



ORIGINAL ARTICLE

Utilization of healthcare and psychotropic medication in elderly and non-elderly people with first self-poisoning episodes: A nationwide population-based cohort study



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Abstract

Background: We investigated health service use patterns before the first self-poisoning (SP) episodes by age groups and genders using a population-based datasets.

Methods: We identified 3465 people with a verified discharge diagnosis of SP from 1997 to 2006. Physical disorders, psychiatric diagnoses, psychotropic prescriptions and health service use one year and one month before the episodes were compared by age groups and genders.

Results: Women younger than 65 years old were found to seek non-psychiatric outpatient services more in the month prior to SP episode (female 61.7% vs. male 50.5%, $p < 0.001$), while their male counterparts contacted the emergency care more in the previous month (male 9.9% vs. female 6.7%, $p = 0.002$) and a year before the episode for the ones older than 65 (male

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39.8% vs. female 29.3%, $p=0.006$). Females younger than 65 years old were prescribed more antipsychotics, antidepressants, and anxiolytics, with nearly half of them receiving anxiolytics in a year prior to their first self-poisoning episodes.

Conclusions: The current analysis suggested age and gender disparities on health service utilizations and prescriptions of psychotropic agents among patients with first self-poison behaviors. Studies about this gender disparity to generate intervention strategies for the prevention of self-poisoning at early stages are warranted.

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Introduction

Suicide and suicidal behavior can cause significant premature mortality and have attracted public health concerns because serious impacts and prolonged grief would affect the life of families and friends of the deceased.¹ Approximately one million people died from suicide every year; and 10–20 times more attempted suicide.² With previous suicide attempts or acts of self-harm (with or without the intention to die) being major predictors of suicide completion,^{3,4} particular attention have been paid to behaviors of 'deliberate self-harm' (DSH). The term DSH was used to refer to people who inflicted harmful acts upon themselves in any form, such as self-poisoning (SP) or self-injury.⁵ Previous Western studies have showed that among people with DSH behaviors, SP (including overdose of prescribed or illicit drugs, ingestion of other chemical substances, gasoline, and other toxicants) accounts for 90% of the causes presenting to hospitals and is a major reason for mortality.^{6,7}

Although DSH might be seen by attempters as a way to relieve pain, revenge, or escape from the world, people who self-harm actually often sought help prior to their action. They would have their own decisions to seek opinions from psychiatric or other medical services.⁸ How these help-seeking behaviors were interpreted and responded may directly influence the action of subsequent attempts. In addition, proportions of suicide attempters or completers that had medical service contacts before the episodes of self-harm,^{9,10} and mortality rates following the first presentation to hospital treated for SP were quite high.¹¹ Although suicide attempters and completers maybe different populations with different characteristics,¹² identifications of underlying patterns in health service use among the vulnerable group might be practical to inform the first-line health professionals of an opportune window for early-stage interventions.¹³

Specific characteristics about age and gender have been reported among suicide completers in many countries,^{14–16} for which, although around 55–85% of non-fatal self-poisoning cases are women,^{6,13} the mortality rates for males with the same behaviors are almost doubled comparing to females.¹⁷ However, while age and gender were found to be major determinant factors in those with suicidal behaviors and seeking medical contacts,^{10,15} empirical evidence exploring patterns of previous medical help seeking behaviors, comorbidities of physical or psychiatric disorders, and

variations of service use by age and gender prior to SP episodes is limited. Thus, we aimed to investigate the patterns of service utilization prior to SP episodes, and their age and gender variations using a nationwide research database in Taiwan to address these issues.

Methods

Study setting and data source

Taiwan National Health Insurance (TNHI) program was launched by law on 1st March 1995, as a single-payer medical insurance system, providing a nearly universal coverage of health care nationwide. An estimated 99.48% of all residents in Taiwan (i.e. about 20 million out of the total 21 million population in 1996) were having unrestricted access to all levels of medical services (Bureau of National Health Insurance Department of Health Executive Yuan Taiwan ROC, 2011). Taiwan National Health Research Institute collects information on service use from the Bureau of TNHI and de-identifies the data into the National Health Insurance Research Database (NHIRD) for research purposes, comprising anonymous eligibility and enrollment information, as well as claims of visits, clinical procedures, and prescriptions for service users. A one million people subset of the insured, the Longitudinal Health Insurance Database (LHID) 2000, consisting of approximate 5% enrollees in TNHI program, was selected with a systematic scheme on a random basis and released for research purposes in 2006. No significant differences in age or gender distribution have been found between the LHID 2000, NHIRD, and the general population in Taiwan in census data.¹⁷ The LHID 2000 provides detailed information about socio-demographics and service utilization from 1996 to 2006.

Study subjects

The study subjects were defined as those above age 18, who had his/her first episode of SP (defined as International Classification of Diseases, Ninth edition, Clinical Modification (ICD-9-CM) codes: poisoning or toxic effects (ICD-9-CM 9XX.XX series), accidental (ICD-9-CM E85X.XX series), or suicide or self-inflicted poisoning (ICD-9-CM E95X.XX series) by the following agents: antibiotics (ICD-9-CM 960.XX, E856.XX), anti-infectives (ICD-9-CM 961.XX,

E857.XX), hormones and synthetic substitutes (ICD-9-CM 962.XX), systematic agents (ICD-9-CM 963.XX), agents affecting blood constituents (ICD-9-CM 964.XX), analgesics, antipyretics, anti-rheumatics, and narcotics (ICD-9-CM 965.XX, E850.XX), anticonvulsants and anti-Parkinsonism drugs (ICD-9-CM 966.XX), sedative and hypnotics (ICD-9-CM 967.XX, E851~853.XX), central nervous system or muscle tone depressants, and anesthetics (ICD-9-CM 968.XX), psychotropic agents (ICD-9-CM 969.XX, E854.XX), central nervous system stimulants (ICD-9-CM 970.XX), drugs affecting autonomic nervous system (ICD-9-CM 971.XX, E855.XX), cardiovascular system (ICD-9-CM 972.XX), gastrointestinal system (ICD-9-CM 973.XX), mineral, water, and uric acid metabolic systems (ICD-9-CM 974.XX), skin, smooth or skeletal muscle (ICD-9-CM 975.XX), otorhinolaryngological (ICD-9-CM 976.XX), other unspecified medicinal substance (ICD-9-CM 977.XX, E858.XX), dental drugs, vaccine (ICD-9-CM 978~979.XX), alcohol (ICD-9-CM 980.XX, E860.XX), petroleum or non-petroleum solvents (ICD-9-CM 981~982.XX, E862.XX), corrosive agents (ICD-9-CM 983.XX, E861.XX, E864.XX), lead or other metals (ICD-9-CM 984~985.XX), gases, fumes, vapors (ICD-9-CM 986~987.XX, E868~869.XX, E951~952.XX), and nonmedicinal as to source, including agricultural and horticultural chemicals and pharmaceutical preparations (ICD-9-CM 988~989.XX, E863.XX, E865~867.XX, E950.XX,) from emergency departments or admitted into the hospital identified from LHID2000 between 1997 and 2006 (i.e. the starting point was at least one year after the initiation of the TNHI). This definition was adapted from a previous study on people who intentionally self-administered any ingestible or non-ingestible substances, prescribed or recreational drugs for self-harm, with or without evidence of the intention to die.⁵ Therefore, besides commonly seen overdose of prescribed drugs, SP in this study also includes intentional ingestion or inhalation of a substance over tolerance that causes harm, like carbon monoxide^{18,19} or pesticides.^{20,21} To prevent underestimation of possible self-inflicted injury, diagnoses coded as accidental poisoning were also included. Frequency, status of contact (i.e. no contact, psychiatry contact, or non-psychiatry medical contact), sector of service (i.e. outpatient department, emergency department, or hospitalization), and prescription within one month and one year before the index episode were of research interests in current analysis.

Statistical analysis

We compared the underlying diseases and service utilizations between genders and age groups, categorized by the cut-off point of 65 years old (younger age group: less than 65 years old; older age group: 65 years old or more). Frequency, status of contact (i.e. no contact, psychiatry contact, or non-psychiatry contact), and service sector (i.e. outpatient department, emergency department, or hospitalization) within one month and one year before the index episode were examined across age and gender groups. We also analyzed subjects' exposure to prescriptions of psychotropic medications (non-barbiturate benzodiazepines, antipsychotics, anxiolytics, antidepressants, and anticonvulsants) in the year before self-poisoning. Patterns of

physical or psychiatric disorders and service utilizations between genders were compared using Chi-squared tests. SPSS for Windows 16.0 (SPSS Inc., Chicago, IL, USA) was used to perform all of the analyses and the statistical significance (alpha level) is defined as 0.05.

Results

Within the 9-year observation period (1997–2006), we identified 3465 people with at least an episode of SP. The mean age at their first episodes was 44.3 (standard deviation: 18.3) years old, and 56.9% of them were women. The majority of these people (37.9%) were between 18 and 35 years old, 24.1% of them were between 45 and 64 years old, and the rest 18.1% were over 65 years old. As shown in Table 1, in the younger age group, women had significantly higher proportion with specific psychiatric diagnoses of affective disorders and neurotic disorders, but lower for alcohol-related disorders, than men in the year prior to self-poisoning. Regards to physical disorders, in the younger age group, women had significantly higher proportions of respiratory diseases, gastrointestinal diseases, and cancer. No evidence for gender differences in receiving psychiatric or physical diagnoses was found in the older age group. In terms of the specialty of service contact, the majority of those who self-poisoned visited internal medicine (88.8%) within one year prior to the event, in the younger age group. Women had more contacts than men in almost all of specialties, including Chinese medicine (73.2% vs. 62.4%). Similarly, no statistically significant gender difference in specialties of service contact was found in the older age group.

As to the differences in the distributions of psychiatric and physical diagnoses between younger and older age groups by gender, schizophrenic spectrum disorders and alcohol-related disorders were significantly more often found in the younger age group of men, within a year before the episode. In females, only a remarkably higher proportion of affective disorders was identified in the younger age group. For all the physical illnesses, older men had significantly higher proportions of diagnosis than younger men. Females experienced very similar patterns of differences in physical disorder diagnoses between the younger and older age groups, except cancer, respiratory, and gastrointestinal disorders. In terms of the specialties of medical service contact, older men were found to use significantly more internal medicine, otolaryngology, neurology and rehabilitation, emergency and intensive care, and surgery. Older women used more medical services in internal medicine, neurology and rehabilitation, and psychiatry than their younger counterparts. However, older women had apparent lower utilizations of Chinese medicine, gynecology & obstetrics, and psychiatry than younger women (detailed p-values were not shown).

Proportions of psychiatric contacts (98% of them were outpatient visits) in one month ($n=367$, 10.6%) and one year ($n=469$, 13.5%) prior the index event were not significantly different across all gender and age groups (details not shown). Table 2 showed the patterns of non-psychiatric medical service sectors utilized by age groups and genders within one month and one year prior to first SP episodes. In the younger age group, we found that the females had

Table 1 Number (%) of medical diagnoses by ICD-9 codes and specialty of service contact in the year prior to the first episode of self-poisoning behavior from 1997 to 2006.

Variables	<65 years old				≥65 years old		
	Total (N = 3465)	Male (n = 1161)	Female (n = 1678)	p-value ^a	Male (n = 332)	Female (n = 294)	p-value ^a
<i>Psychiatric diagnoses</i>							
Affective disorders (ICD-9-CM: 296.XX)	220 (6.3)	56 (4.8)	135 (8.0)	0.001	15 (4.5)	14 (4.8)	0.885
Schizophrenic spectrum disorders (ICD-9-CM: 295.XX)	71 (2.0)	35 (3.0)	33 (2.0)	0.073	1 (0.3)	2 (0.7)	0.493
Neurotic disorders (ICD-9-CM: 300.XX)	233 (6.7)	64 (5.5)	138 (8.2)	0.006	16 (4.8)	15 (5.1)	0.871
Personality disorders (ICD-9-CM: 301.XX)	27 (0.8)	6 (0.5)	19 (1.1)	0.084	2 (0.6)	0	0.183
Alcohol-related disorders (ICD-9-CM: 303.XX, 305.0X)	39 (1.1)	25 (2.2)	17 (1.0)	0.013	0	1 (0.3)	0.288
Substance-related disorders (ICD-9-CM: 304.XX, 305.XX(excluding 305.0X))	43 (1.2)	19 (1.6)	19 (1.1)	0.250	1 (0.3)	0	0.346
<i>Physical disorder</i>							
Disorders of central nervous system (ICD-9-CM: 320.XX~ 359.9)	408 (11.8)	106 (9.1)	167 (10.0)	0.465	68 (20.5)	67 (22.8)	0.484
Disorders of cardiovascular system (ICD-9-CM: 391.XX~ 429.9)	855 (24.7)	194 (16.7)	260 (15.5)	0.385	213 (64.2)	188 (63.9)	0.956
Disorders of respiratory system (ICD-9-CM: 460.XX~ 519.9)	2050 (59.2)	607 (52.3)	1022 (60.9)	<0.001	231 (69.6)	190 (64.6)	0.188
Disorders of gastrointestinal system (ICD-9-CM: 530.XX~ 579.9)	2169 (62.6)	662 (57.0)	1066 (63.5)	<0.001	241 (72.6)	200 (68.0)	0.212
Disorders of musculoskeletal system (ICD-9-CM: 710.XX~ 739.9)	1841 (53.1)	585 (50.4)	846 (50.4)	0.988	213 (64.2)	197 (67.0)	0.454
Cancer (ICD-9-CM: 140.XX~ 239.9)	312 (9.0)	51 (4.4)	198 (11.8)	<0.001	30 (9.0)	33 (11.2)	0.364
<i>Specialty of service contact within a year of the index event</i>							
Internal medicine	3,076 (88.8)	966 (83.2)	1510 (90.0)	<0.001	321 (96.7)	279 (94.9)	0.263
Otolaryngology	2929 (84.5)	906 (78.0)	1480 (88.2)	<0.001	283 (85.2)	260 (88.4)	0.240
Chinese medicine	2,346 (67.7)	724 (62.4)	1229 (73.2)	<0.001	202 (60.8)	191 (65.0)	0.287
Gynecology & obstetrics	1,511 (43.6)	–	1374 (81.9)	–	–	137 (46.6)	–
Neurology & rehabilitation	1,396 (40.3)	379 (32.6)	635 (37.8)	0.004	197 (59.3)	185 (62.9)	0.358
Psychiatry	715 (20.6)	239 (20.6)	374 (22.3)	0.278	62 (18.7)	40 (13.6)	0.087
Emergency & intensive care	658 (19.0)	198 (17.1)	319 (19.0)	0.184	73 (22.0)	68 (23.1)	0.733
Surgery	2,787 (80.4)	926 (79.8)	1325 (79.0)	0.61	284 (85.5)	252 (85.7)	0.95

^a p-Values for gender differences by Pearson's Chi-square tests.

Table 2 Number (% for column) for sectors of non-psychiatric services sought in the previous year and month before first self-poisoning episodes by age and gender from 1997 to 2006.

Variables	Total (N = 3465)	<65 years old		p-Value ^a	≥65 years old		p-Value ^a
		Male (n = 1161)	Female (n = 1678)		Male (n = 332)	Female (n = 294)	
<i>Prior 1-month medical seeking (any)</i>	2143 (61.8)	580 (50.5)	1035 (61.7)	<0.001	272 (81.9)	256 (87.1)	0.08
Outpatient service	2,073 (59.8)	543 (46.8)	1011 (60.3)	<0.001	267 (80.4)	252 (85.7)	0.08
Emergency service	346 (10.0)	115 (9.9)	112 (6.7)	0.002	68 (20.5)	51 (17.3)	0.32
Hospitalization	145 (4.2)	30 (2.6)	34 (2.0)	0.33	47 (14.2)	34 (11.6)	0.33
<i>Prior 1-year medical seeking (any)</i>	2832 (81.7)	912 (78.6)	1368 (81.5)	0.05	294 (88.6)	258 (87.7)	0.76
Outpatient service	2,815 (81.2)	899 (77.4)	1365 (81.3)	0.01	293 (88.3)	258 (87.7)	0.85
Emergency service	901 (26.0)	273 (23.5)	410 (24.4)	0.57	132 (39.8)	86 (29.3)	0.006
Hospitalization	570 (16.5)	150 (12.9)	211 (12.6)	0.79	119 (35.8)	90 (30.6)	0.17

^a p-Values for gender differences within the same age group by Pearson's Chi-squared test.

higher utilization of most non-psychiatric services, particularly for outpatient services in one month (60.3%) and in one year (81.3%) prior to SP than males (46.8% and 77.4%, respectively). Of note, younger men had a significantly higher proportion of emergency service use (9.9%) in one month prior to self-poisoning episodes than younger women (6.7%). Similarly, the older men also had a significantly higher proportion of emergency service use (39.8%) than their female counterparts (29.3%) for one year, but not for the one month, before the episode. Beside the emergency service, no other significant gender difference was found in the older age group. In the comparisons between age groups of each gender, older people were generally having higher proportion for non-psychiatric medical service use in the prior month and prior year, except for emergency service one year before the episodes for females (detailed p-values were not shown).

Table 3 presented age and gender differences for the prescriptions of psychotropic medications in the year before SP. Nearly half of the population was prescribed with anxiolytics (45.9%), around one in five with non-barbiturate benzodiazepines (20.7%), and followed by antipsychotics (18.4%). In the younger age group, the proportions of women prescribed with psychotropic prescriptions were almost always significantly higher than men (with an exception of benzodiazepines and anticonvulsants), specifically for anxiolytics (46.5% vs. 38.1%), antipsychotics (19.5% vs. 16.3%) and antidepressants (15.3% vs. 12.6%). No significance was detected for the differences between genders in the older age group. As to the comparisons between younger and older age groups by gender, the proportions of being prescribed psychotropic medication were significantly higher in the older group, with the exceptions of antipsychotics in men, and antipsychotic and antidepressants in women (detailed p-values not shown).

With an additional analysis regarding the proportion of people whose numbers of drugs prescribed changed a year and a month prior to index event, we found that the number of psychotropic prescriptions increased from one to two or more among 5.8% (n = 201) of subjects with SP, and, meanwhile, prescriptions of psychotropics were stopped in 7.0%

(n = 243) of patients in a month before the first episode. Specifically for lithium, it was added to only one patient but was stopped in 6 patients in the month prior to the first episode.

Discussion

This study depicted that more than half of the people with SP had medical contacts in the month before the first SP episode and around 80% in the year prior to their attempts in both genders. Distributions of psychiatric and physical disorders were significantly different between younger and older age groups. Women younger than 65 years old with self-poisoning behavior were more likely to be diagnosed with affective or neurotic disorder, used more outpatient services, and were prescribed with psychotropic medications, including antipsychotics, antidepressants, and anxiolytics compared to their male counterparts in the short-term (one month) and long-term (one year) before the event. While men younger than 65 years old were more often diagnosed with alcohol-related disorder and utilized more emergency services.

Our results that a vast majority of attempters had medical contacts prior to the index self-poisoning and around one-fifth of them had psychiatric visits, among which affective disorder is a common diagnosis among women, were compatible with previous international studies revealing that patients with self-harm have higher risks of depression or anxiety disorders.^{23–25} In addition, our finding that neurotic disorder was the most commonly given psychiatric diagnosis revealed two potential meanings: 1) Since the ICD-9-CM category of 'neurotic disorder' includes the diagnosis of 'neurotic depression', the high prevalence might imply that prior to SP, these patients were suffering from long-lasting or low-level of depression²⁶; and 2) the result that most younger women received such diagnoses and treatment from the specialty of internal medicine rather than psychiatry might indicate that their psychiatric conditions were just under-diagnosed.

In terms of the finding that alcohol-related disorders were more frequently seen in younger men than women,

Table 3 Categories of psychotropic medications prescribed within the year before the index event among people with their first self-poisoning episodes from 1997 to 2006 (%: column percentage).

Psychotropic prescription	Total (N = 3465)	<65 years old		p-Value ^a	≥65 years old		p-Value ^a
		Male (n = 1161)	Female (n = 1678)		Male (n = 332)	Female (n = 294)	
Benzodiazepines	716 (20.7)	217 (18.7)	322 (19.2)	0.74	89 (26.8)	88 (29.9)	0.39
Antipsychotics	639 (18.4)	189 (16.3)	327 (19.5)	0.03	62 (18.7)	61 (20.7)	0.51
Anxiolytics	1,592 (45.9)	442 (38.1)	780 (46.5)	<0.001	190 (57.2)	180 (61.2)	0.31
Antidepressants	507 (14.6)	146 (12.6)	257 (15.3)	0.04	56 (16.9)	48 (16.3)	0.86
Anticonvulsants	504 (14.5)	158 (13.6)	223 (13.3)	0.81	68 (20.5)	55 (18.7)	0.58

^a p-Values for gender differences within the same age group by Pearson's Chi-squared tests.

similar results were reported in another self-poisoned group in US.²⁷ Alcohol can cause a number of impulsive acts, psychological, physical, and occupational impairments.²⁸ Therefore, drinking at certain level might likely be a gender-related risk factor or a trigger of SP that needs recognition and necessary managements in young men.²⁹ However, compared to previous findings from psychological autopsy among suicide completers,^{9,30,31} our proportions of alcohol-related diagnoses were lower. Such finding might still reveal the potential under-detection of alcohol use disorders and that men were less likely to request for medical help. Hence, effective interventions in identifying affective disorders in younger women and alcohol use disorders in younger men as hints of long-standing psychosocial vulnerabilities³² related to suicide should be emphasized. Methods involving health professionals in general medicine to be familiar with the detection of the above common mental disorders, and to provide brief psychosocial assessment or suicide risk screening³³ for those seeking medical might help to enhance the identification of the risk for self-poisoning.

We found that around two-thirds of people who self-poisoned had diagnoses of gastrointestinal disorders within one year before the index events, possibly indicating that, people with self-poisoning and suicide intent might have psychological distress represented by physical discomforts or symptoms.⁹ Such relationship might also have underlying association between suicidal behavior and inflammation that required future research. In our study subjects, most psychosomatic complaints prior to their SP episode were disorders of stomach, gastritis, abdominal pain, dyspepsia, dizziness, headache, chest symptoms, and low back pain. However, the result that cardiovascular diseases were more prevalent in the older age group may actually reveal the characteristics of their physical conditions. Elderly people are main users of health services and have more medical contacts with health care professionals because of the chronic feature and multiple comorbidities of their illnesses.^{34,35} It might be helpful for the prevention of suicide if their physician or health care staff could be the "gate-keeper". That is, someone who not only concern about their patients' physical discomfort, but could also explore the link between these symptoms and patients' recent change in psychosocial or psychological conditions on the basis of their existing reports.

In our study, the result that women had more contacts than men in almost all of the medical specialties is consistent with previous studies.^{27,35} Gender difference might be

due to the issue that younger men are less likely to seek medical help. One of the reasons might be that men tend to avoid facing the situation in which they are not in control, such as illness, emotional weaknesses, or associated preventive health checkups, because of denial, embarrassment, or the desire to remain tough or masculine.^{27,36} Contrarily, women are more self-conscious of their own somatic discomfort,³⁵ more willing to receive physician counseling comparing to men having equal socio-economic status,³⁶ and more likely to adopt and engage in health beliefs or healthy behaviors.²⁷ These might also explain our finding that the higher percentage of men utilized the more costly emergency services because they may tend to endure their physical or psychological distress till that the severity reaches the extent of acute and critical need to be treated in the emergency department.^{27,35,37}

Another interesting finding in our study was that more than two-thirds of patients with SP utilized Chinese medicine within a year of the index event. Although the proportions seemed a little lower comparing to the national average of 67 per 1000 people per month visiting clinics of Chinese medicine in Taiwan,³⁵ such a phenomenon revealed a unique pattern of health service use different from the Western observations. Aside from the factor that the concept of Chinese medicine, such as that disorders are originated from the imbalance of the circulation of Qi and the blood,³⁸ is a deep-rooted part in the Chinese culture. The other reason for the utilization of Chinese medicine is that many people have the fear that Western medications would cause more side effects, whereas it is less invasive and more delicate to slowly regulate the body's health status through the combination of food and natural herbs.^{38,39} In our study, many patients received diagnoses ranged from musculoskeletal, nervous, circulatory endocrine systems, to mental disorders by Chinese medicine. Although this may indicate the natural course of diseases, they might also partly be the consequences of psychosomatic distress. However, since women in Taiwan often seek for the help of Chinese medicine to alleviate their discomforts from gynecological conditions such as menstrual, menopausal, or postpartum problems,^{38,40,41} this may also be the reason that younger women predominate the use of traditional Chinese medicine.³⁸ Further studies are needed to explore the differences in the utilization of Chinese medicine between people who self-poisoned and the general population.

Lastly, the female-dominant utilization pattern of anxiolytics is consistent with a previous study of Swedish national

registers,²² and might indicate that these patients have already suffered from clinical anxiety, sleep disturbances, or unidentified depression which required pharmacological intervention. Our observation that the SP patients being prescribed with anxiolytics might be people with unrecognized anxiety or depression but were managed in general medical specialties such as Chinese Medicine services rather than being treated by psychiatric professionals requires clinical notice. Further referral for clinical evaluations and appropriate treatments should be given to these people for their potential psychiatric illnesses. In addition, there were about one in six self-poisoned persons in both age groups received antipsychotics without the diagnoses of psychotic disorders. In addition, psychotropic prescriptions have been increased in some people at the time closer to the index event. Such off-label usage and the increase in dose might indicate that some health professionals have sensed the need to add antipsychotic for the prevention of uncontrollable impulses, or the possible aggravation of psychiatric conditions that might result in subsequent self-poisoning.^{43,44} On the other hand, our finding that some people stopped receiving psychotropic agents within one month before the index event needs to be examined from several aspects: 1) whether patients were no longer comply to treatments and such poor compliance deteriorates patients' underlying psychiatric disorders and resulted in subsequent self-poisoning; or 2) that patients chose to stop visiting physicians, because they have stockpiled sufficient medications to carry out self-poisoning⁴⁵; or 3) Physician made inadequate judgements that prescriptions were no longer needed. The second possibility is especially worth attention when previous research have reported that antidepressants overdose was the most common method of SP in those of middle age, and that benzodiazepines and sedatives the most common method in older age groups.^{6,19} Future studies may be needed to explore whether the change in prescription patterns might be able to predict the occurrence of SP. Furthermore, effective methods are needed in order to enhance first-line health care givers' skills regarding treatment adherence and safer medication use for the prevention of self-poisoning.

Strength of this study is the use of a population-based data with a long observation period that allowed the identification of a reasonable number of first episodes of self-poisoning for analysis. These results may be generalized to countries with comparable medical service systems and populations with similar cultural backgrounds. This study explored gender variations in medical help seeking behaviors among people who self-poisoned and to describe age and gender differences on the prescriptions of psychotropic medications in one year before self-poisoning. However, a key limitation is that findings were drawn from administrative rather than research datasets — particularly, the diagnoses in this study only reflected SP subjects who received treatments at hospitals, and there might be potential under reporting of cases who did not visit the medical facilities or died in the first attempt of self-poisoning. For this reason, a broader diagnostic group was deliberately chosen though the inclusion of 'accidental poisoning' might also result in an over-estimation. Moreover, the NHIRD lacks a few key variables such as detailed methods of SP (e.g. inhalation or ingestion of harmful substances), which

might be important for further analysis on the relationships between service utilization, prescriptions, and the methods of SP.⁴² Finally, the information regarding psychotropic medication merely reflected clinicians' prescription patterns, not patients' actual compliance to drugs. Therefore, we were unable to tell whether there were a potential drug-stockpiling behavior before cases' attempts, or the causal relationship between psychotropic medications, specifically antidepressant, and the occurrence of suicidal behaviors.

Conclusions

Our findings suggested that young females with first SP episodes contacted more non-psychiatric services particularly at the outpatient settings and have been prescribed with more psychotropic medications. Reasons for this might also be associated with having psychiatric or somatic diagnoses. Detection for potential affective or alcohol use disorders, as well as psychosomatic discomforts associated with possible risks of self-harm in non-psychiatric specialties may be important for case finding at an early stage. Further studies on developing integrated interventions including services of consultation-liaison and effective case referral protocols for prompt and appropriate clinical attention for first-line health care professionals may be indicated in order to prevent subsequent events of self-poisoning.

Contribution of the authors

CYW analyzed the data, wrote drafts of the study, and sought funding support; FYH contributed significantly in analyzing and interpreting the data and wrote part of the draft; CKC contributed to key research ideas, wrote drafts of the study, and provided professional opinions in manuscript preparation and interpretation of the findings; SIW designed the study, wrote drafts of the study, and provided opinions on interpretations and revisions of this manuscript. KKL designed the study, wrote part of the draft, and provided opinions on interpretations and revisions of this manuscript.

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Conflicts of interest

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