



Research article

Gender differences among long-stay inpatients with schizophrenia in China: A cross-sectional study

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ABSTRACT

Objective: We sought to examine the independent correlates of long-term hospitalization in a sample of Chinese inpatients with schizophrenia (SCZ) from a gender-based perspective.

Methods: This was a cross-sectional study that was carried out in a tertiary psychiatric hospital. All adult inpatients in this hospital were screened from January to March 2020, 251 of whom were identified as long-stay inpatients with SCZ (LSIS) and 224 as short-stay inpatients with SCZ (SSIS). Demographic and clinical information of the two groups was collected through medical records, scale assessments and interviews. Gender differences were analyzed, and independent correlates of long-stay between genders were explored by logistic regression analyses.

Results: Compared to SSIS, greater proportions of LSIS patients were male (64.1%), single (82.1%), unemployed (81.7%) and had no family caregivers (54.2%). For LSIS per se, proportionally more males were single (88.8%), had no family caregiver (65.8%), had concomitant physical disease (65.2%) and had a history of hazardous behavior (27.3%) than their female counterparts. For females, the top independent risk factors for a long stay included poor functioning ($OR = 5.9$, 95% $CI: 2.9-12.0$), older age ($OR = 4.3$, 95% $CI: 2.1-9.1$) and being single ($OR = 3.9$, 95% $CI: 1.8-8.4$). Similar to women, both older age ($OR = 5.3$, 95% $CI: 2.5-11.2$) and poor functioning ($OR = 4.0$, 95% $CI: 2.1-7.9$) were also independent factors for long-term hospitalization of male patients; however, having no family caregiver ($OR = 10.2$, 95% $CI: 4.6-22.6$) was the primary risk factor for men.

Conclusions: Both clinical and nonclinical factors play important roles in long-term hospitalization in Chinese patients with schizophrenia. There are overlaps and distinctions across genders with respect to the independent factors of long stays. These findings provide clues for developing better service strategies for this population, and highlight the importance of paying attention to gender differences in further research in this field.

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1. Introduction

The World Psychiatric Association (WPA) and World Health Organization (WHO) have stated that deinstitutionalization should be regarded as a priority worldwide for psychiatric disease management [1,2]. Deinstitutionalization has been implemented in many countries and has aided the transition of long-stay inpatients to community facilities, which is of help for the rehabilitation of social functioning, reduction of stigma, improvement of well-being and improvement of quality of life [3,4]. Furthermore, deinstitutionalization may promote the rapid and comprehensive development of community-based mental health care. However, the process of deinstitutionalization in East and Southeast Asia is much slower. For instance, in China, the mental health care system remains hospital-based [5]. According to data released by the National Bureau of Statistics, the total number of psychiatric beds in China has increased significantly in recent years [6]. More specifically, this figure in 2016 was double that in 2002. This phenomenon not only shows that the Chinese government is paying more attention to mental health but also indicates that psychiatric deinstitutionalization in China may face major challenges, among which a high rate of long-term hospitalization may have played an important role.

Patients with schizophrenia (SCZ) are the leading long-stay inpatients in China. SCZ affects ~1% of the total population [7] and accounts for more than half of long-term hospitalized patients with mental disorders [8,9]. This could be because SCZ is a chronic, debilitating and disabling disease. As reported in previous studies, up to 20%–60% of SCZ patients are treatment resistant and eventually become mentally disabled [10]. Nevertheless, evidence has also indicated that not all long-stay SCZ patients truly need such long-term hospitalization. As reported by a large sample-size study carried out in Japan, nearly 40% of SCZ inpatients hospitalized for ≥ 1 year were judged to have the possibility of being discharged and treated using community-based mental health care [11]. Therefore, apart from the disease itself, there may also be reasons for the high long-term hospitalization rate of SCZ patients.

Risk factors for long-term hospitalization of SCZ patients have been studied for years; yet studies have yielded inconsistent results thus far. Some researchers have recognized that certain clinical features are of particular relevance, mainly including severe negative symptoms, poor self-care ability, and violent behavior [12,13]. Others hypothesize that some nonclinical factors play a role as well, such as older age, having medical insurance [14], and a shortage of family support and community services [15]. Notably, previous studies on this topic were rarely conducted in China, although China may have the largest number of patients with SCZ worldwide. In addition, China has a unique sociocultural background that might also influence long-term hospitalization; therefore, the results from other countries may not be generalizable [16].

When exploring the reasons and risk factors for long-term hospitalization, the gender gap is another issue worthy of attention. For example, male patients are more likely to have an earlier onset age and present more disorganized and negative symptoms; men tend to have greater social impairment and are more inclined to exhibit relatively poorer treatment response and prognosis [15,17,18]. Additionally, males pose much higher risk of violence than females [19,20]. From this point of view, it is warranted to explore the factors associated with long-term hospitalization in SCZ from a gender-based perspective. Evidence has already shown that, in general, women tend to have fewer hospitalizations and shorter lengths of stay [14,21,22]. Recently, we also noticed that timely discharge of male SCZ patients in China was more difficult and slower than that of their female counterparts [23]. However, as far as we know, there is no research focusing on the independent risk factors for long-term hospitalization in SCZ from the perspective of gender differences.

For the above reasons, we carried out the present study. We set out to investigate the characteristics of long-stay patients with SCZ in China, especially emphasizing the sex difference. We hypothesized that the independent correlates of long-term hospitalization may differ between male and female patients. More specifically, the timely discharge of male patients is more affected by non-clinical factors than that of females. Clarifying this gender difference is helpful to better formulate service strategies for this population, thus helping to reduce unnecessary waste of medical resources.

2. Materials and methods

2.1. Study design

This is a single-center cluster sampling cross-sectional study carried out in the Affiliated Mental Health Center of Jiangnan University, i.e., Wuxi Mental Health Center (WMHC). WMHC is the only tertiary psychiatric hospital in Wuxi City, Jiangsu Province, eastern China; it has ~1300 psychiatric beds and provides services in the treatment and rehabilitation of people with mental disorders from the local and surrounding cities. The technique used for the study included a survey and questionnaire completed by inpatients with SCZ enrolled through convenience sampling from January to March 2020. The study protocol was approved by the Ethics Committee of WMHC (No. *WXMHCIRB2020LLky030*). All researchers signed a written commitment to protecting the privacy of subjects. The reporting of this study followed the Journal Article Reporting Standards of the American Psychological Association (<https://apastyle.apa.org/jars/>).

2.2. Participants

During the study period, all adult inpatients were screened to determine whether they were long-stay inpatients with SCZ (LSIS) or short-stay inpatients with SCZ (SSIS). Those who met the following criteria were defined as LSIS in the present study: (1) first diagnosis was schizophrenia according to the criteria of the International Classification of Diseases, 10th Revision (ICD-10) [24]; (2) aged 18–65 years old; and (3) hospitalized for no less than 12 successive months. For comparisons, inpatients who met the following criteria were defined as having SSIS: (1) diagnosed with schizophrenia according to ICD-10; (2) aged 18–65 years old; and (3) discharged with

Table 1
Demographic and clinical characteristics of all subjects (n, %).

Variable	All (n = 475)	LSIS (n = 251)	SSIS (n = 224)	χ^2/t	p-value
Demographic characteristics					
Male	283 (59.6)	161 (64.1)	122 (54.5)	4.605	0.032
Age range (years)	18–65	22–65	18–65	–	–
Average age (years)	48.20 ± 11.67	52.66 ± 10.11	43.21 ± 11.29	–9.626	< 0.001
Single	340 (71.6)	206 (82.1)	134 (59.8)	28.805	< 0.001
Lower education level	250 (52.6)	153 (61.0)	97 (43.3)	14.795	< 0.001
Unemployed	361 (76.0)	205 (81.7)	156 (69.6)	9.392	0.002
No family caregiver	161 (33.9)	136 (54.2)	25 (11.2)	97.780	< 0.001
Medical insurance	418 (88.0)	239 (95.2)	179 (79.9)	26.268	< 0.001
Clinical characteristics					
Age of onset (years)	27.08 ± 9.05	26.18 ± 8.43	28.09 ± 9.61	2.313	0.021
Paranoid subtype	256 (53.9)	143 (57.0)	113 (50.4)	2.029	0.154
Concomitant physical disease	233 (49.1)	152 (60.6)	81 (36.2)	28.192	< 0.001
Hazardous behavior	104 (21.9)	58 (23.1)	46 (20.5)	0.458	0.499
Treatment with clozapine	178 (37.5)	120 (47.8)	58 (25.9)	24.264	< 0.001
Poor GAF	258 (54.3)	182 (72.5)	76 (33.9)	71.005	< 0.001

psychiatrist approval and a length of stay (LOS) of no more than 3 months [25,26]. We excluded those subjects whose information needed was unavailable or could not be verified (e.g. vagrant patient) and whose LOS was less than 72 h.

Considering that one of our main concerns was the correlation of timely discharge, patients over 65 years old were not included in this study, because their long-term hospitalizations are often more related to comorbidities and complications. Similarly, those with schizophrenia hospitalized for serious medical conditions (e.g. cancer) and those convicted of compulsory medical treatment for committing crimes were also excluded. Patients, who were able to comprehend and provide written informed consent and those without any impairment in communication at the point of recruitment, were recruited into the study. Ultimately, 475 adult patients with SCZ (192 women and 283 men) were enrolled, with a mean age of 48.20 ± 11.67 years, and a mean age of onset of 27.08 ± 9.05 years (Table 1).

2.3. Data collection and management

Information was collected using a purpose designed standard data collection form for this study. Data were mainly collected through the electronic medical record system for inpatients, and confirmed with the patients or their families when necessary. Two aspects of data were collected, of which demographic information included sex, age, educational level, marital status, employment status before admission, guardian or family caregiver, and types of medical insurance. Clinical information included subtype of SCZ, age of onset, date of the present admission, medication used, concomitant physical disease (e.g. diabetes, hypertension) and hazardous behavior (i.e. violent assault, suicidal or severe self-harm behaviors) at admission or during hospitalization. For the protection of privacy, all subjects' names were not collected, but the unique numbers of medical records were used for data collection and verification. Global Assessment of Function (GAF) [27] was employed to evaluate patients' severity of mental symptoms as well as the levels of social and occupational functions. The total GAF score ranges from 0 to 100, and the higher the score is, the better the global functioning. GAF was assessed by a senior psychiatrist together with a psychiatric nurse with knowledge of the patients via a face-to-face interview. For LSIS, these assessments were carried out on a ward-by-ward basis; for SSIS, GAF assessments were performed immediately before discharge to reconfirm that the patient did not belong to the LSIS cohort.

Retrieved data were recorded independently by two researchers using EpiData 3.1 (<http://www.epidata.dk/>). Inconsistencies were resolved by double-checking the electronic medical record database and/or discussion with a third investigator.

2.4. Covariate definitions

To better explain the meaning of each indicator and facilitate data statistics and result interpretation, variables in this study were defined as follows: *LSIS* was defined as a patient with a current LOS of no less than 12 months without a short absence of no more than one week. *SSIS* referred to the current LOS within 3 months and a normal discharge according to a doctor's advice. *Older* referred to 50 and above, according to the median age of all subjects in this study. *Single* meant having no spouse at the time of admission, including unmarried, divorced, widowed and separated. *Lower education level* was defined as an education level of junior high school and below, which corresponds to China's Compulsory Education Law. *Unemployment* referred to being unemployed for at least one year before this admission, including due to long-term leave or retirement due to illness. *Medical insurance* referred to having any kind of medical insurance that reimburses part of medical expenses, including Urban Employee Basic Medical Insurance, Urban Resident Basic Medical Insurance, New Rural Cooperative Medical scheme, and the Government Insurance System. According to the average age of onset of all samples, the *earlier age of onset* was defined as less than 27 years old. *Family caregivers* were defined as those who were willing to provide unpaid care and take responsibility for a patient living at home, which was a broad-sense conception that included spouses, parents, children, siblings, and other relatives. *Poor GAF* referred to a GAF score below 60, which means that the patient has moderate psychiatric symptoms or moderate impairment of social, occupational, or academic abilities [27]. *Treatment with clozapine* meant that

the patient's primary antipsychotic drug at the time of this study was clozapine, which is often used to treat patients with SCZ who have a poor response to other antipsychotics [28]. *Paranoid subtype* refers to patients' clinical diagnosis as paranoid schizophrenia, which is a common subtype of SCZ that mainly manifests with positive symptoms such as hallucinations and delusions, and is generally hypothesized to have a relatively better prognosis [29].

2.5. Sample size estimation

The sample size needed was calculated using the software G*Power (Version 3.1.9.2). To detect a between-group difference using independent sample *t* tests with a power no less than 80%, a total of 128 samples were needed to detect a small effect size (Cohen's $d = 0.3$) when the allocation ratio was set as 1 and alpha as 0.05 (2-tailed). Similarly, to detect independent correlates for LSIS using *z* tests (logistic regression) with a power no less than 80%, a total of 311 samples were needed to detect a medium effect size (odds ratio, OR = 1.68) when H_0 was set as 0.15, R^2 other X as 0.25, and alpha as 0.05 (2-tailed). In our study, 475 participants were recruited, which satisfied the sample size requirement with a power greater than 95%.

2.6. Statistical analysis

All data were analyzed using the software IBM SPSS Statistics for Windows, version 16. The significance level was set at 0.05 (2-sided). Comparisons between two independent groups were conducted using independent-samples *t*-tests for normally distributed continuous variables or Mann-Whitney *U* tests for nonnormally distributed continuous variables, as appropriate. The one-sample Kolmogorov-Smirnov test was employed to check the normal distribution. Categorical variables were compared by Pearson's chi-squared test. Binary logistic regression analysis was employed to explore independent correlates of long-term hospitalization. The OR with 95% confidence interval (CI) was used as a measure of association. First, univariate analysis was applied to reveal potential risk factors, and variables with unadjusted *p*-values no more than 0.2 were allowed to enter the next step to avoid missing important factors. Then, linear regression was used by collinearity diagnostics. Variables with variance inflation factors (VIFs) greater than 2.5 were removed from the model. Finally, eligible variables were entered as covariates into the stepwise multivariate analyses (Forward: LR) to determine the independent correlates. Bonferroni correction was adopted to adjust for multiple comparisons to reduce the probability of type I error. Only those variables with *p*-values less than the Bonferroni adjusted *p*-value threshold were considered statistically significant.

3. Results

3.1. Overview of all subjects

During the study period, a total of 1214 patients hospitalized in WMHC were screened and evaluated, of whom 698 were identified as SCZ patients. According to the inclusion and exclusion criteria, 251 were identified as LSIS and 224 as SSIS. Among all subjects, nearly three-fifths were male (59.6%), 71.6% were single, more than half had relatively lower education levels (52.6%), and most were unemployed before this admission (76.0%). More than one-third of inpatients had no family caregivers (33.9%), and 88.0% of them were supported by medical insurance during hospitalization. In terms of clinical characteristics, 53.9% were diagnosed with the paranoid subtype, and approximately half had one or more physical diseases (49.1%). Notably, 21.9% of patients had a history of hazardous behavior at admission or during hospitalization, and nearly two-fifths were treated with clozapine, either alone or combined (37.5%). In this study, more than half of the samples had poor global functions with a GAF under 60 points (Table 1).

In the univariate analysis, we compared the demographic/clinical characteristics regarding whether the patients had a current LOS of no less than 12 months within our sample ($n = 475$). Individuals who were LSIS had higher proportions of being male (64.1% vs. 54.5%, $p = 0.032$), being single (a combination of unmarried, divorced, and widowed) (82.1% vs. 59.8%, $p < 0.001$), having a lower education level (61.0% vs. 43.3%, $p < 0.001$), and being unemployed (81.7% vs. 69.6%, $p = 0.002$). They also had higher proportions of lacking family caregivers (54.2% vs. 11.2%, $p < 0.001$), and medical insurance during this hospitalization (95.2% vs. 79.9%, $p < 0.001$). The average age of LSIS was significantly higher than that of SSIS (52.66 vs. 43.21, $p < 0.001$), however, the mean age of onset was younger in the LSIS cohort (26.18 vs. 28.09, $p = 0.021$). There were no significant differences in terms of the paranoid subtype of SCZ and a history of hazardous behavior (Table 1).

3.2. Gender differences between LSIS and SSIS

The proportion of men who were single was significantly higher than that of women in LSIS and SSIS ($\chi^2 = 13.0$, 7.5; $p < 0.001$). In LSIS, a higher proportion of male inpatients with SCZ had no family caregivers ($\chi^2 = 24.6$, $p < 0.001$), however, this proportion was similar in SSIS. In addition, there were significant gender differences in concomitant physical diseases and hazardous behavior ($\chi^2 = 4.1$, 4.5; $p < 0.05$), similarly, no significant differences were found in SSIS. No significant gender differences were observed with respect to other characteristics as listed in Table 2.

In the SSIS, in addition to the above differences in marital status, it is worth noting that only diagnostic subtypes between genders had significant differences ($\chi^2 = 7.5$, $p < 0.001$). There were no significant differences between gender in the others (Table 2).

Table 2
Gender differences between the LSIS and SSIS (n, %).

Variable	LSIS (n = 251)			SSIS (n = 224)		
	Males (n = 161)	Females (n = 90)	χ^2/t	Males (n = 122)	Females (n = 102)	χ^2/t
Demographic characteristics						
Age (years)	53.22 ± 10.34	51.64 ± 9.66	1.187	42.25 ± 11.33	44.35 ± 11.18	1.394
Single	143 (88.8)	63 (70.0)	13.896 [#]	83 (68.0)	51 (50.0)	7.516 [#]
Lower education level	104 (64.6)	49 (54.4)	2.500	53 (43.4)	44 (43.1)	0.002
Unemployed	134 (83.2)	71 (78.9)	0.727	91 (74.6)	65 (63.7)	3.102
No family caregiver	106 (65.8)	30 (33.3)	24.570 [#]	12 (9.8)	13 (12.7)	0.474
Medical insurance	156 (96.9)	83 (92.2)	2.768	98 (80.3)	81 (79.4)	0.029
Clinical characteristics						
Age of onset (years)	25.86 ± 7.61	26.76 ± 9.73	0.809	27.46 ± 9.68	28.85 ± 9.52	1.081
Paranoid subtype	85 (52.8)	58 (64.4)	3.196	52 (42.6)	61 (59.8)	5.560 [#]
Concomitant physical disease	105 (65.2)	47 (52.2)	4.082 [#]	45 (36.9)	36 (35.3)	0.061
Hazardous behavior	44 (27.3)	14 (15.6)	4.504 [#]	23 (18.9)	23 (22.5)	0.465
Treatment with clozapine	83 (51.6)	37 (41.1)	2.522	32 (26.2)	26 (25.5)	0.016
Poor GAF	117 (72.7)	65 (72.2)	0.006	42 (34.4)	34 (33.3)	0.030

[#] $p < 0.05$.

3.3. Independent correlates of LSIS

The independent correlates of long-stay were explored by binary logistic regression analyses. When all subjects were pooled together, the univariate analyses showed significant between-group differences in 9 variables, including poor GAF, no family caregiver, older, single, lower education level, unemployed, having medical insurance, concomitant physical disease, and treatment with clozapine. Another 2 variables, namely earlier age of onset and paranoid subtype, had p-values less than 0.2, although they were larger than the Bonferroni adjusted p-value threshold. The VIFs of these variables ranged from 1.06 to 1.62, suggesting no obvious collinearity. In the multivariate analysis, 5 of the above 11 covariates survived in the final model and all were positively related to long-stay: poor GAF, no family caregiver, being older, being single, and having medical insurance (all $p \leq 0.001$) (Table 3).

The Bonferroni adjusted p-value threshold of univariate analysis was set to 0.0042 (0.05/12), and that of the multivariate analysis was set to 0.0045 (0.05/11).

We further performed subgroup analyses by sex. For females, there were 9 variables positively associated with long-stay in univariate analyses, but only 3 of them passed the Bonferroni adjusted p-value threshold. Similarly, 10 variables with unadjusted p values no more than 0.2 were entered into the next step, and no obvious multicollinearity was found (VIFs = 1.10–1.55). In the final model, only 3 of them survived the Bonferroni correction: poor GAF, older age and being single (Table 4).

The Bonferroni adjusted p-value threshold of univariate analysis was set to 0.0042 (0.05/12), and that of the multivariate analysis was set to 0.005 (0.05/10).

For males, 8 variables were significantly associated with a long stay in univariate analyses. Again, no obvious multicollinearity was found among the 12 variables with unadjusted p-values less than 0.2 (VIFs = 1.06–1.65). In the multivariate analysis, similar to females, only 3 of these variables passed the Bonferroni correction and entered the final model, including having no family caregiver, older age and poor GAF (Table 5). Notably, lack of family caregivers ranked first and had an OR value double that of older and poor GAF, which was not the case for women, suggesting that it could be the most important risk factor for long-term hospitalization in men. Being single was no longer a significant independent factor for long-term hospitalization for male patients. The above difference between males and females indicated a gender gap among long-stay inpatients with SCZ.

The Bonferroni adjusted p-value thresholds of both univariate and multivariate analyses were set to 0.0042 (0.05/12).

4. Discussion

This study intended to provide a general impression of long-stay inpatients with SCZ through a Chinese sample and to reveal potential independent correlates of long-term hospitalization from a gender perspective. We found that more long-stay SCZ inpatients were males, and socially disadvantaged, such as being single, older and lacking family caregiving, which contributed more to long-term stay than disease severity. Analyses by gender showed that for females, risk factors included poor GAF, older age and single status. Older age and poor GAF also played a role in long-term stay for males, however, the most important independent variable for them was having no family caregivers.

Long-term hospitalization remains a very common phenomenon for patients with SCZ in China [17,23]. However, there is evidence that such a long stay has not only caused a heavy economic burden on medical healthcare [18,30], but also maybe unnecessary in practice [31]. Recently, we found that male SCZ inpatients had significantly longer hospitalization periods than females, despite their severity of illness and overall function being comparable [23]. The results of the present study indicate that several factors beyond illness severity have contributed to the long-term hospitalization of Chinese SCZ patients; more frankly, having no place to go may be a key obstacle for many patients even if their symptoms were significantly improved. Lower GAF scores and/or older age, which usually represent more severe mental symptoms and/or poorer social functioning that hinder the discharge of SCZ patients [15,30], were replicated in the present study regardless of the overall analysis or subgroup analysis. Notably, not all LSIS patients have poor GAF or

Table 3
Binary logistic regression analyses for LSIS.

Variable	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Poor GAF	5.1 (3.5–7.6)	< 0.001	5.3 (3.3–8.5)	< 0.001
No family caregiver	9.4 (5.8–15.3)	< 0.001	4.7 (2.6–8.4)	< 0.001
Older	4.3 (2.9–6.4)	< 0.001	3.6 (2.2–6.0)	< 0.001
Single	3.1 (2.0–4.7)	< 0.001	3.0 (1.7–5.2)	< 0.001
Medical insurance	5.0 (2.6–9.7)	< 0.001	3.5 (1.6–7.7)	0.001
Lower education level	2.0 (1.4–2.9)	< 0.001	NI	0.451
Concomitant physical disease	2.7 (1.9–3.9)	< 0.001	NI	0.050
Treatment with clozapine	2.6 (1.8–3.9)	< 0.001	NI	0.150
Unemployed	1.9 (1.3–3.0)	0.002	NI	0.571
Earlier age of onset	1.7 (1.2–2.5)	0.005	NI	0.081
Paranoid subtype	1.3 (0.9–1.9)	0.155	NI	0.062
Hazardous behavior	1.2 (0.8–1.8)	0.499	NE	–

NI: variables not in the final model; NE: not entered the multivariate analysis.

Table 4
Binary logistic regression analyses for LSIS in females.

Variable	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Poor GAF	5.2 (2.8–9.7)	< 0.001	5.9 (2.9–12.0)	< 0.001
Older	3.3 (1.8–6.0)	< 0.001	4.3 (2.1–9.1)	< 0.001
Single	2.3 (1.3–4.2)	0.005	3.9 (1.8–8.4)	< 0.001
Medical insurance	3.1 (1.2–7.6)	0.015	2.9 (1.0–8.2)	0.043
Earlier age of onset	2.2 (1.2–3.9)	0.010	2.1 (1.0–4.4)	0.039
No family caregiver	3.4 (1.6–7.1)	0.001	NI	0.371
Concomitant physical disease	2.0 (1.1–3.6)	0.019	NI	0.117
Unemployed	2.1 (1.1–4.1)	0.022	NI	0.894
Treatment with clozapine	2.0 (1.1–3.8)	0.022	NI	0.698
Lower education level	1.6 (0.9–2.8)	0.119	NI	0.700
Paranoid subtype	1.2 (0.7–2.2)	0.509	NE	–
Hazardous behavior	1.6 (0.8–3.3)	0.222	NE	–

NI: variables not in the final model; NE: not entered the multivariate analysis.

Table 5
Binary logistic regression analyses for LSIS in males.

Variable	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p-value	OR (95% CI)	p-value
No family caregiver	17.7 (9.0–34.8)	< 0.001	10.2 (4.6–22.6)	< 0.001
Older	5.7 (3.4–9.5)	< 0.001	5.3 (2.5–11.2)	< 0.001
Poor GAF	5.1 (3.0–8.4)	< 0.001	4.0 (2.1–7.9)	< 0.001
Treatment with clozapine	3.0 (1.8–5.0)	< 0.001	2.3 (1.2–4.4)	0.015
Single	3.7 (2.0–6.9)	< 0.001	2.4 (1.0–5.8)	0.049
Hazardous behavior	1.6 (0.9–2.9)	0.098	2.2 (1.0–4.7)	0.049
Lower education level	2.4 (1.5–3.8)	< 0.001	NI	0.454
Concomitant physical disease	3.2 (2.0–5.2)	< 0.001	NI	0.468
Medical insurance	7.6 (2.8–20.7)	< 0.001	NI	0.145
Unemployed	1.7 (0.9–3.0)	0.076	NI	0.810
Paranoid subtype	1.5 (0.9–2.4)	0.091	NI	0.141
Earlier age of onset	1.4 (0.8–2.2)	0.199	NI	0.740

NI: variables not in the final model.

are older. In our data, more than a quarter of samples had a GAF score above 60 and patient age less than 40, indicating that some factors other than disease severity or functional defects also played a crucial role, which is in line with our hypothesis. Trieman and colleagues reported gender as a noteworthy factor associated with the degree of difficulty of discharging patients [32]. Similarly, despite overlaps, our data also suggest an obvious gender gap with respect to independent correlates of long stay. Subgroup analysis by sex shows that the most important nonclinical factor for female patients is marital status at admission, while for men, it is having no family caregivers.

In our sample, 70% of female LSIS patients were single, which is much higher than their counterparts in the SSIS group. Unfortunately, being single increased the risk for long-term hospitalization by approximately 4-fold for this population. In other words, if

female patients can get married before they get sick, they may be less likely to be left in the hospital for a long time after suffering from schizophrenia. Interestingly, the situation is not the same for men. Although the proportion of men who are single is higher, being single is not a significant independent risk factor for their long-term hospitalization because they may be in a more disadvantageous situation. As shown in [Table 2](#), for those in the LSIS cohort, the proportion of males reported as “single” was just slightly higher than that of females (88.8% vs. 70%); however, the proportion of “no family caregiver” in males was double that in females (65.8% vs. 33.3%), which means that male patients are more likely to be abandoned by their families, not only including their spouse (if present), but also other family members. This dilemma may be caused by a variety of reasons. As we know, the male-biased sex ratio in China has resulted in numerous “surplus” men even among the general population in recent decades [33], and onset ages of SCZ in men are usually earlier than in women: therefore, men usually get sick before they get married [34]. Due to the previous “only one child” policy in China, many people have no siblings and therefore no nephew or niece. In addition, social stigma toward men with SCZ is more common, as male patients tend to display more aggressive and violent behaviors toward the public [22,33]. This might greatly weaken the willingness of their family members (if any) to take care of the discharged patients. Eventually, many patients are hospitalized long-term, mainly due to a shortage of effective external support.

Other factors that are considered reasons for long-term hospitalization are not supported in the present study. For example, in the study by Tulloch and colleagues [13], violent behaviors were the second largest risk factor, just after the severity of disease. Nevertheless, this variable failed to pass the multiple comparison in our final model, indicating that it might play a limited role compared with the above mentioned factors. In addition to the medical insurance associated with long stays [23,35], community placement is also an important factor that cannot be ignored in the successful discharge of patients with SCZ [4]. Community support for SCZ patients is still limited in China, although this issue has received increasing attention in recent years. Distinctions between this study and previous ones may be due to the differences in the sample’s race composition, social and cultural backgrounds, etc., or may be related to the fact that previous studies did not conduct the subgroup analysis by sex, which further demonstrates the necessity of the present study and further research on this topic in different populations.

5. Limitations

There are several limitations of this study. First, this is a cross-sectional study, and by default, it is unable to establish causality; therefore, our results may not directly translate to clinical strategic decisions. Second, this is a single-center study that only collected samples from a large psychiatric hospital. In addition, long-term hospitalization may also be affected by more factors than we investigated in the present study, such as family stigma, family members’ income and employment, size of community, community placements, etc. Moreover, there could be some interactions among the variables defined in this study, although no collinearity was detected. Therefore, our findings need to be further verified by multicenter and large-sample studies, and caution should be taken when generalizing the results of the present study.

6. Conclusion

Despite the above shortcomings, as far as we know, our study is the first to systematically examine the characteristics and gender gap of long-term hospitalized SCZ patients in China. Our findings suggested that some nonclinical factors may exert greater impacts on long stay than disease severity; we also revealed gender overlaps and differences in independent correlates of long stay in this population, which would have helped to better formulate better service strategies for long-stay SCZ patients and reduce unnecessary waste of medical resources. Further investigations on this topic are warranted.

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Author contribution statement

Mingru Hou, Jun Wang and Xianwen Li: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Jianhua Xue, Jianqin Pei and Yan Shi: Contributed reagents, materials, analysis tools or data.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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