President’s report

- Uses of health information
  Angela Randall ............................................................ 2

Guest editorial

- A decade of the Australian casemix classification
  Katrina Chisholm ............................................................ 3

Reviewed articles

- Should there be an age split for stroke DRGs? Analysing a large clinical data set of a principal teaching hospital over a five-year period
  Monique Royle, Joanne Callen and Maria Craig .............................. 5
- Researching hospital patient data to enhance operational management
  Liza Heslop, Brendon Gardner, Dean Athan, Donna Diers and Catherine Taylor .............. 13

Reports

Drug information systems

- The pharmacy management information system at the Department of Veterans’ Affairs
  Elizabeth Moss, Robert Peck and Anthony Corkhill .............................. 17
- The Adverse Drug Reactions Reporting project
  Susan Rodger ............................................................ 21

Professional practice and innovation

Classification and casemix

- A decade of casemix funding in Victoria
  Compiled by Angela Boal and Janine Carter ...................................... 22
- The Australian Coding Standards Advisory Committee
  Compiled by Catherine Perry and Sara Harrison .................................... 26
- AHIMA project offers insights into SNOMED, ICD-9-CM mapping process
  Kathy Brouch ....................................................................... 31

Medico-legal

- Cattanach v Melchior and implications for health information managers
  James Cokayne .................................................................... 35
Uses of health information

The enormous amount of health information which is collected annually is done so in many and varied forms. It is also collected and collated by many individuals and systems for a variety of purposes. We in the business of health information management often under-estimate the importance of our role and function within the health system overall.

Nationally, government agencies rely on the accuracy of reporting, the timely receipt of the data and the integrity of the information received. We have rapidly moved into the electronic era, and often find ourselves overwhelmed by the breadth and vastness of the data and information we maintain.

It is with this in mind that I believe that we as Health Information Managers must continually update and upgrade our credentials and qualifications in order to keep abreast of the information age. The bases of a good healthcare system are increased knowledge of systems, understanding of the benefits of strategic analysis of information and the ability to present a plausible argument based on sound health information.

Our colleagues in the associated professions face the same challenges that we do. Researching data, analysing casemix information, reviewing prescribing patterns through pharmacy systems, clinical trial data management, strategies for preserving the electronic information into the next millennium and beyond, and more: we must change our professional practices to reflect the changing times. Many of the articles in this issue of Health Information Management Journal reflect a great many changes to the use of the data and information collected.

Finally, and notwithstanding the need for care, sensitivity and protection of the information that is collected as required by legislation and in the current environment in which litigation is rife, it is our responsibility to lead in the management of health information. We must become involved in decision-making at all levels that affect both our profession and the work of which we are so proud.

I encourage all to continue the professional development so vital to that involvement in decision-making. Go beyond your safety net to acquire knowledge. Be inquisitive, and support your professional journal by submitting your findings for publication.

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A decade of the Australian Casemix Classification

Katrina Chisholm

Australia’s move to developing its own casemix classification came after five years of research into the use of casemix in Australia. This research was funded under the then Medicare Agreements. Whilst all the research in the late 1980s and early 1990s was focused on the use of the Health Care Financing Administration (HCFA) diagnosis related groups (DRGs), it was felt that DRGs in Australia needed to be localised to reflect the differences in regional health care.

The Australian National Diagnosis Related Groups (AN-DRGs) version 1 was published in 1992, for use from the 1993 financial year. This was the result of collaboration between the Commonwealth Department of Health and 3M. This first version was based on the All-Patient-Refined DRGs version 7.0, but contained some local changes such as a variation in paediatric splits, HIV being split on principal or secondary diagnoses, liver or bone marrow transplant, multiple trauma, and tracheostomy (respiratory or other). In addition, a new numbering system was used for the AN-DRGs. The decision not to use only the principal diagnosis as the initial variable in DRG assignment resulted in a change to the DRG hierarchy. In addition, there were a number of changes to the Paediatric Major Diagnostic Category (MDC). The AN-DRGs were based on the American ICD-9-CM codes for a few years; in 1995 this changed to the Australian Modification of ICD-9-CM. AN-DRG versions were produced yearly, and the use of ICD-9-CM continued until 1998. The Commonwealth Department of Health and Family Services decided to change from ICD-9-CM and, in 1995, shifted from having a sole supplier of the classification to using ICD-10 Australian Modification (ICD-10-AM) with multiple DRG suppliers.

It was recognised that the process of moving to a new coding classification and a new casemix classification would take considerable time and effort and, in March 1995, the development of the fourth version of the Australian casemix classification commenced and was changed to the Australian Refined Diagnosis Related Groups (AR-DRGs). This process consisted of a number of reviews:

- Clinical review of AN-DRG version 3
- Technical review of the clinical recommendations
- Review of the Surgical and Other hierarchies
- Complication and Comorbidity Level (CCL) refinement project
- Clinical Complexity Factor (CCF) analysis
- Preliminary changes due to future conversion to ICD-10-AM codes
- Development of software for AR-DRG version 4.0
- Testing and certification of software for AR-DRG version 4.0

At the same time as AR-DRG version 4.0 was being produced using ICD-9-CM codes, another version, AR-DRG v4.1, was also produced which used ICD-10-AM codes. When the AR-DRG classification was implemented, only half the Australian states chose to move to ICD-10-AM, while the remaining states continued to use ICD-9-CM. This was confusing; however, all states used the same DRG numbering system for the 12-month period during which there were two different coding classifications.

With the change to ICD-10-AM, there were many problems with the mapping between ICD-9-CM and ICD-10-AM. AR-DRG v4.2 was based mainly on the corrections to some of these mapping problems. The Commonwealth Department of Health and Aged Care also decided, on the advice of the states, to move to a two-year cycle for the casemix classification rather than the previous one-year cycle. The Commonwealth decided that a major revision would be undertaken every fourth year, with a two-yearly minor revision. This coincides with the ICD-10-AM edition cycle for the National Centre for Classification in Health (NCCH). The Commonwealth Department of Health and Ageing published AR-DRG version 5.0 in 2002.

A major revision is one where the logic of the grouping classification changes, and new DRGs are added and some may be deleted. The Department of Health and Ageing looks at the performance of the classification and decides whether logic changes should be made. In AR-DRG v5.0 the most changes were in Obstetric MDC 14, where the logic was completely changed from other versions. In this version, cost data were used to determine the impact of the changes, instead of just relying on length-of-stay data.

The Department of Health and Ageing relies on coders, health information managers, clinicians and any other health professional to identify grouping anomalies, suggest new DRGs or nominate areas for future changes. The Department advertises for public submissions for changes to the classification when it is undergoing a major review. For minor changes, the Department evaluates the requests received during the year to determine whether the codes are in the

Useful references on the history of the Australian casemix classification


correct DRGs and, when the Department receives new codes from the NCCH, ensures that they are mapped correctly to the appropriate AR-DRGs.

The Australian casemix classification has been sold to New Zealand, Germany, and Slovenia and is in the process of being sold to Ireland. It is reassuring to know that the Australian classification has become the de facto gold standard for casemix classifications; this was evidenced by the number of countries comparing their performance to the AR-DRG classification at the 2002 Patient Classifications Systems – Europe (PCS-E) conference in Innsbruck, Austria. Most of the authors tried to make their systems appear to perform better than the Australian classification by removing such things as the same-day DRGs.

In 2002, the whole issue of Australian Health Review, volume 25, no.1, focused on the theme 'Funding of hospitals in Australia'. Each state reported on how their public hospitals were funded and how they used casemix to fund hospitals. Some states, such as Victoria, have been using casemix-based funding for many years, whilst other states, such as New South Wales, have used casemix at the area level to fund hospitals, using output-based funding models, rather than the Victorian model of direct funding to the hospitals from the Departments. Each State has taken a different approach according to their funding needs.

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Should there be an age split for stroke DRGs? Analysing a large clinical data set of a principal teaching hospital over a five-year period

Monique Royle, Joanne Callen and Maria Craig

Abstract
The aim of this study was to analyse the inpatient statistics collection relating to stroke patients admitted to a major teaching hospital, with particular reference to length of stay, and to assess the adequacy of the diagnosis related group (DRG) as a predictor of length of stay. The study subjects were selected by DRG to identify all stroke inpatients admitted and discharged between 1 July 1995 and 30 June 2000. There were 1365 stroke discharges (half of whom were over 75 years of age at discharge) over the period of the study. The median length of stay was 8 days, and 67% of the subjects experienced complications and/or comorbidities. Age was significantly associated with increased length of stay of stroke patients, independent of complications or comorbidities.

These findings raise the question of whether casemix-based funding should be based solely on DRGs for complicated conditions such as stroke, or whether additional measures such as age should be used for funding allocation. This study provides a model that health information managers and other researchers could use to analyse inpatient statistics collections at state, territory or national levels.

Keywords: Cerebrovascular accident; diagnosis related groups; DRGs; reimbursement mechanisms; health statistics; health information

Background
State and territory inpatient statistics collections contain a wealth of demographic and clinical data regarding all patients admitted to public and private hospitals in Australia. These collections provide valuable information to assist in the planning and funding of health services. They also provide an important basis for epidemiological and medical research. This study was undertaken to ascertain whether the age and/or associated health conditions of stroke patients influenced their length of stay in hospital. A number of research studies relating to various diagnosis related groups (DRGs) have identified that age and complications and/or comorbidities are key predictors of resource use (Gillett, 1992; Basser et al, 1994). If casemix-based funding for stroke patients is to be based on average length of stay for DRGs and there is no provision for age of patients in the current stroke DRG, hospitals may not be reimbursed adequately for treating older stroke patients who stay longer than the state average length of stay.

The method used to investigate whether age or other health conditions affected the length of stay of stroke patients was an analysis of the data contained in a hospital inpatient statistics collection database. This study provides a model which health information managers and others can use to analyse the inpatient statistics collection at state, territory or national levels.

Aim of the study
The study had three aims:

i. To analyse the inpatient statistics collection of stroke patients of a major teaching hospital to identify age, gender, and number and type of complications and comorbidities for a 5-year period;

ii. To analyse the adequacy of the stroke DRG without age splits as a predictor of length of stay; and

iii. To provide a protocol which can be used by researchers in the analysis of a hospital’s inpatient statistics collection database.

Literature review
‘Stroke’ is also known as a cerebrovascular accident, disease or infarction and is classified as ischaemic, haemorrhagic, embolic or thrombotic. All types of stroke can damage a part of the brain and lead to death or disability (Barnett et al, 1998). Some 40,000 people in Australia are affected each year, half of whom are over the age of 75 years (Anderson, 1993). Stroke represents a substantial burden to western countries and is the third leading cause of death in Australia after cardiovascular disease and malignancy. The incidence of stroke rises with age, and elderly patients tend to have a longer length of stay because they have more complications and comorbidities. Furthermore, severity of illness and casemix complexity of patients tend to increase with age. The use of acute and rehabilitation facilities is likely to increase with the rise in the size of the elderly population, as well as the decrease in mortality and increase in morbidity of stroke (Australian Institute of Health and Welfare, 2001; Jamrozik et al, 1999).

It is acknowledged that stroke patients have a longer length of stay compared with patients admitted for other acute conditions (Beech et al, 1999), as do elderly patients (Flamer et al, 1996; Nakayama et al, 1994). Henderson and colleagues (1990) found that the proportion of admissions in the final year of life significantly increased over time in all age groups (P<0.01), although their study population was limited to National Health Service (NHS) patients in Oxford, England. The results of a study in male Wistar rats by Sutherland and colleagues stress the importance of age in models of cerebral ischaemia (Sutherland et al, 1996). It has been shown that treatment of patients in...
Reviewed articles

a stroke unit compared with treatment in a conventional hospital ward resulted in a shorter length of stay in stroke patients (Jorgensen et al, 1995; Wentworth et al, 1996).

The literature supports the view that complications following hospitalisation for acute conditions contribute substantially to longer periods in hospital (Stineman et al, 1998). The association between increasing age and both length of stay and complication rates has been reported (Cullen et al, 1994; Kim et al, 1993). Various researchers have found different factors related to increased length of stay, for example: the significance of cognitive impairment for rehabilitation (Galski et al, 1993); motor task impairment (Brock et al, 1995); and delayed discharge (Van Straten et al, 1997).

Casemix refers to the number and type of patients treated in a health care service. It describes the degree of treatment required, the use of resources and the cost of treating patients. Casemix complexity refers to the characteristics of patient admissions, including degree of condition, prognosis, level of difficulty to treat, intervention required, and use of resources. Diagnosis related groups (DRGs) are used to relate the casemix of a hospital to resources required; they were developed at Yale University, USA, in 1978 (3M Health Information Systems and Commonwealth Department of Human Services and Health, 1993). Australian National Diagnosis Related Group (AN-DRG) version 1 was developed in Australia based on the American grouper AP-DRGs version 8. Older patients are likely to have longer hospital admissions and more complications and comorbidities. Version 1.0 of the AN-DRGs definitions manual only partially accounted for older age (Basser et al, 1994). Therefore, hospitals that treat a large elderly population may be disadvantaged if funding is based on DRGs (Gillet, 1992). Whilst there have been changes to subsequent versions of the grouper, it is yet to account for the elderly and more complex stroke patient.

Method

The study was undertaken at The Prince of Wales/Prince Henry Hospital, a principal teaching hospital of the University of New South Wales. The researchers investigated all adult stroke inpatient

<table>
<thead>
<tr>
<th>Diagnosis related group*</th>
<th>Gender</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>DRG 37 – Cerebrovascular disorders except transient ischaemic attack with complication or comorbidity</td>
<td>444 (49%)</td>
<td>471 (51%)</td>
</tr>
<tr>
<td>DRG 38 – Cerebrovascular disorders except transient ischaemic attack without complication or comorbidity</td>
<td>231 (51%)</td>
<td>219 (49%)</td>
</tr>
<tr>
<td>Total</td>
<td>675 (100%)</td>
<td>690 (100%)</td>
</tr>
</tbody>
</table>

*Diagnosis Related Group, Australian National Diagnosis Related Groups, version 3.0

<table>
<thead>
<tr>
<th>ICD-9-CM*</th>
<th>Description</th>
<th>Frequency</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>434.91</td>
<td>Cerebral artery occlusion with mention of cerebral infarction</td>
<td>511</td>
<td>(37.4%)</td>
</tr>
<tr>
<td>436</td>
<td>Acute, but ill-defined, cerebrovascular disease</td>
<td>384</td>
<td>(28.0%)</td>
</tr>
<tr>
<td>431</td>
<td>Intracerebral haemorrhage</td>
<td>245</td>
<td>(17.9%)</td>
</tr>
<tr>
<td>430</td>
<td>Subarachnoid haemorrhage</td>
<td>45</td>
<td>(3.3%)</td>
</tr>
<tr>
<td>434.01</td>
<td>Cerebral thrombosis with mention of cerebral infarction</td>
<td>41</td>
<td>(3.0%)</td>
</tr>
<tr>
<td>434.11</td>
<td>Cerebral embolism with mention of cerebral infarction</td>
<td>35</td>
<td>(2.6%)</td>
</tr>
<tr>
<td>437.1</td>
<td>Other generalized ischaemic cerebrovascular disease</td>
<td>22</td>
<td>(1.6%)</td>
</tr>
<tr>
<td>434.9</td>
<td>Cerebral artery occlusion without mention of cerebral infarct</td>
<td>19</td>
<td>(1.4%)</td>
</tr>
<tr>
<td>437.7</td>
<td>Transient global amnesia</td>
<td>17</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>432.1</td>
<td>Subdural haemorrhage</td>
<td>13</td>
<td>(1.0%)</td>
</tr>
<tr>
<td>437.3</td>
<td>Cerebral aneurysm, nonruptured</td>
<td>12</td>
<td>(0.9%)</td>
</tr>
<tr>
<td>432.9</td>
<td>Unspecified intracranial haemorrhage</td>
<td>10</td>
<td>(0.7%)</td>
</tr>
<tr>
<td>434.1</td>
<td>Cerebral embolism without mention of cerebral infarction</td>
<td>6</td>
<td>(0.4%)</td>
</tr>
<tr>
<td>437.9</td>
<td>Unspecified cerebrovascular disease</td>
<td>3</td>
<td>(0.2%)</td>
</tr>
<tr>
<td>432</td>
<td>Non-traumatic extradural haemorrhage</td>
<td>2</td>
<td>(0.1%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1365</td>
<td>(100%)*</td>
</tr>
</tbody>
</table>

*Inpatient separations coded to International Classification of Disease version 10 Australian Modification (ICD-10-AM) were mapped to the International Classification of Diseases version 9 Clinical Modification (ICD-9-CM) codes for the purposes of analysis. Percentage rounded.
3: Frequency of principal diagnosis of adult stroke patient separations categorised by age under or over 40 years, from the Prince Henry/Prince of Wales Hospitals from 1 July 1995 to 30 June 2000

<table>
<thead>
<tr>
<th>ICD-9–CM code</th>
<th>Description</th>
<th>Number</th>
<th>&lt; 40 years</th>
<th>≥ 40 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>430</td>
<td>Subarachnoid haemorrhage</td>
<td>10</td>
<td>10 (40%)</td>
<td>35 (2.6%)</td>
</tr>
<tr>
<td>434.01</td>
<td>Cerebral thrombosis with cerebral infarction</td>
<td>4</td>
<td>4 (16%)</td>
<td>37 (2.8%)</td>
</tr>
<tr>
<td>434.11</td>
<td>Cerebral embolism with cerebral infarction</td>
<td>4</td>
<td>4 (16%)</td>
<td>31 (2.3%)</td>
</tr>
<tr>
<td>434.91</td>
<td>Cerebral artery occlusion with cerebral infarction</td>
<td>3</td>
<td>3 (12%)</td>
<td>508 (37.9%)</td>
</tr>
<tr>
<td>431</td>
<td>Intracerebral haemorrhage</td>
<td>2</td>
<td>2 (8%)</td>
<td>243 (18.1%)</td>
</tr>
<tr>
<td>436</td>
<td>Acute, but ill-defined, cerebrovascular disease</td>
<td>2</td>
<td>2 (8%)</td>
<td>382 (28.5%)</td>
</tr>
<tr>
<td>437.1</td>
<td>Other generalized ischaemic cerebrovascular disease</td>
<td>-</td>
<td>-</td>
<td>22 (1.6%)</td>
</tr>
<tr>
<td>434.9</td>
<td>Cerebral artery occlusion without mention of cerebral infarct</td>
<td>-</td>
<td>-</td>
<td>19 (1.4%)</td>
</tr>
<tr>
<td>437.7</td>
<td>Transient global amnesia</td>
<td>-</td>
<td>-</td>
<td>17 (1.3%)</td>
</tr>
<tr>
<td>432.1</td>
<td>Subdural haemorrhage</td>
<td>-</td>
<td>-</td>
<td>13 (1%)</td>
</tr>
<tr>
<td>437.3</td>
<td>Cerebral aneurysm, non-ruptured</td>
<td>-</td>
<td>-</td>
<td>12 (0.9%)</td>
</tr>
<tr>
<td>432.9</td>
<td>Unspecified intracranial haemorrhage</td>
<td>-</td>
<td>-</td>
<td>10 (0.7%)</td>
</tr>
<tr>
<td>434.1</td>
<td>Cerebral embolism without mention of cerebral infarction</td>
<td>-</td>
<td>-</td>
<td>6 (0.4%)</td>
</tr>
<tr>
<td>437.9</td>
<td>Unspecified cerebrovascular disease</td>
<td>-</td>
<td>-</td>
<td>3 (0.2%)</td>
</tr>
<tr>
<td>432</td>
<td>Non-traumatic extradural haemorrhage</td>
<td>-</td>
<td>-</td>
<td>2 (0.1%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>25</strong></td>
<td><strong>1340</strong></td>
</tr>
</tbody>
</table>

*ICD-9–CM = International Classification of Diseases version 9 Clinical Modification. # Percentage rounded.

4: Number (percentage) by age group and gender of all adult stroke patient separations from the Prince Henry/Prince of Wales Hospitals from 1 July 1995 to 30 June 2000

<table>
<thead>
<tr>
<th>Age groups (years)</th>
<th>Frequency</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>14-29</td>
<td>4 (31%)</td>
<td>9 (69%)</td>
</tr>
<tr>
<td>30-39</td>
<td>9 (75%)</td>
<td>3 (25%)</td>
</tr>
<tr>
<td>40-49</td>
<td>33 (59%)</td>
<td>23 (41%)</td>
</tr>
<tr>
<td>50-59</td>
<td>71 (61%)</td>
<td>45 (39%)</td>
</tr>
<tr>
<td>60-69</td>
<td>155 (63%)</td>
<td>91 (37%)</td>
</tr>
<tr>
<td>70-79</td>
<td>235 (51%)</td>
<td>224 (49%)</td>
</tr>
<tr>
<td>80-89</td>
<td>152 (38%)</td>
<td>244 (62%)</td>
</tr>
<tr>
<td>90-99</td>
<td>16 (24%)</td>
<td>51 (76%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>675 (49%)</strong></td>
<td><strong>690 (51%)</strong></td>
</tr>
</tbody>
</table>

*Percentage rounded

The study subjects were selected by DRG (37 and 38) to identify all stroke patients. The system used for coding patient separations between June 1995 and June 1998 was the International Classification of Diseases version 9 Clinical Modification (ICD-9–CM) (National Coding Centre, 1996), and from July 1998 to June 2000 the International Classification of Diseases version 10 Australian Modification (ICD-10-AM, 1st ed.) was used (National Centre for Classification in Health, 1998). All ICD-10-AM codes were mapped to ICD-9–CM codes for the purposes of analysis. The DRG grouper, Australian National Diagnosis Related Groups (AN-DRG) version 3.0 (3M Health Information Systems and Commonwealth Department of Human Services and Health, 1993), was current from 1 July 1993 to 30 June 1998 when an upgrade to Australian Refined Diagnosis Related Groups (AR-DRG) version 4.1 (Commonwealth Department of Health and Aged Care, 1998) was introduced. The Prince of Wales/Prince Henry Hospital upgraded to AR-DRG version 4.1 on 1 July 2000. All DRG version 4.1 codes were mapped to DRG version 3.0 codes for analysis. The patient population spanned two coding systems, making the grouping of patients a complex task. The process of arranging the data into a format for analysis was a detailed and time-consuming exercise: there were 1246 secondary codes representing complications and comorbidities, and these were classified, with the aid of a clinician, into 41 categories for the purpose of analysis. Secondary codes were grouped by systems (eg, respiratory) and common conditions (eg, hypertension, diabetes).

AR-DRG version 4.1 now classifies stroke patients into four DRGs rather than two. DRG 37 has been reclassified in AR-DRG version 4.1 into two groups: B70A 'Stroke with severe or complicating diagno-
sis/procedure’ and B70B ‘Stroke with other complication or comorbidity’. DRG 38 maps to B70C in AR-DRG version 4.1: ‘Stroke without other complication or comorbidity’. The fourth stroke code, B70D, is defined by ‘Stroke, died, or transferred < 5 days’. Whilst there is an option within the DRG to account for severe or complex diagnosis or procedure and complication or comorbidity, there is no partition for age in these DRGs. This results in patients across all ages being grouped together with no accounting for their differences in age, which may affect length of stay.

**Procedure**

The process of arranging data in a format suitable for analysis can be intricate and lengthy. The data for this study were obtained from two modules (Admissions, Transfers and Separations module and the Disease Index module) of the hospital’s inpatient statistics collection. The patient records from each module were linked and merged using Microsoft Excel Version 97. As most patients had one or more secondary codes representing a complication or comorbidity, each row of patient data (eg, medical record number and date of admission) needed to be duplicated to ensure all data items for each patient were present for each row containing a secondary code. Data are reported as mean ± standard deviation (SD) for parametric data and median and interquartile (IQ) range for skewed data. The t-test was used to compare parametric continuous data and the Mann–Whitney U test was used to compare non-parametric continuous data. Differences in proportions were compared using the χ² test. Pearson’s correlation coefficient was used to measure linear association. Microsoft Access (Version 97), Microsoft Excel (Version 97) and the Statistical Package for Social Sciences (SPSS) (Version 10, Chicago, Ill) were used for data manipulation and analysis.

**Results**

There were 1365 separations involving 1218 patients at Prince Henry/Prince of Wales Hospitals with a principal diagnosis of stroke between 1 July 1995 and 30 June 2000. One hundred and twenty-two (10%) of the 1218 patients had more than one separation: 104 (8.5%) had two separations, and 18 had three or more separations.

**DRG and principal diagnosis code**

The majority of the study patients were coded to DRG 37 (Box 1), indicating that 67% of patients admitted for stroke during the study period experienced complications and/or comorbidities. According to the AN-DRG version 3.0 grouper, these subjects required greater resource use. When the subjects were subdivided into DRG 37 and 38, no significant gender differences were found (P>0.1).

The median age of patients in DRG 37 and DRG 38 was 77 years (74 years for males and 80 years for females) and 72 years (70 for males and 73 for females), respectively. Patients with complicated stroke...
Reviewed articles

(DRG 37) were significantly older compared with patients in DRG 38 (Mann-Whitney U test, \( P < 0.001 \)).

The most commonly occurring principal diagnosis was 434.91: ‘Cerebral artery occlusion with mention of cerebral infarction’ (37.4%) (Box 2).

Principal diagnoses varied with age; thus, the frequency of the principal diagnosis was subdivided using 40 years of age at discharge as a cut-off, following clinical recommendation. The most commonly occurring principal diagnosis for patients under 40 years of

<table>
<thead>
<tr>
<th>Complication/comorbidity category*</th>
<th>Frequency</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemiplegia and paralysis</td>
<td>771</td>
<td>(9.1%)</td>
</tr>
<tr>
<td>Vestibular disorders and hearing loss</td>
<td>738</td>
<td>(8.7%)</td>
</tr>
<tr>
<td>Ischaemic heart conditions</td>
<td>667</td>
<td>(7.9%)</td>
</tr>
<tr>
<td>Coma, altered level of consciousness, dizziness and disorientation</td>
<td>475</td>
<td>(5.6%)</td>
</tr>
<tr>
<td>Electrical conducting disorders of the heart</td>
<td>407</td>
<td>(4.8%)</td>
</tr>
<tr>
<td>Gastrointestinal, liver and pancreatic conditions</td>
<td>385</td>
<td>(4.6%)</td>
</tr>
<tr>
<td>Respiratory diseases and infections</td>
<td>375</td>
<td>(4.4%)</td>
</tr>
<tr>
<td>Dementia, acute brain syndromes, schizophrenia</td>
<td>367</td>
<td>(4.4%)</td>
</tr>
<tr>
<td>Renal failure and other renal and prostatic conditions</td>
<td>351</td>
<td>(4.2%)</td>
</tr>
<tr>
<td>Vascular disease</td>
<td>281</td>
<td>(3.3%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>270</td>
<td>(3.2%)</td>
</tr>
<tr>
<td>Accident (excluding fall)</td>
<td>235</td>
<td>(2.8%)</td>
</tr>
<tr>
<td>Hypercholesterolaemia and hyperlipidaemia</td>
<td>230</td>
<td>(2.7%)</td>
</tr>
<tr>
<td>Neoplasm</td>
<td>211</td>
<td>(2.5%)</td>
</tr>
<tr>
<td>Alcohol and other drug use</td>
<td>205</td>
<td>(2.4%)</td>
</tr>
<tr>
<td>Disorders of skin and soft tissue</td>
<td>202</td>
<td>(2.4%)</td>
</tr>
<tr>
<td>Neuropathy</td>
<td>183</td>
<td>(2.2%)</td>
</tr>
<tr>
<td>Arthropy, joint disorders, osteoarthritis and rheumatoid arthritis</td>
<td>180</td>
<td>(2.1%)</td>
</tr>
<tr>
<td>Visual field defect and other visual disturbances</td>
<td>179</td>
<td>(2.1%)</td>
</tr>
<tr>
<td>Degenerative eye diseases and conditions</td>
<td>149</td>
<td>(1.8%)</td>
</tr>
<tr>
<td>Previous myocardial infarction</td>
<td>143</td>
<td>(1.7%)</td>
</tr>
<tr>
<td>Other</td>
<td>126</td>
<td>(1.5%)</td>
</tr>
<tr>
<td>Bone disorders, osteoporosis and fractures</td>
<td>114</td>
<td>(1.4%)</td>
</tr>
<tr>
<td>Speech disorders including aphasia</td>
<td>108</td>
<td>(1.3%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>107</td>
<td>(1.3%)</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>104</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>Biochemical, electrolyte and fluid disorders including volume depletion</td>
<td>102</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>Fall</td>
<td>86</td>
<td>(1.0%)</td>
</tr>
<tr>
<td>Psychiatric disease</td>
<td>78</td>
<td>(0.9%)</td>
</tr>
<tr>
<td>Thyroid conditions</td>
<td>77</td>
<td>(0.9%)</td>
</tr>
<tr>
<td>Gout</td>
<td>75</td>
<td>(0.9%)</td>
</tr>
<tr>
<td>Parkinson's, ataxia and other neural degenerative disorders</td>
<td>74</td>
<td>(0.9%)</td>
</tr>
<tr>
<td>Heart valve defects</td>
<td>71</td>
<td>(0.8%)</td>
</tr>
<tr>
<td>Person living alone</td>
<td>50</td>
<td>(0.6%)</td>
</tr>
<tr>
<td>Infection</td>
<td>49</td>
<td>(0.6%)</td>
</tr>
<tr>
<td>Other conditions of the brain</td>
<td>47</td>
<td>(0.6%)</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>46</td>
<td>(0.5%)</td>
</tr>
<tr>
<td>Haematological and blood disorders</td>
<td>41</td>
<td>(0.5%)</td>
</tr>
<tr>
<td>Epilepsy, other condition of the brain</td>
<td>38</td>
<td>(0.5%)</td>
</tr>
<tr>
<td>Allied health intervention</td>
<td>32</td>
<td>(0.4%)</td>
</tr>
<tr>
<td>Obesity</td>
<td>15</td>
<td>(0.2%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8444</strong></td>
<td>(100%)*</td>
</tr>
</tbody>
</table>

*Percentage rounded
age was subarachnoid haemorrhage, followed by cerebral thrombosis and cerebral embolism. The highest occurring principal diagnosis in patients over 40 years of age was cerebral artery occlusion with cerebral infarction (Box 3).

**Age and gender**

There was no significant gender bias in adult stroke patients, with 690 females (51%) and 675 males (49%) identified during the study period. Men were significantly younger ($P<0.001$), with a median age of 72 years (IQ range, 64–79) compared with women, who had a median age of 77 years (IQ range, 70–84). The overall median was 75 years (IQ range, 67–83 years).

Age was negatively skewed, indicating that the majority of patients were in the higher age groups. The majority of patients were aged between 60 and 89 years (81%) and only 25 patients (2%) were aged 14–39 years. There were more males in the 30–69-years age groups, but there were more females aged 0–29 years and over 80 years (Box 4).

**Length of stay**

The median length of stay for the 1365 separations was 8 days, with a range of 1 to 96 days. Some 46% of patients stayed in hospital for less than 1 week after their stroke, 78% of patients were discharged within 2 weeks, 96% of patients were discharged within 5 weeks and 23 patients (1%) remained in hospital for longer than 7 weeks (Box 5). The length of stay was positively skewed. There was a significant variation in length of stay by age category ($P<0.001$, Box 6).

**Complications and comorbidities**

The majority of patients ($n = 1358$, 99.5%) had at least one comorbidity or complication. The median number of events per patient was six (IQ range, 4–6). The frequency distribution of number of complications or comorbidities per patient is shown in Box 7. The most frequently occurring complication or comorbidity group was 'hemiplegia and paralysis' (771, 9.1%) (Box 8). Stroke patients in DRG 37 (those with complications) had a significantly longer length of stay compared with patients in the DRG 38 group (Mann–Whitney $U$ test $P<0.001$). There was a significant correlation between length of stay and number of complications and comorbidities ($P<0.001$, Box 7). There was also a significant association between age and number of complications and comorbidities ($P<0.001$).

**Source of admission**

The majority of stroke patients (84.8%) presented to hospital as emergency admissions (Box 9).

**Discussion**

The analysis of all patients admitted for stroke to the Prince Henry/Prince of Wales Hospital over a period of 5 years has supported the findings in the literature that the risk of stroke increases with age, and half of the population affected are over 75 years of age. As age increases, so does the number of certain complications and comorbidities and length of hospital admission. Furthermore, as there are more survivors of stroke now than in previous years and the lifespan of the Australian population is increasing, there is likely to be an increased demand on hospital resources from stroke patients in the future (Anderson et al, 1993).

The findings in the present study illustrate the inequalities of episode-based funding when applied to stroke patients. If funding is based on the average cost weight for stroke patients, hospitals receive the same funds for patients with longer admissions, or more complications or comorbidities, as for uncomplicated stroke patients. It was suggested by Gillett in 1992, in a paper presented to the Fourth National Australian CaseMix Conference, that an elderly allowance or earlier discharge to community facilities may partially compensate for the increased costs associated with treating an elderly population. Whilst the AN-DRG version 3.0 grouper that was used in the study has been superseded by AR-DRG version 4.1 and 4.2, there is still no division within the stroke DRGs to assign a higher cost weight to older patients. Despite the fact that the most complex of patients may be assigned the highest cost-weighted stroke DRG, the cost weight may not adequately reimburse hospitals for many of the very old and clinically complex stroke patients with long admissions.

Hospitals that treat a large elderly population may be disadvantaged if funding is based on DRGs (Gillett, 1992). Basser and colleagues (1994) found that DRGs with complication and comorbidity splits only partially accounted for older age. They found that version 1.0 AN-DRGs did not account for age-related lengths of stay in the elderly population. Patients coded to the DRGs with complication or comorbidity splits were older ($P<0.01$) when the data were pooled. This study not only supports the finding of the previous study that older patients are

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**9: Source of referral of all adult stroke patient separations from the Prince Henry/Prince of Wales Hospitals from 1 July 1995 to 30 June 2000**

<table>
<thead>
<tr>
<th>Source of referral</th>
<th>Number</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency admission</td>
<td>1157</td>
<td>(84.8%)</td>
</tr>
<tr>
<td>Hospital in same area</td>
<td>121</td>
<td>(8.86%)</td>
</tr>
<tr>
<td>Other medical practice</td>
<td>50</td>
<td>(3.67%)</td>
</tr>
<tr>
<td>Other than a private psychiatric practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other hospital</td>
<td>18</td>
<td>(1.32%)</td>
</tr>
<tr>
<td>Type change admission*</td>
<td>13</td>
<td>(0.95%)</td>
</tr>
<tr>
<td>Outpatients</td>
<td>5</td>
<td>(0.4%)</td>
</tr>
<tr>
<td>Community health</td>
<td>1</td>
<td>(0.07%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1365</strong></td>
<td>(100%)*</td>
</tr>
</tbody>
</table>

*Type change admissions occur when patients are recategorised from one type of admission to another (eg, from acute to rehabilitation).

# Percentage rounded.
likely to have longer admissions and more complications and comorbidities, but demonstrated that, while a DRG may have a split for complications and comorbidities, this does not account for older age.

Conclusion
This study has shown the value of analysing the data contained in inpatient statistics collections to investigate issues related to funding of health services. The findings raise the question as to whether casemix funding should be based solely on DRGs for complicated conditions such as stroke, or whether additional measures should be used for funding allocation. A major driver of cost is length of stay, but as shown here the DRG does not predict length of stay accurately. This raises two alternative proposals. Firstly, the use of a predictive formula for each DRG could be employed, incorporating age and selected complications and comorbidities. Alternatively, the DRG-based payment could be modified by an outcome measure that reflects the quality and/or the efficacy of care, such as death, complications of care, discharge or readmissions. It is acknowledged that the latter would require considerable work to refine and validate the output measure. Health information managers working in hospitals are largely responsible for the input and quality checks on the data contained in state and territory data collections. They should also initiate analysis of these data to assist in funding and planning health services, as well as for research purposes.

References


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Researching hospital patient data to enhance operational management

Liza Heslop, Brendon Gardner, Dean Athan, Donna Diers and Catherine Taylor

Abstract
For the purposes of funding and policy development, the Victorian Department of Human Services expects Victorian health care institutions to capture patient data at all levels. These data can be extracted from hospital information systems and potentially offer a business role within a health service organisation. However, there are many issues to be addressed at the organisational level in order that operational directors can be enabled to use hospital data to solve health service operational problems. In this paper, we discuss some of those considerations and give practical examples of how patient data can be used for research and management purposes.

Key words: health services research; casemix analysis; hospital data systems; health information management; patient management

Fundamentals of data mining for health services research
Data mining is a process used to identify trends and patterns in data by analysing and extracting data contained within a database. It is a process of assembling data, presenting it to a data mining software program, interpreting it and applying the results to new problems. Such data are of interest to hospital operational directors for several reasons; for example, they could be responsible for prejudices or misconceptions, but could also inform operational decisions (Lee et al, cited in Liao & Embrechts, 2000).

Although useful data are available for health services research, the processes for extracting and preparing data, and the decision-making processes about actions that might be taken, can be time-consuming aspects of the research process. Although many textbooks and journal papers provide information on data mining processes, many do not sufficiently elaborate the difficulties faced by health service managers and health researchers.

Before commencing health services research using clinical data, researchers and managers need to know what inpatient data are collected in Victorian hospitals, and how to access these data. As part of the mandatory inpatient state-based reporting system, large volumes of data are collected for each inpatient episode. These data include patient demographics, country of birth, Indigenous status, criteria for admission, admission type and source, type of care, financial classification, length of stay, diagnoses and procedures (up to 24 of each), diagnosis related group, intensive care hours, hours of mechanical ventilation, coronary care hours, intention to re-admit, and discharge destination and type. These data are reported to the Victorian Admitted Episode Dataset (VAED). The VAED is an invaluable data source for researchers, health planners and policy makers, but it is at the local level that it can be used for enhancing patient management. There are also several other mandatory data reporting systems in place, such as the Victorian Emergency Minimum Database (VEMD), the Client Management Interface (CMI), the Elective Surgery Incentive Scheme (ESIS), and the Critical Care Inter Hospital Transfer (CCIHT), all of which are excellent data sources for research, benchmarking and other types of data analysis.

Data mining begins as an inductive process whereby key research questions are defined, given knowledge of the data available. The next step in this process is to explore whether the research questions can be illuminated by data mining procedures, whether data are available to illuminate the problem, whether the data analysis is useful for reporting purposes, and what potential knowledge can be gained from the process.

A team based at Peninsula Health has undertaken several hospital data mining studies. Peninsula Health is located in Victoria, Australia, and services metropolitan and semi-rural areas. The region encompasses 900 square kilometres and is at least an hour’s drive from the Melbourne CBD. The resident population of Peninsula Health’s catchment area is a multicultural community of just under 300,000 people. The region’s higher-than-average number of elderly residents requires a special focus on aged-care services. The steps that may be useful for health service personnel who wish to pursue data mining processes using hospital data are summarised in the next section. They involve the creation of a multidisciplinary team, development of strategies for health information management services, and provision of education to health service personnel. Finally, we report some data quality and data capture issues and describe some experiences of extracting and preparing data.

Steps for undertaking data mining in health services research
Creating a multidisciplinary data mining team
Before delineating key questions that can potentially be answered following mining of hospital data, it is essential to form an integrated team of appropriate personnel who have an interest in clinical data mining methodology for application to hospital best practice models. Our group (hospital data mining group) consists of clinicians, university personnel, health information management personnel, and hospital finance officers. This group is currently undertaking hospital-
Developing strategy and future directions for Management Information Services

A primary goal of MIS at Peninsula Health is to provide timely and accurate information and to disseminate that information to relevant groups such as the Board of Directors, Executive Directors, Clinicians, Department Heads, Cost Centre Managers, and Financial Officers. Making available the desirable amount of easily accessible information to these groups is crucial for operational decision making. The reliance of MIS staff members on electronic methods has increased, and the technologies available have expanded to allow access to more complex data.

Part of MIS’s development has been to encourage the use of best practice and industry-standard technologies at each level of development. A Microsoft SQL server is a failsafe, central store of data; XML is a universal data transfer mechanism; OLAP provides for complex and interactive data analysis; and web browsers allow for intranet report distribution. The toolkit used to process complicated business logic for presentation to hospital groups includes Microsoft’s .NET family of products.

These technologies provide a number of benefits to Peninsula Health:
- Standard Microsoft technologies that make use of existing assets like Office and Windows Server are used.
- Reporting systems are integrated with multiple systems which access central cost centre and general ledger and payroll information.
- Reporting of clinical and quality indicator type is now efficient and timely.
- There are familiar ways of reporting and manipulating data using web browser.
- Key performance indicator type data are easily accessible.

Key examples of established application of these technologies at Peninsula Health are:
- weekly productions of key performance indicators and other activity and clinical performance based reporting mechanisms.
- the integration of all MIS reporting (desktop and web-based) with our central cluster/aggregate/cost centre data store using SQL Server.

In addition, the online-reporting web site allows users to view expenditure reports archived to July 2000, with the ability to ‘drill down’ to journal-level detail. Reports can be viewed via a web browser, and printed or analysed using Microsoft Excel. This system replaced the e-mail distribution of expenditure reports, and was developed using Microsoft Active Server Pages, Visual Basic and XML.

Budget Online 2003 was created based on an online budget entry system developed by MIS in 2002. The specifications of the older system were reviewed and a list of improvements was drawn up. There was an opportunity to build the new intranet web site using .NET technology with the latest development tools, and utilising data access components optimised for SQL Server as a back-end and support for XML. The simplicity of the application – a report screen and a data-entry screen – meant that the project could be finished in the time specified, built using three-tier architecture and integrated with existing enterprise data stores, such as cost centre distribution and general ledger data. Online Reporting Version 2 (still in development) extends Version 1 and will provide greater decision-support capabilities. This is achieved through drill-down capabilities for salaries to employee level, and for consumables to purchase order level.

The immediate and forthcoming developments of MIS include the completion of an Online Reporting Version 2 which will replace much of the current e-mail distribution of cluster and cost centre reports. This will provide a single intranet location for access to a wide range of current and historical reports, delivered in easily navigated format, with the ability to target specific data and investigate expenditure to its source. A salary reporting system, which will replace the current legacy system, is also being developed. This system will also include automated interfacing directly to the SAP payroll data store.

The research and effort spent on the creation of existing systems will be used in the development of future web-based and desktop applications. Such applications will make use of an improved developer toolkit in Microsoft .NET, industry-standard technologies and best practices, and efficient data access principles. This includes the use of SQL Server data warehousing using OLAP, XML as a universal transfer mechanism, and a structured development methodology. The end objective of employing these technologies is to empower clinicians and key decision makers with up-to-date and relevant information concerning the ongoing operational and decision-making needs of the hospital.

The need for clinical education

The power of casemix information for hospital clinical and management reform cannot be realised until user-friendly methods of teaching are developed. It has been common for casemix education to focus on payment issues, but health service personnel require knowledge of how casemix information can be used ‘at the coalface’. If clinicians and operational managers know how to access and manipulate the clinical and operational data elements within a casemix information system, they can better understand, monitor and
change practice. Part of our work at Peninsula Health has been to develop workshops for clinicians and managers at all levels, as well as for finance and information system personnel. These workshops have been conducted at several conferences as well as through Monash University. The teaching model we have developed is underpinned by a living database of real hospital discharges based in AN-DRGs; the data are not meaningful without a context. We review the production and function of casemix (from which DRGs and AR-DRGs descend), ICD coding and DRG grouping rules. For demonstration purposes, we provide participants with a modified demographic and clinical dataset and a simple manual that translates ICD codes and AN-DRGs. We assist participants with reading the data and answering clinical queries. For example, nursing managers have difficulty in describing the work of their units in clinical management terms. If they have knowledge of data within hospital casemix information systems they can use that knowledge to make management decisions concerning the nursing unit. The content of the workshop demonstrates that the large quantity of data available within a healthcare institution provides operational managers with a very powerful and functional patient management tool.

Data quality and data capture

Peninsula Health uses Combo PC as the clinical costing and casemix analysis system. This incorporates the VAED with patient-specific departmental activity data throughout the hospital (for example, pathology, radiology and ward activity) to produce a comprehensive hospital-activity and patient-costing database which can be quickly and readily accessed.

Capturing an appropriate clinical population can be a difficult part of the data mining research process, requiring consultation with financial, health information and operational managers. There are several research papers that give practical advice on how to access patient data in a way that will give operational directors, such as nurses, helpful information to effectively manage care in the acute care sector (Diers, 1999; Bozzo, Carlson and Diers, 1998; Diers et al 1998; Pollack & Diers, 1994). Health information managers or clinical costing managers are able to determine exactly what data are needed to answer a clinical query because they know what data and indicators are available to assist with answers to any query. When capturing relevant clinical data, we needed to ensure that it could be reliably extracted. Multiple methodologies were investigated, but we elected to work in conjunction with our software supplier to develop a suite of data extracts that could provide us with the data in a reliable way and in a timely manner. These data were then stored on a separate server and manipulated using Microsoft Access.

Experiences of extracting data and preparing data

Once the data are extracted, research can commence by clarifying key research questions and exploring the data. For example, we have recently undertaken a study which explores high-cost users as a patient group. High-cost users are separations or patient discharges from hospital that generate extremely high costs when compared with average cases in the same diagnostic related group (DRG). The high-cost users group was studied to highlight patterns across key variables derived from clinical, financial and operational categories. The purpose was to support operational management strategies for patients identified as high-cost users. One of the key research questions was: What DRGs are inappropriately represented in high-cost groups?

Prior to commencing the data mining exercise on high-cost users, various methodological questions required clarification, for example:

- What groups of patients should be excluded?
- What procedures should we adopt to identify high-cost users?
- What criteria will be used to qualify the group as ‘high-cost’ users?
- What methodological procedures are best adopted to identify high-cost users?
- What criteria can be used to qualify patient groups as high-cost users?
- What variables are associated with patients who fall into high-cost status?
- What key variables are associated with high-cost users as a group?
- How do high-cost groups compare with groups identified as not high cost?

Some time was spent discussing these points and the various options and directions that were taken for the study.

Examples of data manipulation

Following are examples of the types of patient data manipulation that have enhanced patient management at Peninsula Health over the last 2 years.

1. Development of a bed management strategy to maximise bed occupancy. This was achieved by investigating admission and discharge practices, including an analysis of the day-of-week admissions and discharges, as well as analysis of elective and emergency admission rates.

2. Modelling a new High Dependency Unit in contrast to maintaining high dependency patients in the Intensive Care Unit. This required the modelling of costs, workload and other factors such as throughput and casemix.

3. Investigation of the community benefit of developing an angiography service at the hospital by analysing the population’s morbidity and current service patterns.

Some research demonstrates clinical applications for improving decision support for health and nursing managers (see, for example, Munsch, 2002; Heslop, Elsom and Parker, 2000; Taylor et al, 2001). Nurses can use the data that the health information managers collect, code, report and analyse in many ways. Consider, for example, the following proposition: Baragwanath (1998) has argued that reduced length of stay (LOS) for patients may be associated with increased nursing resource consumption, but there has been little empirical evidence to support this argument. Using
hospital data there is the potential to establish relationships between LOS and nursing activity. Further studies are needed to clarify the relationship between nursing activity and length of stay. Diers and Potter (1997) sought to improve nursing practice patterns in a nursing unit which is funded under casemix. Nursing care requirements are complex in wards in which a wide range of cases are treated. Casemix data offer nursing managers a description of the casemix of their particular unit. Diers and Potter (1997) were able to restructure the casemix of the ward, and subsequently found that nursing resource consumption improves when nurses have enough similar clinical experiences to become expert at their work.

Conclusion
Access to, and knowledge of, standard hospital information systems is a relatively recent factor in nursing inquiry. The harnessing and understanding of the large quantity of data available within a healthcare institution provides a very powerful and functional patient management tool, which is currently underutilised by many clinicians; there are numerous standardised databases throughout the health industry. Various ‘stepping stones’, such as understanding what is collected, how to access the data and formulating clinical questions to which the data can respond, provide a firm basis for manipulating patient data to enhance patient management.

References
The pharmacy management information system at the Department of Veterans’ Affairs

Elizabeth Moss, Robert Peck, Anthony Corkhill

Abstract

This article describes the pharmacy management information systems environment currently being implemented at the Australian Department of Veterans’ Affairs (DVA), and focuses on the objectives and design of the medication management program’s management of information. As the system is new, it is too early to predict the difference that it will make to the operations and policy initiatives within the Medication Management section. The anticipated benefits are discussed. The user reaction, and the uses of these management data, are part of an ongoing benefits realisation study and the subject of a future article.

Background

The Department of Veterans’ Affairs (DVA) contracts with health service providers to deliver health care services to veterans and their eligible dependents. In order to ensure that appropriate, good quality, cost-effective services are delivered to meet the needs of the veteran population, there is a need for ready access to management information. In the mid to late 1990s it became apparent that in order to support contract management and veteran health status evaluation, a system which would provide an integrated view of the Department’s business across the various health programs would be necessary. In response to this need, the Department has invested in a Departmental Management Information System (DMIS). DMIS is an innovative data warehouse system which has been designed to provide staff with easy access to quality information.

Departmental Management Information System (DMIS) project

The DMIS technology enables the conversion of large and disparate data stores into integrated business views or data marts. This is achieved by ‘warehousing’ data from various source systems, both internal and external, into an integrated platform for analysis. The data are organised and presented to users according to health programs and various cross-business views. The implementation of the business views or data marts is being phased in across the programs such as hospital care, community nursing, home care, medication management and mental health. As the implementation of data marts progresses, DMIS allows departmental managers to:

- Integrate information across departmental activities and programs
- Obtain and analyse management information quickly without technical assistance
- Access client, provider and activity profiles
- Access departmental reporting data simply and easily (Department of Veterans’ Affairs, 2000).

DMIS uses data warehousing architecture that has been designed from the outset to have the capability to provide for all the future decision support requirements of DVA. This includes the protection of personal data that are aggregated for management statistics under the guideline of the Department’s Privacy Code of Conduct. Access to these data needs to be authorised by the data custodian and is protected with appropriate levels of security and audit logs.

In common with most sophisticated data warehouses, DMIS has an ‘architecture’ (see Boxes 1 and 2), for example a sequence of processes that:

- Captures data from disparate operational systems and external sources (such as Repatriation Pharmaceutical Benefits Scheme [RPBS] claims from the Health Insurance Commission [HIC]) into a basic repository known as the Generic Data Store (GDS)
- Extracts the relevant data from the GDS and applies a sequence of purifying, cleansing and transformation processes
- Enforces relational integrity to the data (ie, every table of data is linked, through appropriate common data ‘keys’, to other tables of data)
- Loads the data into an Enterprise Data Warehouse (EDW)
- Utilises business rules to create and derive additional data elements (eg, the calculation of a length of time between dates, aggregations of specific treatment costs)
- Progresses selected data from the EDW to a data mart (eg, DVA clients with prescription claims over the past five and a half years to the pharmacy data mart) (Department of Veterans’ Affairs, 2000).

Data marts

DMIS data are delivered through various data marts, comprising a subset of data extracted from the EDW. End-user access to the data mart data is via an ad hoc query tool such as 'Cognos Impromptu’. These data are specifically structured for analysis by particular subject matter and/or a group of business users. Specific data constructs also may be created to meet specific business needs. The derivation of a polypharmacy event is one such requirement for medication management (Department of Veterans’ Affairs, 2000).

Data cubes

Data from the data marts are extracted and summarised into more specific data ‘cubes’ which structure the data in predefined dimensions and measures and...
are accessed by an on-line analytical processing (OLAP) tool such as 'Cognos Powerplay'. Cubes are particularly effective for answering routine or common queries and exploring data trends; they have been designed to satisfy at least 80% of business management information needs. In relation to DMIS, data cubes enable users at any business or technical skill level to explore and report on large volumes of summarised data reliably and in a timely manner. The vision for DMIS is to move DVA from its historic use of IT-driven systems, with little or no integration across programs, to use of systems that are driven by business information requirements (Department of Veterans’ Affairs, 2000).

Medication management’s information requirements
Veterans who are eligible for the RPBS receive subsidised medications. The cost of the prescriptions is claimed by the dispensing pharmacy via the HIC in the same way as for the Pharmaceutical Benefits Scheme (PBS) prescriptions, but paid for by the DVA. In common with the PBS, the cost of the RPBS is increasing. In 2000–2001 the overall cost of the scheme increased by 19.4%, the number of pharmaceutical items dispensed increased by 8.7%, and the average number of pharmaceutical items dispensed per veteran increased by 15% (DVA 2001). In the year 2002, a total of 15,050,263 pharmaceutical items were supplied under the RPBS, and approximately 72.5 million items have been supplied over the last six years.

The main business problem to be addressed by the project is the provision of a reliable source of pharmacy data, which must:

• model and promote policies that contain expenditure
• provide evidence for fact-based decision making
• target atypical medication profiles and promote initiatives to ensure the quality use of medicines.

There are two existing primary sources of management information:

• A mainframe system storing five years’ history of pharmacy claims data. This provides aggregated reports and a printed summary of a veteran’s prescription history. It has limitations in relation to the history of data that can be retrieved, the number of requests a user can make in a month, and when the report may be run (ie, overnight).
• An ad hoc query system, built in 1997, giving access to aggregated prescription history and prior approval authority data. In this system there is no link to any details about the individual veteran or to common personal characteristics. The formulation of a query is more flexible and easier to use than the mainframe system, but response times may vary from between 10 minutes to one day. This system will be replaced by the new Department Management Information System (DMIS).

The solution
The medication management or pharmacy data mart project began in May 2001, and in February 2003 we were finalising the implementation of the first release. The objectives of the pharmacy data mart project are:

• to develop a capability providing reliable, integrated pharmacy data and the tools needed to access and analyse these data
• to integrate data from disparate transaction processing systems to form an integrated, comprehensive view of veterans’ medication usage and their interaction with health services across settings over time
• to reduce the time taken to produce routine management information, especially for the Repatriation Pharmaceutical Review Committee.

The project commenced with the gathering of user requirements and understanding the business and the need for information. A detailed analysis of the existing data sources followed. Sixteen data sources were identified as being required to meet the pharmacy policy’s management information needs. The number of sources was later reduced to 12 main sources that met the core pharmacy information requirement. The remaining sources are to be integrated with the core at a later stage in the project. The data discovery phase quantified a number of aspects about the data in each source, such as the quality, integrity, currency, availability, granularity, volume, and length of history held at DVA.

The main reason for the lengthy development time has been the large volume of data. Setting up procedures to load and process the data from the source to the data mart has challenged the DMIS architecture. The building of cubes with a 5-year pharmacy claims history also has been a challenge to the business intelligence environment and has meant that the cubes have been redesigned; the more tightly focused the requirements, the more manageable and responsive the data cubes need to be.

The design
The data views or cubes are designed to focus on the main aspects of the medication management business. These are:

• Supplied pharmaceutical items expenditure and usage; analysis of expenditure and usage trends over five years. The focus is on paid pharmaceutical items, and the event is the claim payment date.
• Current medications; analysis of the occurrence of polypharmacy. The focus is on clients who are dis-
pensed the same drug more than once in a given quarter and who, concurrently, have received 10 or more medications in the same period.

- Clients reaching safety net; analysis of the effect on expenditure and medication usage for clients and their families who reach the safety net threshold.
- Prescribers; monitoring of prescribing trends from the point of view of the clinician, by speciality. The focus is the prescribing patterns of clinicians, by prescription date.
- Pharmacies; monitoring the dispensing, claim and expenditure trends from the point of view of community pharmacies. The focus is pharmacies, the event is the supply date.
- Medication review and management; monitoring the effect of medication review on the medication management of clients. Twenty-five months of history will be available, focusing on items dispensed to clients with medication reviews. The time period is 25 months, to enable monitoring of items supplied 12 months both pre- and post- the month in which a medication review took place.
- Prior approval authority applications; analysis of the applications received and related issues, including the cost of claims arising from the different prescribing restrictions. The focus is on prior approval applications, and the event is the application lodgement date.

To allow trend analysis, the history for the past five-year period is available in most of the cubes, with the exception of medication review (a recently established program), and polypharmacy, which has two years’ data history.

The anticipated benefits

Once the pharmacy data mart and cubes are up and running it is anticipated that the Department will benefit because of:

- routine monitoring of RPBS expenditure against budget
- resource savings by reducing the time taken to provide management information.

Definitions

Data architecture: a set of rules or structures providing a framework for the overall design of a system or product (Poe 1996).

Data architecture for a data warehouse: a framework identifying how the data will move throughout the system and will be used within a corporation (Poe 1996).

Data mart: a set of data designed and constructed for optimal end-user decision support access. Data marts may either be sourced from a data warehouse or legacy systems (Marco 2000).

Data warehouse: an enterprise-wide collection of data that is subject oriented, integrated, non-volatile, time variant; organised for end user access and use (Marco 2000).

Metadata: data about data.

The system will:

- give information about initiatives to improve health status of the veteran community; for example, decreasing the incidence of hospital stays related to adverse drug reaction and adverse drug events
- assess the effectiveness of pharmacy-related initiatives such as medication reviews
- facilitate the ability to forecast demand and expenditure related to changes in the RPBS and the veteran community
- facilitate monitoring of:
  - trends in drug usage and expenditure
  - trends in prescribing
  - trends in dispensing
  - health service encounters
  - service use across settings over time
  - service use by age, location and eligibility.

Conclusion

The pharmacy data mart provides users with an integrated, five-year view of DVA clients’ receipt of prescriptions, their prescribers, and the dispensing pharmacies. It is anticipated that these consolidated data will become a trusted and preferred source of
reliable and timely pharmacy management information. In a short time all officers in the program will understand these data and be able to use this knowledge in better managing the program initiatives to promote the quality use of medicines in the veteran population.

References

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The Adverse Drug Reactions Reporting project

The Therapeutic Goods Administration (Commonwealth Department of Health and Ageing) has been collecting handwritten information on adverse drug events from prescribers, dispensers and other healthcare providers on a voluntary basis for over 28 years. Pharmacists and general practitioners (GPs) have been the main reporting professions in the past; however, the Therapeutic Goods Administration (TGA) will accept reports from any healthcare source. The data received include patient demographic information using the patient’s initials as an identifier, description of the adverse drug reaction, other drugs used prior to this reaction, and treatment, including outcome and sequelae. The reporting of this information is not mandatory, hence whether or not any report is made to the TGA rests with the discretion of the author of that report. This situation has limited the volume of data received, and therefore has implications for the quality of data available for statistical reporting.

The TGA regularly distributes a newsletter to GPs and pharmacists which reports any international drug reaction news and also any responses picked up from the data that they collect. The TGA is also in contact with the drug companies with which they are collaborating in order to decide the appropriate course of action, based on the severity and nature of the drug reactions.

The need to increase the number of reports and improve the quality of the data available for analysis means that the manual system has become unmanageable; it is clearly a candidate for process improvement. Those concerned need to be encouraged to report reactions to drugs, and this can be facilitated by making the reporting process as easy and labour saving as possible.

The Collaborative Centre for e-Health (CCEH) in Ballarat has been working in collaboration with the TGA to facilitate the electronic transmission of the Report of Suspected Adverse Reaction to Drugs and Vaccines (ADRDV) form to the TGA by GPs. The project improves and simplifies the collection of data concerning adverse drug and vaccine reactions, thus enhancing electronic transmission of high quality data to the TGA. As a result, there is an improvement in the return of information to the GP. GPs create an electronic form of this data from their desktop prescribing software. This software then attaches the Suspected Adverse Reaction to Drug & Vaccine electronic form to an e-mail which is sent directly to the TGA with the click of a couple of buttons. The first transmission must also have a ‘blue’ form manually sent to check accuracy. After an initial test transmission no ‘blue’ form will need to be written up and sent to the TGA, thus decreasing the administrative workload of the GP.

Phase 1 of the project involved piloting the electronic lodgement of the ADRAC report, incorporating new functionality in the enhanced desktop prescribing software (Locum and Medical Director) to provide a proof of concept. The Ballarat and District Division of GPs was used as the pilot test environment. Eight GP practices were set up with the improved functionality and the transmission of data was used to validate the retrieval system at the TGA end. The pilot project ran for over 12 months, with very few reports actually being sent to the TGA. The problem faced in the pilot project was that the Ballarat region sent very few reports to the TGA in the previous 2-year period. Discussions with the GPs found that unless a particular drug reaction was overwhelming, they were unsure what to report. TGA assured them that no reaction was too small to report; they would rather receive a large cohort of information to analyse and eliminate than too little to make statistically significant evaluations.

The concepts were proven in the pilot study. Phase 2 began in mid-2002 for release mid-2003, creating opportunities to:

- Implement Phase 1 software changes to a wider group of users. This is to ensure that a large body of data can be validated by the TGA prior to Phase 2 functionality being introduced nationally.
- Develop improved functionality in three desktop prescribing software packages (Locum, MedTech32 and Medical Director) and distribute this nationally. Phase 2 functionality incorporates the ability to transmit the information historically required by TGA on the ‘blue’ form and attaches reports, letters and results to the patient’s ADRV form. This phase also incorporates the transmission of information in a secure encrypted format to protect patient confidentiality.

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A decade of casemix funding in Victoria

Compiled by Angela Boal and Janine Carter
Contributions by Stephen Duckett, Elizabeth Berriman, Jane Kaye, Kay Borgelt, Janine Carter, Brendon Gardner and Kathy Wilton

Introduction
The introduction of casemix funding to Victorian hospitals in 1993 was the beginning of many changes for health information managers. This segment provides a policy overview of casemix funding and describes its impact in each of the various health sectors from a health information manager’s perspective. The introduction is by Professor Stephen Duckett, who has played a major role in casemix policy development and implementation at both national and state levels. The transformation of the health information manager role has provided many exciting opportunities for professional development and skills diversification. Despite the different sizes, specialties and locations of hospitals, it seems obvious that the effect of casemix-based funding has been consistent: increased profile, greater responsibility, improved coding quality and a greater involvement in financial decision making and planning have been experienced by health information managers across the state.

By way of background, the following definitions have been sourced from the Victorian Department of Human Services (DHS) casemix website <www.casemix.health.vic.gov.au/>. Victoria defines the admitted patient workload of a hospital in terms of WIES (weighted inlier equivalent separations):

- A patient’s WIES value depends upon the amount of time they stay in hospital compared with other patients with similar conditions (inlier equivalence) and the relative cost of treating their condition compared to the cost of other illnesses (cost weight or relativity).

- Cost weights are developed each year and are based upon the costs of treating individual patients in Victorian public hospitals. Hospitals report the costs of over half a million patients annually. In addition to new cost weights, DHS often makes changes to the WIES in response to health industry concerns. Consequently, casemix funding in Victoria has evolved considerably from the relatively simple model introduced in 1993-1994.

Overview of a decade of casemix in Victoria
In retrospect, it seems obvious that hospitals ought to be paid on the basis of what they do rather than what they say, what they did, how vociferous they are in the media, how good they are at lobbying, or indeed the population they claim to serve. However, simple ideas are often the most profound. The introduction of casemix funding in Victoria represented a quantum leap forward in the way public hospitals were funded in this state and had flow-on effects in other states.

Of course, casemix funding in Victoria had a number of antecedents. Victoria had 10 years’ experience of requiring all separations from public hospitals to be coded. The Diagnosis Related Group (DRG) classification system had been developed in the United States 20 years before, and the Australian adaptation had been on the agenda for at least the previous 5 years. Casemix funding for Medicare patients had been implemented in the United States a decade earlier and had been talked about in publicly oriented systems over a similar period.

Casemix funding had been foreshadowed by the Labor government in 1992, but this commitment did not attract the attention of public hospitals, neither did the considerable developmental work that had taken place in the Health Commission of Victoria and its successors over the years. Computer printouts of information on a hospital’s casemix had been provided to hospitals for a number of years; the ‘Rainbow Books’ had provided performance data in terms of comparative efficiency over a similar period. Although casemix funding may have been seen to be subject to rapid implementation, the policy directions had been set for many years. Health Information Managers were obviously aware of DRGs, their design and their implications, but clinicians and managers ignored the portents.

Casemix funding was tainted by the opprobrium associated with the contemporaneous budget cuts, but casemix funding has been retained as the principal basis for funding public hospitals under the Labor government elected in 1999. The idea thus seems to transcend political parties.

Casemix funding in Victoria 10 years after implementation is quite different from the system that was implemented in 1993. Initially, casemix funding only applied to inpatient services. A wider range of hospital activity is now funded on a casemix basis: outpatients (using Victorian Ambulatory Classification Scheme, VACS) and rehabilitation (using Casemix for Rehabilitation and Funding Tree, CRAFT) are the most notable extensions of scope. In terms of discourse, hospital boards are crucially aware of the importance of ‘revenue’, particularly casemix payments relating to activity levels.

Casemix funding has shown that it can develop as systems of how to describe hospital activity evolve. Casemix funding can also change as new priorities, policies and personalities emerge on to the policy stage. Interestingly, even a decade on, hospital managements are still learning about how to use casemix information in management and how to involve clinicians in the quest for improved efficiency and outcomes.

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Casemix in the private sector

The introduction of casemix, or, as we refer to it in the private sector, episodic funding or episodic based payments, has had an enormous impact on our profession as well as on the environment in which we work.

The primary emphasis is on coding, and coding quality, due to the ever-present demand to shorten the revenue cycle. This is critical to the financial stability of private hospitals that rely on incoming revenue. Unfortunately, this emphasis on coding has led to the under-utilisation of other skills. In my experience, private hospitals are generally well resourced, and health information managers certainly are encouraged and supported to attend continuing education sessions, conferences and coding updates. The main problem has been, and remains, the recruitment and retention of qualified coders, due to a high demand for coders across the state.

From an information technology (IT) perspective, most health information managers have access to the internet and e-mail, yet the private sector is yet to embrace the use of automated coding software products. Health information managers in the private sector work closely with their organisation’s Credit/Finance Department due to the focus on revenue and coding turnaround times.

Elizabeth Berriman
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Casemix in the aged care sector

The introduction of casemix funding for Victorian hospitals had no immediate impact on funding of aged care services. It was recognised that DRGs would not measure some inpatient groups appropriately and these groups remained funded by special grants or per diem payments. These groups included rehabilitation, geriatric evaluation and management (GEM), palliative care, and aged persons’ mental health, and included nursing home care and respite care. Although it was recognised that maximising independence and quality of life and better management of long-term care for older people could result in cost savings in acute and residential areas, data collected by the DHS did not provide an accurate picture of specialised resources required to care for older people.

The first impact of casemix in aged care occurred with the development of casemix funding for rehabilitation. The Victorian Rehabilitation Project commenced in 1994 with a pilot study, resulting in additional reporting requirements to DHS for rehabilitation and other subacute inpatients from 1995. Over the next few years, the Casemix Rehabilitation and Funding Tree (CRAFT) model was developed to fund inpatient rehabilitation episodes of care. CRAFT (also called VicRehab) was introduced in Victoria in July 2001 after 2 years of CRAFT shadow funding. During this period, subacute inpatient facilities, and health information managers in particular, invested a great deal of time analysing current practices and service activity to measure the impact of CRAFT on future funding. DHS also started looking at the options for episode based funding of GEM patients during this time, and a report was commissioned by DHS to provide an overview of strategic directions for subacute services in Victoria. The implementation of CRAFT funding and ongoing development of service and funding mechanisms within aged care created many challenges for managers of Health Information Services (HIS). In aged care services, HIS is seen as the ‘engine room’ of the organisation, the link between clinical, administrative, IT, and financial services and the provider of key information for financial and service planning.

Each of the services comprising aged care has specific state and federal reporting requirements and funding mechanisms. Because IT systems that can manage all requirements are still in the early stages of development, it has been very time consuming to provide comprehensive organisational activity reports. With increasing focus on development of coordinated services to provide clinically effective and financially viable care for older people, ad hoc and ongoing requests for information have increased dramatically over the last couple of years as new projects commence. These have included the Acute to Subacute Breakthrough Collaborative, Hospital Admissions Risk Program (HARP) and Community Health Online Record Project (CHORD), just to name a few.

Casemix funding models for aged care will continue to evolve over the next few years, in both inpatient and non-inpatient areas. Because of the limited number of health information managers with experience in aged care services, we will continue to be challenged to ensure that funding models are developed with a real understanding of what is actually happening at the patient level and will be sensitive to the evolving nature of health services within subacute care.

Jane Kaye
Manager, Health Information Services
Caulfield General Medical Centre, Caulfield, VIC

Casemix in small, non-metropolitan health services

The introduction of casemix-based funding in Victoria has been the single biggest development in health information management in my time in the profession. It is unfortunate that casemix funding in Victoria was introduced at the same time as massive budget cuts in the health sector, as this has led to the continuing impression that casemix funding is synonymous with making productivity savings. In fact, casemix should have been perceived as a wonderful step in the right direction; for the first time hospitals were being paid for the work they did.

Health Information Services, through the provision of timely and accurate coding, were now responsible for nearly all acute, inpatient funding. As a health information manager I assumed a presence that had not been evident previously; the priority of management shifted dramatically and I became very involved in budget negotiations with DHS and formed a close internal liaison with the Finance Department. I saw this as a golden opportunity to prove the range of talents of health information managers. As the only person...
who truly understood how WIES were allocated, I was now the expert in casemix funding; this meant some very quick lessons to learn about debtors, creditors and general ledgers so that I could contribute in a meaningful way in budget meetings.

Ten years down the casemix path, as a profession we remain in the best place to see the big financial picture in terms of casemix funding. It remains a lasting concern that our undergraduate course still contains very little in the way of financial training. There is no reason why a health information manager should learn not only about variable casemix-based payments, but also the other components, which comprise the total revenue budget.

Before casemix funding I remained a coding purist; there was no way I was going to go down the path of automated coding; the books were the only real way to code! Having the option of an allocated DRG at the time of coding and the ability to ensure the optimum WIES for each patient soon meant a radical change of heart. One year after casemix was introduced we purchased an automated coding system; this pays for itself repeatedly, simply by ensuring that we claim the appropriate WIES. Extra resources, in the form of an additional health information manager, were provided to ensure that our coding was completed in a timely and accurate manner but also because of a realisation that health information managers were capable of so much more than our hospital management may have been aware previously.

As other patient programs, and in particular, residential aged care, moved towards a modified casemix-based funding system, it seemed a natural progression for Health Information Services to assume responsibility for the claiming of all government-based revenue, both State and Commonwealth. Therefore, 10 years down the track the Health Information Service is an integral component of the executive structure, and sits very comfortably alongside the Finance Department. The role of the health information manager has grown in stature with the realisation that members of our profession have a range of talents and that we are limited only by our individual perceptions of our professional capabilities.

Kaye Borgelt
Director, Health Information Services
West Wimmera Health Service, Nhill, VIC

Casemix in large, non-metropolitan health services

In July 1993, when the casemix payment system was introduced in Victoria, I was happily working in the aged care sector and oblivious to the frenzy occurring in acute healthcare. My experience of casemix at the time was limited to the six regional hospitals where I provided a medical record service. The impact in these hospitals was not significant, but it did provide a catalyst to reviewing clinical documentation standards and ensuring that ‘diagnoses’ such as ‘delivery’ and ‘death’ were no longer used. The other obvious impact was the urgent interest by senior management in coded data and the need to reduce the coding turn-around time as the effect of the new funding model became apparent. It was surprising to note that 5 years later when I commenced work at a large rural hospital things were not much different from the small regional hospitals, except in scale.

There continues to be a strong focus on the coding standards, which has assisted in improving the accuracy and consistency of coding. The standards have also facilitated regular internal and external audits, the latter evoking significant interest from executive staff. The work of the National Centre for Classification in Health (NCCH) has ensured that coding standards continue to evolve in line with clinical practice, thereby making the codes more meaningful to clinicians.

The increased complexity of coding has created a reliance on the Encoder and led to the demise of the old ‘cheat sheets’. Coding without reference to the codes or standards is no longer possible. The increasing number of standards has also placed a greater importance on understanding anatomy, physiology and the pathological relationships between diseases. While this provides great scope for ongoing education for health information managers, it can be difficult to maintain the levels of knowledge required to ensure coding accuracy. Regular contact with clinical staff provides opportunities for addressing clinical questions and gaining more information about medical conditions and surgical procedures.

Health information managers are considered experts in casemix and they continue to provide education and advice to clinical and administrative staff. ‘WIES’, ‘DRGs’ and ‘inliers’ are now part of the vocabulary of most staff members; in addition, clinicians now understand the impact that documentation has on the funding of the hospital, and subsequently the quality of documentation has improved. Weekly coding audits with clinicians have created an effective forum for communicating about documentation, clinical practice and other casemix-related issues.

Casemix has had a significant impact on the profile of health information managers, which has provided a springboard for promoting our diverse range of skills. Health information managers in large rural health services have an opportunity to contribute to the development and refinement of casemix systems in acute, subacute and ambulatory services by participating in cost studies, data analysis and clinical reviews. It is important that, simultaneously, they ensure that coding is recognised as a highly skilled and important task while continuing to value and demonstrate the many other health information manager roles.

Janine Carter
Business Analyst
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Casemix in acute care, metropolitan hospitals

I started my professional career just prior to the introduction of casemix funding and remember how at the time we ‘played’ with these funny things known as Diagnosis Related Groups for a year or two before it all became real. At the time, we were medical record ad-
ministrators, no one knew our names, the only time we left the Medical Record Department was to go to lunch, we referred to the doctors as ‘Doctor’ and we even wore white coats. We spent our days sitting in offices without computers, or, if we were really important, had access to a green-screen dumb terminal. WIES was something unmentionable, we had memorised the ICD-9-CM codes, and we chased up our outstanding uncoded episodes once annually, at the end of the financial year!

How things have changed! Today we are health information managers and hold highly respected, well-paid and quite senior positions within our health services. Doctors now come to us for advice or are concerned that we will tell them what they should be doing. We are consulted on major policy decisions regarding funding of services and throughput options, and we spend more time out of our offices in meetings than in them. We have ditched the white coats and have access to some of the most powerful PCs in the health service. The codes are now in ICD-10-AM and the DRGs look very different. We know the revenue for every item from an outpatient encounter to a complex ICU patient, and WIES is part of our standard vocabulary. Indeed, we are the only ones who actually know what it stands for, let alone means, and our outstanding uncoded episodes are measured in days, with hours being the next unit of measure.

Our profiles have improved dramatically, as a modern day Edna Huffman once said, “Information is power!” (Jackie McLeod, Manager of Health Information Services, The Northern Hospital). We are the information experts and as a result hold a substantial power base in today’s healthcare environment.

I have been a member of the Victorian Advisory Committee on Casemix Data Integrity (VACCDI) for over 5 years, and when my involvement with this committee commenced the members were mainly medical directors and senior hospital administrators, with a handful of health information managers involved. Today, health information managers account for approximately 90% of the membership and represent most metropolitan health services. The alteration in membership of this committee also demonstrates the effect of casemix funding on our profession. We are the recognised professionals in relation to data capture and information reporting and, as such, are being sought more and more for the provision of expert advice on this component of the health system.

Brendon Gardner
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Casemix in specialist teaching hospitals

The first of July 1993 saw the introduction of casemix payment to Victorian public hospitals. The American experience of the previous 9 years had already given some insight into the impact of casemix funding on medical record administrators, department processes and the financial implications for individual institutions. Data for the previous several years had been analysed at the Royal Children’s Hospital (RCH) to ensure that the development of the casemix funding formula would consider the tertiary, training and specialised nature of the hospital and its clientele.

The initial stages of casemix introduction saw responses to processes that focused on timeliness and quantity of documentation. ‘Discharge summary’ forms were redesigned for brevity in the hope that this would encourage their completion at the time of discharge. In hindsight, not all these decisions were favourable towards meeting the long-term requirements of casemix, as they adversely affected the quality of documentation, which in turn affects the completeness of coding and, inevitably, the funding. The number of coders employed did not alter in the initial stages of casemix funding, but over time, as coding audits and documentation reviews proved to be financially productive, the number of hours dedicated to these processes has increased, requiring additional qualified staff. Additional clerical support has also become necessary as weekly and monthly deadlines for coding completion have become incorporated into the objectives of Health Information Services and hospitals. In light of the need to increase the efficiency of the coding function, discharge completion processes were altered to meet the need for coding to be completed as soon as possible after discharge. At RCH, this decision was made to the detriment of timeliness of discharge summaries to referring and local doctors. Casemix was altering the priorities of the department.

Data analysis is now a key skill of the health information manager, and a strong understanding of underlying coding principles, DRG construction, and casemix classification is essential. The coded data are often combined with financial information. The traditional uses of coded data for utilisation, review and research, for example, have now been overshadowed by the financial language of the data.

The impact on the health information manager has been significant in many ways. The introduction of casemix brought with it the National Centre for Classification in Health (NCCH), the introduction of more Australian coding standards and the need for more consistent coding to ensure the appropriate DRG output. This resulted in ICD-10-AM (Australian Modification) and the update of coding classification books every 2 years. All these processes have resulted in additional pressure on health information managers and clinical coders. The recognition of the important contribution of clinical coders has also been a significant outcome.

The impact of casemix on the profession within the hospital context has been positive, although this has been a slow outcome. There has been an increase in the understanding of the role of health information managers, their skills in data analysis, and their knowledge of the intricacies of casemix. The potential of the profession in the casemix area will be fully realised only when health information managers take up the opportunities, available in all teaching hospitals, to lead and staff the casemix departments.

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Note: All authors, with the exception of Professor Duckett, are qualified health information managers.
Overview of CSAC
The National Centre for Classification in Health (NCCH), then the National Coding Centre, established CSAC in 1994. The main function of CSAC is to introduce new and amended International statistical classification of diseases and related health problems, tenth revision, Australian modification (ICD-10-AM) codes and Australian coding standards. In addition, CSAC:
- provides advice regarding activities and products relating to coding and coding quality measures
- provides and receives reports from the organisations and jurisdictions represented on the committee
- ensures that standards of definition and convention are maintained when ratifying changes to ICD-10-AM and the Australian coding standards
- reviews and considers public submissions for modifications to ICD-10-AM
- receives feedback from users of coded data regarding the impact of standards and codes on current data collections
- ratifies coding advice from the NCCH before publication in Coding Matters
- recommends to the Commonwealth Department of Health and Ageing changes to the Australian Refined Diagnosis Related Groups (AR-DRG) classification system, as they relate to clinical coding
- recommends to the National Health Information Management Group the national adoption of ICD-10-AM modifications on a biennial basis
- provides input to relevant authorities regarding issues related to morbidity and mortality coding, such as data edits, coding quality measurement, and data collection systems
- provides specialist advice to the National Health Data Committee on issues relevant to the National Health Data Dictionary
- provides advice to the NCCH and the Australian Bureau of Statistics on the relationship between the Australian coding standards for morbidity coding and rules for cause of death coding
- provides advice on other relevant health classification systems

In 2002, two subcommittees of CSAC were formed: the Data Quality Subcommittee, and the Education Subcommittee. Their establishment reflects two key priorities requiring consideration in the implementation of new and amended Australian coding standards and ICD-10-AM codes.

Membership
Members of CSAC include staff members from the three NCCH Divisions, plus representatives of:
- the public and private health sectors (one representative each from each state and territory health authority, the Department of Health and Ageing, the Australian Institute of Health and Welfare, and the Australian Private Hospitals Association)
- the Health Information Management Association of Australia, Ltd
- the Clinical Coders’ Society of Australia
- the New Zealand Health Authority.

Impacts of CSAC
The decisions made by CSAC have wide and varied implications for the different members. The introduction of new and revised ICD-10-AM codes and Australian coding standards requires much work at NCCH, including:
- the production of the specifications for new or amended Australian coding standards or ICD-10-AM codes
- the production of mapping tables between the new version and the previous version
- the development of educational materials to inform coders of the changes
- the updating of existing educational and data quality materials, such as the Casemix, DRGs and Clinical Coding speciality book series, and the Performance Indicators for Coding Quality (PICQ) software.

Education requirements
Changes to codes and coding standards are communicated to coders through education packages developed and provided by the NCCH. Additionally, those organisations offering education services (mainly Universities and the Health Information Management Association of Australia [HIMAA] Education Services) must alter their course material to reflect changes, and advise their students of all changes.

Coders
The specificity of codes and coding standards also affects many individuals and organisations. New codes and standards may require a level of documentation that is not readily available in some patients’ medical records. Hospital coders must assess the changes and verify the availability (or otherwise), within their hospital, of the required level of detail. If this is not available, the coder must consult with the relevant hospital staff and determine appropriate methods by which
these data may be collected. Education of relevant hospital staff may be required, by way of discussing the requirements and the necessary level of detail.

Data users

New codes can provide specificity not currently available, enabling researchers and others to receive data on a particular condition, procedure or external cause. The creation of specific codes for new diseases or procedures is undertaken to reflect current clinical practice, and one of the outcomes of this is that changes in practice can be monitored more closely.

Data users also need to be aware of the differences between editions of the ICD-10-AM. As changes are made every two years, data requests can yield interesting results if all of the appropriate versions of ICD-10-AM are not consulted prior to data extraction. Additionally, data users need to ensure that changes in results over time are due to prevalence trends in diseases or treatments, and not to changes in ICD-10-AM.

Other impacts

New codes and Australian coding standards (ACS) also impact on AR-DRGs: new codes need to be incorporated in the grouper logic, and changes in ACS may cause grouping of episodes to shift from one DRG to another, or result in a change in grouper logic to reflect the ACS logic. One of the less tangible impacts of CSAC is the networking of the different members, from different jurisdictions, and the fostering of relationships with NCCH.

Priorities of CSAC members

The various members of CSAC represent different organisations and viewpoints, and therefore have different priorities when viewing the CSAC proposals. Generally members’ priorities come from two different angles:

- **The application of the Australian coding standards and codes.**
  Australian coding standards and ICD-10-AM codes need to be clear, precise and easy to apply from the documentation available. This is a key concern of those primarily representing those who complete the coding.
- **The use of ICD-10-AM codes to generate data.**
  The level of detail of the information required by data users and the ease with which it can be obtained by using ICD-10-AM codes impact on the decisions that may be made by CSAC.

Many organisations and individuals are interested in using the datasets that incorporate ICD-10-AM codes.

Reports from a selection of CSAC stakeholders

In order to provide a picture of the different members’ perspectives of the CSAC process and priorities, following are six accounts from members and stakeholders, giving their experience and motivation for participating in CSAC.

The Clinical Coders’ Society of Australia

I am the Clinical Coders’ Society of Australia representative on CSAC. As a CSAC member, I receive each proposal document and my role is to consider the proposed changes. (We are currently working with documents for proposed changes for the Fourth Edition of ICD-10-AM for implementation on 1 July 2004). Each proposal contains the background to the change, then details all the changes to the tabular, index, Australian coding standards, notes for education, forward and backward mappings, edits, and ASCII list changes. Questions that need to be addressed when considering these changes include:

- Are there other areas that overlap with these changes?
- Are the index entries clear?
- Do the code titles explain what the code covers?
- Is the Australian coding standard clear?
- Have the ‘best’ maps been chosen?

Many hours of reading later, I e-mail my comments to all members. I am concerned primarily with making the changes as easy and clear as possible, as well as not too onerous for coders. All other members also e-mail their comments to each other; the different stakeholders often have views that are different from mine, which makes for interesting reading, and often raises extra issues requiring resolution.

Some time after submitting our comments, a revised document is circulated by the NCCH. Again I check the changes, especially against the comments I have made previously. The face-to-face meeting is the last chance to make any changes; all documents from the previous quarter are listed, but only those that have not had overwhelming agreement are discussed. With up to 40 papers to consider between meetings, this can be a lengthy, but worthwhile, discussion!

CSAC decisions come into force when the new books are released, and further, unresolved issues sometimes become evident. Coders, as the creators of the data used by the other stakeholders, need to ensure that the classification moves forward and is improved with each new edition.

During the years in which I have been a member of CSAC, the approval process has been constantly improved and streamlined. For instance, the proposals are more structured, and therefore always include the information required to make a decision. The proposals now include an ‘Education’ section which is designed to ensure that all changes can be integrated easily into the education program for the forthcoming edition of ICD-10-AM, and recently there was discussion about including whether or not the change could be written as a PICQ indicator. These improvements lead to a better outcome for those who use the classification, particularly the coder.

As a coder, auditor, Coding Educators’ Network member, and coding educator, I aim to make a difference: I am always considering how the changes will affect coders and try to make sure they will be clear and easy to follow.

Andrea Groom

Coding and Casemix Educator
Health Information Services
Southern Health, Melbourne;
The Commonwealth government

The Commonwealth government has a representative on the CSAC. This enables the Commonwealth to determine whether the suggested changes to codes and coding standards will have an impact on the Australian casemix classification. Coding issues that may affect the casemix classification are raised by the states and territories at the CSAC meeting, thus enabling the Commonwealth to be proactive, rather than reactive.

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HIMAA Education Services

The Health Information Management Association of Australia’s (HIMAA) Education Services benefits significantly from its participation in CSAC. The role of HIMAA differs from that of other representatives on the committee, as HIMAA provides distance education courses for inexperienced and experienced coders throughout Australia and New Zealand. HIMAA Education Services has between 180-200 students undertaking their courses at any given time; this gives HIMAA a broad perspective on how students utilise and interpret ICD-10-AM. The courses offered by HIMAA include Introductory, Intermediate and Advanced Coding Courses. HIMAA also publishes the textbook Introduction to Coding with ICD-10-AM, which is widely used by TAFE and Health Information Management programs in universities around Australia.

There are benefits for HIMAA Education Services and the NCCH through involvement in CSAC:

- Coding educators are informed of forthcoming publications in Coding Matters and new edition changes. This enables the coding educators to make enhancements to course material promptly, and guarantees that HIMAA course material is current and credible. It also gives coding educators a background to coding standards and coding convention changes and an appreciation of where and why these changes are made.
- HIMAA endeavours to evaluate discussion papers and proposals circulated to CSAC members from an educative perspective, on behalf of experienced and inexperienced coders. This ensures that new and amended Australian coding standards, coding conventions and ICD-10-AM codes are created, documented and used for education in a way that can be interpreted by all coders. Because HIMAA Education Services is a national and international provider of coder education, there is no direct link with state coding authorities. HIMAA’s involvement in CSAC provides an opportunity for coder educators to liaise with the NCCH and be informed of current coding issues.
- HIMAA gains early access to draft versions of new editions of ICD-10-AM. This enables HIMAA Education Services to update course material before the new edition is implemented. This ensures that students receive the most recent version of ICD-10-AM promptly. HIMAA gives valuable feedback to the NCCH before implementation of new editions.
- It is important for HIMAA Education Services to maintain a prominent role in the development of ICD-10-AM through CSAC membership to enable HIMAA coding courses to maintain a high standard in coding education.

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Australian Private Hospitals’ Association

The Australian Private Hospitals’ Association (APHA) representation on CSAC has affected Health Information Managers and clinical coders working in the private hospital sector; however, the primary impact has been on the national morbidity data. The APHA uses the national morbidity data principally:

- to examine the workload of the private and public sectors;
- to track changes over time in the case mix treated in the private sector; and
- to compare the private sector case mix with that of the public sector.

The data on treatment of patients by age group are also used for both the current situation and to examine changes over time. In addition, the aggregated data on separations are analysed to track changes over time in the total caseload of each sector, both nationally and in each state. These data are then used in various internal documents and external publications, presented in different forums, and included in articles where relevant.

Kay Bonello
Health Information Manager
NorthPark Private Hospital

The Northern Territory health sector

I became the CSAC representative for the Northern Territory (NT) in November 1999. I have a long association with the NT Department of Health and Community Services, working as a medical record manager at
both the Royal Darwin Hospital and the Alice Springs Hospital, and latterly as a clinical coder and health information manager at Alice Springs Hospital. Working in health information management in the NT is challenging; there are presently only 3 health information managers and 11 clinical coders working in the NT. I welcomed the opportunity to participate in CSAC and represent the NT in shaping and contributing to the development of future ACS.

The Northern Territory has a little over 200,000 residents and is the smallest jurisdiction represented on CSAC in terms of population. Remote locations and small, scattered groups of people over a wide area comprise the region-of-service provision for the Territory’s 1 private and 5 public hospitals. Indigenous peoples comprise 27% of this population, and there is an over-representation of Indigenous patients in the admissions to NT hospitals; in at least one hospital, Indigenous clients comprise 77% of admitted patients.

One of the benefits of a small jurisdiction is that there is a small group of people with whom to consult, discuss, liaise and communicate regarding coding dilemmas and decisions. The NT Coders’ Forum is an inclusive committee (all health information managers and clinical coders are members) which was established to foster good coding practice and to provide a peer support network throughout the Territory. The committee meets monthly to discuss all issues pertaining to coding. The meeting is held by teleconference, as health information managers and clinical coders are spread over wide distances ranging from Alice Springs in the south to Gove District Hospital in Arnhem Land in the north. As the CSAC representative, I communicate both to and from the NT Coders’ Forum and also to the NT Hospital Information Management Group.

Although our hospitals serve the population of the NT, some specialist services, for example radiotherapy, are not provided, and hence some of the proposals that come before CSAC regarding new surgical procedures or specialised procedures are not relevant to the NT. Conversely, some diseases, for example a number of infectious diseases, are more prevalent in the NT than in other states.

CSAC is very much a working committee, and between each quarterly meeting there is a flow of communication between NCCH and committee members working towards proposals for the next meeting. Attention to detail and willingness to devote the hours required (plenty of bedtime reading) are definitely prerequisites for membership of the committee. In order to have any impact on decisions one must have a seat at the table and I have found it very valuable to be part of CSAC. The two-yearly ICD-10-AM update cycle encompasses the public submission process, the NCCH query process, and feedback through Clinical Classification and Coding Groups, which channel information into the Quality and Education division and generate articles in Coding Matters (10 Commandments). This forms a complex but interconnected web of information. The interrelationship of these processes through CSAC has given me a greater understanding of how the inputs of all CSAC representatives contribute to a living classification that is continually evolving. One of the benefits of being the NT representative has been in meeting and gaining an understanding of the differing perspectives of each CSAC representative in relation to the ACS and the ICD-10-AM classification in general.

On a practical note, my representation on CSAC has given me a much greater understanding of when and why changes in Australian coding standards and coding practice have occurred. This has been helpful when communicating with users of data who look at information broadly from the NT Department of Health and Community Services’ perspective, as well as those clinicians and researchers in the hospitals who are auditing or reviewing their own data.

The decisions made at CSAC affect all of us in the gathering, abstracting and dissemination of health information. When you are next asked to comment on a proposal or to offer some advice, remember that you are contributing to the development of your national classification.

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The Victorian health sector

Victoria, via the state Department of Human Services, has always welcomed the opportunity to be represented on CSAC. The Victorian representative consults with the Victorian ICD Coding Committee (VICC) members and, where necessary, with other coders from specialist hospitals for advice on Victoria’s response to CSAC issues. The CSAC minutes, proposals and other discussion papers are circulated to the VICC members.

The link between CSAC and the VICC does not stop here. The VICC is a very active committee which meets monthly, primarily to answer coding questions originating from Victorian hospitals. Issues arising at meetings of the VICC often highlight areas within ICD-10-AM which require amendment or enhancement. Numerous public submissions and queries are forwarded to the NCCH by the VICC for action. Many of these ultimately result in changes to the classification.

Victoria’s DRG cost weights for its casemix funding model are based on data received from hospitals in the previous financial year. When changes to the ACS alter the grouping of specific cases, these need to be identified prior to the actual implementation of the revised coding standards so that the Victorian
Department of Human Services (DHS) can determine the financial impact of that grouping shift. Occasion-
ally, Victoria will introduce a VicDRG to overcome grouping changes where the DRG shift may have a potentially significant impact on the funding received by hospitals (Kearsey, 2001).

Due to the high level of usage of ICD-10-AM data in Victoria, the Victorian Department of Human Services has a keen interest in improving the quality and content of the ICD-10-AM data in our dataset. Therefore, we take a strong interest in providing feedback on education and data quality issues raised at CSAC.

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Note: All authors are qualified health information managers.
AHIMA project offers insights into SNOMED, ICD-9-CM mapping process

Kathy Brouch*

How can clinical data specialists working with a coding classification system and a terminology ensure accuracy and maximize efficiency? They rely on "maps" or "crosswalks." Ideally, these systems are easy to use and understand.

Many coders are already comfortable using maps (see "Maps, Crosswalks: Don't Leave Home Without Them," page 32). But the industry still has a lot to learn about the mapping process. To advance understanding of the mapping process between the Systematized Nomenclature of Medicine (SNOMED) terminology and International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM), AHIMA and the creators of SNOMED joined forces in 2001. The project's goal was to assess the effectiveness and reliability of the existing mapping process and to advance the industry's understanding of any limitations the map might have for administrative uses.

As a result of this work, AHIMA has gained new insights about the granularity of a clinical terminology and the subjectivity of code assignment to a classification. This article will reveal the results of the project and provide context on its process and methodology.

How is mapping different from coding?

At its simplest, mapping is linking content from one terminology or classification scheme to another. It requires deciding how they match or in some instances, are similar or don't match at all. Mapping considers different purposes, levels of detail, and coding guidelines of source and target. The mapping process employs a standard method in which the terminology context or classification description principles are interpreted between systems.

Coding is designating descriptions of diseases, injuries, and procedures into numeric or alphanumeric designations. It involves the use of a health record as the source for determining code assignment.

Automated maps create efficiency by minimizing duplicative data entry and patient data integration across a wide variety of applications. A crosswalk creates a map from one code system to another, usually involving an automated translation software engine.

Today's SNOMED mapping contains more than 95,000 terms for the disorders and findings hierarchies, while the ICD-9-CM disease classification has fewer than 10,000 codes. To map from one to the other requires a defined procedure and corresponding rules recognizing each system's unique characteristics and purpose. The key objectives of the AHIMA project were to develop a set of mapping rules based on the ICD-9-CM classification and to suggest enhancements or refinements to the current mapping guidelines and methodology used by the SNOMED team, thereby helping to define realistic user expectations.

Why maps matter

One of AHIMA's goals is to help prepare its members and the industry for the challenges and opportunities of a changing healthcare workplace. Coding, as one of the domains of HIM, faces great potential for rapid change. The electronic health record with embedded terminology is becoming a reality, and the development of automated coding technology greatly affects traditional coding practice.

AHIMA supports and works toward advancements that will improve productivity and enhance the accuracy of coded data. One important advancement is the adoption of standardized clinical terminology with automated mapping and coding tools. This adoption is integral to the development of a national health information infrastructure.

However, having a map does not necessarily eliminate coding or the need for expertise in code selection. Maps standardize linkages to a certain extent and...
therefore improve coding accuracy simply and efficiently through automated algorithms.

Putting a system in place that fully automates the process of mapping from a clinical terminology to an administrative code set is challenging because of the inherent differences between a clinical terminology and classifications. In the AHIMA mapping project, participants gained a greater understanding of the granularity of a clinical terminology and the subjectivity of code assignment to a classification, and the incompatibility issues that can occur in code assignment.

The Mapping Project: A key partnership

SNOMED is developed and maintained by the College of American Pathologists (CAP). SNOMED CT (clinical terminology) is a comprehensive, multilingual clinical terminology tool providing the information framework for clinical decision making for electronic medical records.

SNOMED International, a division of the CAP, developed a map from the SNOMED CT standardized clinical terminology to ICD-9-CM classification system. Users of SNOMED depend on a reliable mapping tool to facilitate administrative coding. According to SNOMED International, the mapping structure provides a technical structure that will eventually support rule-based processing and thus facilitate automated cross mapping.4

When AHIMA and SNOMED joined forces to review the SNOMED to ICD-9-CM map, the two parties agreed on a random sampling plan. The SNOMED terms selected consisted of a 5 percent sample of the then-current SNOMED RT (SNOMED Reference Terminology) Version 1.5 mapping, which consisted of terms from the Disease and General Patient Findings hierarchies. (The most current version of SNOMED is SNOMED CT, which was first released in 2002 and is a combination

Maps, crosswalks: don’t leave home without them

Maps between terminologies or classification schemes are created and used for various reasons.

ICD-9-CM Updates

Every year, when the new ICD-9-CM codes are released, a crosswalk, or map, is created between the old codes and the new ones. This map, created by the government agencies that oversee the ICD-9-CM coding system, is easy to create because the basis is a single system. It is also easy to implement and simple to use. Coders understand how to use it and why they should use it.

The yearly ICD-9-CM map also serves as a historical resource that allows facilities and researchers to perform longitudinal studies of diseases and procedures for purposes such as improved patient outcomes and epidemiological studies.

ICD-9-CM to CPT (and vice versa)

Other maps, such as the map from ICD-9-CM procedure codes to CPT codes, exist due to billing requirements by third-party payers.

For instance, coders are also familiar with the map from ICD-9-CM procedure codes to CPT codes (or vice versa). The coding community is also familiar with this map’s problems. Because ICD-9-CM is a classification system and CPT is a terminology, there is not always a one-to-one relationship between the two.

By definition, a classification groups together similar concepts and a terminology represents the system of concepts of a particular subject field. To develop a map, an understanding of two divergent systems is required.

Most of the time, this crosswalk is incorporated into an encoder software product and automated. Once a code is assigned in ICD-9-CM or CPT, a simple click on a menu bar provides the other system’s code or codes.

Of course, there are always caveats. For instance, the vendor’s map or translation between systems must be accurate. And end users must understand the mapping process to prevent incorrect assumptions that may affect data consistency. For example, the software may provide a range of codes or more than one code and the coder will have to determine which is correct.

The good news is the need for this map vanished on October 16, 2003, when the HIPAA standard medical code sets came into effect. From that date, the ICD-9-CM Volume III procedure codes are only used to describe a procedure performed on a hospital inpatient. CPT will continue to be used, as will ICD-9-CM Volume III, but “dual coding”—coding hospital outpatient procedures using both ICD-9-CM and CPT—will no longer be necessary. Data on hospital outpatient procedures will be maintained in CPT only; therefore, any comparability studies will need to take this into account.

DSM-IV to ICD-9-CM

Coding professionals at facilities that treat mental health disorders are also familiar with the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) to ICD-9-CM crosswalk. Like the ICD-9-CM to CPT map, this map became necessary due to the requirement of a third-party payer. The federal government required ICD-9-CM codes, not DSM, for claim submission for Medicare beneficiaries. However, behavioral health practitioners consider DSM their nomenclature. And the diagnostic categories, criteria, and textual descriptions are meant to be employed by individuals with appropriate clinical training and experience in diagnosis.2

AHIMA worked with the American Psychiatric Association in the creation of a crosswalk. The development involved auditing each diagnostic term using the Alphabetic Index (for inclusion) and then the Tabular List of ICD-9-CM (to assess appropriateness of classification).3 This map is an example of taking clinical concepts defined in the vocabulary and translating them into a code from a classification. Like other maps, it has complexities and drawbacks, such as the need for expertise in two distinct systems. An additional intricacy for mapping in this instance was the need to work closely with the owner of the terminology to ensure an accurate map.

Coding professionals may be less familiar with additional maps such as:

- SNOMED Clinical Terms (SNOMED CT) to Nursing Terminologies
- SNOMED CT to Logical Observation Identifiers Names and Codes (LOINC)
- SNOMED CT to the International Classification of Diseases for Oncology (ICD-0)
of the content and structure of SNOMED RT and the United Kingdom National Health Service’s Clinical Terms Version 3, formerly known as the Read Codes.)

At the same time, a committee of AHIMA staff members (including coding practice managers and others) developed a methodology, resources, and goals, as well as a project design and outline. Official coding resources, such as the US Department of Health and Human Services CD-ROM, were used along with common coding references. The team also used a tool used by the SNOMED team, the CLUE browser.1

Two encoders were selected based on their widespread use in the industry, their encoder structure, and availability to the AHIMA staff.

The project used previously identified mapping rules based on official ICD-9-CM conventions.6 In addition, participants created a set of data elements and created data collection steps for placement in a database. AHIMA’s coding practice staff mapped the 5 percent sample to the ICD-9-CM codes and compared their mapping result to the SNOMED mapped result.

To ensure inter-rater reliability, two independent AHIMA staff members mapped each term, and the group analyzed and resolved all discrepancies. The final AHIMA-mapped codes and category assignment were compared to SNOMED mapped codes and category assignments, and variances again were identified and analyzed.

Knowledge gained

The summary of results indicated that AHIMA staff selected the same mapping as the SNOMED team 87 percent of the time. In addition, the AHIMA raters produced the same mapping between themselves 85 to 86 percent of the time.

Project participation also brought the group to several new insights about the mapping process:

1. The process depended on several factors. Applying the rules that govern the use of a particular ICD-9-CM code, AHIMA coding staff members found, could be a straightforward or complex process, depending on two things: the SNOMED concept that was being mapped and the coder’s understanding of the context of the term and knowledge of the system to which it was being mapped. They also discovered that the two systems are very different in structure and that in many cases it was not possible to obtain a perfect “match” in a numeric or alphanumeric code in ICD-9-CM for clinical concepts defined in SNOMED.

2. Resources and guidelines were key. The outcome of the map was also influenced by how the mapping rules were defined and applied and the available resources. In addition, the participants learned the importance of using defined mapping rules and applying them consistently. The availability of specific examples and guidelines for the mapping rules, for example, ensures that all participants can interpret the definitions in the same manner.

3. Coder knowledge was a factor. In addition to available resources, the success of a mapping project also depends on the knowledge of the person doing the mapping. Individual knowledge and interpretation of the ICD-9-CM axis of classification for and understanding of the SNOMED clinical term affected code assignment. Even when coding resources are available, the coder must figure out the relationship between the meaning of the condition being coded and the rules of the classification to select the correct code. Even individuals with sound knowledge of medical concepts and of ICD-9-CM may not map the SNOMED concept to the same ICD-9-CM code. These disagreements will frequently occur due to the nature of mapping a terminology to a classification.

4. Differences in structure add to difficulties. Data analysis showed when the SNOMED concept was specific. Because ICD-9-CM is a classification sys-

Know your terms: A mapping glossary

Classification system: A system that groups together similar diseases and procedures and organizes related entities for easy retrieval

Clinical coding: The designation of descriptions of diseases, injuries, and procedures into numeric or alphanumeric designations. Involves the use of a health record as the source for determining code assignment

Crosswalk: The creation of a map from one code system to another, usually involving an automated translation software engine


Logical Observation Identifiers Names and Codes (LOINC): A database of a standard set of universal terms and codes for identifying individual laboratory and clinical results that allows users to merge clinical results from many sources into one database for patient care, clinical research, or management

Mapping: The process of linking content from one terminology or classification scheme to another

Nomenclature: In medicine, a recognized system that lists preferred medical terminology

Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT): A comprehensive, multilingual clinical terminology containing descriptions or synonyms relating to clinical concepts linked to clinical knowledge to enable clinical decision making for electronic medical records

Terminology: A set of terms representing the system of concepts of a particular subject field. Thus, a terminology used in healthcare would contain a set of terms that describe health concepts

Vocabulary: The set of words used by an individual or group within a particular subject field
tem, a separate code may not be available for each concept that SNOMED identifies. This is because the SNOMED terminology is more granular, with more specificity than the ICD-9-CM classification. By definition, a classification is a systematic arrangement of similar entities on the basis of differing characteristics. ICD-9-CM employs multiple axes of classification. Within individual chapters, different axes are used in classifying different diseases. Therefore, ICD-9-CM lists synonyms or conditions similar enough to be classified in the same code. Some SNOMED concepts resulted in no ICD-9-CM code assignment, because SNOMED content extends beyond disease concepts while ICD classifies diseases only.

The important insights about the variability of the mapping process lead us to several conclusions about mapping. Understanding the importance of resources, for example, suggests that development of rules will help to minimize incompatibilities in the mapping process without compromising clinical integrity.

The project also reinforces the importance of the role of the coder. Even as coding processes become more automated, the project shows that coding professionals will be needed to review one-to-many or many-to-one relationships in order to develop these rules for algorithmic translation.

AHIMA has taken the first step toward expanding its involvement in clinical terminology projects to learn their structure and uses firsthand, how they will link to coding, and future roles for HIM professionals working with terminologies. We'll continue to explore new opportunities and keep you informed.

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Notes
5. CLUE software is provided by the Clinical Information Consultancy. For more information, go to www.clinical-info.co.uk.
7. “A Crystal Ball for Coding.”


Cattanach v Melchior and implications for health information managers

James Cokayne

Introduction

The recent High Court ruling upholding a prior decision to allow a mother to sue for the cost of rearing a child after having had a failed sterilisation has understandably attracted great controversy (Cattanach v Melchior [2003]). The implications of this decision on what can now be claimed for through medical litigation are significant, and lawyers and doctors will extract from it lessons for their respective professions. The case also has some important implications for health information managers, whose role includes the release of clinical information.

History of the case

The particulars of this case are remarkable, and in view of the findings, medical practitioners of all specialties would be wise to exercise extreme caution in the future about taking, at face value, a patient's version of their clinical history.

In 1967, when Mrs Kerry Melchior was 15 years old, she underwent an appendectomy at Balmain Hospital in Sydney, New South Wales. During the course of the operation, the surgeon found her right ovary to be filled with a blood clot and, consequently, it was removed. Significantly, her left ovary and both Fallopian tubes were normal and left intact. Her mother had subsequently told Mrs Melchior that an ovary had been removed.

Mr and Mrs Melchior married in 1984, and in 1991 decided that, after having had two girls, their family was complete. Mrs Melchior did not want to continue taking the oral contraceptive pill, and the couple discussed taking steps to ensure they had no more children. Mr Melchior suffered from Charcot-Marie-Tooth syndrome and he thought that a male child might be at risk of inheriting this disorder, although this was in fact an erroneous assumption.

Mrs Melchior was referred to gynaecologist Dr Stephen Cattanach, and in March 1992 he performed a laparoscopic tubal ligation at the Redland Hospital, near Brisbane, Queensland. Importantly, prior to surgery Mrs Melchior told him that her right ovary and her right Fallopian tube had been removed during the operation in 1967. Dr Cattanach's operation report from the sterilisation procedure stated:

- Good view small bowel associated with right adnexal area – extensive adhesions. No right tube or ovary visible. Consistent with patient's history of right salpingo-oophorectomy. Left tube and ovary normal. One Filshie clip applied to tube and application checked.

Dr Cattanach did not see any right ovary or Fallopian tube and believed that this was consistent with the patient's history that both ovary and tube had been removed. He applied the clip to the left tube only, checked its application, and completed the operation.

In fact, the right tube had been present but obscured by bowel adhesions resulting from the 1967 surgery. After the procedure, one minor point which was noted by the courts was that in Dr Cattanach's post-operative correspondence to Mrs Melchior's general practitioner (signed by the hospital's medical superintendent) he incorrectly referred to the clip as having been applied to the right tube instead of the left.

Mrs Melchior fell pregnant in 1996 (at the age of 44) and, in early 1997, she gave birth to a son, Jordan. After the delivery, the uterus was examined outside the abdominal cavity and, at first, all that could be seen were the adhesions of the bowel to the uterus. After dissecting these, it became apparent that the right tube was present, albeit convoluted and compressed, and turned almost 180 degrees back upon itself. It was attached by adhesions to its own supporting structures and to the uterus itself, and was displaced towards the uterus from its normal position. The left Fallopian tube was viewed by a similar procedure; it could be seen to be effectively ligated by an appropriately placed Filshie clip.

Four months after the birth, a hysterosalpingogram performed on Mrs Melchior showed the right tube to be patent. The consensus of medical opinion was that conception had taken place by transmigration of an ovum from the left ovary to the right fallopian tube. This extraordinary occurrence was described in the following way by Brisbane obstetrician David Molloy:

An egg had somehow come from the left ovary, crossed the pelvis, come up under all the adhesions and scarring and managed to find its way through a very badly damaged right tube into the uterus... it was a miracle pregnancy (The World Today, 17 July 2003).

Findings of the Courts

Jordan was born 5 years after the failed sterilisation, and a lower court found that the sterilisation procedure had been performed negligently. It awarded Mrs Melchior $100,000 for the cost of feeding, clothing and educating him, as well as another $100,000 for the loss of income and the pain and suffering associated with the pregnancy and birth. The High Court did not revisit the question of whether the doctor had been negligent (The Law Report, 22 July 2003). The appeal lodged in the High Court was against the $100,000 for raising Jordan until age 18.

Dr Cattanach was criticised, not for failing to have noticed during the procedure that the right tube had not been removed, but for too readily and uncritically accepting his patient's history, as well as his failure to warn her that if her history was incorrect there remained the possibility that she might conceive. The case was one of negligent advice and failure to warn. Dr Cattanach's negligence after the sterilisation fell into three 'failure to warn' areas:
1. Mrs Melchior’s history of right salpingectomy in 1967 had not been positively confirmed during sterilisation.
2. If the tube was present, there was a tenfold increase in the risk of her falling pregnant than was usual after such a procedure being performed.
3. A hysterosalpingogram was an available procedure, which was likely to disclose the existence of a functioning Fallopian tube.

Discussion
Dr Cattanach accepted the patient’s version of her history and did not perform a hysterosalpingogram. In addition, he did not check the details of the original operation. A current ethical issue in medical practice is one known as defensive medicine. With the perception, real or imagined, that the frequency of medical litigation is increasing, doctors are under increasing degrees of scrutiny for performing unnecessary tests on patients. Could Dr Cattanach have been accused of practising defensive medicine or responsible medicine had he performed a hysterosalpingogram on Mrs Melchior? He had already performed an ultrasound scan, which led him to conclude, he told Mrs Melchior, that there were no impediments to the successful completion of the sterilisation. The Court found that performing a hysterosalpingogram would have been labelled responsible medicine, as it would have discovered a condition about which patient and doctor were unaware. In Dr Cattanach’s clinical judgement, this test was unnecessary, as it would merely have confirmed what he saw through the laparoscope.

A hysterosalpingogram involves taking x-rays after a dye has been injected through the cervix to outline the uterine cavity and fallopian tubes. The test is often performed in a doctor’s office and may cause discomfort such as cramps. For this reason, a sedative may be given (Merck Manual of Medical Information – Home Edition, 1999). Dr Cattanach had to weigh up the risk of complications versus the benefits the procedure provided. What if a complication had occurred if he had performed the hysterosalpingogram after the sterilisation? (Post delivery, no such complication occurred). Alternatively, what if, somehow, the dye had not permeated the badly damaged right tube, and the test had failed to show that it was, in fact, patent? (Again, post delivery, the tube was shown to be patent.) Had this been the case, the patient’s history would have been confirmed and Dr Cattanach’s judgement that it was not necessary to obtain the original operation report may then have been criticised. What it is possible to say with certainty is that Dr Cattanach could have just telephoned the Balmain Hospital where the appendicectomy (and subsequent oophorectomy) were performed, and requested a copy of the operation report. Given its availability at the trial, it would have been available also to Dr Cattanach at the time of the sterilisation procedure.

We may agree that this is all very well in hindsight; however, now that other medical practitioners have the benefit of that hindsight, it would seem to follow that they naturally will request originals of a patient’s history more frequently.

Health information management
This case highlights for clinicians the importance of obtaining quality and timely clinical information from an original source and not just from the patient’s recollection. It emphasises the importance of health information managers as one of the partners in the health care system, especially in their specialised role as custodians and disclosers of information. Health information managers should expect more requests for information from clinicians. The potential importance of even those requests that may appear to be routine (rather than urgent) should be recognised. Health information managers must also ensure that they constantly seek to create efficiencies in their storage, retrieval and release of information. This applies regardless of the format in which their records are stored, or what medium is used to release their content. Health information managers need to incorporate their expertise in managing and retrieving information while working with clinicians from all specialties and from all types of institutions. In this way health information managers can provide clinicians with the best quality clinical information so they can best care for their patients’ health interests.

In the end, it may help to care for the treating doctor’s legal interests as well.

References

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