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Research paper

Psychotropic medication utilisation in adult cancer patients in China: A cross-sectional study based on national health insurance database

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ABSTRACT

Background: Psychotropic medications are useful to treat psychiatric disorders which are frequently underdiagnosed and undertreated in cancer patients. Evidence on utilisation of psychotropic medications in cancer patients was absent in China. This study aimed to analyse the prevalence and the potential predictors of psychotropic medication use in adult cancer patients in China.

Methods: We analysed cross-sectional data from the China Health Insurance Association database in 2015–2017, which contained health care utilisation information for a national representative sample of basic medical insurance beneficiaries. Cancer patients aged above 18 were identified by International Classification of Disease 10th revision code C00–C97. Psychotropic medications were defined following the Anatomical Therapeutic Chemical codes: antipsychotics (N05A), anxiolytics (N05B), hypnotics and sedatives (N05C), and antidepressants (N06A, N06CA). We calculated the prevalence of psychotropic medication use in cancer patients, and applied multivariable logistic regression to identify its potential predictors.

Findings: A total of 260,364 adults with cancer were identified in the database, of which 48,111 (18•5%) were prescribed at least one psychotropic medication comprising antipsychotics (3763, 1•4%), anxiolytics (15,902, 6•1%), hypnotics and sedatives (37,040, 14•2%), and antidepressants (2379, 0•9%). Patients with solid tumours had higher prevalence of psychotropic medication use than patients with lymphoid and hematopoietic malignancies (e.g. female genital organs, adjusted odds ratio (OR)=2•25, 95%CI=2•09–2•44). The prevalence of psychotropic medication use in cancer patients in the Eastern region was significantly higher than those of cancer patients in the Western regions (OR=2•33, 95%CI=2•27–2•40). Compared with the Urban Rural Resident Basic Medical Insurance beneficiaries, cancer patients covered by the Urban Employee Basic Medical Insurance were more likely to use psychotropic medications (OR=1•18, 95%CI=1•15–1•20). Midazolam was the most frequently used psychotropic (21,728, 45•2%), and flupentixol–melitracen was the most commonly used antidepressant (1176, 2•4%) among all psychotropic medication users in the sample.

Interpretation: The prevalence of psychotropic medication use in Chinese adult cancer patients was inequitable. Further attention will be needed to be paid to the mental health of cancer patients in China.

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Research in context

Evidence before this study

Mental health of cancer patients would be greatly affected by cancer and related treatment. Psychotropic medica-

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tions are useful to treat psychiatric disorders which are very common among cancer patients. We searched PubMed from database inception to July 11, 2020, without language restrictions for full papers, using the search terms "psychotropic", "antidepressant", "anxiolytic", "antipsychotic", "hypnotic" or "sedative"; "use" or "utilisation"; and "cancer", "malignant", "tumour" or "oncology". We identified 21 relevant papers. Evidence suggested that cancer patients were more likely to use psychotropic medications than general patients. The higher prevalence of psychotropic medication use was potentially associated with female, lower socio-economic status, and premorbid chronic medical conditions. Few studies analysed the utilisation of psychotropic medications in Chinese cancer patients.

Added value of this study

To our best knowledge, this is the first study to estimate the prevalence and potential predictors of psychotropic medication use in adult cancer patients in China. This study comprised 260,364 Chinese adults diagnosed with cancer sampled from a nationally representative health insurance database. Our results showed that the prevalence of psychotropic medication use in Chinese adult cancer patients was 18•5%, and only 2379 (0•9%) sample patients used antidepressants. There was an imbalanced distribution of psychotropic medication utilisation among regions and insurance schemes.

Implications of all the available evidence

Psychotropic medications were potentially underused in Chinese cancer patients. China's oncologists should pay more attention to the mental health of cancer patients, and improve their mental health service ability. With the gap between high prevalence and low recognition and treatment of psychiatric disorders in Chinese cancer patients, it will be necessary to raise the quality of psychosocial cancer care in general and cancer hospitals, especially in undeveloped regions.

Introduction

Mental health of patients would be greatly affected by cancer and related treatment. It has been reported that at least 30% of cancer patients meet the criteria for a psychiatric diagnosis, including about 10% for anxiety disorders, over 30% for depression or adjustment disorders, and 25–59% for sleep disturbances [1,2]. Psychotropic medications are useful to treat psychiatric disorders, such as antidepressants to treat depression and anxiety disorders [2,3].

In China, about 3,929,000 new cancer cases were reported in 2015, with the crude incidence rate of 285•8 per 100,000 population [4]. A systematic review showed that the prevalence of depression and anxiety among Chinese adults with cancer were about 54•9% and 49•7%, respectively [5]. However, few studies analysed the utilisation of psychotropic medications in Chinese cancer patients. This study aimed to estimate the prevalence and types of psychotropic medication use in adult cancer patients, and to identify its potential predictors in China.

Methods

Data source

China has been building a social health insurance system to achieve universal health coverage. By the end of 2015, over 95% of the population were covered by one of the two separate basic medical insurance (BMI) schemes [6]: the Urban Rural Resident Basic Medical Insurance (URRBMI) which covered the urban non-employed and self-employed population and rural residents, formed by merging the Urban Resident Basic Medical Insurance (URBMI) and the New Rural Cooperative Medical Scheme (NRCMS) in 2016 [7], and the Urban Employee Basic Medical Insurance (UEBMI) which was mandatory for urban employees.

The China Health Insurance Association (CHIRA) employed a two-stage systematic sampling design to obtain a national representative sample of BMI beneficiaries and extracted cross-sectional medical service utilisation data annually from the city-level BMI databases, sampled from 82 cities nationwide, representing about 2% of the total population in Mainland China [8,9]. Using probability proportionate to size sampling, the sampled BMI beneficiaries accounted for 2% of the beneficiaries from the centrally administered municipalities and provincial capitals, 5% of those from the prefecture-level cities, and 10% of those from the counties [8]. This study included cross-sectional data from the CHIRA database in 2015, 2016, and 2017, which overall contained detailed medical service utilisation information, including patients' age, gender, type of insurance scheme, region, cancer diagnosis and medication use of BMI beneficiaries. More details of the CHIRA database could be found in previous studies [8,10-12]. Since the CHIRA data was anonymised and de-identified, the need for ethics approval of this study was waived by the Ethics Committee of Peking University Health Science Centre, Beijing, China (No. IRB00001052-19017).

Study population

Cancer patients aged above 18 were identified in the CHIRA database according to the International Classification of Disease 10th revision code C00–C97 (malignant neoplasms).

Psychotropic medication

Medications in the CHIRA database were coded according to the Anatomical Therapeutic Chemical (ATC) Classification System maintained by the World Health Organisation Collaborating Centre for Drugs Statistics Methodology. We analysed psychotropic medications in four groups following the ATC codes: antipsychotics (N05A), anxiolytics (N05B), hypnotics and sedatives (N05C), and antidepressants (N06A, N06CA).

Statistical analysis

We conducted descriptive analyses for demographic and clinical characteristics. We classified age into three categories as young adults (18–44 years old), middle-aged adults (45–59 years old), and older adults (60 years old and above). Regions in the dataset were classified into three groups referred from the **China Health Statistics Yearbook** [13]. Eastern region consisted of 11 relatively developed provinces; Central region consisted of 8 less developed provinces; Western region consisted of 12 developing provinces.

The prevalence of psychotropic medication use was estimated as the proportion of cancer adults with any psychotropic medication prescribed, and the prevalence of specific psychotropic medication use was calculated as the percentage of cancer patients with a specific medication prescribed of all cancer patients with psychotropic medication use. Multivariable logistic regression models were used to examine the association of variables (including age, gender, type of insurance scheme, region, and cancer site) with psychotropic medication use in cancer patients based on literature review, reported in adjusted odds ratio (OR). All statistical analyses were performed by STATA 15. Statistical significance was set at 2-tailed P <0•05.

Role of the funding source

No funding source had been involved in or influenced the research process at any stage. The corresponding authors had full ac-

cess to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Sample characteristics

A total of 260,364 adults with cancer were identified in the CHIRA database in 2015, 2016, and 2017. Overall, 129,920 (49•9%) sample patients were female, 140,439 (53•9%) were 60 and older, 183,443 (70•5%) were covered by UEBMI. In terms of regions, 83,125 (31•9%) cancer patients received health care services in the Eastern region, 79,319 (30•5%) in the Central region, and 97,920 (37•6%) in the Western region. Digestive cancer (59,400, 22•8%) accounted for most patients in the sample, except cancers of ill-defined, secondary, and unspecified sites (96,254, 37•0%) (Supplementary Table 1).

Prevalence and predictors of psychotropic medication use

As shown in Table 1, 48,111 (18•5%) adult cancer patients had been prescribed at least one psychotropic medication, comprising antipsychotics (3763, 1•4%), anxiolytics (15,902, 6•1%), hypnotics and sedatives (37,040, 14•2%), and antidepressants (2379, 0•9%).

The prevalence of psychotropic medication use of patients covered by UEBMI was significantly higher than those of patients covered by URRBMI (OR=1•18, 95%CI=1•15–1•20). Compared to cancer patients in the Western region, patients in the Eastern and Central regions were significantly more likely to use psychotropic medications (east, OR=2•33, 95%CI=2•27–2•40; central, OR=1•27, 95%CI=1•23–1•30). Patients with solid tumours had higher prevalence of psychotropic medication use than patients with lymphoid and hematopoietic malignancies, such as female genital organs (OR=2•25, 95%CI=2•09–2•44), urinary tract (OR=2•25, 95%CI=2•07–2•45), and endocrine glands (OR=2•33, 95%CI=2•15–2•53). Besides, logistic regression analysis showed that psychotropic medication use was significantly associated with gender (female, OR=1•10, 95%CI=1•07–1•13) and age (aged 45–59, OR=1•14, 95%CI=1•11–1•19; aged ≥60, OR=1•14, 95%CI=1•10–1•18) (Table 1).

Of total psychotropic medication users, the most commonly prescribed was midazolam (21,728, 45•2%). In terms of antidepressant use, the most frequently used was flupentixol–melitracen (1176, 2•4%). The number of patients prescribed doxepin (193, 0•4%) and amitriptyline (184, 0•4%) was slightly higher than those of patients prescribed paroxetine (172, 0•4%) and escitalopram (169, 0•4%) (Table 2).

Discussion

This study firstly reported the prevalence of psychotropic medication use among Chinese adult cancer patients, and found it was much lower than previous studies reported in other countries and regions [14-16]. Especially, the prevalence of antidepressant use was only 0•9%, compared to 7•4% in Asian cancer patients to 27•1% in Spanish cancer patients [16-18]. It was reported that the prevalence of psychiatric disorders among adult cancer patients in China was considerably high, such as depression (54•9%) and anxiety (49•7%) [5], which meant psychotropic medications were potentially underused in Chinese cancer patients. This may due to several explanations. In China, most mental health care was provided in specialty psychiatric hospitals not co-located within general hospitals, resulting in access barriers of mental health services for cancer patients [20]. China's doctors except for psychiatrists still had difficulties in recognising and treating psychiatric disorders and communicating with cancer patients about mental problems due to inadequate training [19,21], leading to underdiagnosis and undertreatment [19,22]. Additionally, stigma perceived in mental disorders and extra economic burden from psychotherapy might prevent patients or their families from seeking mental health services [20,23].

Further, there was an imbalanced distribution of psychotropic medication utilisation among regions and insurance schemes. Cancer patients in the Eastern region were more likely to use psychotropic medications than patients in other regions, which could be explained by region imbalance in economic and health-care development. In China, the economically developed regions, including some eastern provinces, have more adequate health resources and services and higher personal disposable income per capita compared to underdeveloped regions [13,24-26]. Hence, the psychosocial care capacity in more developed regions were better and patients' needs for mental health care can be met in a more timely manner [20,27]. What's more, the prevalence of psychotropic medication use in cancer patients covered by URRBMI was much lower than that in patients covered by UEBMI. Patients covered by URRBMI with higher share of out-of-pocket expenses had higher economic burden [28], which might contribute to more psychological stress but make patients less willing to seek mental health care.

Cancer patients who were female or aged 45 years and over were more likely to be prescribed with psychotropic medications, which probably reflected the higher prevalence of psychiatric disorders in women and older patients [14]. Besides, adult patients with solid tumour of female genital organs and urinary tract had a higher prevalence of psychotropic medication use, similar to previous researches [15,29,30]. It was reported that the prevalence of psychiatric disorders in patients with the two cancers were higher among all cancer patients [31,32], which might relate to the decline in life quality and the blow to their dignity [33,34]. More attentions should be paid to mental health of patients with cancer of female genital organs and urinary tract. Psychiatrists could be invited to provide psychiatric consultations if necessary [35].

Among adult cancer patients prescribed psychotropic medications, the most commonly prescribed was midazolam (45.2%). In addition to treating sleep disorders, midazolam could be used in the palliative setting to address symptoms including extreme anxiety, pain, dyspnoea, nausea, restlessness, and agitated delirium, and was recommended to be made available in all settings caring for dying patients with cancer [3,36], which might make a biased estimation of sleep disorders in cancer patients based on the prevalence of hypnotics and sedatives use. Moreover, we found that flupentixol–melitracen was the most frequently used antidepressant containing tricyclic antidepressant (TCA) melitracen, and the second and the third most commonly used antidepressants were TCAs doxepin and amitriptyline. Although frequently used in the cancer setting, TCAs were less tolerated than other antidepressants (e.g. escitalopram) with more side effects [37]. TCAs might be problematic for patients with cardiac conditions and those taking other medications with anticholinergic properties [38]. Doctors should be more careful in clinical practice when prescribing psychotropic medications for cancer patients.

To our best knowledge, this is the first study to estimate the prevalence and potential predictors of psychotropic medication use among adult cancer patients in China based on a representative national health insurance database. However, our study had some limitations. First, as the CHIRA data was pooled cross-sectionally, it was unable to identify patients who used psychotropic medications before or after cancer diagnosis, which might make our findings overestimated. However, the prevalence of antipsychotic and antidepressant use in this study were just 1•4% and 0•9%, which meant psychotropic medications were potentially underused in Chinese cancer patients. Second, we failed to capture the psychiatric diagnosis and other indication information in the dataset.

Table 1
Prevalence and associated factors of psychotropic medication use in cancer patients from multivariable logistic models.

Characteristics	Psychotropic medications (*N*=48,111)				Antipsychotics *(N=3763)*			Anxiolytics *(N=15,902)*			Hypnotics and sedatives *(N=37,040)*			Antidepressants *(N=2379)*		
	No. of cancer patients with psychotropic medication use	*Proportion of psychotropic medication use (%)*	*Crude OR (95%CI)*	*Adjusted OR[a] (95%CI)*	*Proportion of antipsychotic use (%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*	*Proportion of anxiolytic use (%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*	*Proportion of hypnotic and sedative use(%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*	*Proportion of antidepressants use (%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*
Overall	48,111	18·5	••	••	1·4	••	••	6·1	••	••	14·2	••	••	0·9	••	••
Year																
2015	12,576	18·6	1·00	1·00	1·4	1·00	1·00	6·6	1·00	1·00	14·0	1·00	1·00	0·9	1·00	1·00
2016	15,721	18·8	1·01 (0·99–1·04)	1·01 (0·98–1·03)	1·5	1·02 (0·94–1·11)	1·02 (0·94–1·11)	6·3	0·95* (0·91–0·99)	0·95** (0·91–0·99)	14·4	1·03 (1·00–1·06)	1·02 (0·99–1·05)	1·0	1·12* (1·01–1·24)	1·08 (0·97–1·20)
2017	19,814	18·2	0·97* (0·95–1·00)	0·94*** (0·92–0·97)	1·5	1·02 (0·94–1·10)	1·01 (0·93–1·10)	5·7	0·86*** (0·83–0·90)	0·88*** (0·84–0·92)	14·1	1·00 (0·97–1·03)	0·96** (0·93–0·99)	0·8	0·89* (0·81–0·99)	0·99 (0·89–1·10)
Gender																
Male	23,337	17·9	1·00	1·00	1·6	1·00	1·00	6·2	1·00	1·00	13·3	1·00	1·00	0·8	1·00	1·00
Female	24,774	19·1	1·08*** (1·06–1·10)	1·10*** (1·07–1·13)	1·3	0·77*** (0·72–0·82)	0·89*** (0·82–0·95)	6·0	0·95** (0·92–0·99)	1·09*** (1·05–1·13)	15·0	1·15*** (1·13–1·18)	1·12*** (1·09–1·15)	1·0	1·15*** (1·06–1·25)	1·33*** (1·22–1·46)
Age																
18–44	5827	16·4	1·00	1·00	1·1	1·00	1·00	4·1	1·00	1·00	13·5	1·00	1·00	0·6	1·00	1·00
45–59	15,780	18·7	1·18*** (1·14–1·22)	1·15*** (1·11–1·19)	1·4	1·21*** (1·08–1·36)	1·04 (0·93–1·17)	6·0	1·48*** (1·39–1·57)	1·26*** (1·18–1·33)	14·7	1·10*** (1·06–1·14)	1·11*** (1·06–1·15)	0·9	1·66*** (1·42–1·94)	1·51*** (1·29–1·78)
≥60	26,504	18·9	1·19*** (1·15–1·23)	1·14*** (1·10–1·18)	1·6	1·37*** (1·23–1·53)	1·04 (0·93–1·16)	6·7	1·70*** (1·60–1·79)	1·29*** (1·22–1·37)	14.0	1·04* (1·01–1·08)	1·07*** (1·03–1·11)	1.0	1·83*** (1·57–2·13)	1·51*** (1·30–1·77)
Health insurance scheme[b]																
URRBMI	12,997	16·9	1·00	1·00	1·3	1·00	1·00	5·5	1·00	1·00	12·7	1·00	1·00	0·5	1·00	1·00
UEBMI	35,114	19·1	1·16*** (1·14–1·19)	1·18*** (1·15–1·20)	1·5	1·23*** (1·14–1·32)	1·26*** (1·17–1·36)	6·4	1·16*** (1·12–1·20)	1·16*** (1·12–1·21)	14·7	1·18*** (1·16–1·21)	1·20*** (1·17–1·23)	1·1	2·26*** (2·02–2·53)	1·97*** (1·76–2·20)
Region[c]																
Western	9355	9·6	1·00	1·00	0·9	1·00	1·00	2·8	1·00	1·00	7·1	1·00	1·00	0·4	1·00	1·00
Eastern	24,019	28·9	3·85*** (3·75–3·95)	2·33*** (2·27–2·40)	2·2	2·54*** (2·34–2·76)	1·86*** (1·70–2·03)	11·1	4·31*** (4·12–4·50)	2·91*** (2·78–3·05)	21·7	3·62*** (3·52–3·73)	2·08*** (2·02–2·15)	1·9	5·27*** (4·70–5·92)	4·89*** (4·33–5·53)
Central	14,737	18·6	2·16*** (2·10–2·22)	1·27*** (1·23–1·30)	1·4	1·62*** (1·48–1·77)	1·10 (1·00–1·21)	5·0	1·83*** (1·74–1·92)	1·13*** (1·07–1·19)	14·9	2·30*** (2·23–2·37)	1·32*** (1·28–1·37)	0·6	1·60*** (1·39–1·84)	1·57*** (1·36–1·82)
Cancer site[d]																
C81–C96	1146	18·6	1·00	1·00	1·6	1·00	1·00	7·2	1·00	1·00	12·5	1·00	1·00	1·0	1·00	1·00

(*continued on next page*)

Table 1 (*continued*)

Characteristics	Psychotropic medications (*N*=48,111)				Antipsychotics *(N=3763)*			Anxiolytics *(N=15,902)*			Hypnotics and sedatives *(N=37,040)*			Antidepressants *(N=2379)*		
	No. of cancer patients with psychotropic medication use	*Proportion of psychotropic medication use (%)*	*Crude OR (95%CI)*	*Adjusted OR[a] (95%CI)*	*Proportion of antipsychotic use (%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*	*Proportion of anxiolytic use (%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*	*Proportion of hypnotic and sedative use(%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*	*Proportion of antidepressants use (%)*	*Crude OR (95%CI)*	*Adjusted OR (95%CI)*
C00–C14	1065	20•2	1•11* (1•01–1•22)	1•19*** (1•09–1•31)	1•7	1•08 (0•81–1•44)	1•11 (0•83–1•48)	6•4	0•89 (0•77–1•03)	0•97 (0•84–1•13)	15•2	1•26*** (1•13–1•40)	1•34*** (1•20–1•49)	1•0	1•00 (0•69–1•45)	1•18 (0•81–1•71)
C15–C26	15,079	25•4	1•49*** (1•39–1•59)	1•60*** (1•49–1•71)	2•1	1•30* (1•06–1•60)	1•34** (1•09–1•65)	8•9	1•26*** (1•14–1•39)	1•36*** (1•23–1•51)	19•7	1•72*** (1•59–1•87)	1•83*** (1•69–1•98)	1•0	0•99 (0•76–1•29)	1•13 (0•87–1•47)
C30–C39	8527	25•9	1•53*** (1•43–1•64)	1•61*** (1•50–1•72)	2•5	1•54*** (1•25–1•90)	1•57*** (1•27–1•94)	11•8	1•74*** (1•57–1•92)	1•83*** (1•65–2•03)	17•4	1•48*** (1•37–1•60)	1•55*** (1•43–1•68)	1•4	1•43** (1•10–1•87)	1•57*** (1•20–2•05)
C50	5596	24•0	1•38*** (1•29–1•49)	1•30*** (1•21–1•40)	1•2	0•77* (0•61–0•97)	0•80 (0•64–1•02)	5•6	0•77*** (0•69–0•86)	0•72*** (0•65–0•81)	20•2	1•78*** (1•64–1•93)	1•64*** (1•51–1•78)	0•8	0•79 (0•59–1•05)	0•66** (0•49–0•88)
C51–C58	3754	33•4	2•20*** (2•04–2•37)	2•25*** (2•09–2•44)	2•1	1•33* (1•05–1•68)	1•49*** (1•17–1•90)	12•2	1•81*** (1•62–2•02)	1•89*** (1•69–2•13)	26•8	2•58*** (2•37–2•81)	2•56*** (2•35–2•80)	0•9	0•91 (0•66–1•25)	0•90 (0•65–1•24)
C64–C68	2310	35•5	2•41*** (2•22–2•61)	2•25*** (2•07–2•45)	2•2	1•37* (1•05–1•77)	1•23 (0•95–1•60)	7•8	1•09 (0•95–1•24)	0•96 (0•84–1•09)	31•0	3•16*** (2•88–3•47)	3•02*** (2•75–3•31)	0•9	0•93 (0•65–1•33)	0•80 (0•56–1•14)
C73–C75	2967	38•7	2•77*** (2•56–3•00)	2•33*** (2•15–2•53)	0•8	0•48*** (0•35–0•67)	0•43*** (0•31–0•59)	4•5	0•61*** (0•53–0•70)	0•49*** (0•42–0•57)	36•5	4•05*** (3•70–4•42)	3•42*** (3•12–3•74)	0•4	0•43*** (0•28–0•65)	0•31*** (0•20–0•47)
C76–C80	5484	5•7	0•26*** (0•25–0•28)	0•31*** (0•29–0•34)	0•6	0•39*** (0•31–0•48)	0•45*** (0•36–0•56)	1•8	0•24*** (0•21–0•26)	0•29*** (0•26–0•33)	3•8	0•28*** (0•26–0•30)	0•33*** (0•30–0•35)	0•7	0•70** (0•54–0•91)	0•96 (0•74–1•26)
Others	2183	18•7	1•01 (0•93–1•09)	1•06 (0•97–1•14)	1•7	1•09 (0•85–1•39)	1•09 (0•85–1•39)	6•0	0•83** (0•73–0•94)	0•88* (0•78–1•00)	14•2	1•17*** (1•06–1•28)	1•21*** (1•11–1•33)	1•1	1•04 (0•77–1•42)	1•16 (0•85–1•58)

* *P* value <0•05.
** *P* value < 0•01.
*** *P* value <0•001.
[a] OR, odds ratio. Adjusted OR, odds ratio adjusted for all other variables.
[b] Health insurance scheme: URRBMI, The Urban Rural Resident Basic Medical Insurance; UEBMI, The Urban Employee Basic Medical Insurance.
[c] The classification of the regions was referred from the China Health Statistics Yearbook. Eastern region: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan; Central region: Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan; Western region: Inner Mongolia, Chongqing, Guangxi, Sichuan, Guizhou, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.
[d] Cancer site: (1) C00–C14 for lip, oral cavity and pharynx; (2) C15–C26 for digestive organs; (3) C30–C39 for respiratory and intrathoracic organs; (4) C50 for breast; (5) C51–C58 for female genital organs; (6) C64–C68 for urinary tract; (7) C73–C75 for thyroid and other endocrine glands; (8) C76–C80 for ill-defined, secondary, and unspecified sites; (9) C81–C96 for lymphoid, haematopoietic, and related tissue; (10) remaining codes for other cancer sites.

Table 2.
Number and percentages of sample patients with specific medications in psychotropic medication users

Psychotropic medications (*N*=48,111)		Antipsychotics (*N*=3763)		Anxiolytics (*N*=15,902)		Hypnotics and sedatives (*N*=37,040)		Antidepressants (*N*=2379)	
Generic name	*No. (%)*	*Generic name*	*No. (%)*	*Generic name*	*No. (%)*	*Generic name*	*No. (%)*	*Generic name*	*No. (%)*
Midazolam	21,728 (45•2)	Chlorpromazine	1237 (2•6)	Diazepam	11,865 (24•7)	Midazolam	21,728 (45•2)	Flupentixol–melitracen	1176 (2•4)
Diazepam	11,865 (24•7)	Olanzapine	1139 (2•4)	Alprazolam	4388 (9•1)	Dexmedetomidine	11,215 (23•3)	Doxepin	193 (0•4)
Dexmedetomidine	11,215 (23•3)	Droperidol	956 (2•0)	Lorazepam	465 (1•0)	Estazolam	11,170 (23•2)	Amitriptyline	184 (0•4)
Estazolam	11,170 (23•2)	Haloperidol	247 (0•5)	Oxazepam	264 (0•5)	Zolpidem	1175 (2•4)	Paroxetine	172 (0•4)
Alprazolam	4388 (9•1)	Risperidone	80 (0•2)	Buspirone	16 (0•0)	Zopiclone	667 (1•4)	Escitalopram	169 (0•4)
Others	3918 (8•1)	Others	261 (0•5)			Others	512 (1•1)	Others	552 (1•1)

It was unable to identify whether the psychotropic medications, such as olanzapine which could be used as antiemetics, were used for psychiatric disorders, chemotherapy-induced nausea and vomiting, or other indications. Therefore, we could not measure the underuse of psychotropic medications in cancer patients. Third, we analysed medications with the ATC code N05, N06A and N06CA, so that some psychotropic medications used for mania, anxiety, and insomnia would be missed, such as clonazepam and lamotrigine (N03), chlormezanone (M03), and tandospirone, etc. Fourth, with the limitation of the database, we failed to analyse some socio-economic characteristics as potential predictors in our models, such as patients' education, occupation, and income. In addition, the CHIRA database did not capture medical utilisation information of cancer patients uncovered by BMI, the representativeness of the study sample might be biased. Nevertheless, its impact on our findings should be quite limited because the people uncovered by BMI accounted for less than 5% in the whole population in China [6].

Conclusions

This study showed that the prevalence of psychotropic medication use in Chinese adult cancer patients was inequitable. It will be necessary to improve the mental health service ability of doctors and raise the quality of psychosocial cancer care in general and cancer hospitals, especially in undeveloped regions.

Author contributions

LS, XG, and ZX conceptualised and designed the study. CH and LB contributed to the data analysis. LB and XG conducted the final analyses. LB, YS, and XG contributed to results interpretation. LB, XG, ZX, YS, and LS drafted the initial manuscript. All authors contributed to the article and approved the submitted version.

Declaration of Interests

All authors declare that there are no conflicts of interest.

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Data sharing statement

The datasets generated for this study are available on request to the corresponding author.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.lanwpc.2020.100060.

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