Research Square

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Frequent readmission versus prolonged hospitalization in depressive disorder: distinct risk factor profiles from a 6,172-patient retrospective cohort in Northwest China

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Abstract

Background

Hospitalized patients with depressive disorder consume substantial psychiatric resources, yet the determinants of how often patients are admitted and how long they stay remain poorly characterized within a single population. This study examined the demographic, clinical, and social-determinant factors differentially associated with the two dimensions of hospital burden.

Methods

This retrospective cohort study included 6,172 patients with a primary discharge diagnosis of depressive disorder (ICD-10 F32–F33) at a tertiary hospital in Northwest China from 2021 to 2025; 6,115 entered main analyses. The number of admissions was modeled with Poisson regression and length of stay with a Gamma model with log link; restricted cubic splines examined non-linear associations.

Results

The cohort (72.8% female; median age 38 years) had a mean of 1.44 admissions (SD 1.1); 24.9% had ≥ 2 admissions and 19.0% stayed > 15 days. Older age (IRR 1.006 per year, 95% CI 1.003–1.008), retirement (IRR 1.103, 1.026–1.186), higher BMI (1.006, 1.001–1.012), longer illness duration (1.001 per month), suicidal ideation (1.056, 1.008–1.107), and more recent admission year (1.023, 1.006–1.041) predicted more admissions. For length of stay, somatic comorbidity count was the strongest predictor (RR 1.013 per condition, 95% CI 1.009–1.017), followed by severe depression (1.213, 1.088–1.353), unmarried status (1.034, 1.008–1.061), male sex (1.020, 1.000–1.041), retirement (1.036, 1.003–1.070), and admission year (1.028, 1.021–1.035); age was not associated with stay duration (1.000, 0.999–1.001). Admissions declined to 519 in 2022, surged to 1,691 in 2023, and declined thereafter.

Conclusions

Admission frequency and length of stay in hospitalized depressive disorder have largely distinct risk profiles. Differentiated strategies (community-based relapse prevention for older and socially isolated patients, integrated medical-psychiatric management for those with multimorbidity, and structured post-discharge follow-up for patients with suicidal ideation) may improve resource allocation.

Introduction

Depressive disorders are a leading contributor to the global burden of disease, and patients requiring psychiatric hospitalization represent a particularly resource-intensive subgroup characterized by severe symptomatology, acute suicidality, and high rates of medical comorbidity [1, 2]. In China, where a large

national survey has documented substantial unmet mental health needs [3], mental health service demand has risen markedly in recent years, and tertiary psychiatric services report sustained overcrowding; evidence on which patients consume the most inpatient resources is therefore needed [4].

From a health-services perspective, inpatient burden is best captured by two distinct dimensions: how often a patient is admitted, and how long each admission lasts. Frequent readmission signals failed community transitions and chronic instability, whereas prolonged hospitalization directly consumes bed capacity and generates costs; psychiatric length of stay itself follows a bimodal distribution, with crisis admissions distinct from extended-care admissions [5]. Evidence increasingly indicates that psychiatric readmission reflects not only clinical trajectories but also broader social vulnerability during the transition from inpatient to community-based care [6]. Registry data implicate unemployment, low education, and poor social support as independent predictors of early readmission [8], and pooled analyses estimate that 16% of discharged patients return within 30 days [7]. For length of stay, somatic comorbidity burden has emerged as one of the strongest predictors in hospital-based studies [9], and substance use has been linked to more frequent readmissions with shorter individual stays in schizophrenia spectrum disorders [10], whereas unemployment and older age show less consistent associations across settings [11, 12].

However, three gaps remain. First, most studies examine readmission and length of stay as isolated endpoints, leaving open the question of whether the two dimensions of high hospital burden are driven by the same or by distinct risk factor profiles within a single population. Second, social-determinant variables, although central to public health frameworks, remain inconsistently captured in psychiatric utilization studies using administrative data. Third, evidence from Northwest China, a region with distinctive demographics and a multi-ethnic population, is scarce.

This study therefore used a five-year retrospective cohort of 6,172 hospitalized patients with depressive disorder from a tertiary hospital in Northwest China to model the two dimensions of hospital burden simultaneously. We aimed to (i) describe the distribution and temporal trends of admission frequency and length of stay from 2021 to 2025, and (ii) identify demographic, clinical, and social-determinant factors differentially associated with each dimension, to inform stratified resource allocation and post-discharge management strategies.

Methods

Study design and setting

This retrospective cohort study was conducted at the psychological medicine center of a tertiary hospital in Northwest China, using electronic medical records (EMRs) of consecutive hospitalizations over a five-year period. The study was approved by the Ethics Committee of The First Affiliated Hospital of Xinjiang Medical University and was conducted in accordance with the Declaration of Helsinki.

Because the study used de-identified retrospective data, the requirement for informed consent was waived.

Study population

Admissions were identified by discharge dates between 1 January 2021 and 31 December 2025. Eligible admissions had a primary discharge diagnosis of depressive disorder (ICD-10 F32–F33). Records with a missing narrative history of present illness were excluded (n = 1) because suicidal and self-harm behaviors could not be classified. Admissions with ICD-10 codes that do not specify episode severity (F32.8, F32.9, F33.9, F34, F39; n = 57) were excluded from primary analyses because core exposure variables could not be determined; sensitivity analyses including these cases were performed. For patients with multiple hospitalization records during the study period, the most recent admission was retained as the analysis record, and the total number of admissions (2021–2025) was analyzed as the count outcome. Records with unrecordable illness duration (n = 19) were excluded from regression models (0.3% of the main analysis set). After these steps, 6,172 patients were identified and 6,115 entered the main analyses (Fig. 1).

Variables and outcomes

The two primary outcomes were (i) the number of hospital admissions per patient during 2021–2025 (count, range 1–16) and (ii) length of stay (LOS) in days for the most recent admission (range 1–71). Secondary dichotomous outcomes were defined as high-frequency admission (≥ 2 admissions) and prolonged stay (> 15 days).

Predictors comprised sociodemographic and social-determinant variables (age, sex, marital status, occupation categorized as employed, retired, unemployed, or student, body mass index [BMI], and admission year), clinical characteristics (illness duration in months, depression severity classified from ICD-10 codes as mild [F32.0], moderate [F32.1], or severe [F32.2/F32.3], psychotic features [F32.3], substance dependence identified from F10–F19 codes among secondary diagnoses, anxiety comorbidity, number of additional psychiatric comorbidities, and number of somatic comorbidities), and suicidal/self-harm behaviors. Suicidal ideation, suicide attempt, and self-harm were extracted from the narrative history of present illness by manual chart review applying explicit classification criteria. The Hamilton Depression Rating Scale (HAMD) score, when available (n = 5,399), was used as a continuous measure of depression severity in ancillary analyses.

Statistical analysis

Continuous variables are presented as mean (SD) or median (IQR) according to distribution, and categorical variables as counts (percentages). For the count outcome, Poisson regression was used after confirming the absence of overdispersion (Pearson dispersion statistic 0.67); a negative binomial

model was fitted as a comparison and showed no improvement in fit. For LOS, a Gamma generalized linear model with log link was used, given the right-skewed distribution. Restricted cubic splines with four knots at the 5th, 35th, 65th, and 95th percentiles [13] were used to examine non-linear associations of age, somatic comorbidity count, and illness duration with both outcomes; non-linearity was tested by likelihood-ratio tests against linear models. Collinearity was assessed with variance inflation factors (maximum 5.7, attributable to the expected structural correlation between age and retirement status). Two interactions were prespecified on prior grounds: sex × age group (admission frequency) and psychotic symptoms × somatic comorbidity count (LOS). Subgroup analyses stratified by sex, age group (≤ 17, 18–44, 45–64, ≥ 65 years), and psychotic symptoms were performed for the two key exposures. Five sensitivity analyses were conducted: (i) excluding LOS outliers above the 99th percentile; (ii) including the 57 unclassifiable cases with severity coded as moderate; (iii) restricting to 2023–2025; (iv) restricting to adults (≥ 18 years); and (v) using untruncated illness duration. All tests were two-sided with $\alpha = 0.05$. Analyses were performed with R version 4.4.3.

Results

Study population and hospitalization patterns

From 11,357 admission records of the psychological medicine center between 2021 and 2025, 6,172 patients with a primary discharge diagnosis of depressive disorder were identified; after excluding 57 admissions with ICD-10 codes that do not specify severity, 6,115 patients entered the main analyses (Fig. 1). The cohort was predominantly female (72.8%), with a median age of 38 years (IQR 18–53) and a median somatic comorbidity count of 4 (IQR 2–6). Employed patients accounted for 45.6%, students 32.4%, retired patients 15.0%, and unemployed patients 7.0%; 51.7% were married. Suicidal ideation was recorded in 59.2%, suicide attempt in 18.7%, and self-harm in 27.6% of patients; severe depression (ICD-10 F32.2/F32.3) accounted for 8.0% and psychotic features for 4.4% (Table 1). HAMD scores were available for 5,399 patients (median 24, IQR 22–27).

Table 1
Baseline characteristics of 6,115 patients with depressive disorder

Characteristic	All (n = 6115)	< 2 admissions (n = 4590)	>=2 admissions (n = 1525)	<=15 days (n = 4955)	> 15 days (n = 1160)
n	6115	4590	1525	4955	1160
Age, median (IQR)	38 (18–53)	34 (17–51)	47 (33–58)	36 (18–52)	42 (22–56)
<=17	22.4%	26.2%	11.0%	23.7%	17.0%
18–44	38.2%	39.7%	33.7%	38.4%	37.2%
45–64	30.5%	27.0%	40.9%	29.5%	34.8%
>=65	8.9%	7.1%	14.4%	8.5%	11.0%
Female	72.8%	72.8%	72.7%	73.4%	70.3%
Married	51.7%	47.1%	65.5%	51.0%	54.6%
Employed	45.6%	43.1%	53.2%	45.1%	47.7%
Retired	15.0%	12.0%	24.0%	13.9%	19.7%
Unemployed	7.0%	7.3%	6.0%	6.8%	7.8%
Student	32.4%	37.6%	16.8%	34.2%	24.8%
BMI, median (IQR)	23 (20–26)	23 (20–26)	24 (21–27)	23 (20–26)	23 (20–26)
Illness duration, months, median (IQR)	36 (12–72)	24 (12–60)	48 (24–96)	36 (12–72)	36 (12–84)
Moderate depression	91.2%	91.3%	91.0%	91.7%	89.1%
Severe depression	8.0%	7.9%	8.4%	7.5%	10.5%
Psychotic symptoms	4.4%	4.8%	3.3%	4.3%	5.2%
Suicidal ideation	59.2%	59.6%	57.8%	59.2%	59.3%
Suicide attempt	18.7%	19.5%	16.1%	18.9%	17.8%
Self-harm	27.6%	29.6%	21.3%	28.3%	24.5%
Substance dependence	0.6%	0.6%	0.7%	0.5%	0.9%
Anxiety comorbidity	33.4%	31.2%	40.1%	32.9%	35.3%

Characteristic	All (n = 6115)	< 2 admissions (n = 4590)	>=2 admissions (n = 1525)	<=15 days (n = 4955)	> 15 days (n = 1160)
Psychiatric comorbidity count, median (IQR)	0 (0–1)	0 (0–1)	1 (0–1)	0 (0–1)	0 (0–1)
Somatic comorbidity count, median (IQR)	4 (2–6)	4 (2–6)	5 (2–7)	4 (2–6)	4 (2–7)
HAMD, mean (SD)	24.3 (4.3)	24.3 (4.3)	24.0 (4.4)	24.1 (4.3)	24.7 (4.2)
Admission year, median (IQR)	2024 (2023–2024)	2024 (2023–2024)	2024 (2023–2025)	2024 (2023–2024)	2024 (2023–2024)

Values are median (IQR), mean (SD), or n (%). IQR, interquartile range; HAMD, Hamilton Depression Rating Scale. Main analysis set excludes 57 patients with unclassifiable ICD-10 severity codes.

Hospital utilization was markedly skewed. The mean number of admissions was 1.44 (SD 1.1); 4,590 patients (75.1%) had a single admission, and 1,525 (24.9%) had two or more admissions (Table 2; Fig. 2A). The median length of stay was 13 days (range 1–71), and 1,160 patients (19.0%) stayed longer than 15 days (Fig. 2B). Annual admissions showed a clear temporal pattern: 719 in 2021, 519 in 2022, 1,691 in 2023, 1,749 in 2024, and 1,437 in 2025. The proportion of prolonged stays (> 15 days) rose from 7.6% in 2021 to 25.4% in 2023, then declined to 17.5% by 2025, whereas the proportion of high-frequency admissions (≥ 2) increased steadily from 22.4% in 2021 to 29.8% in 2025 (Fig. 5).

Table 2
Hospitalization characteristics (n = 6,115)

Characteristic	Value
Number of admissions, mean (SD)	1.4 (1.1)
median (range)	1 (1–16)
1 admission(s)	75.1%
2 admission(s)	16.0%
3 admission(s)	4.5%
4 admission(s)	2.3%
5 admission(s)	0.9%
6 admission(s)	0.5%
7 admission(s)	0.3%
8 admission(s)	0.1%
9 admission(s)	0.0%
10 admission(s)	0.0%
11 admission(s)	0.0%
12 admission(s)	0.0%
13 admission(s)	0.0%
14 admission(s)	0.1%
16 admission(s)	0.0%
High-frequency admission (> = 2)	24.9%
Length of stay, days, mean (SD)	12.7 (4.4)
median (range)	13 (1–71)
Prolonged stay (> 15 days)	19.0%
Admissions in 2021	11.8%
Admissions in 2022	8.5%
Admissions in 2023	27.7%
Admissions in 2024	28.6%
Admissions in 2025	23.5%
Recurrent admission	24.9%

Factors associated with number of admissions

Poisson regression showed no evidence of overdispersion (dispersion statistic 0.67); therefore Poisson models were retained. Older age was associated with a higher number of admissions (IRR 1.006 per year, 95% CI 1.003–1.008, $p < 0.001$; approximately 1.06 per decade). Retired patients had a 10.3% higher admission rate than employed patients (IRR 1.103, 95% CI 1.026–1.186, $p = 0.008$), while students and unemployed patients showed non-significant trends toward fewer admissions (IRR 0.919, $p = 0.064$ and IRR 0.922, $p = 0.069$, respectively). Higher BMI (IRR 1.006 per unit, 95% CI 1.001–1.012, $p = 0.018$), longer illness duration (IRR 1.001 per month, 95% CI 1.000–1.001, $p < 0.001$), more recent admission year (IRR 1.023 per year, 95% CI 1.006–1.041, $p = 0.009$), and suicidal ideation (IRR 1.056, 95% CI 1.008–1.107, $p = 0.023$) were also independently associated with more admissions. Psychotic symptoms showed a trend toward fewer admissions (IRR 0.873, 95% CI 0.754–1.010, $p = 0.068$). Sex, marital status, depression severity, suicide attempt, self-harm, substance dependence, anxiety comorbidity, psychiatric comorbidity count, and somatic comorbidity count were not significantly associated with admission frequency (Table 3). Restricted cubic spline analysis confirmed a non-linear association between age and admission frequency (non-linearity $p = 0.016$): relative to the median age (38 years), the admission rate was approximately 23% lower among adolescents and 15% higher among patients in their late 60s, with the steepest rise between ages 25 and 48 years (Fig. 3A). The association between somatic burden and admission count was consistent with linearity ($p = 0.340$, Fig. 3C).

Table 3
Factors associated with number of hospital admissions (Poisson regression, n = 6,096)

Variable	Rate ratio	95% CI	P
Age, per year	1.006	1.003–1.008	< 0.001
Male (vs female)	0.990	0.943–1.038	0.674
Not married (vs married)	0.987	0.929–1.048	0.671
Retired (vs employed)	1.103	1.026–1.186	0.008
Unemployed (vs employed)	0.922	0.844–1.005	0.069
Student (vs employed)	0.919	0.840–1.005	0.064
BMI, per unit	1.006	1.001–1.012	0.018
Illness duration, per month	1.001	1.000–1.001	< 0.001
Moderate depression (vs mild)	1.051	0.828–1.362	0.692
Severe depression (vs mild)	1.233	0.949–1.630	0.128
Psychotic symptoms	0.873	0.754–1.010	0.068
Suicidal ideation	1.056	1.008–1.107	0.023
Suicide attempt	1.021	0.958–1.089	0.515
Self-harm	1.023	0.960–1.090	0.481
Substance dependence	0.988	0.756–1.263	0.924
Anxiety comorbidity	0.953	0.889–1.023	0.181
Psychiatric comorbidity count	1.019	0.967–1.073	0.485
Somatic comorbidity count	0.996	0.986–1.006	0.434
Admission year	1.023	1.006–1.041	0.009

IRR, incidence rate ratio; CI, confidence interval. Adjusted for all variables listed.

Table 4
Factors associated with length of stay (Gamma GLM with log link, n = 6,096)

Variable	Rate ratio	95% CI	P
Age, per year	1.000	0.999–1.001	0.585
Male (vs female)	1.020	1.000–1.041	0.050
Not married (vs married)	1.034	1.008–1.061	0.010
Retired (vs employed)	1.036	1.003–1.070	0.032
Unemployed (vs employed)	1.023	0.988–1.060	0.202
Student (vs employed)	0.989	0.954–1.026	0.560
BMI, per unit	0.998	0.996–1.000	0.045
Illness duration, per month	1.000	1.000–1.001	< 0.001
Moderate depression (vs mild)	1.099	0.995–1.211	0.059
Severe depression (vs mild)	1.213	1.086–1.351	< 0.001
Psychotic symptoms	0.982	0.923–1.045	0.571
Suicidal ideation	1.019	1.000–1.039	0.052
Suicide attempt	0.980	0.955–1.005	0.114
Self-harm	0.997	0.972–1.022	0.799
Substance dependence	1.058	0.949–1.183	0.318
Anxiety comorbidity	0.995	0.966–1.025	0.752
Psychiatric comorbidity count	1.019	0.996–1.042	0.104
Somatic comorbidity count	1.013	1.009–1.017	< 0.001
Admission year	1.028	1.021–1.036	< 0.001
Recurrent admission (vs first)	0.980	0.960–1.001	0.059
Rate ratio > 1 indicates longer stay. Adjusted for all variables listed.			

Factors associated with length of stay

In the Gamma model with log link, the somatic comorbidity count was the strongest predictor of longer hospitalization: each additional somatic condition was associated with a 1.3% longer stay (RR 1.013, 95% CI 1.009–1.017, p < 0.001; approximately 6.7% longer for five conditions). Severe depression was associated with a 21.3% longer stay compared with mild depression (RR 1.213, 95% CI 1.088–1.353, p <

0.001). Patients who were not married stayed 3.4% longer than married patients (RR 1.034, 95% CI 1.008–1.061, p = 0.010). Male sex (RR 1.020, 95% CI 1.000–1.041, p = 0.050), retired status (RR 1.036, 95% CI 1.003–1.070, p = 0.032), and more recent admission year (RR 1.028 per year, 95% CI 1.021–1.035, p < 0.001) were also associated with longer stays, whereas higher BMI was associated with marginally shorter stays (RR 0.998 per unit, 95% CI 0.996–1.000, p = 0.045). Age showed no association with length of stay (RR 1.000 per year, 95% CI 0.999–1.001, p = 0.585), and recurrent admission was associated with a non-significant trend toward shorter stays (RR 0.980, 95% CI 0.960–1.001, p = 0.059). Restricted cubic spline analysis revealed a non-linear association between somatic burden and length of stay (non-linearity p < 0.001), characterized by a monotonic increase that attenuated at higher comorbidity counts (Fig. 3D). The association between age and length of stay was consistent with linearity (p = 0.613, Fig. 3B) and remained essentially flat across the age range. In an ancillary model additionally adjusted for HAMD score (n = 5,399), each one-point increase in HAMD was associated with a 0.4% longer stay (RR 1.004, 95% CI 1.001–1.006, p = 0.007), whereas HAMD was not associated with admission frequency (IRR 0.995, 95% CI 0.990–1.001, p = 0.113).

Interaction, subgroup, and sensitivity analyses

Neither prespecified interaction reached statistical significance: sex × age group for admission frequency (p = 0.337) and psychotic symptoms × somatic comorbidity count for length of stay (p = 0.121; Supplementary Table S3). In subgroup analyses, the association of age with admission frequency and of somatic burden with length of stay remained directionally consistent across strata of sex, age group, and psychotic symptoms (Fig. 4; Supplementary Table S2), with the largest age effect observed among patients aged 18–44 years (IRR 1.013, 95% CI 1.005–1.021) and the largest somatic effect among patients with psychotic symptoms (RR 1.035, 95% CI 1.015–1.056). Sensitivity analyses supported the robustness of the main findings: excluding length-of-stay outliers above the 99th percentile, including the 57 unclassifiable cases (with severity coded as moderate), restricting to 2023–2025, restricting to adults (≥ 18 years), and using untruncated illness duration all yielded materially unchanged estimates (e.g., age IRR for admission frequency 1.000–1.006; somatic RR for length of stay 1.011–1.014; severe depression RR 1.148–1.252; Supplementary Table S1).

Discussion

In this cohort of 6,115 hospitalized patients with depressive disorder, the determinants of how often patients were admitted and how long they stayed were largely distinct. Somatic comorbidity burden was the strongest predictor of prolonged hospitalization, whereas older age, retirement, and suicidal ideation predicted more frequent admissions, with age showing no association with length of stay, consistent with prospective evidence linking somatic comorbidity to worse long-term outcomes in unipolar depression [14]. This bifurcated pattern suggests that the "high-burden" phenotype in depressive disorder is not monolithic, and that strategies to reduce recurrent admissions and strategies to shorten stays may need to target different patient subgroups.

The dissociation between age and the two outcomes is a key finding. Each additional year of age was associated with a 0.6% higher admission rate, and the spline analysis showed a non-linear escalation that was steepest between ages 25 and 48, whereas age was essentially unrelated to LOS. Large Chinese administrative cohorts similarly report higher readmission risk across age groups [17]. This pattern is consistent with a model in which aging lowers the threshold for relapse and crisis presentation without altering the within-episode recovery trajectory; polypharmacy with central nervous system-active medications may further destabilize outpatient management in older adults [15]. The higher admission rates among retired patients (IRR 1.103) reinforce a social-structural interpretation: loss of occupational routine and social networks may precipitate recurrent crises, in line with evidence that non-employment and retirement predict higher inpatient utilization among middle-aged and older adults in China [16]. This dissociation is also consistent with the limited predictive performance reported for 30-day readmission models even in large national registry cohorts, where patient-level predictors leave most variance unexplained [8].

The association between suicidal ideation and more frequent admissions (IRR 1.056), identified with the re-classified suicidality variables, adds a further nuance. Patients with ideation re-entered inpatient care more often, yet ideation, attempts, and self-harm showed no positive association with LOS; elsewhere, suicidal ideation has been linked to shorter crisis-focused stays [10]. Together, these observations suggest a utilization pattern of repeated crisis admissions without prolonged episodes for this subgroup, which argues for post-discharge suicide-prevention follow-up rather than longer stays as the appropriate response; Chinese adolescent data similarly identify suicide attempt history as a strong readmission predictor [18].

Among social determinants, unmarried status predicted a 3.4% longer stay, and retired status predicted both outcomes. The rising proportions of unmarried and unemployed patients observed in Chinese psychiatric emergency services in recent years [4] suggest that social isolation and economic insecurity are increasingly concentrated among those presenting for mental health care, a trend our findings extend to inpatient utilization. From a public health perspective, this supports the systematic assessment of psychosocial circumstances in discharge planning, as recommended by recent reviews [6].

The temporal pattern we observed (a trough in 2022, a 3.3-fold surge in admissions in 2023, and gradual decline thereafter, mirrored by an increase in the prolonged-stay rate from 7.6% in 2021 to 25.4% in 2023) parallels national reports of post-pandemic surges in psychiatric service use across China [4, 19]. The proposed mechanisms include release of pent-up demand, post-COVID biological effects, re-entry stressors after lockdowns, and secular increases in depression prevalence. These trends point to the need for surge capacity and stronger primary-level mental health services, which currently face crowding by semi-urgent presentations at tertiary centers.

Several implications for service planning follow. First, recurrent admissions among older and retired patients point to community-based relapse prevention, a priority shared by global initiatives on healthy

ageing [22, 23]: models such as home-based collaborative care have reduced hospitalizations in comparable populations [20], and hospital-community bridging programs can shorten access to stepped care from months to weeks [21]. Second, the consistent somatic-burden gradient in LOS supports integrated medical-psychiatric co-management within hospitals for patients with multimorbidity. Third, given that a quarter of patients accounted for nearly half of all admission episodes, stratified post-discharge management targeting high-frequency users may yield meaningful efficiency gains.

This study has limitations. The retrospective single-center design limits generalizability, although the cohort size and five-year span are substantial. Administrative data are subject to coding inconsistencies, and illness duration relied partly on narrative extraction. The count outcome reflects admissions within a five-year window only, and exposures were measured at the most recent admission, which may post-date earlier outcome episodes. The suicidality variables were derived by manual classification, albeit with auditable criteria. Finally, unmeasured factors such as medication adherence, social support quality, and insurance status, which have been associated with readmission in other Chinese studies, were unavailable.

Conclusions

In a five-year cohort of 6,115 hospitalized patients with depressive disorder, admission frequency and length of stay had largely distinct determinants: older age, retirement, and suicidal ideation predicted recurrent admissions, whereas somatic comorbidity burden, severe depression, and unmarried status predicted longer stays, with age unrelated to stay duration. These bifurcated risk profiles support differentiated service strategies: community-based relapse prevention for older and socially isolated patients, integrated medical-psychiatric management for those with multimorbidity, and structured post-discharge follow-up for patients with suicidal ideation.

Abbreviations

BMI: body mass index; CI: confidence interval; EMR: electronic medical record; HAMD: Hamilton Depression Rating Scale; ICD-10: International Classification of Diseases, 10th Revision; IQR: interquartile range; IRR: incidence rate ratio; LOS: length of stay; RR: rate ratio; SD: standard deviation; SDOH: social determinants of health.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of The First Affiliated Hospital of Xinjiang Medical University. The requirement for informed consent was waived because the study used de-identified retrospective data with no potential risk to patients.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available due to restrictions imposed by the ethics committee regarding patient confidentiality. The data are stored in the secure institutional electronic medical record system and access is limited to authorized research personnel. Reasonable requests for data access may be considered upon formal application to the First Affiliated Hospital of Xinjiang Medical University and in compliance with applicable data protection regulations.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

D.T. contributed to the conceptualization, data curation, formal analysis, and writing of the original draft. X.L. was responsible for the investigation and resources. Y.L. developed the software and visualization. H.H. provided supervision, project administration, and funding acquisition, and contributed to the writing, review, and editing. All authors have read and approved the final manuscript.

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Figures

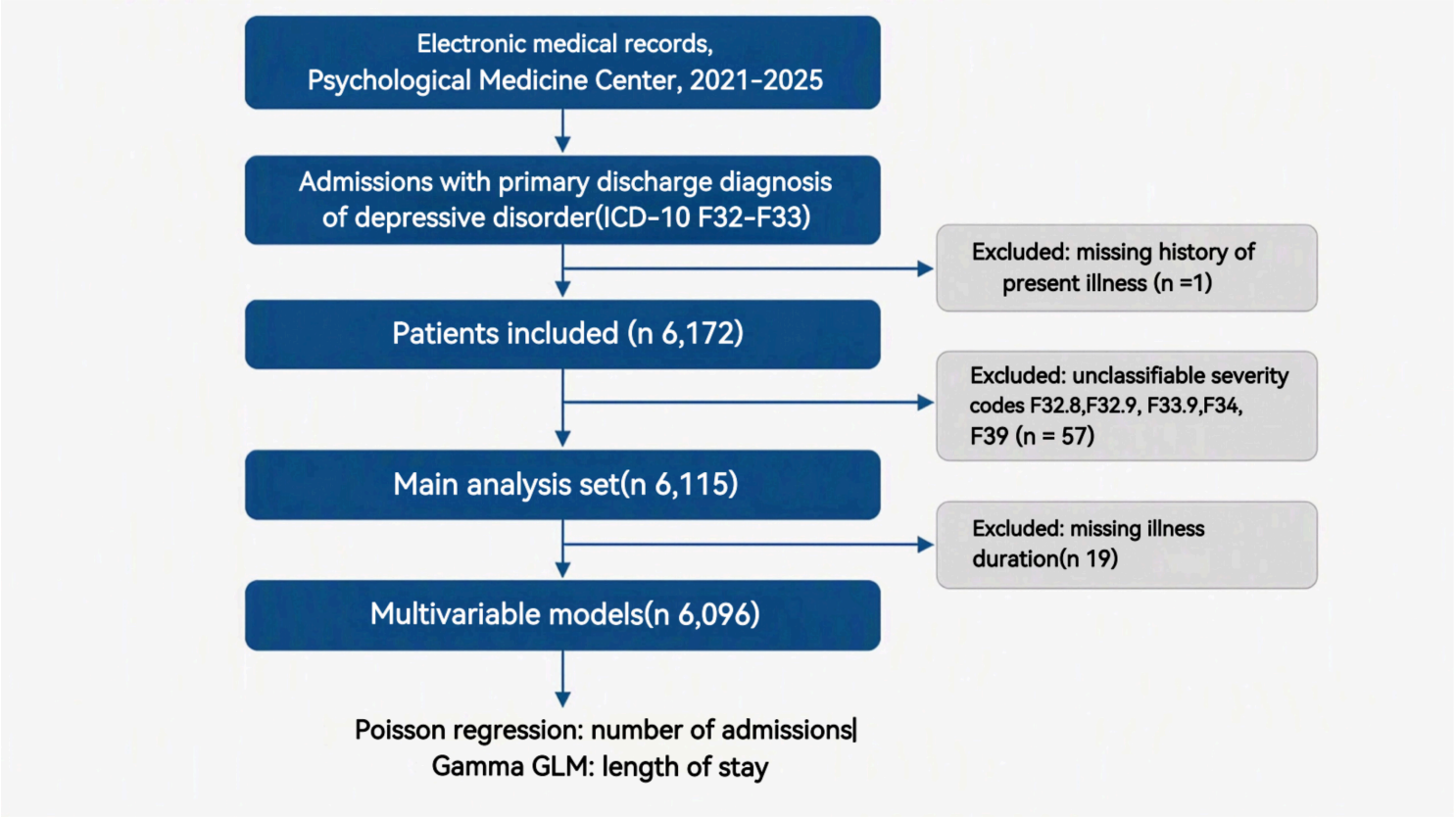


Figure 1

Flowchart of patient selection. From 11,357 admission records, 6,172 patients with depressive disorder were identified; 57 admissions with unclassifiable severity codes were excluded from primary analyses, and 19 records with missing illness duration were excluded from regression models.

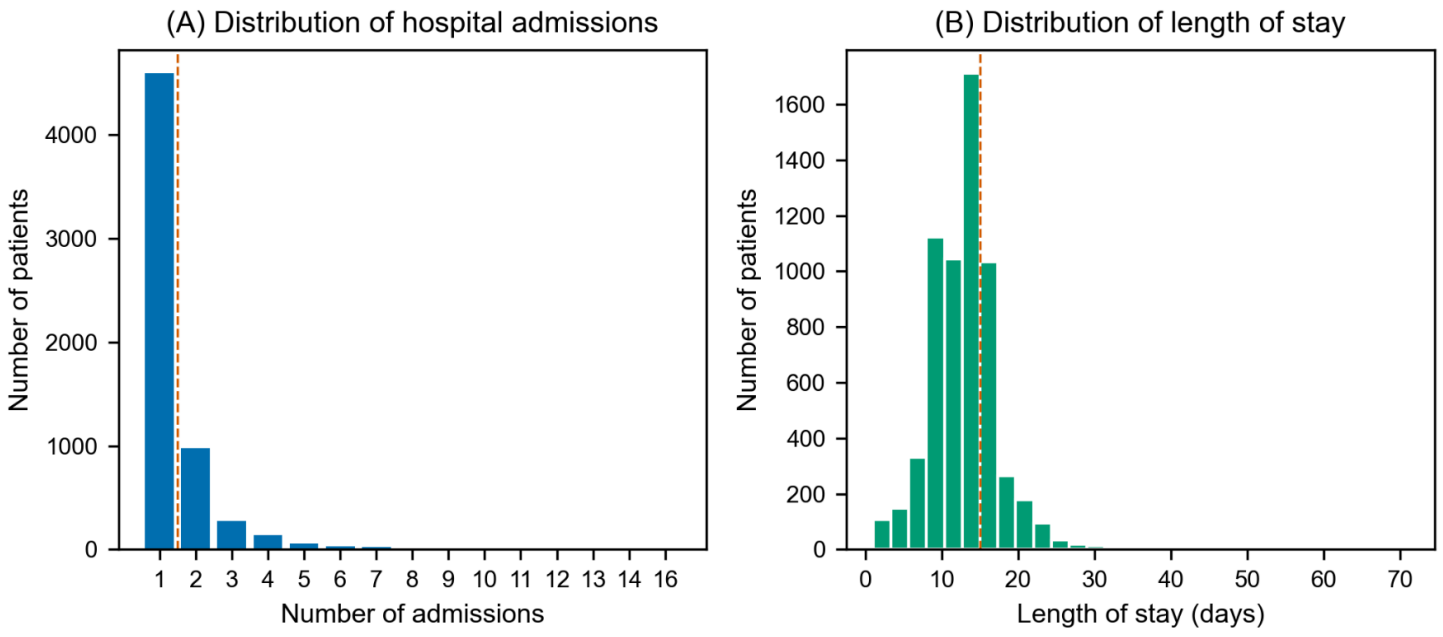


Figure 2

Distribution of hospital utilization. (A) Number of admissions per patient; the red dashed line indicates the mean (1.44). (B) Length of stay in days; the red dashed line marks the 15-day prolonged-stay cutoff and the blue dotted line marks the median (13 days).

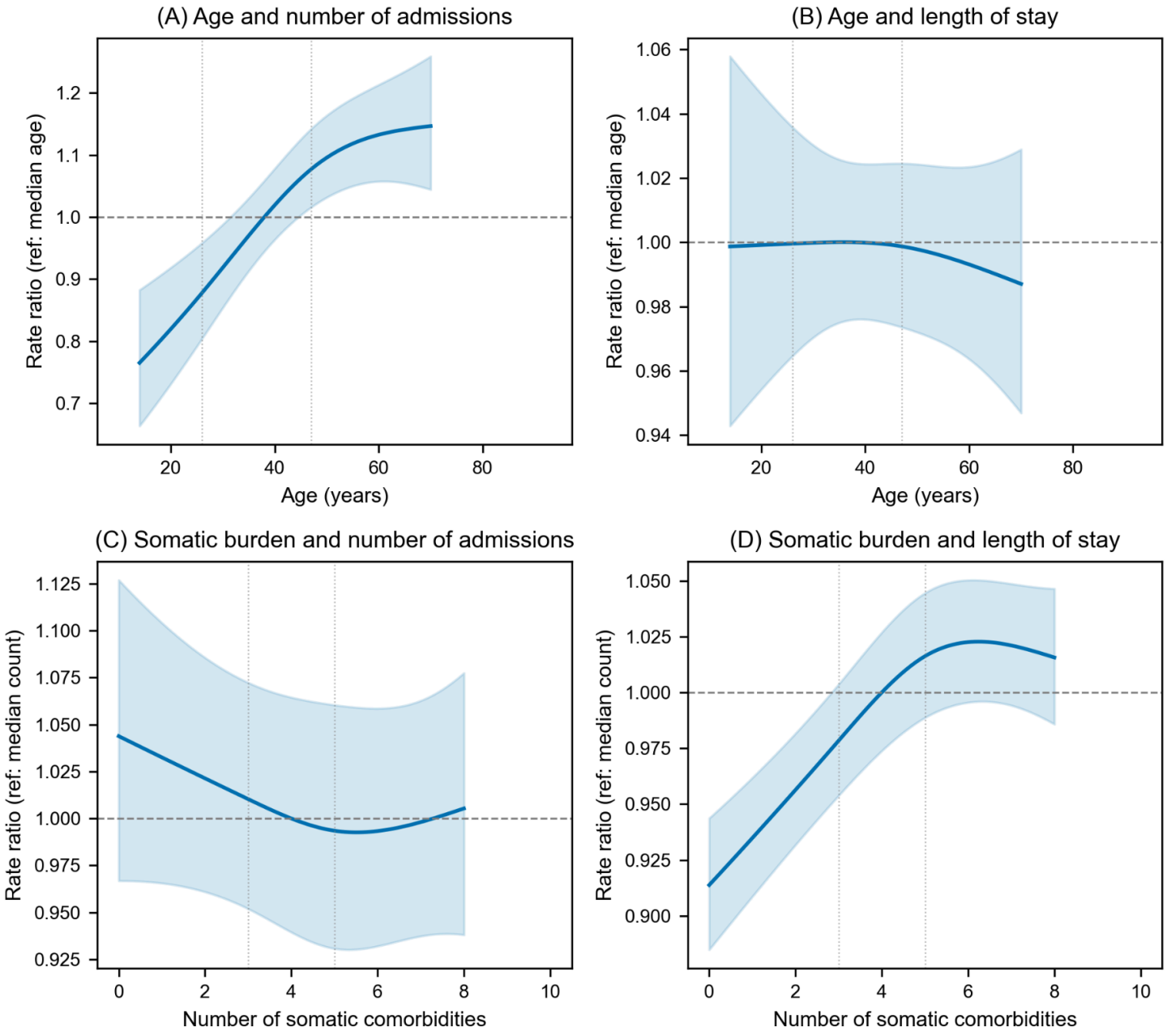


Figure 3

Restricted cubic spline analyses with four knots (5th, 35th, 65th, and 95th percentiles). Rate ratios are relative to the median value of each predictor (38 years for age; 4 conditions for somatic burden), adjusted for all covariates. (A) Age and number of admissions (non-linearity p = 0.016). (B) Age and length of stay (non-linearity p = 0.613). (C) Somatic burden and number of admissions (non-linearity p = 0.340). (D) Somatic burden and length of stay (non-linearity p < 0.001). Dotted vertical lines mark internal knots; orange rug marks indicate the data distribution. Shaded areas represent 95% confidence intervals.

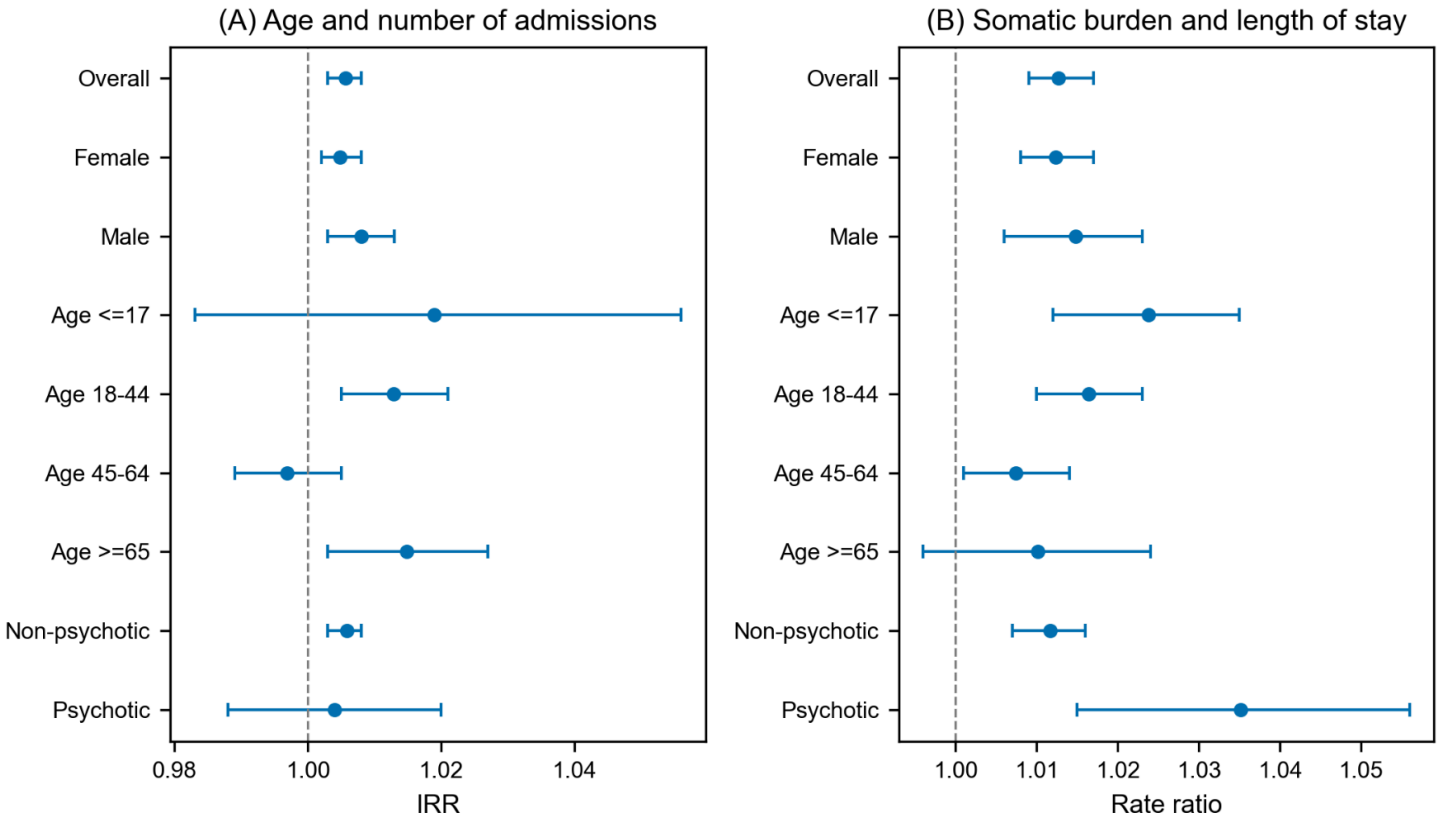


Figure 4

Subgroup analyses. (A) Association of age with number of admissions within subgroups of sex, age group, and psychotic symptoms. (B) Association of somatic burden with length of stay within the same subgroups. Values are point estimates with 95% confidence intervals; n and P values are shown on the right.

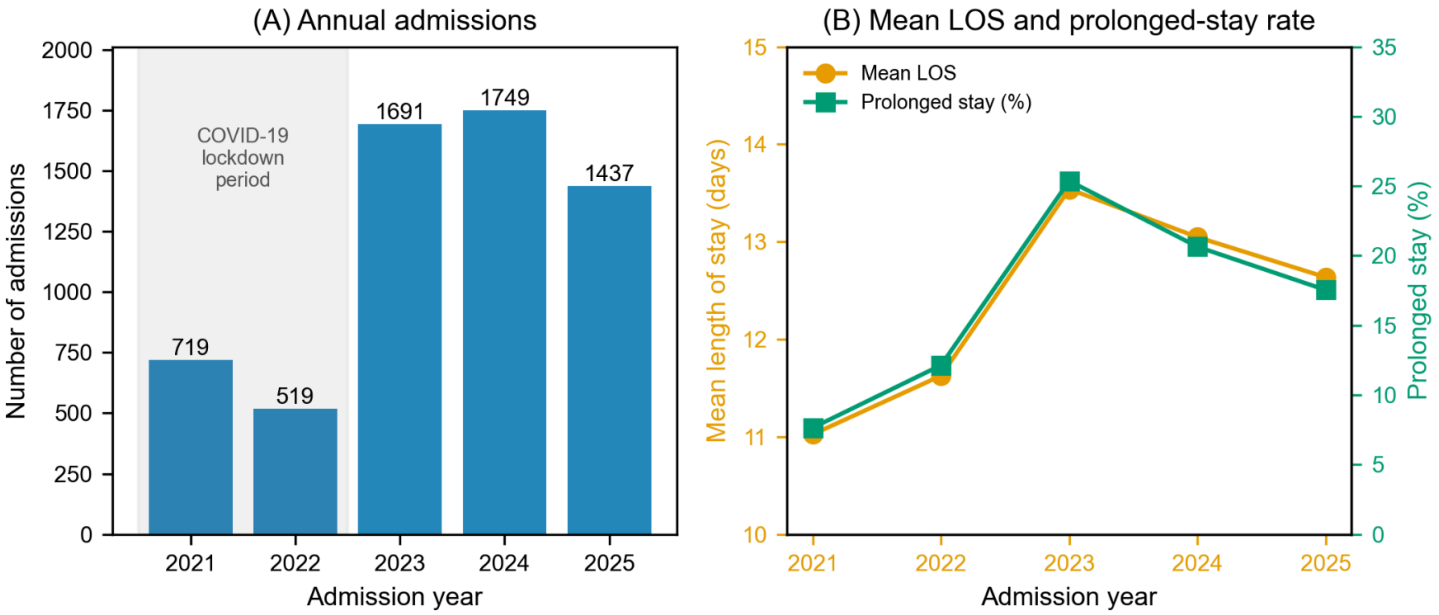


Figure 5

Temporal trends, 2021 to 2025. (A) Annual number of admissions; the shaded area marks the COVID-19 pandemic and associated restrictions (2021–2022). (B) Mean length of stay (left axis) and the proportion of prolonged stays exceeding 15 days (right axis).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- TableS1.SensitivityAnalyses.docx
- TableS2.Subgroupanalyses.docx
- TableS3.Interactiontests.docx