through mortality, morbidity and disability coding networks and global training and certification activities.

Andrea Besenyei was seconded to the position of Quality Assurance and Training Officer for the Queensland Trauma Registry from the Brisbane office of the National Centre for Classification in Health from 2001-2004. She holds a Bachelor of Business degree in Health Information Management and her career follows quality assurance and data management roles. Andrea was involved in conducting a nationwide survey of Australian users of the Abbreviated Injury Scale (AIS), used in injury classification. She is one of only two people in Queensland internationally accredited as

a trainer in the use of the AIS. Her role at the QTR involved providing support for the QTR coding staff, Manager and Data Manager. She is currently employed as the Data Manager for Queensland Clinical Genetics Service.

Leanne Aitken has been the Manager and Senior Research Fellow with the Queensland Trauma Registry since December 2003. Her previous appointments have spanned research, clinical practice and education in critical care nursing. Research interests include practice development, trauma care, decision-making practices of critical care nurses, educational outcomes related to speciality education, and a range of clinical practice issues within critical care. Leanne holds a Doctor of Philosophy and a Graduate Diploma of Science in Medicine (Clinical Epidemiology) and is a Fellow of the Royal College of Nursing, Australia.

Bridget Allison was employed at the Queensland Trauma Registry as a Health Information Manager from 2000 to 2004. Her background involves working in cause of death statistical collection at the Australian Bureau of Statistics and she has a keen interest in clinical auditing, mortality data collection, Abbreviated Injury Scale coding issues and data quality. Bridget has recently been appointed to a Health Information Manager position with the National Centre for Classification in Health and is seconded to the Commission for Children and Young People and Child Guardian (CCYPCG) three days per week. This position involves data management, classification, training and quality assurance for the Child Death Review team within the CCYPCG. Bridget is currently completing her Bachelor in Health Science majoring in Health Information Management.