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Mortality in Western Australian psychiatric patients*

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Abstract Background: The aim was to examine mortality in psychiatric patients in Western Australia (WA), over a time period of considerable change in the delivery of mental health services. Methods: A population-based record linkage analysis was undertaken to quantify mortality among people with mental illness in WA. Mortality rates were calculated in users of mental health services and compared with rates in the whole population of WA. Trends in mortality were also examined using relative survival analysis, and proportional hazards regression. Results: The overall mortality rate ratio was 2.57 in males (95% CI: 2.51–2.64), and 2.18 in females (2.12–2.24). The highest cause-specific mortality rate ratio was for deaths due to suicide [RR: 7.37 in males (95% CI: 6.74–8.05) and 8.38 in females (95% CI: 7.11–9.89)], with mortality rate ratios being significantly greater than 1 for all other major causes of death. A relative survival analysis found that the excess mortality risk was concentrated in the first few years after first contact with mental health services. Proportional hazards regression analysis found a slight elevation of mortality rates over time. Conclusions: Mortality among psychiatric patients remains high and appears to be increasing. Highest excess mortality rate is associated with suicide, but mortality rates are significantly elevated for all major causes of death.

Introduction

A number of studies have reported mortality among people with mental illness to be higher than expected. Record linkage of hospital-based psychiatric case registers with death registers has revealed excess mortality in several different locations [1–3]. One recent study also showed excess mortality in a community-based system of care, although lower than has been reported in hospital-based studies [4]. Some authors have attributed some of the excess mortality in psychiatric patients to long-term inpatient-based care [5, 6]. In Western Australia (WA) there was a significant move away from inpatient-based services in favour of community-based services in the early 1980s. Between 1980 and 1985 there was a 50% reduction in the number of inpatient psychiatric beds. With the significant improvements in general health care, the general increase in life expectancy in Australia, and the major changes in psychiatric service delivery that have occurred, it is relevant to examine the mortality of psychiatric patients.

This study used the recently established WA Health Services Research Linked Database (WA Linked Database), which has linked all available administrative health data within WA [7]. WA is well suited for population-based record linkage studies, with well-maintained comprehensive administrative data collections dating back to 1980, and in many cases much earlier, its relative geographic isolation, its stable population of approximately 1.8 million people, its relatively

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centralised psychiatric services, and the cooperative relationship existing between public and private hospitals and the state health department. The availability of this research infrastructure allows a more comprehensive analysis on a larger population to be performed than has been possible in the past.

This study sought to quantify mortality in people with mental illness for an entire population, and to compare this with figures for the general population of WA. The study also sought to identify risk factors associated with highest mortality, and to examine whether mortality among people with mental illness has fallen over time.

**Subjects and methods**

The WA Linked Database was constructed by means of probabilistic matching, using the Automatch software package [8], as there are no unique identification numbers in use on the core data sets. Name, residential address, date of birth and sex were the principal fields used in the probabilistic matching. The probabilistic matching technique is based on estimating the probability that any two records represent the same person, while allowing for the possibility of errors or changes in the identifying information used for matching. A study of a random sample of links within the WA database has been undertaken, finding a less than 1% error rate [7].

A file was extracted from the WA Linked Database that contained all chains of records for any patient who had contact with mental health services in WA in 1966–1995. This file was extracted on 7 May 1998. The chains link together acute hospital admissions, death records, psychiatric hospital movements and psychiatric outpatient contacts for each patient. The linked death records cover the period 1980–1995, but data on psychiatric service contacts go back to 1966. A second file containing records of all deaths during 1980–1995 was also extracted. The data on mental health services contacts prior to 1980 were used to restrict the study cohort to those patients whose first psychiatric admission occurred in 1980–1995, and the cohort was started in 1980. This cleared out the pool of prevalent cases, dating back to 1966. As mortality risk may vary with time after first contact, this removes a potential source of bias from the results. There were 133,105 patients who met these selection criteria.

A principal psychiatric diagnosis was assigned to each patient who had contact with mental health services using the following procedure. The Mental Health Information System (MHIS) records individual movements (admissions, discharges, periods of leave, outpatient contacts, etc.). These were grouped together to form episodes of care, and the final diagnosis in each episode of care was used (to allow for revision of preliminary diagnoses during a period of observation or treatment). Diagnoses were coded using ICD-9 [9]. The last occurring informative final diagnosis across the episodes was then assigned as the principal diagnosis according to a hierarchy of diagnoses. So if a final diagnosis for an earlier episode is higher in the hierarchy than that for the last episode, this diagnosis would be taken as the principal diagnosis. The hierarchy used was:

1. **ICD-9 290, 293–296**: dementia, organic psychotic conditions, schizophrenia and affective psychosis
3. **ICD-9 306–312, 317–319**: adjustment reaction, reaction to stress, depressive disorders nec, conduct disorders nec, special syndromes nec, mental retardation

4. Non chapter 5 (mental disorders) diagnoses

Preference was also given to diagnoses made in inpatient treatment units over diagnoses made in outpatient clinics or psychiatric residential units. The purpose of the hierarchy was to allow more specific psychiatric diagnoses to take precedence over less specific diagnoses, and to favour an underlying condition rather than a specific symptom or event.

**Calculation of rates**

Age-sex standardised mortality rates were calculated using direct standardisation. The average population distribution of WA over the period 1980–1995 was used as the standard weights [10]. The start of follow-up was taken as the date of each patient’s first contact with mental health services. Patients were then censored at death or 31 December 1995. Rates were calculated by principal diagnosis, by type of care received and by cause of death. The mortality rate was also calculated in the WA population by cause of death and sex. Denominators were taken from estimated resident population counts [10]. Mortality rate ratios were calculated in groups of patients in the study cohort relative to the rate in the WA population.

**Relative survival analysis**

The mortality of psychiatric patients in WA was compared with the general WA population using the technique of relative survival [11, 12]. In this method, an expected survival curve for the cohort is computed by matching each study subject by age, sex and calendar year with a fictional referent from the general population having the average life expectancy for a person of that age and sex in that year. The analysis was performed using a SAS macro developed by Therneau et al. [13].

**Regression analysis**

To examine risk factors associated with highest mortality risk, proportional hazards regression was used [14]. The regression model examined the risk of death from time of first contact with mental health services until death or censoring at the end of follow-up (31 December 1995). Factors included in the model were principal psychiatric diagnosis, sex, marital status, type of care received, cumulative length of inpatient treatment, aboriginality, place of birth, place of residence and socio-economic status. Person attributes that can change (such as address and marital status) were based on information recorded at initial contact with mental health services. The model was also adjusted for age. Type of care received was assigned hierarchically (involuntary inpatient, voluntary inpatient, day-patient, hostel resident, outpatient), so a patient who had both an involuntary inpatient admission and outpatient attendances was classified as an involuntary patient. Socio-economic status was assigned based on residential postcode. These were assigned using the index of relative disadvantage from the Socio-Economic Indexes For Areas produced by the Australian Bureau of Statistics [15]. This index gives a relative score for each postcode area based on data collected in the 1996 census.

A second model was fitted to examine possible period trends in mortality among psychiatric patients. The cohort was split into three groups: those patients whose first contact with mental health services was in 1980–1984; those whose first contact was in 1985–1989; and those whose first contact was in 1990–1994 (patients whose first contact was in 1995 were excluded). Follow-up was terminated at 31 December 1984 for the first group, 31 December 1989 for the second group and 31 December 1994 for the third group, so that each group had an average of 2.5 years of follow-up. In addition to all the variables from the previous model, indicators for these three groups were also used in order to test the hypothesis that mortality rates have fallen following the deinstitutionalisation of psychiatric patients.