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Mortality among psychiatric patients in Taiwan—Results from a universal National Health Insurance programme

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ABSTRACT

This study investigated 6-year follow-up mortality rates and cause of death for persons younger than 45 years old with a history of hospitalisation for major psychiatric disorders after the introduction of the National Health Insurance (NHI). Linkage data combining death certificates with Taiwan NHI research claims data were used. The study cohort was comprised all patients under the age of 45 years, who had been hospitalised for major psychiatric disorders in 1998. Patients aged <45 years undergoing an appendectomy were selected as a control group. Cox proportional hazard regressions were performed to compute the adjusted 6-year hazard ratios. For patients with schizophrenia, major depression, or bipolar disorder, the adjusted risks of dying during the follow-up period were significantly 4.614, 3.707 and 3.866, respectively, times higher than that for appendectomy patients. The adjusted hazard ratios of non-natural dying during the follow-up period were significantly 16.316, 14.626 and 8.481 times for female patients with schizophrenia, major depression, and bipolar disorder, respectively, as high as for female appendectomy patients. The continuing excess mortality among psychiatric patients, from both natural and unnatural causes, still remains even after implementation of a NHI.

1. Introduction

Over the years, studies have consistently reported higher mortality rates among psychiatric patients of both genders, in various countries and ethnic groups, especially among younger patients and specifically during the first year after admission (Black et al., 1985; Casadebaig and Quemada, 1991; Chen et al., 1996; Räsänen et al., 2003). Despite some studies reporting a distinct decline in excess mortality (Sims, 1987; Casadebaig and Quemada, 1991), others have observed a persistent or even widening disparity in health outcomes between the general population and psychiatric patients (Lawrence et al., 2003; Räsänen et al., 2003).

Compared with the general population, excess mortality among psychiatric patients is attributed to both natural and unnatural causes of death (e.g., suicide and accidents). Higher risk of suicide was reported for schizophrenic, manic, and depressive patients, especially among male patients with affective disorders during the first decade after a psychiatric hospitalisation (Tsuang, 1978). Although similar patterns of death from natural causes (e.g., cardiovascular diseases and lung diseases) were reported comparing psychiatric groups and the general population, an elevated risk of mortality was documented among mentally ill people (Tsuang and Woolson, 1978; Corten et al., 1988; Mortensen and Juel, 1990, 1993).

Consistent with this picture, higher mortality, both natural and unnatural deaths, among psychiatric inpatients in Taiwan has likewise been reported (Chen et al., 1996). Using a nationwide cohort of Taiwanese psychiatric inpatients admitted between 1987 and 1988, inclusive, Chen et al. (1996) reported a higher 6-year mortality rate for psychiatric inpatients (i.e., standardized mortality ratios of 3.1 for men and 4.8 for women) compared with the general population.

Mortality studies have contributed considerably as indicators of health-care quality for inpatient and outpatient services (Tsuang and Simpson, 1985; Hewer et al., 1995). It is often asked whether equal access to health services including specialised medical procedures has been achieved for a population in general (Corten et al., 1991). Many countries with advanced economies provide universal health insurance coverage to achieve more equal health-care access and to improve the health of the general population. In Taiwan, before 1995, about 57% of the people were insured through three separate programmes, the Labor, the Government Employee, and the Farmers' Insurance Programs. In March

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1995, Taiwan initiated its National Health Insurance (NHI) programme to finance health care for all citizens. Taiwan's NHI has a unique combination of characteristics: universal coverage, a single-payer payment system with the government as the sole insurer, very low out-of-pocket copayments, comprehensive benefits, unrestricted access to any medical institution of the patient's choice and a wide variety of providers including primary care physicians. The NHI also covers the cost of medication.

Although there are limited studies available, positive effects of universal health insurance on health and health-care use have been observed (Decker and Remler, 2004). Some researchers have indicated that changes in a health-care system might contribute to a decline in the tendency to excess mortality among psychiatric patients (Tsuang and Simpson, 1985; Sims, 1987). Following the implementation of the NHI in 1995, a significant change in health-seeking behaviours and health resources use could be anticipated. It is thus of interest to re-examine the mortality rates among psychiatric patients in Taiwan following implementation of the NHI.

In this study, we investigated mortality among psychiatric patients in a universal National Health Insurance programme in Taiwan. The 6-year follow-up mortality rates and causes of death for persons younger than 45 years with a history of hospitalisation for a major psychiatric disorder following the introduction of the NHI were investigated, using data that combines death certificates with Taiwan NHI research claims data.

2. Methods

2.1. Database

The hospitalisation data used in this study were obtained from the National Health Insurance Research Dataset (NHIRD) for the years 1996–98 inclusive, as published by the National Health Research Institute in Taiwan. The dataset includes all claims data from Taiwan's National Health Insurance (NHI) programme implemented as a means of financing health care for all Taiwanese citizens. As of April 2005, the NHI program had over 21 million enrollees, representing around 96% of the island's population (Chen et al., 2007).

The NHI's reimbursement system ties a hospital's reimbursement level to its patient severity profile. To deter diagnosis upcoding, the NHI Bureau implements routine sample cross-checks of each hospital's claims with its medical charts, followed by punitive measures for coding infractions. Fines for fraudulent diagnosis reporting are generally 100 times the value of the false claim. As a result, hospitals' interests are best served by accurate coding of diagnoses and services provided. It is generally believed that the NHI's checks and balances foster accurate coding, although there have not been sensitivity and specificity studies to document its coding accuracy. Since this dataset is for the purpose of claims, no missing data is likely. As one of the largest databanks of medical/health information in the world, the NHIRD offers a unique opportunity to compare mortalities among young patients admitted to psychiatric departments.

In this study, the date of death was obtained from the 1998–2004 'cause of death' data file published by the Department of Health (DOH) in Taiwan. The 'cause of death' file provides details on marital status, the dates of births and deaths, place of legal residence, underlying cause of death (ICD-9-CM code), and employment status. Given that there is mandatory registration of all deaths in Taiwan, this data should be particularly accurate and comprehensive. The NHIRD was linked to the 'cause of death' data file with the assistance of the DOH in Taiwan.

2.2. Study sample

The study cohort consisted of all patients under the age of 45 years who had been hospitalised for schizophrenia (any ICD-9-CM 295 code other than 295.7 for schizoaffective disorder), major depression (296.2X and 296.3X), or bipolar disorder (296.0X, 296.4X, 296.5X, 296.6X, 296.7X, 296.80 or 296.89) between January and December 1998, because patients younger than 45 years are at higher risk of excess mortality (Casadebaig and Quemada, 1991; Meloni et al., 2006). To avoid the potential confounding factors of institutionalisation and chronicity (Cuijpers and Smit, 2002), those who had been hospitalized for schizophrenia, bipolar disorder, or major depression or were under any psychiatric treatment for schizophrenia during the previous 2-year period (1996–97) were excluded from the study cohort. In addition, patients aged <45 years undergoing an appendectomy in 1998 with an ICD-OP code of 47.0 as the primary operative procedure were selected as a control group, since data on the general population are not available from the NHIRD. The reason for selecting appendectomy patients as the control group was that patients undergoing appendectomies are relatively indistinguishable from the general population. No statistically significant differences were found between the control cohort and the general population in Taiwan with regard to either gender ($P>0.05$) or age ($P>0.05$). Appendectomy patients were, however, excluded if they had ever been diagnosed as having any major psychiatric disorder at the time of their recruitment.

In total, 26 374 eligible patients were ultimately selected for this study, including 5515 suffering from schizophrenia, 555 from major depression, and 1581 from bipolar disorder, as well as 18 754 who had undergone an appendectomy. Follow-up of each individual patient was undertaken from recruitment until the end of 2004, with all patients identified from administrative data to determine whether any had died. Both natural and unnatural causes of deaths were examined, with unnatural causes including suicides, accidents, and homicides, while all other deaths were defined as due to natural causes (Honkonen et al., 2008).

The regression modeling also adjusted for sociodemographic variables including age (<18, 18–24, 25–34, and ≥35 years), gender, medical co-morbidities, level of urbanisation and the geographic location of the community in which the patient resided (northern, central, eastern and southern Taiwan). Details on co-morbid medical disorders, including hypertension, diabetes, renal disease, and chronic obstructive pulmonary disease (COPD), were also extracted from the claims data at the time of the index discharge, because these conditions may exacerbate the risk of mortality.

The urbanisation levels in Taiwan consist of seven strata, with level 1 referring to the 'most urbanised' communities and level 7 referring to the 'least urbanised' communities, according to standards published by the Taiwanese National Health Research Institute. However, given that there were only very small numbers of schizophrenia cases in levels 5, 6 and 7, these three levels were combined into a single group, which was thereafter referred to as level 5.

2.3. Statistical analysis

The SAS statistical package (SAS System for Windows, version 8.2) was used to perform the statistical analyses in this study. Pearson χ^2 tests were used to examine differences in sociodemographic characteristics, co-morbid medical disorders, and the risk of stroke development among the four cohorts (schizophrenia, major depression, bipolar disorder and appendectomy). The 6-year survival rate was then estimated using the Kaplan–Meier method, with the log-rank test used to examine differences among cohorts. Cox proportional hazard regressions were also carried out as a means of computing the adjusted 6-year hazard ratios, following adjustment for the variables above. Finally, hazard ratios (HRs) are presented along with the 95% confidence intervals (95% CIs), adopting a significance level of 0.05 ($P<0.05$) for this study.

3. Results

Of the total sample of 26 374 patients under the age of 45 years, 52.1% were male, 30.6% were aged between 25 and 34 years and 0.3% had conditions complicated by hypertension, 0.1% by cardiovascular diseases, 0.5% by diabetes, 0.1% by renal diseases and 0.3% by COPD. Details of the distribution of demographic characteristics and co-morbid medical disorders for the sampled patients are provided in Table 1 by disorder type.

Compared to the appendectomy patients, patients with major depression were more likely to be female, aged between 35 and 44 years, with conditions complicated by diabetes, residing in more-urbanized communities and in northern Taiwan at the time of the index discharge (all $P<0.001$). Table 1 also shows that there were significant differences in the distributions of gender ($P<0.001$), age ($P<0.001$), hypertension ($P<0.001$), diabetes ($P=0.009$), urbanization level ($P<0.001$), and geographic region ($P<0.001$).

The log-rank test indicated that patients with schizophrenia, major depression, and bipolar disorder had significantly lower 6-year survival rates compared with appendectomy patients ($P<0.001$). The 6-year survival rate, crude HRs, and adjusted HRs of mortality for the four cohorts are presented in Table 2, which reveals that 6.8%, 5.8%, 5.6% and 1.2% of patients with schizophrenia, major depression, bipolar disorder, and an appendectomy, respectively, died during the 6-year follow-up period. For patients with schizophrenia, major depression or bipolar disorder, the risks of dying during the follow-up period were 6.113 (95% CI = 5.169–7.230, $P<0.001$), 5.191 (95% CI = 3.580–7.526, $P<0.001$), and 4.952 (95% CI = 3.864–6.347, $P<0.001$) times that for appendectomy patients, respectively. After adjusting for patient's age, gender, co-morbidities, urbanization level, and geographic region, the relationships still remained; for patients with schizophrenia, major depression, or bipolar disorder, the risks of dying during the follow-up period were 4.614 (95% CI = 3.870–5.500, $P<0.001$), 3.707 (95% CI = 2.544–5.401, $P<0.001$), and 3.866 (95% CI = 3.003–4.978, $P<0.001$) times that for appendectomy patients,