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ORIGINAL PAPER

Rates and trends of psychiatric inpatient and postdischarge suicides in Taiwan, 2002–2013: a national register-based study

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Abstract

Purpose In contrast to the downsizing trend of psychiatric beds in the Western world, the psychiatric bed capacity in Taiwan has steadily increased in recent decades. This study aimed to assess the suicide rates and their variations over time among psychiatric inpatients and recently discharged patients.

Methods Data on psychiatric inpatients admitted from 2002 to 2013 were extracted from the psychiatric inpatient registry of the National Health Insurance and merged with information from the Cause of Death data by means of unique identified numbers. Suicides occurring during admission and within 90 days after discharge were defined as inpatient and postdischarge suicides, respectively. Calendar year was fitted as a continuous variable in multivariate Poisson regression models to evaluate these rates over time. The analyses were adjusted for sex, age, primary psychiatric diagnosis, and number of admissions in the preceding year.

Results The overall inpatient suicide rate was very low (81 per 100,000 person-years). It decreased significantly from 146 to 74 per 100,000 person-years over the study period. This fall was observed among both genders and across all psychiatric diagnoses. The postdischarge suicide rate was comparatively high (1108 per 100,000 person-years) and did not show statistically significant change over the study period.

Conclusions Our results suggest that efforts to increase public awareness of mental disorders and efficient utilization of psychiatric inpatient care are essential for suicide prevention despite the comparatively high bed capacity. The discharge plans of inpatients should be bridged with population suicide prevention programs for continuity of care after discharge.

Keywords Claim data · Incidence · Inpatient suicide · Postdischarge suicide · Psychiatric hospitalization · Time trend

Introduction

Patients with mental illness have been identified as a high-risk population for suicide [1]. Researchers have also found that suicide risk is highest among psychiatric patients related to hospitalization, i.e., during inpatient care or the postdischarge period [2–5]. Inpatient suicide has been recognized as an important concern for patient safety in the hospital settings [6] and risk assessments for suicide both during hospitalization and the period of transition from inpatient to community care have increasingly been deemed important for population suicide prevention in recent years [3, 7, 8]. With the influences of deinstitutionalization, psychiatric bed availability and length of stay have markedly decreased since the 1960s in some Western countries. With these changes, concerns not only about increased inpatient suicide rate but also regarding possible negative consequences of transitions to increased postdischarge suicide rate are developing [9].

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There have been debates regarding the association between the decline in psychiatric bed capacity and the increase in national suicide rates [10–14] or mortality rates of psychiatric patients [15–19]. An alternative hypothesis that low suicide rate after deinstitutionalization was associated with the development of integrated community-based services was raised in some Nordic countries [20].

Few studies have examined changes in inpatient suicide rates or postdischarge suicide rates over time. Two representative studies reported decreasing changes in inpatient suicide rates over time in Denmark and the United Kingdom (UK) [9, 21], while another study reported increased standardized mortality ratios for inpatient suicide over time in Israel during the same period as the two former studies [5]. Conflicting results were found and some authors have reported significant decreases in postdischarge suicide rates in Denmark and Finland [9, 19], but increased over time in the UK [21]. Large-scale suicide data from non-Western countries were not many [22, 23]. To our knowledge, no studies investigating overall psychiatric inpatient and postdischarge suicide rates in Asian countries have used a national mortality database.

In contrast to the downsizing trend of psychiatric beds influenced by the deinstitutionalization movement in the Western world, psychiatric bed capacity in some Asian countries, including Japan, South Korea, and Taiwan, have remained high or steadily increased in recent decades (Japan 269 beds, Korea 88 beds, Taiwan 90 beds per 100,000 population in 2010) [24]. The total psychiatric bed capacity in Taiwan increased by 28.2% from 71 beds per 100,000 population in 2002 to 91 beds per 100,000 population in 2013, and the ratio of psychiatric beds in chronic and acute wards decreased from 2.15 to 1.85 over the study period [25]. The average length of stay in psychiatric inpatient units in Taiwan also increased from 89.8 (SD, 114.0) to 96.7 (SD 117.4) days (the median increased from 38 to 41 days), a feature similarly observed in South Korea [26]. The total number of psychiatric outpatient visits in Taiwan also increased 117% by person-times (from 3,292,542 to 7,151,437) and 100% by persons (from 490,158 to 982,223), respectively, from 2002 to 2013. The general population suicide rates in Taiwan increased from 10.0 per 100,000 person-years in 1999, after reaching a high of 16.8 per 100,000 person-years in 2006, then dropped to 12.0 per 100,000 person-years in 2013 [27].

With comparatively high psychiatric bed capacity, we expect that our inpatient suicide rate would be low compared to those of other nations with lower bed capacity and that the postdischarge suicide rate would also be comparatively low if the inpatient treatment effects can be successfully transferred to patients shortly after discharge from hospitals. We also expect that the trend of inpatient suicide rate will decrease over time because disease severity of inpatient population might decrease when bed availability increases and increased awareness of patient safety issues might improve inpatient care during the study period. However, the postdischarge suicide rate may not go along with the downward trend of inpatient suicide rate in reference to the inverse V-shaped general population suicide rate. In the current study, we aimed to (1) investigate the psychiatric inpatient suicide rate and postdischarge suicide rate in Taiwan; (2) examine changes in the rates of inpatient suicide and postdischarge suicide over time; (3) examine these trends by sex and psychiatric diagnosis. In this present one, we adapted the method used in one of the prior studies in order to compare our data with those in Western countries [9].

Methods

Data sources

The current healthcare system in Taiwan, financed via the National Health Insurance (NHI), was implemented in 1995. The NHI is a single-payer compulsory social insurance plan and the population coverage had reached 99% by the end of 2004 [28]. More than 90% of private and public hospitals (93%) in Taiwan are contracted by the National Health Insurance Bureau [29].

The inpatient cohort was extracted from the NHI database from January 1st 2002 to December 31st 2013 from the Departments of Welfare and Health of Taiwan [30]. Psychiatric inpatients were identified as patients hospitalized in psychiatric units of both psychiatric hospitals and general hospitals. The inpatient registry recorded information on diagnoses at admission and discharge with one main diagnosis and four secondary diagnoses, department of admission, date of admission, length of stay, and expenditure of the index admission. The inpatient registry of the psychiatry department was linked to the Causes of Death data by means of anonymous identification numbers and suicides occurring during admission and within 90 days after discharge were defined as inpatient and postdischarge suicide, respectively, according to the dates of suicide death, admission, and discharge. The Causes of Death database recorded causes of death for those aged 15 years and above and included information on identification number, date of birth, date of death, locale of death, place of death, and major cause of death (by category) for the years 1971–2016. Suicide deaths were defined as those coded E950–E959 according to the International Classification of Diseases (ICD) 9th edition (1981–2007) and X60–X84 in the ICD-10 (2008 and beyond). The finally extracted file provided data over a 12-year period between 2002 and 2013 for use in this study.

The study protocol was approved by the Institutional Review Board of the National Taiwan University Hospital.

Data analyses

We used two kinds of denominators, i.e., number of suicides per 100,000 person-years (incidence rate) and number of suicide deaths per 100,000 admissions (incidence proportion), to estimate crude incidence of inpatient suicide. We calculated the annual incidence rate of inpatient suicide by dividing the number of suicide events by number of person years for patients staying in inpatient units in each year from 2002 to 2013. When incidence is determined by dividing the number of suicide events by the number of people "at risk" (per admission) during that year, it is referred to as the incidence proportion. For example, for a patient who was hospitalized from Feb 2002 to July 2004, he would be counted as admission once in every year, i.e., one patient was counted three times in total from 2002 to 2004. For patients who died on the same date of discharge, they were arbitrarily assigned into "inpatient suicide" group. We also examined suicide death occurring within 90 days after discharge as the number of suicides per 100,000 person-years and number of suicide deaths per 100,000 discharges. The discharge number was counted as many times as the total number of discharges a patient had in the year. But patients who died by any cause on the same date of discharge were excluded from the count of discharge. The postdischarge follow-up interval was estimated to be 90 days or period between discharge and some events happened that patients died of causes other than suicide or were re-admitted.

Patients' psychiatric diagnoses were adopted from the main discharge diagnosis of the index admission and grouped into schizophrenia (295.X, 297.X, 298.2, 298.3, 298.4, 298.8, 298.9, 301.0, and 301.2X), affective disorders (296.XX, 298.0, 298.1, 300.4, 301.1X, 309.0, 309.1, and 311), alcohol use disorders (291.X, 292.X, 303.X, and 304.X–305.X), and others (290.XX to 319.XX excluding the above). Since the NHI does not reimburse patients for treatment only for an alcohol/drug use disorder, individuals with alcohol/drug use disorder may be underdiagnosed. In the inpatient suicide model, alcohol use disorders were merged with disorders other than schizophrenia and affective disorders due to their very small numbers.

Descriptive analyses were used to estimate crude incidence rates of inpatient and postdischarge suicides during the 12-year period. Univariate Poisson regression analysis was used to test for linear trends in the changes in crude inpatient and postdischarge suicide rates over time. We also carried out multivariate Poisson regression analyses in the changes in suicide rates over time with adjustments for sex, age, primary psychiatric diagnosis, and number of admissions in the preceding year. To estimate adjusted suicide rates, calendar year was applied as a continuous variable in the multivariate Poisson regression models to examine suicide rates over time among inpatients and among those recently discharged. To examine whether gender and psychiatric diagnosis influenced the changes in rates of inpatient and postdischarge suicides over the year, we estimate the changes in incidence risk ratio by year on strata of different genders and diagnoses.

With the concerns that data might be incomplete in the last year since patients were still admitted after 2013, we also carried out a sensitivity analysis by examining our findings with data from the final year excluded. Statistical analyses were performed using the SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). All tests were two-tailed, and $P < 0.05$ was considered statistically significant.

Results

Of 760,455 admissions during the 12-year period, 192 individuals died of suicide as inpatients. Similarly, of 758,580 discharges, 1,359 died of suicide in the 3-month postdischarge period. The average crude incidence rate of inpatient suicide was 81 per 100,000 person-years and 25 per 100,000 admissions. The number of person-times that patients died of causes other than suicide and were re-admitted in the 3-month postdischarge period was 6016 and 340,963, respectively. The corresponding figure for incidence of postdischarge suicide was 1108 per 100,000 person-years and 179 per 100,000 discharges.

Changes in suicide rates by year

Table 1 displays the psychiatric inpatient and the postdischarge suicide rates per 100,000 person-years and per 100,000 admissions (discharges) by year. Although using different denominators (per 100,000 admissions vs. discharges), Fig. 1 provides a better visualization of the changes in inpatient and postdischarge suicide rates during 2002–2013. The graph shows that the number of suicides was generally lower during admission than after discharge. The number of suicides per 100,000 admissions decreased gradually but the number of suicides per 100,000 discharges increased initially and then fluctuated downward. Tests using univariate Poisson regression showed that the inpatient suicide rate by number of admissions was significantly decreased [incident risk ratio (IRR) = 0.93, 95% CI = 0.89–0.97] but the postdischarge suicide rate showed no statistically significant change over the study period (IRR = 1.00, 95% CI = 0.98–1.01). The adjusted suicide rate in Table 2, using calendar year as a continuous variable in multivariate Poisson regression, showed a significant decrease in inpatient suicide rate of 0.83 [95% confidence interval (CI): 0.80–0.87]. During the same period, the postdischarge suicide rate showed no

Table 1 Inpatient suicide and postdischarge suicide rates by calendar year in Taiwan 2002–2013

Years	Inpatient suicide					Post-discharge suicide				
	N	Person year	Incidence[a]	Admission number	Incidence[b]	*N*	Person year	Incidence[c]	Discharge number	Incidence[d]
2002	24	16475	146	66945	36	68	8877	766	52381	130
2003	16	16845	95	70835	23	98	9359	1047	55883	175
2004	22	18012	122	76760	29	110	10216	1077	61176	180
2005	19	18889	101	78478	24	128	10441	1226	62335	205
2006	15	19456	77	78231	19	120	10158	1181	60943	197
2007	17	20230	84	78751	22	112	10268	1091	61337	183
2008	17	20519	83	78019	22	132	9988	1322	60125	220
2009	14	20887	67	81013	17	119	10258	1160	62632	190
2010	7	21354	33	85757	8	121	10997	1100	67842	178
2011	18	21378	84	86437	21	109	11090	983	68436	159
2012	7	21467	33	83734	8	138	10913	1265	66152	209
2013	16	21747	74	82074	19	104	10141	1026	79338	131

[a]Incidence rate = inpatient suicide per 100,000 person years

[b]Incidence proportion = inpatient suicide per 100,000 admissions

[c]Incidence rate = postdischarge suicide per 100,000 person years

[d]Incidence proportion = postdischarge suicide per 100,000 discharges

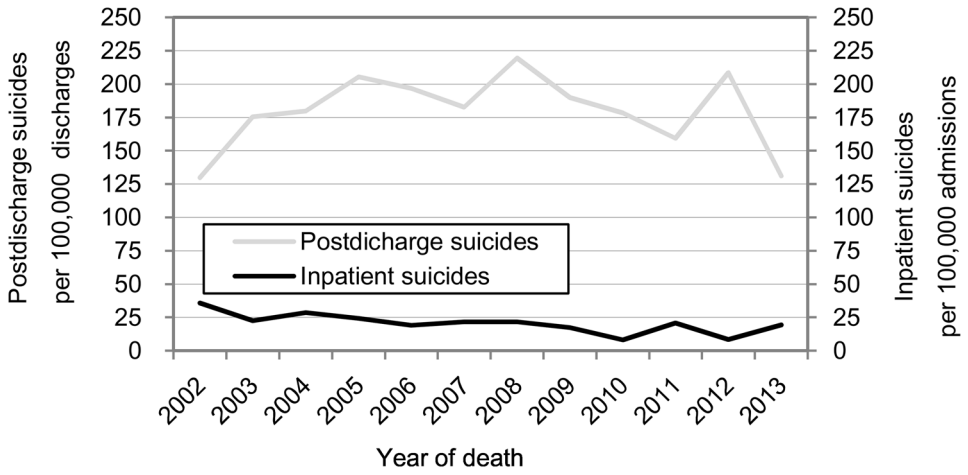

Fig. 1 Changes in inpatient and postdischarge suicide rates in Taiwan, 2002 to 2013

Table 2 Changes inpatient suicide rates from 2002 to 2013 as estimated by Poisson regression

Inpatient group	Length of staymean	Length of stay Median (IQR)	No. of Suicides	Univariate		Multivariable	
				IRR	95% CI	IRR	95% CI
All inpatients	114.4	31 (15–63)	192	0.83	0.80–0.87	0.83	0.80–0.87[a]
Men	115.9	32 (15–65)	126	0.81	0.77–0.85	0.81	0.77–0.85[b]
Women	111.8	31 (15–61)	66	0.88	0.82–0.94	0.89	0.83–0.95[b]
Schizophrenia	175.0	45 (23–103)	125	0.83	0.79–0.87	0.83	0.79–0.87[c]
Affective disorders	45.7	24 (11–41)	54	0.86	0.80–0.93	0.85	0.79–0.92[c]
Other diagnoses	71.3	24 (10–51)	13	0.80	0.67–0.94	0.81	0.68–0.96[c]

Values in bold type indicated statistically significant

IQR interquartile range, *IRR* incidence risk ratio

[a]Adjusted for gender, age, psychiatric diagnoses, and number of admissions in the preceding year

[b]Adjusted for age, psychiatric diagnoses, and number of admissions in the preceding year

[c]Adjusted for gender, age, and number of admissions in the preceding year

statistically significant increase at an adjusted rate of 1.00 (95% CI: 0.99–1.02) (Table 3).

Suicide rates by gender and diagnosis

Tables 2 and 3 show the estimated suicide rates stratified by gender and diagnosis for inpatients and recently discharged patients. The results indicated that the adjusted inpatient suicide rate decreased for both men (IRR = 0.81, 95% CI: 0.77–0.85) and women (IRR = 0.89, 95% CI: 0.83–0.95), and across all diagnostic categories including schizophrenia (IRR = 0.83, 95% CI: 0.79–0.87), affective disorders (IRR = 0.85, 95% CI: 0.79–0.92), and others (IRR = 0.81, 95% CI: 0.68–0.96). However, the adjusted postdischarge suicide rate did not change significantly over time for either gender or diagnosis.

Sensitivity test

Sensitivity analysis (with the final year of data excluded) showed similar results to the main analyses with the exception that the adjusted postdischarge suicide rate increased significantly over time for affective disorders (IRR = 1.03, 95% CI: 1.00–1.05). The adjusted IRR for inpatient suicide and postdischarge suicide per year was 0.80 (95% CI = 0.77–0.84) and 1.01 (95% CI = 1.00–1.03), respectively.

Table 3 Changes postdischarge suicide rates from 2002 to 2013 as estimated by Poisson regression

Post-discharge group	No. of suicides	Univariate		Multivariable	
		IRR	95% CI	IRR	95% CI
All inpatients	1359	1.01	1.00–1.03	1.00	0.99–1.02[a]
Men	766	1.01	0.99–1.03	1.01	0.99–1.03[b]
Women	593	1.01	0.98–1.03	1.00	0.98–1.03[b]
Schizophrenia	496	0.99	0.96–1.01	0.99	0.96–1.01[c]
Affective disorders	684	1.02	1.00–1.04	1.02	0.99–1.04[c]
Alcohol/drug use	47	1.00	0.92–1.08	1.00	0.92–1.09[c]
Other diagnoses	132	1.03	0.98–1.08	1.02	0.97–1.08[c]

IRR incidence risk ratio

[a]Adjusted for gender, age, psychiatric diagnoses, and number of admissions in the preceding year

[b]Adjusted for age, psychiatric diagnoses, and number of admissions in the preceding year

[c]Adjusted for gender, age, and number of admissions in the preceding year

Discussion

Our results show that the overall inpatient suicide rate declined among psychiatric inpatients admitted from 2002 to 2013 in Taiwan. This fall occurred among both genders and across all diagnostic groups. The overall rate of suicide in the 3-month postdischarge period did not show a significant change over the 12-year period, nor did it show a significant change in any subgroup. Nevertheless, the adjusted postdischarge suicide rate might have increased over the period among patients who were discharged with affective disorders.

The inpatient suicide rate (81 per 100,000 person-years) in Taiwan was at the lower end of those identified in all studies (1st quartile 98, median 358, 3rd quartile 808 per 100,000 person-years) in a meta-analysis of suicide rates among psychiatric inpatients [22]. Our inpatient suicide rate was also much lower than that of Denmark (1067 per 100,000 person-years) and England (588 per 100,000 person-years) [9, 21]. Notably, the total number of inpatient suicide cases was also low in our data ($n = 192$). The proportion of general suicide patients who died as psychiatric inpatients was very low (0.4%) in our data (data not shown) compared to that of Denmark (6%) [4] and the UK (16%) [31]. Despite the great accessibility to psychiatric inpatient care and medical application of medical expense waivers for catastrophic illnesses (e.g., psychosis and severe affective disorders) covered by the NHI, one seemingly contradictory reason responsible for the low inpatient suicide rate might be related to the low hospitalization rate among individuals with completed suicide in Taiwan.

Although the proportion of contact with psychiatrists in the year preceding death among individuals who committed suicide in the general population in Taiwan (24.9%) [32] was comparable to those of Western countries (UK 24%) [31], the proportion of psychiatric hospitalization in the preceding year was rather low (5.8%) in our data compared to those of Western countries (19.4% in Demark, 20% in Finland, and 23–31% in Sweden) [3, 19, 33]. A few papers demonstrated the low utilization of psychiatric care by individuals with mental disorders, especially major depressive disorder, in Taiwan compared to those of Western countries [32, 34]. A recent meta-analysis reported that the studies from East Asia had a significantly lower mean prevalence (69.6%) of mental disorders among suicide cases than those from North America (88.2%) and South Asia (90.4%) [1]. All these findings indicate that in East Asian societies where there is cultural stoicism or social stigmatization of mental health disorders and the related treatments [34], individuals with completed suicide may underutilize mental health services, specifically for psychiatric hospitalization.

Paradoxically, it may also be that the observed decrease in suicide rates occurred because patients at a lower risk of suicide, who might previously have been treated in the community, were admitted, leaving a smaller cohort of admitted patients with higher risks of suicide. Low reimbursement rates for outpatient care often undermine community services and reinforce the role of the hospital as the primary care provider in Asian countries, e.g., Korea [26] and Taiwan. Differences in the mix of acute and chronic patients might also explain the low number of suicides per 100,000 inpatient years [22]. In our example, a twofold ratio of chronic to acute beds may lead to a certain proportion of inpatients with long lengths of stay accounting for a large fraction of the occupied bed days. If these long stay patients had a lower rate of suicide, then the number of suicides per 100,000 inpatient-years would be expected to be significantly lower in hospitals having a higher proportion of chronic patients. Instead, the reduction in bed capacity may have led to a concentration of more severely ill patients in hospitals in Western countries. Thus, psychiatric inpatients might have different severities of suicide risk profiles in our study and those of Western countries.

Other explanations that have been proposed for this observation in prior studies include better medical and psychotherapeutic treatments of psychiatric inpatients [9], the parallel trend of inpatient suicide rate with the general population suicide rate [9, 22], changes in the inpatient case mix [21], and increased awareness of the problem of suicide through policy initiatives and guidance [9, 21]. Some of the explanations are applicable to Taiwan, e,g., improved medical and psychotherapeutic treatments and increased focus on patient safety and healthcare quality for inpatient suicide prevention under the initiatives guided by the Joint Taiwan Commission [35] and the Suicide Prevention Center, a national integrated platform for suicide prevention and control established in 2005 [36]. Regarding the relationship with the general population suicide rate, the rates of suicide per 100,000 inpatient years tended to be higher in samples from regions with higher general population suicide rates, but there was no significant trend in studies conducted in regions with higher national suicide rates to report smaller numbers of admissions per suicide [22]. No significant change in general population suicide rates (from 12.5 to 12.0 deaths per 100 000 population per year) was found from year 2002 to 2013 in Taiwan [27].

In the present study, we adjusted the changes in case-mix over the study period on suicide rates and obtained its precise estimate. The finding that a significant decrease in inpatient suicide rate in all diagnostic groups was not consistent with that of the Danish study of no significant decrease by a diagnosis of schizophrenia or affective disorders [9], or that conducted in England that the falls were statistically significant for those with schizophrenia only [21]. Unlike the study result of a significant decreasing trend only among women in Denmark, we found a significant decreasing trend in both genders similar to that found in England.

In contrast to the finding that inpatient suicide rate was relatively low in Taiwan, postdischarge suicide rate (179 per 100,000 discharges) was lower than that of Denmark (204 per 100,000 admissions) but comparable to that of the UK (166 per 100,000 discharges). It was comparable (1108 per 100,000 person-years) to the pooled estimates of postdischarge suicide (1,132 per 100,000 person-years, 95% CI: 874–1467) in a meta-analysis [23]. The postdischarge rate in Taiwan was much higher compared to that of the United States (44 suicides per 100,000 discharges) [37], whereas the general population suicide rates (12.5 per 100,000 person-years) between Taiwan and the United States were comparable.

Different trends of postdischarge suicide rate have been observed in European countries; a decreasing trend was found in Denmark [9] and Finland [19], whereas an increasing rate was noted in England [21]. Unlike those earlier studies, there was no significant change in postdischarge rate in Taiwan from 2002 to 2013 despite that the number of outpatient visits had a twofold increase during the period. The same findings also applied to subgroups of gender or psychiatric diagnosis. We are concerned that the postdischarge suicide rate did not follow the downhill trend of inpatient suicide over the same period. The therapeutic effects of hospitalization may not be transferred to mental health care in the community immediately after discharge from inpatient settings. Despite optimal bed capacity, much work still needs to be done to fill the gap of care in suicide prevention during the transition from inpatient to postdischarge care. The discharge plan of inpatient care should be incorporated into the national suicide prevention network to promote continuity of care for individuals at risk of suicide after discharge as an initiative recently released based on the realization that suicidal individuals often fall through the cracks in a fragmented and distracted health care system [38]. Different approaches including brief contact interventions using new technology [39], and some support program, e.g., the Care Program Approach in the UK [40], during the transit period have been raised to help reduce suicide risk during the postdischarge period.

As there are high contract rates of both private and public hospitals with the National Health Insurance Bureau and nearly 100% population enrollment in the NHI, the national representativeness of the data is a strength of this study. Nevertheless, current findings should be interpreted in view of several methodological limitations. First, certain factors are important for suicide risks, such as a history of self-harm [41], discharge against medical advice [42], involuntary admission [43], and individual demographics. Hospitalizations for deliberate self-harm, including suicide,

can be identified in administrative claims databases using external cause of injury codes (E-codes). However, the rates of E code completeness [44] and involuntary admission in Taiwan (4%) [45] have been reported to be low, and underreporting could have resulted in the absence of risk prediction by prior self-harm for inpatient and postdischarge suicides [7]. Second, the reliability and validity of psychiatric diagnoses cannot be determined. But prior epidemiological studies in Taiwan have demonstrated that most patients with schizophrenic disorders and bipolar disorders received treatment in Taiwan under the NHI program [46]. One meta-analysis revealed that the odds of suicide among inpatients associated with diagnostic and demographic factors were much lower than the degree of variation in suicide rates between settings that were observed [47]. Finally, we assigned the patients who committed suicide on the same date of discharge into "inpatient suicide" group. Although the inpatient suicide rate might be inflated, the potential misclassification will not change our conclusions that inpatient suicide rate is low and postdischarge suicide rate is comparatively high in Taiwan as compared worldwide.

In summary, the overall inpatient suicide rate in Taiwan was at the lowest end of rates compared to other nations and has declined among psychiatric inpatients admitted between 2002 and 2013. The 3-month postdischarge suicide rate was comparatively high worldwide and did not show a significant change over the 12-year period. Despite comparatively high bed capacity and long length of stay, underdiagnosis and undertreatment of suicide patients with mental disorders might occur in Taiwan. To maximize the best practices of suicide preventive work at the hospital level, more efforts are needed to increase public awareness of mental disorders and efficient utilization of inpatient care, as well as to bridge the discharge plan of inpatients to the population suicide prevention network after discharge.

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Compliance with ethical standards

Conflict of interest None.

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