A review of hospital medical record audits: Implications for funding and training

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Abstract

This paper summarises the findings of coding audits in seven hospitals and one re-audit conducted by the Health Department of Western Australia. The accuracy of the coding in the first audits, as measured by differences in AN-DRG assignment, varied from 83% to 93%. The accuracy of the coding in the re-audited hospital increased by 6% to 94.5%. The major coding problems related to incorrect abstraction of information from the medical record, inaccurate code assignment, non-application of the Australian Coding Standards, or poor documentation. On average, these coding problems resulted in a loss of nearly $400 000 per hospital per year in the surveyed hospitals.

Introduction

The Western Australian Hospital Morbidity Data System, which is maintained by the Health Statistics Branch of the Health Department of Western Australia, collects patient separation data from all public and private hospitals in Western Australia. About half a million hospital separations occur each year.

After a patient has been discharged, a summary of the medical record detailing their inpatient stay is sent to the Health Statistics Branch, either on a paper form or electronically. (A flow chart illustrating the processing of hospital records in

Western Australia is shown in Unwin et al. 1996, p 190.) After the branch processes the record, it is put onto the Hospital Morbidity Data System.

The National Minimum Data Set provided the uniform definitions used to collect the morbidity data. This information plays a major role in the planning and provision of health services, disease surveillance, epidemiological studies and performance measurements. More recently, the quality of this coded data has also become important for hospital funding and casemix management. A study which used a database of over four million public and private hospital discharges to evaluate the performance of three versions of Australian national diagnosis related groups (AN-DRGs) concluded that 'the main barrier to further improvement in the performance of any versions of DRGs in Australia was the quality of data' (Palmer et al. 1997). The quality of the data collected is the limiting factor in any hospital morbidity database.

Within this environment, clinical coders must maintain a high level of accuracy and completeness in coding, while ensuring a rapid turnover in the number of records coded each week. The attainment of a high degree of accuracy measured against an objective standard is the goal of most coding officers and hospitals. However, it is not easy to consistently achieve high performance levels in clinical classification for many reasons, which are discussed in this paper.

Several Australian and international studies have examined the accuracy of clinical coding in the hospital environment and found that the likelihood of coders agreeing on exact ICD-9-CM codes to be low (Donoghue M 1992; Yeoh & Davies 1993; Victorian Department of Health and Community Services & Deloitte Touche Tohmatsu 1995; MacIntyre et al. 1997).

The aim of the study reported in this paper was to determine the accuracy of ICD-9-CM coding in Western Australia, and the financial impact of errors in AN-DRG assignment and, by identifying the causes of these errors, suggest how the current situation could be improved.

Method

In 1996–97 the Health Statistics Branch conducted audits of hospital medical records in seven hospitals – two public and five private hospitals. The audits were undertaken at the request of the hospitals to check the quality of the data, and contracts were drawn up citing the conditions of the individual audits. The methodology was consistent between all seven hospitals to allow comparison of results, and the same methodology was used for the re-audit.

A pool of three auditors conducted the audits. All had more than five years coding experience, current experience of coding in hospitals, were familiar with the Australian Coding Standards, and had gained a coding competency certificate from the Health Department of Western Australia. To pass the certificate, they had to achieve marks of over 80% in monthly tests over a period of a year. They must have sat at least nine tests to become eligible for the certificate. After the accreditation examination was introduced in September 1996, all three auditors became accredited clinical coders. On average, the pass rate for the Health Department of Western Australia Coder Competency Certificate was about the same as that for the accreditation examination, with about a third of all coders sitting the tests passing. There was also a chief auditor, who was responsible for writing the audit report. The chief auditor was a member of the Expert Panel for the Coder Accreditation Examination and was also responsible for coding activities and quality assurance procedures in Western Australia.

For the audit, between 50 and 200 recent cases were selected from each hospital, depending on the total number of discharges per year. Most of these records were randomly selected from the Hospital Morbidity Data System although, in some cases, specific records were chosen to ensure a sufficient number of high complexity cases. A list of the chosen records was given to the hospital concerned and they provided the original medical record to the auditor. The auditor then recoded the original medical record at the hospital, without seeing the original codes, to produce the audit record.

After grouping into AN-DRGs using the AN-DRG grouper version 3, the audit record and the original record from the Hospital Morbidity Data System were entered into an Access database. A computer program was used to compare the two matched records and rapidly identify any differences between them. Cases with discrepancies were referred back to the hospital coder and also checked by the chief auditor. In most instances, the hospital coder and the chief auditor agreed on the correct code after consultation. Where this was not possible, the original coder was deemed to be correct and the discrepancy was not reported. In future audits, an independent arbitration panel made up of three accredited clinical coders will be used.

Information relating to the coder, such as the type of training, the number of years of coding experience, and scope of experience, was also collected to see whether there was any correlation between the quality of coding and coding education and experience.

The national public or national private hospital cost weights were used to estimate the cost of the care received (Commonwealth Department of Human Services and Health 1995).

Results and discussion

The results of the audits showed that coding accuracy rates for AN-DRGs were similar in most of the hospitals, ranging from 82% to 93% (see Table 1). The accuracy was based on the variation of AN-DRG assignment, not on the total number of coding differences found. However, the accuracy was also assessed using the ICD-9-CM codes and was found to be similar.

Table 1: Profile of the hospitals audited and the quality of the AN-DRG coding

Hospital	Number of records audited	Number of coders	Number of AN-DRG errors	Accuracy (%)
Hospital A[1]	200	3	34	83.0
Hospital B[2]	200	1	23	88.5
Hospital B[3]	200	1	11	94.5
Hospital C	100	1	15	85.0
Hospital D	50	3	9	82.0
Hospital E	200	2	27	86.5
Hospital F[1]	200	2	24	88.0
Hospital G	100	1	7	93.0
Total[4]	**1050**	**na**	**139**	**86.8**

Notes:
1. Public hospitals.
2, 3. Indicates the first and second audit performed in Hospital B.
4. Excludes data collected from the second audit in Hospital B.

Overall, an average of 13.2% of the medical records studied were assigned a different AN-DRG by the audit process. This is similar to the results of two independent audits of Victorian hospital data that found that 13.5% of the medical records studied were assigned a different AN-DRG (Victorian Department of Health and Community Services & Deloitte Touche Tohmatsu 1995; MacIntyre et al. 1997). These figures are higher than those reported from a French study of a single hospital, where the error in DRG assignment was only 9% (Colin et al. 1994), and those of another study in Australian hospitals where the error was found to be 9.5% (Donoghue 1992). However, the error rate has been reported to increase with the rarity of the AN-DRG to as high as 56% (MacIntyre et al. 1997).

The financial consequences of inaccurate coding

Based on the original AN-DRG assignment, most of the hospitals audited would have lost a considerable amount of money had they been funded by casemix. On average, the financial impact of incorrect coding was estimated to be nearly $400 000 per hospital per year. Six of the audited hospitals potentially lost a total of more than $2.8 million dollars per year and one hospital potentially made a profit of $90 000 (see Table 2).

Such a dramatic effect on hospitals' casemix budgets was not observed in another Australian study (Victorian Department of Health and Community Services & Deloitte Touche Tohmatsu 1995). This study reported that, while discrepancies in coding were more common among higher weighted AN-DRGs, these errors were just as likely to result in assignment of a higher paying DRG as a lower one.

Understandably, most hospitals are keen to improve the accuracy of their coding. The hospital that profited in the first audit was the one that was re-audited. In the re-audit, it made an estimated loss of $7397, which is insignificant in comparison with the losses experienced by the other audited hospitals. This highlighted an improvement in accuracy resulting from the implementation of recommendations given after the first audit.

Table 2: The cost of inaccurate coding in the audited hospitals

Hospital	$ loss or gain per 100 cases	$ loss per year[1]	$ gain per year[1]
Hospital A[2]	–$2 021	$169 764	–
Hospital B[3]	+$1 666	–	$89 964
Hospital B[4]	–$269	$7397	–
Hospital C	–$6 110	$207 740	–
Hospital D	–$948	$18 279	–
Hospital E	–$3 713	$631 210	–
Hospital F[2]	–$21 855	$1 748 360	–
Hospital G	–$2 732	$60 104	–
Total	**$35 982**	**$2 842 854**	**$89 964**

Notes:

1. Based on the number of discharges from the previous year.
2. Public hospitals.

3,4. Indicates the first and second audit performed in the same hospital.

This variance in AN-DRG assignment reflects some of the current problems in Western Australian hospitals of inadequate clinical documentation, inexperienced coders, and lack of knowledge of the Australian Coding Standards. The major areas in which the coding errors occurred are explained in the next section.

Major coding problem areas

In total, 1050 cases were audited in the first round of audits and four major coding problem areas were identified. The overall percentage of differences between the original record and the audited record by each of these groups was as follows (see Table 3):

- incorrect abstraction of clinical information (36%)
- inaccurate code assignment (33%)
- non-application of the Australian Coding Standards (14%)
- poor documentation (7%).

Table 3: Number of records showing differences, by major problem area and hospital

Hospital	Abstraction	Coding	Australian Coding Standard	Documentation
Hospital A[1]	83	68	41	26
Hospital B[2]	42	48	35	21
Hospital B[3]	–	8	–	6
Hospital C	23	69	18	4
Hospital D	9	12	2	0
Hospital E	93	49	35	14
Hospital F[1]	87	75	15	7
Hospital G	36	26	2	0
Total	**373**	**355**	**148**	**78**

Notes:
1. Public hospitals.
2, 3. Indicates the first and second audit performed in the same hospital.

A sample of 710 code discrepancies were examined to see which variables contributed most to the major problem areas. Nearly half of the errors involving the secondary diagnoses were abstraction errors, whereas nearly half of the discrepancies associated with the principal diagnosis – 60% of differences

in the major procedure, 54% of errors involving the secondary procedures, and 81% of problems encountered with the external causes – were coding errors (see Table 4).

Table 4: Percentage of errors in selected fields by major problem area

Major problem area	Abstraction	Coding	Australian Coding Standard	Documentation
Principal diagnosis	12	49	22	16
Secondary diagnosis	46	31	16	7
Major procedure	22	60	16	2
Secondary procedure	35	54	6	5
External cause	15	81	0	4

A definition of each of these problem areas, examples of each, and the differences between the original record and the audited record are discussed below.

1. Incorrect abstraction of clinical information from the medical record

This group includes coders who failed to recognise clinically significant conditions or procedures indicated in the medical record and, therefore, either assigned incorrect codes or did not assign a code at all.

In the first example, the surgeon documented F/T skin graft to mouth, but the coder did not know what F/T meant and assigned a more general code, plastic repair of mouth.

In the second example, the clinician documented that the patient had a past history of emphysema, meaning that the patient suffered from emphysema which had resulted in many previous admissions to hospital. The coder thought that this meant the patient was cured of emphysema and coded past history of respiratory disease.

Both examples show that the clinical coder lacked the medical knowledge necessary for proper abstraction of information from the medical record.

Table 5: Examples of incorrect abstraction of clinical information from the medical record

Record	*Documentation*	Code	DRG	Cost	Cost to the hospital
Original	*Plastic repair of mouth*	27.59	484	$1113	
Audit	*F/T skin graft to mouth*	27.55	483	$1493	–$380
Original	*PH respiratory disease*	V12.6	99	$1706	
Audit	*Emphysema*	492.8	98	$1913	–$207

2. Inaccurate code assignment

This group covers the allocation of incorrect codes, invalid codes, or incorrect sequencing of a code as principal diagnosis. Most incorrect codes were valid codes, making it difficult to implement an error checking routine for these codes in audit programs.

Table 6: Examples of inaccurate code assignment

Record	Documentation	*Code*	DRG	Cost	Cost to the hospital
Original	Wide excision of melanoma	*863*	484	$1 228	–
Audit	Wide excision of melanoma	*864*	502	$11 732	–$10 504
Original	Postoperative wound infection	*909.3*	956	$1 132	–
Audit	Postoperative wound infection	*998.5*	818	$18 043	–$16 911

3. Non-application of the Australian Coding Standards

This group includes inaccurate code choice or sequencing of codes where there was an Australian Coding Standard covering the condition or procedure.

Table 7: Examples of non-application of the Australian Coding Standards

Record	Documentation	*Code*	DRG	Cost	Cost to the hospital
Original	Colonoscopic polypectomy	*45.25*	938	$358	–
Audit	Colonoscopic polypectomy	*45.42*	335	$680	–$322
Original	Non-Hodgkin's lymphoma	*V5810*	780	$516	–
Audit	Non-Hodgkin's lymphoma	*20280*	794	$1570	–$1054

4. Poor documentation

These cases result from insufficient documentation in the medical record to allow the coding of particular cases. This often results in inaccurate code assignment.

In the second example, the patient had a caesarean section. No diagnosis was recorded so the coder assigned the code for caesarean section without indication. When the clinician was contacted by the auditor, he explained that the baby had died because of a fetal-maternal haemorrhage and the mother had been sent to a major obstetrics hospital for a coagulation problem and severe anaemia. None of this was documented in the medical record.

Table 8: Examples of poor documentation

Record	*Documentation*	Code	DRG	Cost	Cost to the hospital
Original	*Upper GI endoscopy*	45.13	332	$495	–
Audit	*Colonoscopic biopsy*	45.25	335	$501	–$6
Original	*Caesarean w/o indication*	669.71	670	$3769	
Audit	*Fetal/maternal haemorrhage*	656.01	671	$4305	–$536

Reasons for coding differences

The errors reported in these audits were discussed by the original coders, auditors, hospital administrators and the chief auditor. There appeared to be six main reasons for these coding differences which were similar in all of the hospitals, although not necessarily in the same order of priority.

These were:

- no indication of a principal diagnosis
- lack of comprehensive clinical comment and review

- under-reporting of additional diagnoses
- inconsistent coding
- many changes to coding structure, coding standards and codes within a short period of time
- limitations of the Australian Coding Standards.

Both the coders and the auditors (all of whom had a clinical background as former nurses or medical students) identified unclear clinical documentation as the underlying cause of coding problems.

In many cases, no principal diagnosis was documented, although pathology, radiology and microbiology reports usually indicated the reason for admission. Some clinicians, particularly in rural areas, expected coders to be able to select a diagnosis from these reports. This is an unreasonable expectation given that one European study (Steinum 1997) found that, for complex cases, clinicians often chose the principal versus secondary diagnosis at random, resulting in different coding decisions.

This lack of clinical comment also extended to abnormal clinical results, so coders often had to interpret abnormal laboratory results themselves or leave out vital information. Where this information was not included, there was a significant cost penalty to the hospital, resulting in a potential loss of funding. In cases of grossly abnormal thyroid function tests without any clinical comment, for example, the coder added hypothyroidism or hyperthyroidism to the medical record, according to the results. However, the auditor did not record such findings because the Australian Coding Standards indicate that coders should not code according to abnormal laboratory results.

Another problem arises when there is a discrepancy between what the clinicians record and the laboratory results. For example, in one case the clinician recorded a fractured radius but the radiology report indicated that there was a fracture of the shaft of radius and ulna. The Australian Coding Standards do not indicate what should be coded in these circumstances.

The recording of past medical histories of chronic diseases also poses dilemmas for coders. The Australian Coding Standards require coders to assign a code for any condition that is considered to be an additional diagnosis, co-morbidity or complication, on the basis of clinical evaluation, diagnostic testing, increased monitoring, or a delay in discharge of up to a day. Yet the Australian Coding Standards do not define the criteria for 'clinical evaluation', nor provide guidelines about assigning codes for chronic conditions. Indeed, clinicians have different definitions of what clinical evaluation is. Does the notation on an

anaesthetic record of, for example, asthma without any pulmonary tests being performed constitute clinical evaluation? Does the coder record a past history of asthma for a patient who has only had one asthma attack 16 years ago, where the diagnosis was made by a general practitioner who was untrained in the diagnosis of respiratory disease, and for which the patient received no treatment? Both coders and auditors had difficulty deciding which past medical diagnoses fitted the definition of an additional diagnosis.

Clinical coders face these difficult decisions every day. Lack of clinical comment and review leads to over-reporting of conditions with which coders are familiar, such as asthma, epilepsy and hypertension, and under-reporting of conditions which significantly influence the reason for admission such as diabetes, multiple sclerosis and other chronic conditions. This often affects DRG assignment and can lead to difficulties in identifying and following disease trends.

The Australian Coding Standards are produced on 1 July each year by the National Centre for Classification in Health and every year there are many changes. In 1996, 282 new codes and 78 new standards were introduced. For updates to ICD-9-CM, the National Centre for Classification in Health held one-day workshops to educate coders about the revisions. Only a few changes can be covered in such a short time, so the coders were expected to update their knowledge of the Australian Coding Standards themselves. The coders in the audits were not aware of all the code changes made in 1996. This may reflect the rapidity of the changes, incomplete training, inattention to basic coding rules, or an inability to absorb the changes.

Changes in medical technology are occurring so rapidly that, although the Australian Coding Standards are current when they are developed, by the time they are published they may be out of date. There is a discrepancy between procedures classified in ICD-9-CM and what is being done in clinical practice. For example, there is no code for cerebral embolisation of arteriovenous fistula, a procedure often performed at a Western Australian hospital. Coders struggle to find a consistent method of coding such procedures as these, which are not supported by the classification system. It is hoped that the introduction of ICD-10-AM may resolve this problem.

Coding can be an uncertain business, fraught with the dangers of subjective judgement in the absence of objective scientific evidence. These audits conducted in Western Australia were designed to find the real problems behind the coding of medical and surgical conditions, and to recommend how to overcome these problems in order to improve the quality of data to the Hospital Morbidity Data System. They were not designed to catch fraud or other activities, and in this they are unique.

Coders

The audited data were selected from an historical sample. During this time frame, none of the coders had been accredited. Accuracy of coding was found to be linked to the coder's depth of medical knowledge, number of years of coding experience, training, and the complexity of the casemix. The recent National Coder Accreditation Examination reported similar findings (Mitchell & Holmes 1996).

The coder who achieved the highest accuracy rate was coding simple casemix and had an excellent knowledge of the conditions and procedures performed in her hospital. She had been coding for nearly four years in the same area and was conversant with the new medical technology used and the conditions described. Her coding training included a four-week short course, followed by monitoring for six months while performing coding duties at the hospital and continued attendance at the ongoing coder education seminars.

Coders at the lower end of the scale had been coding for less time or had a more complex casemix, had no follow-up training after completing their coding course, and were lacking in medical knowledge. In some circumstances, because there was no recognition of the disease when it was documented, the symptom was coded instead. For example, in several cases chest pain was coded instead of unstable angina. Hospital F, which had a potential loss of over $1.7 million, has a complex casemix and an inexperienced coder with little medical knowledge. The medical records were also poorly documented.

There were also inconsistencies in hospitals which had more than one coder, illustrating one of the difficulties of the coding industry. A program called Encoder, which was originally thought to be able to replace highly trained coders, has not fulfilled expectations. However, it is useful for improving consistency where there is more than one coder at a site, if there is adequate communication between the coders.

Recommendations

Based on these results, the following recommendations were suggested to improve the quality of hospital morbidity records.

- Improve the quality of clinical documentation, particularly for principal and additional diagnoses. This could be achieved by running clinical education programs and changing hospital management policies. For example, in South Australia, clinicians have to fill out a legal document called an attestation form when a patient is discharged, giving details of the patient's treatment.

- Improve coding skills through processes such as the National Coder Accreditation Examination.
- Develop editing and coding quality measures as a standard part of coding best practice in hospitals.
- Encourage ongoing coder education programs.
- Subject all coding training courses to an accreditation process.
- Reduce the number of annual changes to the Australian Coding Standards to a manageable level.
- Standardise medical terminology throughout Australia.
- Improve coders' medical knowledge.

Conclusion

Since the audits, both public hospitals have implemented all the recommendations in their individual audits and three of the five private hospitals have sent their coders for training and made an effort to improve documentation. One of the private hospitals that implemented all the recommendations (Hospital B) has since been audited again. The accuracy of coding in this hospital had increased from 88.5% to 95%. The other two private hospitals have improved quality assurance management at a basic level, but have done nothing about coder education or documentation.

Errors in coding can lead to very large potential losses so it is advisable for hospitals to invest more time and money in attracting experienced coders, provide the opportunity for ongoing coder training, and improve the documentation of their medical records. The introduction of ICD-10-AM in the near future will present new challenges for coders.

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