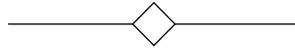


ARTICLES



Psychiatric and substance abuse disorder diagnoses as predictors of length of hospital stay

DAVID I BEN-TOVIM, ROB ELZINGA AND PHILLIP BURGESS

David I Ben-Tovim and Rob Elzinga are Co-Directors of the Centre for Applied Research in Mental Health Care at the University of Adelaide and Repatriation General Hospital.

Phillip Burgess is the Head of Psychiatric Indicators at the Mental Health Research Institute.

Abstract

The mental health and substance abuse components of AN-DRG 3 were examined using data from all inpatient separations in two Australian States over a two-year period. Assignment to a mental health or a substance abuse diagnosis related group (DRG) predicted about 20 per cent of the variability in average length of stay of patients treated for such conditions. Assignment to a substance abuse DRG was a much less robust predictor of length of hospital stay than assignment to a mental health DRG. There was little variation between years or States. Day-only intent patients were excluded, as were long-stay outliers identified using an inter-quartile range trimming process. Psychiatric DRGs are similar to a number of other non-surgically focused diagnosis related groups in their capacity to predict length of hospital stay. They are likely to remain an important component of casemix classification systems.

Introduction

Do diagnoses for mental health and substance abuse disorder matter? Considerable energy has been invested in the development and adoption of structured diagnostic systems for mental and substance abuse disorder. Enhanced clinical classification tools such as the DSM-III and IV (American Psychiatric Association 1980, 1987, 1994) and the diagnostic criteria for research of the ICD-10 (World Health Organization 1993) are the results of these endeavours, but uncertainty remains as to whether such diagnoses will ever provide a sufficiently sturdy foundation on which to build a funding and management system for acute psychiatric care (Lipton 1993; McCrone 1995).

Casemix is a language whose terms enable a coming together of the clinical and financial aspects of health care. It is fast becoming the dominant language of Australian clinical care, with four State governments using it as a component to fund their acute health care systems. The original casemix language which came into use in North America in the early 1980s (Fetter et al. 1980) had been developed using data sets that contained very limited information about mental health services. It described mental health and substance abuse disorders (MHSA) in crude and simplistic terms. A number of studies conducted at that time showed that the psychiatric groupings, or diagnosis related groups (DRGs), that formed part of that casemix did not predict how long MHSA patients stayed in hospital, and therefore did not predict the resource consumption of patients in treatment for MHSA disorders (Hunter & McFarlane 1994; McCrone & Phelan 1994). Consequently, MHSA problems were excluded from the North American prospective payment systems that used casemix measures and, after an initial flurry of mainly critical examination, very little systematic research has been conducted on MHSA issues and casemix since that time. However, as casemix languages begin to be developed outside North America, the relevance of an MHSA casemix is again coming under scrutiny (Ben-Tovim & Elzinga 1994; Hunter & McFarlane 1994; McCrone & Phelan 1994; McCrone 1995).

In 1993 and 1994 the MHSA components of the Australian national diagnosis related group (AN-DRG) system were extensively revised in preparation for the release of AN-DRG 3 in 1995. The resultant system has been described elsewhere (Ben-Tovim & Elzinga 1994). In 1994 the present authors were commissioned by the Commonwealth Department of Human Services and Health to test the limits of psychiatric diagnoses as predictors of the length of inpatient stay when those diagnoses were aggregated into the groupings used in the third version of the AN-DRG. This paper describes the results of that study.

Method

A set of information is forwarded to the central health authorities at the time that each patient leaves or separates from hospitals in South Australia and Victoria. We accessed the de-identified hospital separation data sets maintained by the health authorities in those States. In South Australia, it was possible to assemble a complete set of separations from all hospitals in the State for the financial years 1991–92 and 1992–93. In Victoria, the set was complete except for a number of private hospitals which were unavailable for the 1991–92 set, and a much smaller number which were not available in the 1992–93 set.

Amongst the information recorded in the data sets was the principal diagnosis for each separation, recorded using the ICD-9-CM system, and the length of hospital stay. Amongst the other information available about each patient was sex, marital status and legal status. Marital status was defined in terms of six categories in South Australia – never married, married/de facto, widowed, divorced, separated and unknown. In Victoria, marital status was coded dichotomously – married or not married. Legal status was defined as being a voluntary or involuntary patient at the time of admission to hospital. This information was only available for the Victorian data set.

The type of hospital from which a patient had separated was also identifiable. Six hospital types were distinguished in South Australia and nine in Victoria. In both States, hospitals could be categorised into specialised psychiatric facility or non-specialised facility, metropolitan or country hospital, and into public or private hospital. In South Australia a distinction was made between metropolitan and country hospitals, while in Victoria further distinctions between acute and non-acute care, and forensic and alcohol and drug treatment centres were also recognised.

All separations, acute and non-acute, with a principal diagnosis that would place a patient in a DRG in MDC 19 (Mental diseases and disorders) or MDC 20 (Alcohol/drug use and alcohol/drug induced organic mental disorders) in AN-DRG 3 were identified and consolidated into a data set in which each separation was allocated to the appropriate DRG, using the rules for aggregation of diagnoses into DRGs to be found in AN-DRG 3. Separate data sets were compiled for each State for each year.

Casemix classification development attempts to do justice to the expected range of cases a service might encounter, rather than describe all possible cases. To achieve this end, analytical processes often involve trimming out exceptional cases, which are then handled in a different way from the majority of cases.

Controversy exists over which trimming method to use to achieve the aim of describing an appropriate range of cases.

Mental health care data sets have the potential to be skewed by the inclusion of day patients who attend day hospitals or inpatient units for a day program, but who are admitted and discharged as inpatients from that hospital at each attendance. These 'day-only intent' patients were removed from the South Australian data set. This was not necessary in Victoria as the practice was not believed to be widespread there. Mental health care data sets also contain a small number of patients who have been resident in hospitals for a number of years, and then leave, either through death, transfer to an alternative facility or discharge.

A trimming process was therefore applied to the remaining separations contained within the data sets. The upper trim point (T_H) was defined using a modification of the process described in the *Australian casemix report on hospital activity, 1991–1992* (Commonwealth Department of Human Services & Health 1994).

The upper (Q_3) and lower (Q_1) bounds of the inter-quartile range of average length of stay for each DRG were first computed. The upper trim point was then specified using the formula:

$$T_H = Q_3 + 1.5 (Q_3 - Q_1)$$

Records whose length of stay was outside the high trim point were excluded from analysis reported here. Between 8 per cent and 9 per cent of episodes fell beyond the high trim point. No lower trim point was calculated or applied.

The above procedure was applied separately to the data sets relating to each State and each year.

The coefficient of variation of each DRG in each State in each year was computed after trimming. The coefficient of variation is a pure number which describes the dispersion of length of stay around the mean. The smaller the coefficient of variation, the more tightly the length of stay bunches around the mean, and the more strongly the DRG predicts variation in length of stay.

Results

Table 1 shows the total number of separations falling within the mental health and substance abuse major diagnostic categories for the two States combined for each of the two years, as well as the number of separations trimmed.

Table 1: Number of separations by AN-DRG 3 MDC 19 and MDC 20, and trimming effect

| AN-DRG 3 groups | 1991-92 | | 1992-93 | |
|---|---------------|--------------|---------------|--------------|
| | Number | High trim | Number | High trim |
| Dementia | 3 553 | 487 | 4 012 | 486 |
| Schizophrenia | 5 324 | 663 | 5 780 | 616 |
| Paranoia and acute psychotic reaction | 1 460 | 125 | 1 867 | 143 |
| Major affective disorders | 3 853 | 269 | 5 670 | 340 |
| Other affective and somatoform disorders | 3 743 | 348 | 5 044 | 451 |
| Anxiety disorders | 2 861 | 234 | 4 143 | 350 |
| Eating disorder and compulsive disorders | 526 | 53 | 1 248 | 155 |
| Personality disorders and acute reactions | 3 861 | 381 | 5 076 | 511 |
| Childhood disorders | 300 | 28 | 329 | 33 |
| Alcohol intoxication and withdrawal | 2 229 | 151 | 2 269 | 125 |
| Drug intoxication and withdrawal | 376 | 25 | 449 | 49 |
| Alcohol abuse and dependence | 1 055 | 88 | 1 386 | 101 |
| Other drug abuse and dependence | 1 286 | 65 | 1 429 | 78 |
| | 30 427 | 2 917 | 38 702 | 3 438 |

Table 2 shows the coefficient of variation for each MHS DRG after trimming in each year of data. For completeness, a dementia DRG is shown in that table, though in AN-DRG 3 dementia codes are moved to MDC 1. Dementia codes were also retained in the analysis of the variance explained by MHS DRGs.

Table 2: Coefficients of variation for DRGs in MDC 19 and MDC 20 in AN-DRG 3

| AN-DRG 3 groups | 1991–92 | | 1992–93 | |
|---|--------------------|-------------|--------------------|-------------|
| | South Australia | Victoria | South Australia | Victoria |
| 56 Dementia | 0.79 | 0.85 | 0.81 | 0.89 |
| 841 Schizophrenia | 0.84 | 0.93 | 0.84 | 0.95 |
| 842 Paranoia and acute psychotic reaction | 0.84 | 0.95 | 0.87 | 0.92 |
| 843 Major affective disorders | 0.82 | 0.95 | 0.81 | 0.95 |
| 844 Other affective and somatoform disorders | 0.86 | 0.98 | 0.90 | 0.99 |
| 845 Anxiety disorders | 0.86 | 0.72 | 0.77 | 0.82 |
| 844 Eating disorder and compulsive disorders | 0.90 | 1.24 | 0.83 | 1.32 |
| 847 Personality disorders and acute reactions | 0.88 | 0.98 | 0.90 | 0.92 |
| 848 Childhood disorders | 0.89 | 1.03 | 0.79 | 0.93 |
| 860 Alcohol intoxication and withdrawal | 0.97 | 1.00 | 0.88 | 1.06 |
| 861 Drug intoxication and withdrawal | 0.84 | 0.96 | 0.89 | 0.90 |
| 862 Alcohol abuse and dependence | 0.91 | 0.83 | 0.87 | 1.03 |
| 863 Other drug abuse and dependence | 1.11 | 0.85 | 0.91 | 0.91 |
| Total | 1.04 | 1.11 | 1.05 | 1.12 |

Table 3 summarises the overall reduction in variation of average length of stay predicted by the assignment to a mental health or a substance abuse DRG, and also shows the amount of average length of stay explained by a number of other variables that were routinely recorded in the morbidity data sets. It also includes the interaction between the variables. It must be remembered that the Victorian data set for 1991–92 was incomplete in that private hospitals were excluded. Their inclusion in the 1992–93 data appeared to dilute the effect of hospital type.

Table 3: Variance explanation for MDC 19 and MDC 20 in AN-DRG 3 and selected variables

| MDC 19 and MDC 20 | South Australia | | Victoria | |
|--------------------------------|-----------------|-------------|-------------|-------------|
| | 1991–92 (%) | 1992–93 (%) | 1991–92 (%) | 1992–93 (%) |
| AN-DRG 3 trimmed by IQR | 21.3 | 22.4 | 19.1 | 17.0 |
| Hospital type | 8.1 | 9.2 | 8.9 | 9.5 |
| Sex | 0.4 | 0.3 | 0.0 | 0.5 |
| Marital status | 1.1 | 1.3 | 0.0 | 0.1 |
| Legal status | – | – | 5.7 | 5.7 |
| Interactions | | | | |
| AN-DRG 3 x hospital type | 24.4 | 25.7 | 26.3 | 24.6 |
| AN-DRG 3 x sex | 21.4 | 22.4 | 19.2 | 17.0 |
| AN-DRG 3 x hospital type x sex | 24.6 | 25.8 | not calc | not calc |
| AN-DRG 3 x legal status | – | – | 21.6 | 19.8 |
| MDC 19 trimmed by IQR | 18.3 | 19.3 | 18.6 | 16.7 |
| MDC 20 trimmed by IQR | 4.9 | 2.3 | 5.0 | 4.5 |

IQR = inter-quartile range

Discussion

The data on the coefficients of variation indicate that the broad groupings of diagnoses described in AN-DRG 3 do create meaningful groups which are worthy of further study. When MHSA diagnoses are organised into the groupings described in AN-DRG 3, allocation to DRGs predicts approximately 20 per cent of the variability of length of hospital stay for patients being treated for a mental illness, and about 5 per cent of the variability in length of stay for patients with a substance abuse problem.

This can be compared with data taken from a national data set, where the range of variability in average length of stay predicted by other groups of disorders classified according to AN-DRG 3 has also been calculated using the same trimming methodology. In that data set, the variance reduction attributable to allocation to a set of DRGs ranges from lows of 17.9 per cent for ophthalmic problems, 23.6 per cent for endocrine disorders, and 23.1 per cent for injuries, to highs of 59.5 per cent for digestive disorders and 59.7 per cent for female

reproductive problems (Elzinga, Ben-Tovim & Burgess 1994). Psychiatric diagnoses are not quantitatively different from a range of other medical diagnoses in their capacity to predict the average length of stay of patients in hospitals, though they are not amongst the most powerful of diagnostic groupings in that regard.

Our analyses were confined to separations from two States and two years only. They urgently need replication on larger data sets. However, the consistency of the results over the four data sets, created, and then analysed, separately, generates some confidence in our results.

Mental health and substance abuse care involves a complex mixture of inpatient and ambulatory services. Furthermore, those services are currently being reconfigured in accordance with Australia's national mental health policy (Whiteford 1993; Whiteford, MacLeod & Leitch 1993). Further research will be necessary to generate a classification and funding system that does justice to the complexity of mental health and substance abuse care in hospital and in the community. One of these is the Mental Health Classification and Service Costs Project. Within this project, the addition of patient attributes as well as functioning and symptom severity are examined in a nationwide sample.

Until research evidence suggests otherwise, our conclusion is that psychiatric diagnoses are not substantially different from many other medical diagnostic groupings in their capacity to predict length of stay in acute care settings. This means that those diagnoses are likely to continue to be of importance for classification activities. The research does not, however, answer the broader questions of how best to use relatively weak predictors of resource utilisation to fund a health service. This is an issue for all medical services, including mental health and substance abuse care.

References

American Psychiatric Association 1980, *Diagnostic and statistical manual of mental disorders 3rd edn (DSM-III)*, American Psychiatric Association, Washington, DC.

American Psychiatric Association 1987, *Diagnostic and statistical manual of mental disorders 3rd rev. edn (DSM-III-R)*, American Psychiatric Association, Washington, DC.

American Psychiatric Association 1994, *Diagnostic and statistical manual of mental disorders 4th edn (DSM-IV)*, American Psychiatric Association, Washington, DC.

Ben-Tovim David I & Elzinga Rob H 1994, 'Making casemix work in psychiatry', *Medical Journal of Australia*, vol 161, no 5, pp S33–S36.

Commonwealth Department of Human Services and Health 1994, *Australian casemix report on hospital activity 1991–1992*, Australian Government Publishing Service, Canberra.

Elzinga RH, Ben-Tovim DI & Burgess P 1994, *Casemix classification for mental health and substance abuse (Report)*, Casemix Development Branch, Department of Human Services & Health, Commonwealth Government of Australia.

Fetter RB, Shin Y, Freeman JL, Averill RF & Thompson JD 1980, 'Casemix definition by diagnosis-related groups', *Medical Care*, vol 18, no 2, pp 1–53.

Hunter CE & McFarlane AC 1994, 'DRGs and Australian psychiatry', *Aust NZ J Psychiatry*, vol 28, pp 114–20.

Lipton G 1993, 'National health policy, psychiatry and casemix', *Australasian Psychiatric Bulletin*, vol 4, pp 163–5.

McCrone P 1995, 'Predicting mental health service use: Diagnosis based systems and alternatives', *Journal of Mental Health*, vol 1, pp 31–40.

McCrone P & Phelan M 1994, 'Diagnosis and length of psychiatric in-patient stay', *Psychological Medicine*, vol 24, pp 1025–30.

Whiteford H 1993, 'Australia's national mental health policy', *Hosp Commun Psychiatry*, vol 44, pp 963–6.

Whiteford H, MacLeod B & Leitch E 1993, 'The national mental health policy: Implications for public psychiatric services in Australia', *Aust NZ J Psychiatry*, vol 27, pp 186–91.

World Health Organization 1993, *The ICD-10 classification of mental and behavioural disorders, Diagnostic criteria for research*, World Health Organization, Geneva.