

Mortality trends in external causes of death in people with mental health disorders in Sweden, 1987–2010

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Abstract

Aim: We investigated mortality from external causes in Swedish people who had been hospitalised with a severe mental disorder. **Methods:** Hospitalisations in people aged 15 years or older admitted to hospital with a main diagnosis of schizophrenia, bipolar mood disorder or unipolar mood disorder between 1987 and 2010 were linked to their causes of death. **Results:** The mortality rate from all external causes was 20-fold higher in those with unipolar mood disorder, 15-fold higher in those with bipolar disorder and 12-fold higher in those with schizophrenia than in the general population. Over the study periods, the mortality rate declined more for people with unipolar mood disorder (–35%) and schizophrenia (–29%) than the total population (–25%) and those with bipolar mood disorder (–15%). The suicide rate declined most for those with unipolar mood disorder and schizophrenia (–42% for both) and less for the general population (–37%) and those with bipolar mood disorder (–21%). For external causes other than suicide, the mortality rate declined in the general population (–17%) but increased in people with schizophrenia (14%), bipolar mood disorder (30%) and unipolar mood disorder (52%).

Conclusions: People with mental disorders have high but declining excess mortality from suicide. Mortality from other external causes has increased, as has the gap in mortality rates between psychiatric patients and the general population.

Keywords: Depression, mortality, public mental health, suicide

Introduction

People with schizophrenia, bipolar mood disorder or unipolar mood disorder have reduced life expectancy and increased risk for premature death [1–7]. The excess risk for death from suicide is well known, but the risk for death from other external causes of injuries and poisoning is also elevated. In the Nordic countries, the risk for dying from external causes other than suicide is 8- to 10-fold higher in people with substance abuse, 3- to 7-fold higher in people with schizophrenia, 4- to 6-fold higher in people with personality disorder and 3- to 4-fold higher in people with affective disorder [3].

The risk of any kind of accidental death in a Swedish adult with a mental disorder is 6-fold higher in women and 8-fold higher in men than in the general population [8]. The higher risk in men than women is explained by socioeconomic factors and substance abuse [8]. In both sexes, people with dementia,

alcohol use disorder or other substance use disorders have the highest risk for accidental death [8].

One Swedish study has reported higher mortality risk from external causes in people with depression or bipolar disorder than in those with schizophrenia [8]. However, another study found similarly 5- to 6-fold higher mortality in men and women with schizophrenia, affective disorder, and anxiety disorder than in the general population [9]. A Swedish study reported 4-fold higher mortality from external causes in men and 5-fold higher mortality from external causes in women with bipolar disease than in the general population [10].

An older Swedish study analysed various causes of death in more detail and reported a 3- to 5-fold higher mortality risk from accidents, traffic accidents, and homicides in men and a 2- to 4-fold higher mortality risk from these causes in women with

bipolar disorder than in the general population. Similarly, men with unipolar disorder had a 2-fold higher risk, and women with unipolar disorder, a 2- to 3-fold higher risk [11]. A trend analysis reported that between 1979 and 2009 in Sweden, the odds of suicide and premature mortality increased more in patients with schizophrenia and related diagnoses than in unaffected siblings [12].

The aim of our study was to assess mortality trends from suicides and other external causes including accidents, homicide, and intentional injuries over a 24-year period in people in Sweden who had been hospitalised with a main diagnosis of schizophrenia, bipolar mood disorder or unipolar mood disorder.

Material and methods

To obtain longitudinal population-based data, we collected data on causes of deaths and psychiatric inpatient hospitalisations through individual-level linkage of Swedish nationwide health registers. Analyses were performed with a longitudinal cohort design in which patients with mental disorder were followed-up individually from the time of hospital diagnosis.

The Swedish National Patient Register was used to identify all people aged 15 years or older who were admitted to hospital in Sweden and received a main diagnosis of schizophrenia, bipolar mood disorder, or unipolar mood disorder between 1987 and 2010 ($n = 201,931$). This register is maintained by the National Board of Health and Welfare and contains information on all inpatient hospital episodes in Sweden since 1987. The register has covered psychiatric inpatient care nationwide since 1973, but the period when the ICD-8 was used was not included in our study, since the diagnostic definitions of affective disorders in the ICD-8 were substantially different from the definitions in the ICD-9 and ICD-10. For each hospitalisation, the unique national personal identity code, date of admission and discharge, and main and secondary diagnosis were recorded in National Patient Register.

In Sweden, hospital diagnoses are classified in accordance with the World Health Organization (WHO)'s International Classification of Diseases (ICD). ICD-9 codes 296A (manic disorder), 296C (bipolar affective disorder, manic), 296D (bipolar affective disorder, depressed), 296E (bipolar affective disorder, mixed) and 298B (excitatory type psychosis) were used to identify bipolar mood disorder diagnoses recorded between 1987 and 1996. ICD-10 codes F30 (manic episode) and F31 (bipolar affective disorder) were used to identify bipolar mood disorder diagnoses recorded from 1997 onward. Similarly, ICD-9 codes

296B (major depression), 298A (depressive type psychosis), 300E (neurotic depression) and 311X (depression, unspecified) and ICD-10 codes F32 (depressive episode), F33 (recurrent depressive disorder) and F34 (persistent mood affective disorder) were used to identify unipolar mood disorder diagnoses. ICD-9 code 295 (schizophrenia) and ICD-10 codes F20 (schizophrenia) and F25 (schizoaffective disorder) were used to identify schizophrenia. Only patients diagnosed in adult psychiatric care were included.

Information of causes of deaths was obtained by linking the National Patient Register with the national Swedish Cause of Death Register using the unique personal identification numbers given to all citizens and permanent residents.

The Cause of Death Register includes information on all people who were registered in Sweden at the time of their death. The register provides the death certificate information on the date and main (underlying) and secondary causes of death. ICD-9 codes E800–E999 and ICD-10 codes from chapters V, W, X and Y were used to identify all deaths from external causes (injuries and poisoning). These deaths were further divided into suicide (ICD-9 codes E950–E959 and ICD-10 codes X60–X84) and external causes other than suicide (ICD-9 codes E800–E949 and E960–E999, and ICD-10 codes from chapters V, W and Y as well as codes X00–59 and X85–X99).

In total, the study population comprised 201,931 patients with mental disorder, of whom 5807 died during the study period: 4842 from suicide and 965 from other external causes. Of these deaths, 1315 were in people with schizophrenia (suicides, $n = 1017$; other external causes, $n = 298$), 833 were in people with bipolar mood disorder (suicides, $n = 686$; other external causes, $n = 47$) and 3659 were in people with unipolar mood disorder (suicides, $n = 3139$; other external causes, $n = 520$).

To study time trends, we divided the 24-year observation period into six four-year periods: 1987–1990, 1991–1994, 1995–1998, 1999–2002, 2003–2006 and 2007–2010. Four-year periods were chosen to diminish random variation and to achieve cohorts with similar time from first hospitalisation to the end of follow-up in each period. In each period, follow-up started on the date of first hospital admission. Each person was followed from the day of first hospital admission until death or the end of the four-year period. A person could thus be counted in more than one period if readmitted during a different period. The change in the mortality rate over time was calculated using the decline in the mortality rate between the first period (1987–1990) and the last one (2007–2010).

Table 1. Age of people with the psychiatric diagnosis, number of cases (in total and by sex), mean and median age (in years), mean follow-up time (in years) and number of deaths from suicides and other external causes in each time period and for each psychiatric diagnosis.

	Year	Mean age	Median age	N	Men	Women	Mean follow-up	Deaths suicides/ other external causes
Schizophrenia	1987–1990	46.3	42	15,744	8877	6867	2.36	239/66
	1991–1994	46.1	43	15,096	8501	6595	2.41	229/46
	1995–1998	45.4	43	13,774	7672	6102	2.39	166/48
	1999–2002	45.5	44	11,880	6446	5434	2.39	148/45
	2003–2006	46.5	46	11,477	6231	5246	2.28	115/53
Bipolar mood disorder	2007–2010	47.4	47	10,940	6004	4936	2.33	120/40
	1987–1990	50.9	50	6564	2604	3960	2.28	142/19
	1991–1994	51.5	50	6307	2569	3738	2.25	103/23
	1995–1998	51.8	51	6257	2501	3756	2.15	110/23
	1999–2002	50.7	51	6245	2597	3648	2.21	80/21
Unipolar mood disorder	2003–2006	50.2	50	7596	2989	4607	2.05	98/25
	2007–2010	47.3	47	9995	3896	6099	2.08	153/36
	1987–1990	56.5	59	25,495	8803	16,692	2.09	650/80
	1991–1994	57.3	59	25,141	9063	16,078	1.92	506/65
	1995–1998	55.4	56	28,503	10,802	17,701	1.97	519/90
	1999–2002	52.2	52	28,725	10,914	17,811	1.99	510/96
	2003–2006	49.9	50	29,430	11,633	17,797	1.94	491/87
	2007–2010	48.1	48	31,396	12,896	18,500	2.00	463/102

Person-years at risk and number of cause-specific deaths were determined for both patients and the general population. Person-time was stratified by sex, calendar year, and five-year age categories. Adjusted mortality rates were calculated using direct standardisation methods using the Swedish population in 2010 as the standard. Analyses were carried out using the statistical software SAS (version 9.4). All models were adjusted for or stratified by sex, age attained and years of follow-up.

Ethical permission for this study was received from the ethics committee in Gothenburg, Sweden (Dnr 130-08). The Swedish National Board of Health and Welfare provided permission to use their confidential health register data in this study.

Results

Basic information on the study groups is provided in Table 1. The mean and median ages of hospital admission for schizophrenia, bipolar mood disorder and unipolar mood disorder were 47 through 48 years during the last period (2007–2010) in all three groups. More of the patients with schizophrenia were men (55%), and more of the patients with bipolar mood disorder (61%) and unipolar mood disorder (59%) were women.

People with severe mental disorders had a 12- to 20-fold higher age- and sex-standardised mortality rate from all external causes than people in the general population (Figure 1). The excess mortality was highest for people unipolar mood disorder: an average of 20-fold higher than that of the general population, although the number varied by study

period (from 18- to 21-fold). It was second-highest for people with bipolar mood disorder (an average of 15-fold higher; varied between 13- and 18-fold) and lowest, but still high, for people with schizophrenia (an average of 12-fold higher; varied between 11- and 14-fold). Mortality was higher in men than women. The mortality rate declined similarly in both sexes but more substantially in people aged 15–64 than people aged 65 or older.

The age- and sex-adjusted suicide rate declined most in people diagnosed with unipolar mood disorder (–35%) or with schizophrenia (–29%). These declines were both larger than the decline in the general population (–25%). The decline was substantially smaller in people with bipolar mood disorder (–15%).

Excess risk was higher for suicide than for other external causes of death. People with severe mental disorders had a 20- to 50-fold higher suicide mortality rate than people in the general population. Suicide risk was higher for those with unipolar mood disorder (an average of 45-fold higher; varied by study period from 41- to 50-fold) and bipolar mood disorder (32-fold; varied from 25- to 40-fold) than for those with schizophrenia (23-fold, varied from 21- to 27-fold).

Excess mortality risk from other external causes was higher in people with schizophrenia (an average of 5.5-fold; varied between 4- and 7-fold) than those with bipolar mood disorder (an average of 4-fold; varied from 4- to 6-fold) and unipolar mood disorder (an average of 4-fold; varied between 3- and 5-fold).

Time trends were substantially different for suicide (Figure 2) and for other external causes of death (Figure 3). The age- and sex-adjusted suicide

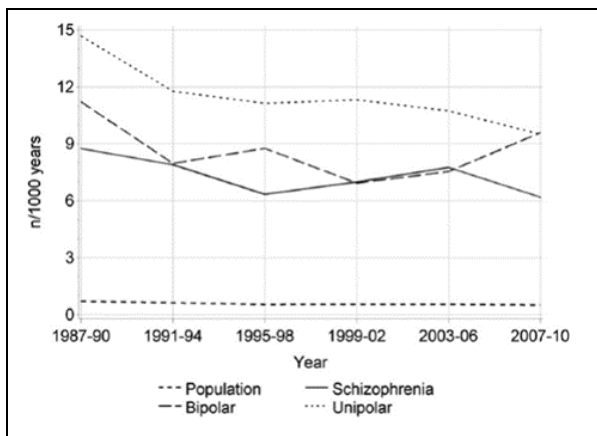


Figure 1. Time trends in mortality from all external causes in people with schizophrenia, bipolar mood disorder, and unipolar mood disorder and in the general population of Sweden between 1987 and 2010.

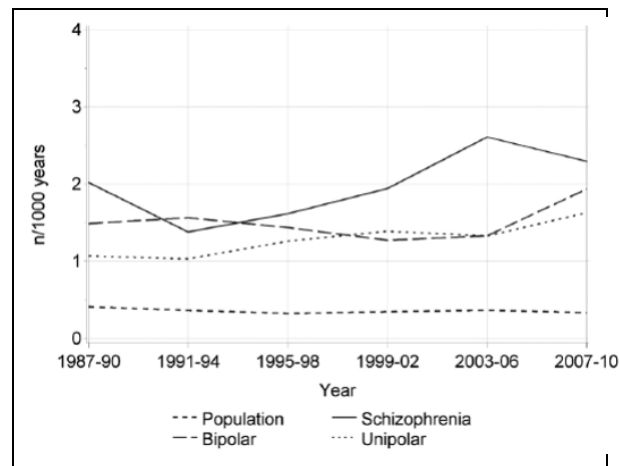


Figure 3. Time trends in mortality from external causes other than suicide in people with schizophrenia, bipolar mood disorder, and unipolar mood disorder and in the general population of Sweden between 1987 and 2010.

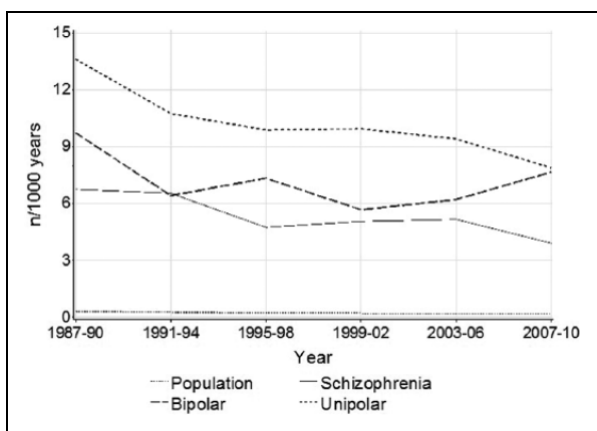


Figure 2. Time trends in suicide mortality in people with schizophrenia, bipolar mood disorder, and unipolar mood disorder and in the general population of Sweden between 1987 and 2010.

rate declined most in people diagnosed with unipolar mood disorder or with schizophrenia (–42% in both groups); this fall was larger than that observed in the general population (–37%). The decline was substantially smaller in people with bipolar mood disorder (–21%).

The age- and sex-adjusted rate of death from external causes other than suicide declined in general population (–17%) but increased in people with diagnosed with schizophrenia (14%), bipolar mood disorder (30%) and unipolar mood disorder (52%).

Discussion

The Sustainable Development Goals adopted by the United Nations General Assembly in 2015 state that by 2030, premature mortality from non-communicable diseases is to be reduced by one-third through prevention and treatment and promoting mental health and well-being [13]. To achieve this ambitious goal, all countries need more detailed information on mortality in people with severe mental disorder. In

addition, these data have to be analysed in a detailed manner to find optimal ways to decrease excess mortality in the population at highest risk for death.

In the current study, as in previous studies, patients with severe mental disorders had substantially higher excess mortality from all causes of injuries and poisoning than people in the general population. Our data showed that mortality risk decreased faster in people with unipolar mood disorder or schizophrenia than in those in the general population. Progress was slowest in people with bipolar mood disorder. Most of the deaths from external causes were due to suicide: 86% in people with unipolar mood disorder, 82% in people with bipolar mood disorder, 77% in people with schizophrenia and 39% in the general population. However, suicide rates in people with severe mental disorders declined over the study period, diminishing the gap between this group of people and the general population.

Alarming, mortality rates from external causes other than suicide increased in all three groups of people with severe mental disorders. Since the mortality rate decreased in the general population, the gap in the mortality rate between people with severe mental disorders and those in the general population increased during the 24-year study period.

One explanation for the slow progress in reducing suicide in those with bipolar disorder may be changes in patterns of diagnosis [14]. Clinicians' awareness of type 2 bipolar disorder (hypomania with depressive episodes) increased during the study period. Thus, some people who would have been diagnosed with depression in earlier years were correctly diagnosed with bipolar disorder in later years, which may have affected the time trends in suicide in people with bipolar disorder.

Several factors may explain the excess risk for death from external causes other than suicide in people with severe mental disorders. These include comorbidity (especially substance use), the side effects of medication, increased levels of risk-taking and/or self-destructive behaviour, and symptoms commonly related to mental disorders (such as poor concentration and fatigue) [3,8,9]. Another explanation of this finding could be that more people with mental disorders than in the general population have known risk factors. For instance, those who are unmarried, unemployed, or of low socioeconomic status are at higher risk of death than those who are married, employed, or of high socioeconomic status [8]. Moreover, people with mental disorders who are not treated with appropriate medication are at higher risk [10], as are those who live in cities [15].

The example of suicide prevention shows that individual-level strategies are not enough to decrease the excess mortality from suicide in people with mental disorders – population-based strategies are also needed, as described by WHO [16]. Our data suggest that to diminish other external causes of death in people with mental disorders, we need to develop more effective population-based prevention programmes. Interventions at the population level should aim to reduce alcohol and drug use, violent crime and self-harm [12], which all are risk factors for premature mortality. Assessment and management of such interventions must be carefully tailored for specific outcomes [12], since the mechanisms behind suicide and violence are different, as shown for schizophrenia [12].

The distribution of accidental deaths in people with serious mental disorders needs to be studied in more detail. Traffic accidents and drug overdoses are more common in people with mental disorders than in the general population [3]. The same is true of instances in which the actual mode of death is uncertain, that is, deaths that cannot be clearly categorised as suicides or accidents.

Over the study period, we found a decline in the number of admissions for schizophrenia but not for mood disorders. The long time span of the study coincided with changes in health care policies. Large mental hospitals were closed, and people with mental disorders began to receive care in psychiatric open care. There was a larger shift from hospital to community care for people with schizophrenia than for people with other mental disorders, such as mood disorders. This may help explain the reduction in hospital admissions for people with schizophrenia but not for people with mood disorders.

The strength of our study is the completeness of the Swedish National Patient Register and Cause of Death Register. Information on practically all somatic and psychiatric hospital discharges is recorded in the

National Patient Register, since the law makes it mandatory to collect these data [17]. All diagnoses in the National Patient Register and the Cause of Death Register are provided by the physician treating the patient, and studies indicate that these diagnoses are of high validity [18]. We used the most recent diagnoses in the National Patient Register, which are considered to be the most reliable because the accuracy of diagnoses can improve with time. We cannot, however, rule out that the time trends were affected by possible changes in the way diagnoses were made or reported during the study period.

The main limitation of our study was that our data covered only inpatients, who tend to be more severely ill than people treated solely in primary care or in hospital outpatient care. These inpatients included people who had been hospitalised after a suicide attempt and thus had a substantially increased risk for suicide. Most people with schizophrenia and most with severe stages of bipolar and unipolar mood disorder are, however, treated in the hospital in Sweden. All medical care, including hospital care and prescribed medication, is heavily subsidised in Sweden [19], which reduces the bias caused by restrictions in access to care or by health-care seeking behaviour. Since the mortality rate decreased among the hospitalised patients, it is not likely that the patients treated in recent years have more severe disorders than those treated at the beginning of the study period.

In addition to excluding some people with mental disorders, our data did not include information on several key factors that affect health, such as measures of socioeconomic status and health behaviour. The relationship between socioeconomic status and mental disorders is complex and bidirectional. In particular, people with schizophrenia are often young at disease onset, which affects their future working life and socio-economic opportunities. This can even be true of people with other mental disorders. Furthermore, we did not use the information on secondary diagnoses in the analyses, since the quality of this information varies.

Finally, coding and diagnostic criteria changed during the study period. We used ICD-10 codes F20 and F25 for schizophrenia and schizoaffective disorder, but currently ICD-10 codes F20-F29 are used to diagnose the related phenotype of schizophrenia-spectrum disorders. People may shift between the various diagnoses under this category, and many with schizophrenia are given the diagnoses F29 (unspecified psychosis).

The number of suicides in people with mental disorders declined during the study period. However, they remain higher than in the general population; thus, suicide prevention programs should focus on people with mental disorders. We have been much

less successful in preventing deaths from external causes other than suicide. Future research could therefore focus on the raised risk of external causes of death other than suicide, aiming to increase knowledge so policy recommendations can be made. Further actions are also required in clinical practice to prevent deaths due to accidents and homicide in psychiatric patients. This would further reduce the mortality gap between psychiatric patients and the general population to reach one of our main public health goals: health equality.

Declaration of Conflicting Interests

The authors declare that there are no conflicts of interest.

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Note

The data presented in this study cannot be shared with third parties because of national data protection legislation and the rules of the Swedish National Board of Health and Welfare, but similar data can be applied for from the National Board of Health and Welfare.

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