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ARTICLE

Factors Influencing Length of Stay and Symptom Improvement among Psychiatric Patients by Diagnosis: Analysis of the Korea National Survey

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ABSTRACT: Objectives: Psychiatric inpatient care plays a critical role in stabilizing acute mental health crises, yet the optimal length of stay (LOS) and its impact on short-term clinical outcomes remain poorly defined across diagnostic groups. This study aimed to examine how LOS in psychiatric inpatient units is associated with clinical improvement at discharge and to determine whether this association differs across major diagnostic groups, using nationally representative hospital discharge data from Korea. **Methods:** A cross-sectional secondary analysis was conducted using the 2022–2023 Korea National Hospital Discharge In-depth Injury Survey. Adults whose primary discharge diagnosis was a mental or behavioral disorder (Korean Standard Classification of Diseases, F00–F99) were included (n = 3700). Sociodemographic characteristics, hospital factors, comorbidities (Charlson Comorbidity Index), psychiatric subdiagnoses, surgical procedures, and LOS were analyzed. **Results:** The average LOS was longer in the improvement group (21.48 days) compared to the non-improvement group (12.18 days) ($p < 0.001$). Longer LOS was associated with higher odds of improvement overall (OR = 1.04, 95% CI: 1.03, 1.04; $p < 0.001$) and showed strong diagnosis-specific effects: schizophrenia (OR = 5.27, 95% CI: 3.41, 8.09), dementia (OR = 2.38, 95% CI: 0.10, 40.9), alcohol use disorder (OR = 2.21, 95% CI: 0.79, 6.36; interaction OR = 2.11, $p < 0.05$), whereas non-significant or weaker in mood disorders and substance use disorders (OR = 0.60, 95% CI: 0.17, 2.13) Significant interaction effects indicated that the magnitude and shape of the LOS outcome relationship differed by diagnostic category. **Conclusions:** Longer length of stay was significantly associated with clinical improvement at discharge, with the strongest effects observed in schizophrenia, dementia, and alcohol use disorder, but limited benefit in substance use disorders. These diagnosis-specific patterns support tailored inpatient duration policies rather than uniform psychiatric bed-day targets.

KEYWORDS: Psychiatric inpatients; schizophrenia; dementia; alcohol use disorder; substance use disorder; hospital discharge

1 Introduction

Mental disorders encompass a wide range of conditions characterized by clinically significant disturbances in cognition, emotion regulation, or behavior that impair individual functioning and overall quality of life [1]. These conditions include mood disorders such as depression and bipolar disorder, anxiety disorders, substance use disorders, schizophrenia, and other severe mental illnesses [2]. Mental disorders represent a major global public health challenge due to their high prevalence, chronicity, and substantial disability burden [3].

Globally, it is estimated that approximately one in five adults (17.6%) experiences a common mental disorder within any given 12-month period, with lifetime prevalence rates reaching nearly 30% [4]. The global burden of mental disorders continues to rise, accounting for about 12% of the total global disease burden in 2019, with significant impacts on disability adjusted life years (DALYs) and socioeconomic costs [3]. Anxiety disorders are among the most prevalent, affecting roughly 5% to 20% of the population internationally, closely followed by depressive disorders [5]. As prevalence increases, so do healthcare expenditures. Owing to their often chronic and relapsing trajectories, mental disorders impose considerable socioeconomic costs, including direct medical expenses, productivity losses, and broader societal impacts [6].

Inpatient management remains a cornerstone of acute psychiatric care for individuals with severe mental disorders who pose imminent risks to themselves or others, or whose symptoms severely impair daily functioning [7]. Admission criteria typically include acute suicidal ideation, psychotic episodes, severe agitation, or failure of outpatient interventions, necessitating 24-h structured supervision, multidisciplinary pharmacotherapy, and intensive psychosocial interventions within a secure setting [8]. Despite its critical role, inpatient psychiatric care faces unique challenges, including high rates of coercive measures (e.g., seclusion and restraint), interpersonal violence, medication errors, and self-harm, which contribute to suboptimal patient safety profiles compared to general medical wards [9].

In South Korea's psychiatric care system, length of stay (LOS) has been adopted as a primary variable because it directly influences medical service coverage, healthcare expenditure, and resource allocation within the National Health Insurance framework [10]. Government agencies rely on LOS data derived from nationwide sources, including the Korea National Hospital Discharge In-depth Injury Survey, to determine per diem reimbursement rates and to design policy initiatives aimed at curbing unnecessary long-term hospitalization [11].

South Korea had the longest average LOS for psychiatric inpatients among Organisation for Economic Co-operation and Development (OECD) countries in 2011, at 116 days, which was approximately four times the OECD average [12]. Although the number of psychiatric beds per 1000 population in Korea remains high and ranks among the highest in the OECD, features of the reimbursement system, particularly the per diem payment model, together with relatively low bed turnover rates, have been linked to prolonged hospitalization [13,14]. This trend is particularly pronounced among patients with schizophrenia, and LOS has been reported to be even longer among Medical Aid beneficiaries [15]. However, the clinical implications of prolonged hospitalization may differ across diagnostic groups. In conditions where overall functioning is relatively preserved, such as depression, prolonged hospitalization may increase the risk of social withdrawal and functional decline. In alcohol use disorders, although extended inpatient care may be required for stabilization, particularly for the management of withdrawal symptoms, excessively long hospital stays may increase the risk of complications (e.g., infections, pressure ulcers) and subsequent readmission [16,17]. These marked deviations from international benchmarks have prompted ongoing policy reforms, including revisions to the Mental Health and Welfare Act, aimed at facilitating deinstitutionalization and strengthening community-based mental health services [18].

Evidence from previous studies indicates that short-term psychiatric inpatient treatment is effective in reducing acute symptoms such as depression, anxiety, and suicidal ideation for a substantial proportion of patients, typically over 1–3 weeks of care, while 30-day unplanned readmission rates remain high at around 13–20% when post discharge continuity of care is insufficient [19,20]. Patient-centered approaches, emphasizing therapeutic alliances, safety planning, and recovery-oriented programming, have been associated with enhanced outcomes, including higher follow-up engagement and reduced restraint use [21,22]. However, disparities persist, particularly in for-profit facilities and low-resource settings,

where lower patient experience scores correlate with poorer continuity of care and increased readmission rates [23].

Implementation of evidence-based guidelines, such as those from the American Psychiatric Association (APA) and the National Institute for Health and Care Excellence (NICE), has demonstrated improvements in clinical outcomes, including reduced LOS and better functional recovery, yet adherence remains inconsistent amid staffing shortages and environmental constraints [24,25]. Collectively, these findings highlight the importance of balancing safety, therapeutic effectiveness, and patient dignity within inpatient psychiatric services. The conceptual framework of this study is grounded in the "Quality of Care" model, where structural factors like LOS are hypothesized to influence clinical outcomes differently depending on the complexity of the psychiatric diagnosis.

However, a significant gap remains in the literature regarding whether the benefits of extended LOS are universal or diagnosis-specific within the Korean healthcare context, which is characterized by high bed availability but fragmented community-based support. Previous studies have been largely limited to single institutions or small cohorts, which restricts generalizability and precludes detailed comparisons across specific diagnostic categories [26,27]. In contrast, the present study utilizes a nationally representative probability sample comprising 9% of hospitals with over 100 beds, encompassing more than 580,000 discharge cases, thereby ensuring both reliability and generalizability [28]. By evaluating clinical improvement at discharge (improved vs. not improved) and employing detailed KCD F00-F99 classifications, this study investigates the relationship between LOS and clinical improvement across diagnostic categories. Therefore, this study evaluates two primary hypotheses: (Hypothesis 1) longer LOS is positively associated with clinical improvement at discharge, and (Hypothesis 2) the strength and direction of this association vary significantly across different psychiatric diagnostic categories.

While efforts to reduce unnecessary inpatient days among individuals with mental disorders are important, uniform reductions are challenging due to the chronic and relapsing nature of these conditions. Therefore, optimization of inpatient duration should incorporate both diagnostic characteristics and observed patterns of clinical improvement. This study aims to examine the differential effects of LOS on clinical improvement across major psychiatric diagnostic groups, thereby informing the development of diagnosis-specific policies for appropriate inpatient duration.

2 Methods

2.1 Study Population and Data Collection

This study utilized data from the 2022 and 2023 National Hospital Discharge In-depth Injury Survey. This survey is conducted annually by the government to support the development of policies for the management and prevention of chronic diseases and injuries, targeting patients discharged from hospitals [28].

Mental disorder cases were identified based on the Korean Standard Classification of Diseases (KCD), defining eligible individuals as those whose primary diagnosis at hospital admission fell within the mental and behavioral disorders category (F00–F99). Among a total of 588,230 discharged patients in 2022 and 2023, 3700 individuals with mental disorders were included in the final study sample (Fig. 1).

The survey instrument used in this study consisted of nine items, including three questions on sociodemographic characteristics (sex, age, and type of medical payment), two items on healthcare facility characteristics (facility location and bed capacity), and four items on healthcare utilization characteristics (primary and secondary diagnoses, presence of major and minor surgical procedures, and length of stay). Multicollinearity by considering a complex sample design, was assessed. Analysis results showed that all

independent variables (age, region, hospital bed size, etc.) except for interaction terms had VIF values below 5.0, confirming the model's basic stability.

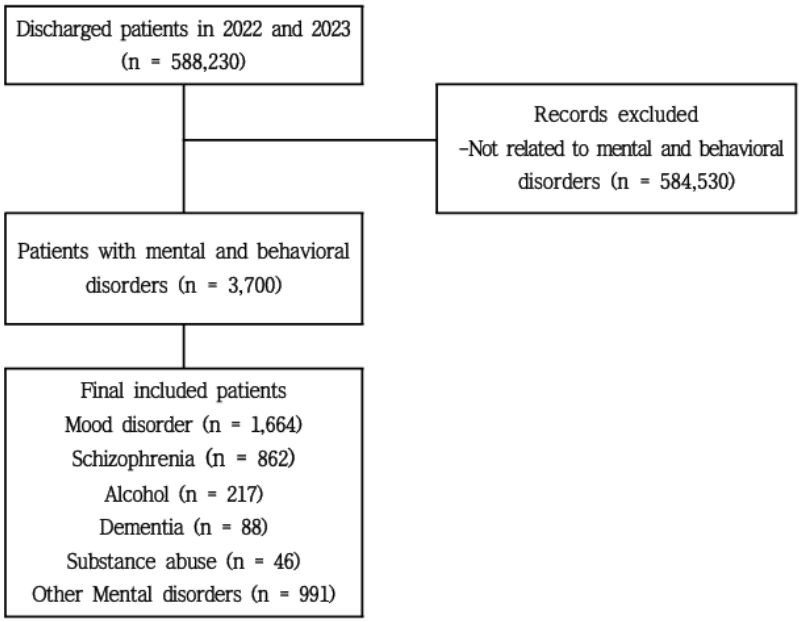

Figure 1: Flow chart of inclusion and exclusion of participants.

2.2 Variables

2.2.1 Dependent Variable

The dependent variable was clinical improvement at discharge. The survey identifies cases of "clinical improvement" based on the discharge summary completed by the attending physician at the time of discharge. Cases coded as "improved" in the discharge outcome section of the survey were classified as the improvement group, whereas all other outcomes were categorized as non-improvement. While this administrative indicator lacks the granularity of validated psychometric scales like PANSS (Positive and Negative Syndrome Scale) or GAF (Global Assessment Function), it provides a standardized measure of a patient's readiness for discharge in a large-scale national database.

2.2.2 Independent Variables

Sociodemographic Characteristics

Sex, age, and type of health insurance were included. Health insurance type was categorized into National Health Insurance, Medical Aid, and Other.

Healthcare Facility Characteristics

Healthcare facility variables included facility location and bed capacity. Facility location was grouped into five regions: the Seoul Metropolitan Area (Seoul, Incheon, Gyeonggido) (1); Hoseo region (Daejeon, Chungcheongnamdo, Chungcheongbukdo) (2); Honam region (Gwangju, Jeollabukdo, Jeollanamdo) (3); Yeongnam region (Busan, Daegu, Ulsan, Gyeongsangbukdo, Gyeongsangnamdo) (4); and Other (Gangwondo and Jejudo) (5) Bed capacity was classified into four categories: 100–299 beds (0), 300–499 beds (1), 500–999 beds (2), and ≥1000 beds (3).

Healthcare Utilization Characteristics

Healthcare utilization variables included comorbidities, psychiatric diagnostic subcategories, presence of major surgery, presence of minor surgery, and length of stay. Major surgery was coded as no (0) or yes (1). LOS was measured as the number of days from admission to discharge (discharge date − admission date + 1).

Comorbidities were assessed using the Charlson Comorbidity Index (CCI), one of the most widely used indicators for measuring comorbidity burden. The CCI was originally developed to adjust for mortality risk in clinical research and assigns weighted scores ranging from 1 to 6 across 17 comorbidity categories, which are summed to produce a total score. The index is known to predict outcomes such as length of stay, complication rates, short- and long-term mortality, and overall disease burden [29]. In this study, CCI scores were calculated based on secondary diagnosis codes and categorized into three groups: 0, 1, and ≥2.

Psychiatric diagnostic subcategories were classified according to KCD codes as follows: F00–F03 (dementia), F10 (mental and behavioral disorders due to alcohol use), F11–F19 (mental and behavioral disorders due to psychoactive substance use), F20–F29 (schizophrenia, schizotypal, and delusional disorders), F30–F39 (mood [affective] disorders), and the remainder of F00–F99 (other mental and behavioral disorders). These categories were used to examine differences across specific diagnostic groups.

2.3 Ethics Approval

This study was reviewed by the Institutional Review Board (IRB) of Gachon University (No. 1044396-202507-HR-151-01). The IRB determined that the study was exempt from full ethical review in accordance with relevant laws and regulations, as it involved analysis of de-identified secondary data from a public national survey. Accordingly, the requirement for informed consent was waived.

2.4 Statistical Analysis

All statistical analyses were performed using R version 4.5.2 (R Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics for the general characteristics of the study population were presented as unweighted percentages and weighted percentages to account for the survey design. Differences in improvement status according to participant characteristics were assessed using Chi-square tests and *t*-tests. To examine whether the effect of LOS on clinical improvement varied across diagnostic groups, logistic regression models were estimated with an interaction term between LOS and diagnostic category. To address potential non-linear effects of LOS, we included a squared term of LOS in the model. However, as the quadratic term was not statistically significant, the final analysis proceeded with a linear specification for LOS to ensure model parsimony.

The complex survey analysis was performed using the 'survey' package (Version 4.5) in R. Bed capacity was designated as the stratification variable to account for variance between hospital sizes. Sampling weights provided by the Korea Disease Control and Prevention Agency (KDCA) were applied to each case to produce nationally representative estimates and adjust for the multi-stage sampling design. These procedures ensure that the standard errors and *p*-values correctly account for the non-random nature of the national discharge data.

3 Results

3.1 Characteristics of Subjects

Table 1 presents the sociodemographic and clinical characteristics of the study population. The table summarizes the distribution of each variable for the improvement group (n = 3442) and the non-improvement

group (n = 358), providing both unweighted and weighted percentages, along with statistical tests comparing the two groups. In terms of sex distribution, the proportion of females (improvement: 97.5%, non-improvement: 2.5%) was slightly higher than that of males (94.4% and 5.6%, respectively), although the difference was not statistically significant. By age group, individuals aged 20–39 and 40–59 years scored higher improvement proportions (92.9%, 92.0% respectively), and a statistically significant difference between the improvement and non-improvement groups was observed. Regarding regional distribution, residents of the Honam area showed the highest representation of improvement (95.1%), with significant differences across regions. Differences between the two groups were also observed for hospital bed capacity and CCI scores. By diagnostic category, Dementia and Alcohol abuse recorded high improvement rates, and significant differences between groups were noted across diagnoses. No significant differences were found between groups with respect to major or minor surgical procedures. The average length of hospital stay was longer in the improvement group (21.5 days) compared to the non-improvement group (12.2 days) ($p < 0.001$).

3.2 Factors Associated with the Improvement of Participants

The logistic regression results for factors associated with participant improvement are presented in Table 2. These analyses tested the two primary hypotheses stated in the Introduction. Hypothesis 1 (longer LOS is positively associated with clinical improvement at discharge) was supported, as both the basic model (OR = 1.04, $p < 0.001$) and interaction model (OR = 1.10, $p < 0.001$) demonstrated significant positive associations between LOS and improvement.

This trend persisted across diagnostic groups, with significant differences observed in the LOS-improvement association ($p < 0.001$). Hypothesis 2 (the strength and direction of this association vary significantly across diagnostic categories) was also supported, as longer hospitalization showed strong positive effects in alcohol abuse (basic model: OR = 1.94; interaction model: OR = 2.21), schizophrenia (basic model: OR = 1.49; interaction model: OR = 5.27), and dementia (basic model: OR = 4.23; interaction model: OR = 2.38), but no meaningful benefit in substance abuse (basic model: OR = 0.55; interaction model: OR = 0.60). Among the diagnostic groups, alcohol abuse (OR = 2.11) and dementia (OR = 4.73) demonstrated the largest discrepancies between the basic and interaction models in terms of the relationship between LOS and improvement. Although the interaction model incorporates a greater number of parameters and interaction terms and is therefore structurally more complex than the basic model, it nonetheless exhibited better overall fit, as indicated by lower AIC (basic: 2268; interaction: 2213) and BIC (basic: 2431; interaction: 2407) values.

Table 1: Descriptive analysis.

Label		Outcome			Outcome-Weighted %		
		Not Improved (n = 358)	Improved (n = 3442)	*p*-Value	Not Improved (n = 358)	Improved (n = 3442)	*p*-Value
Sex	Male	12 (5.6%)	202 (94.4%)	0.119	2168.4 (7.8%)	25,730.3 (92.2%)	0.311
	Female	2 (2.5%)	79 (97.5%)		3626.3 (8.8%)	37,794.4 (91.2%)	
Age	≤19	198 (12.0%)	1451 (88.0%)	0.001	1181.2 (11.7%)	8906.8 (88.3%)	<0.001
	20–39	68 (7.1%)	885 (92.9%)		2271.8 (10.2%)	20,105.2 (89.8%)	
	40–59	69 (8.0%)	789 (92.0%)		1220.7 (7.4%)	15,351.1 (92.6%)	
	60–79	9 (20.0%)	36 (80.0%)		916.7 (5.8%)	14,762.5 (94.2%)	
	≥80	115 (8.4%)	1254 (91.6%)		204.2 (4.4%)	4399.1 (95.6%)	
Financing	NHI	243 (10.0%)	2188 (90.0%)	0.372	5045.1 (8.6%)	53,498.5 (91.4%)	0.096
	Medical aid	70 (11.8%)	525 (88.2%)		584.3 (6.2%)	8817.9 (93.8%)	
	Other	167 (10.7%)	1400 (89.3%)		165.2 (12.0%)	1208.3 (88.0%)	
Region	Capital region	67 (8.7%)	702 (91.3%)	<0.001	2604.6 (8.1%)	29,619.7 (91.9%)	<0.001
	Hoseo province	45 (6.6%)	642 (93.4%)		829.9 (15.7%)	4452.2 (84.3%)	
	Honam province	9 (4.9%)	173 (95.1%)		444.8 (6.0%)	7017.0 (94.0%)	
	Yeoungnam province	315 (9.5%)	2993 (90.5%)		1706.7 (8.2%)	19,106.9 (91.8%)	
	Other	32 (7.9%)	371 (92.1%)		208.6 (5.9%)	3328.9 (94.1%)	
Beds	100–299	11 (12.4%)	78 (87.6%)	0.009	574.2 (4.3%)	12,750.8 (95.7%)	<0.001
	300–499	158 (9.0%)	1594 (91.0%)		578.3 (6.4%)	8437.5 (93.6%)	
	500–999	56 (15.9%)	296 (84.1%)		3165.4 (9.5%)	30,167.5 (90.5%)	
	≥1000	25 (7.3%)	318 (92.7%)		1476.6 (10.8%)	12,168.8 (89.2%)	
CCI	0	335 (9.9%)	3033 (90.1%)	0.008	5299.1 (8.9%)	54,431.0 (91.1%)	0.004
	1	16 (5.0%)	302 (95.0%)		292.4 (4.0%)	6987.0 (96.0%)	
	≥2	7 (6.1%)	107 (93.9%)		203.1 (8.8%)	2106.7 (91.2%)	

Table 1: *Cont.*

Label		Outcome			Outcome-Weighted %		
		Not Improved (n = 358)	Improved (n = 3442)	*p*-Value	Not Improved (n = 358)	Improved (n = 3442)	*p*-Value
Disease	Mood disorder	198 (12.0%)	1451 (88.0%)	<0.001	3006.8 (10.9%)	24,469.2 (89.1%)	<0.001
	Alcohol abuse	12 (5.6%)	202 (94.4%)		207.9 (3.7%)	5349.5 (96.3%)	
	Substance abuse	9 (20.0%)	36 (80.0%)		172.1 (17.7%)	797.5 (82.3%)	
	Schizophrenia	69 (8.0%)	789 (92.0%)		1123.8 (8.1%)	12,707.6 (91.9%)	
	Dementia	2 (2.5%)	79 (97.5%)		63.3 (3.1%)	2010.8 (96.9%)	
	Other	68 (7.1%)	885 (92.9%)		1220.8 (6.3%)	18,190.2 (93.7%)	
Main surgery	No	355 (9.5%)	3398 (90.5%)	0.641	5751.4 (8.4%)	62,850.2 (91.6%)	0.808
	Yes	3 (6.4%)	44 (93.6%)		43.2 (6.0%)	674.5 (94.0%)	
Adjuvant surgery	No	280 (9.4%)	2711 (90.6%)	0.862	4517.3 (8.3%)	50,137.2 (91.7%)	0.739
	Yes	78 (9.6%)	731 (90.4%)		1277.3 (8.7%)	13,387.5 (91.3%)	
Inpatient period		12.2 (35.8)	21.5 (82.3)	<0.001	11.8 (0.51)	21.6 (0.31)	<0.001
Year	2022	181 (9.6%)	1711 (90.4%)	0.802	3073.6 (9.4%)	29,556.7 (90.6%)	0.039
	2023	177 (9.3%)	1731 (90.7%)		2721.0 (7.4%)	33,968.0 (92.6%)	

Note: CCI, Charlson Comorbidity Index; NHI, National Health Insurance.

Table 2: Logistic regression results of factors associated with participant improvement.

Label		Basic Model			Interaction Model		
		OR	95%CI	*p*-Value	OR	95%CI	*p*-Value
Sex	Male	1.00	Ref.	0.60	1.00	Ref.	0.44
	Female	0.94	0.73, 1.19		0.91	0.71, 1.16	
Age	≤19	1.00	Ref.	0.25	1.00	Ref.	0.25
	20–39	1.10	0.80, 1.50		1.07	0.78, 1.47	
	40–59	1.10	0.75, 1.61		1.12	0.76, 1.66	
	60–79	1.52	1.00, 2.33		1.52	1.00, 2.35	
	≥80	1.71	0.83, 3.91		1.70	0.82, 3.92	

Table 2: *Cont.*

Label		Basic Model			Interaction Model		
		OR	95%CI	*p*-Value	OR	95%CI	*p*-Value
Financing	NHI	1.00	Ref.	0.34	1.00	Ref.	0.34
	Medical aid	0.87	0.59, 1.32		0.85	0.57, 1.31	
	Other	0.63	0.31, 1.29		0.61	0.31, 1.30	
Region	Capital region	1.00	Ref.	<0.001			<0.001
	Hoseo province	0.45	0.32, 0.64		0.43	0.30, 0.61	
	Honam province	0.91	0.59, 1.47		0.87	0.56, 1.40	
	Yeoungnam province	0.95	0.72, 1.26		0.89	0.67, 1.18	
	Other	1.13	0.65, 2.13		1.12	0.64, 2.12	
Beds	100–299	1.00	Ref.	0.05	1.00	Ref.	0.01
	300–499	0.75	0.34, 1.55		0.72	0.32, 1.50	
	500–999	0.56	0.28, 1.03		0.49	0.24, 0.91	
	≥1000	0.46	0.22, 0.87		0.39	0.19, 0.73	
CCI	0	1.00	Ref.	0.36	1.00	Ref.	0.34
	1	1.47	0.87, 2.65		1.49	0.87, 2.68	
	≥2	1.01	0.47, 2.49		0.96	0.45, 2.40	
Main surgery	No	1.00	Ref.	0.49	1.00	Ref.	0.48
	Yes	1.52	0.50, 6.66		1.55	0.50, 6.85	
Adjuvant surgery	No	1.00	Ref.	0.46	1.00	Ref.	0.24
	Yes	0.90	0.68, 1.20		0.84	0.64, 1.12	
Period		1.04	1.03, 1.04	<0.001	1.10	1.08, 1.12	<0.001
Disease	Mood disorder	1.00	Ref.	<0.001	1.00	Ref.	<0.001
	Alcohol abuse	1.94	1.04, 3.91		2.21	0.79, 6.36	
	Substance abuse	0.55	0.26, 1.26		0.60	0.17, 2.13	
	Schizophrenia	1.49	1.11, 2.04		5.27	3.41, 8.09	
	Dementia	4.23	1.24, 26.6		2.38	0.10, 40.9	
	Other	2.05	1.52, 2.79		3.55	2.21, 5.73	

Table 2: *Cont.*

Label		Basic Model			Interaction Model		
		OR	**95%CI**	***p*-Value**	**OR**	**95%CI**	***p*-Value**
Period*Disease	Period*Mood disorder				1.00	Ref.	<0.001
	Period*Alcohol abuse				2.11	1.11, 4.32	
	Period*Substance abuse				0.53	0.25, 1.22	
	Period*Schizophrenia				1.57	1.15, 2.17	
	Period*Dementia				4.73	1.36, 30.0	
	Period*Other				1.91	1.38, 2.67	
Year		1.04	0.83, 1.30	0.75	1.04	0.83, 1.31	0.71
AIC			2268			2213	
BIC			2431			2407	
Log-Likelihood			−1108			1076	

Note: CCI, Charlson Comorbidity Index; OR, Odds Ratio; CI, Confidence Interval; AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; NHI, National Health Insurance.

4 Discussion

4.1 Main Findings and Their Implications

This nationally representative study examined whether LOS functions as a structural determinant of short-term clinical improvement among psychiatric inpatients. Confirming both hypotheses, longer LOS was associated with higher odds of improvement overall (Hypothesis 1), with this relationship varying substantially by diagnostic category (Hypothesis 2; interaction $p < 0.001$). Rather than reiterating individual adjusted estimates, the central finding is thatdiagnosis-specific LOS-outcome patterns challenge uniform inpatient duration policies. By demonstrating heterogeneous LOS outcome relationships across major diagnostic categories, this study addresses an important gap in the literature, which has often treated psychiatric inpatient populations as homogeneous when evaluating optimal duration of hospitalization. The odds ratio for LOS among patients with schizophrenia increased markedly from 1.49 in the basic model to 5.27 in the interaction model. This amplification suggests a strong diagnosis-specific effect, indicating that prolonged hospitalization may confer greater short-term clinical benefit in schizophrenia compared with other psychiatric conditions. This interpretation aligns with prior evidence indicating that stabilization in schizophrenia often requires sustained, structured inpatient management [27]. Previous studies have described intensive inpatient treatment for schizophrenia as comprising optimized pharmacotherapy in combination with cognitive and affective cognitive remediation, social skills training, and structured family psychoeducation [30]. Such multimodal interventions may require sufficient time to achieve measurable symptomatic and functional improvement. For dementia, intensive care models have been reported to center on individualized multidisciplinary rehabilitation approaches, including tailored physical, occupational, and speech therapy interventions [31]. Previous studies have shown mixed effects of LOS on outcomes across psychiatric disorders. In conditions such as schizophrenia and dementia, stabilization and functional recovery often necessitate sustained multidisciplinary input, whereas in substance use disorders, outcomes appear to depend more heavily on post-discharge continuity of care and community integration [27,32].

The high improvement rate observed among patients aged 20–39 years (92.9%) has important clinical implications. This age range corresponds to the peak onset period for schizophrenia, typically during early adulthood, when acute positive symptoms such as hallucinations and delusions may respond robustly to intensive inpatient treatment [27]. Moreover, individuals at this developmental stage often face strong social and occupational expectations regarding return to work or education and may benefit from relatively strong family support systems. These contextual factors may enhance treatment adherence and contribute to a favorable short-term discharge outcome.

Importantly, our findings suggest that LOS should not be interpreted solely as a cost driver or efficiency metric, but rather as a diagnosis-sensitive indicator of treatment intensity and care complexity [33]. In schizophrenia and dementia, extended hospitalization may facilitate medication optimization, behavioral stabilization, caregiver education, and structured discharge planning [27,32]. In particular, the finding that prolonged LOS does not lead to significant clinical improvement among patients with substance use disorders may be attributed to the current inpatient focus on acute detoxification and stabilization of withdrawal symptoms, rather than long-term rehabilitation or behavioral modification programs [34]. While physiological stabilization is typically achieved within a relatively short inpatient period, sustained recovery depends largely on psychosocial interventions and structured community follow-up. Because the Korean national discharge database does not capture post-discharge continuity of care, inadequate linkage to community-based addiction treatment services may partially explain the limited marginal benefit of extended hospitalization observed in this group [35]. These findings underscore that inpatient duration

alone may be insufficient to improve outcomes in disorders where long-term behavioral modification and community reintegration are central to recovery.

The pronounced LOS benefits observed for schizophrenia (OR = 5.27) and dementia (OR = 2.38) likely reflect systemic gaps in Korea's community mental health infrastructure. Korea maintains the highest psychiatric bed density among OECD countries, with approximately 207 beds per 100,000 population, compared with an OECD average of approximately 70 beds per 100,000 population [13]. Yet, community mental health centers provide services to only 2.3% of individuals with severe mental illness annually [14]. Patients with schizophrenia who are discharged without adequate assertive community treatment demonstrate a 3.6-fold higher risk of readmission within one year [18]. In the context of dementia, limited availability of outpatient cognitive rehabilitation and caregiver support services may necessitate longer inpatient stabilization prior to safe discharge [31]. Collectively, these structural conditions suggest that observed LOS benefits may, in part, compensate for limited community-based alternatives rather than reflect intrinsically optimal care duration.

From a clinical practice perspective, these results support tailoring inpatient duration to diagnostic needs rather than applying uniform discharge pressure. From a resource allocation standpoint, policies focused solely on reducing LOS to improve efficiency may inadvertently compromise outcomes in disorders that benefit from sustained inpatient stabilization. At the health system level, our findings underscore the need to strengthen transitional care, outpatient follow-up, and community-based addiction services for substance use disorders, where marginal benefit from prolonged hospitalization appears limited. Taken together, this study contributes to the ongoing policy debate regarding psychiatric bed reduction and cost containment by providing empirical evidence that optimal LOS is diagnosis-specific and should be integrated into quality-of-care frameworks rather than evaluated solely through utilization metrics.

4.2 Integration with Existing Evidence

The finding of this study that a longer LOS was significantly associated with a higher probability of improvement at discharge among psychiatric inpatients is largely consistent with previous studies suggesting that inpatient treatment beyond a minimum duration contributes to symptom stabilization and functional recovery. Chen et al. analyzed approximately 20,000 patients with schizophrenia spectrum disorders in Ontario, Canada, and reported that symptom severity and functional scores improved significantly during an average hospitalization of about 30 days. Even after adjusting for illness severity and comorbid conditions, they concluded that an adequate LOS is necessary to achieve meaningful clinical improvement [27]. Similarly, multiple studies of acute psychiatric inpatient care have shown that LOS is primarily determined by symptom severity, risk of harm to self or others, and physical comorbidities, and that within a certain range, longer hospitalization is associated with functional improvement. These findings support the positive association between LOS and improvement observed in the present study after controlling for age, CCI score, and hospital bed capacity [20,36,37].

When examined by diagnostic group, the observed increase in the probability of improvement with longer hospitalization among patients with schizophrenia, dementia, and alcohol use disorder but not among those with substance use disorder also aligns with the existing literature. In patients with schizophrenia, adequate inpatient duration is critical for preventing symptom exacerbation and promoting functional recovery; however, outcomes are often limited when comorbid substance use is present, due to reduced treatment adherence and higher rates of readmission, even with prolonged hospitalization [27,38]. For patients with dementia, prior studies have reported longer hospital stays, higher risks of functional decline, complications, and unfavorable discharge outcomes compared with non-dementia patients during

admissions to general acute medical and surgical wards. In contrast, studies conducted in geriatric medical and long-term care facilities in Japan have demonstrated that intensive cognitive and functional rehabilitation programs incorporating multidisciplinary cognitive rehabilitation and behavioral symptom management over several weeks of inpatient observation can significantly improve cognitive function and behavioral symptoms. These findings suggest that psychiatric and rehabilitative inpatient environments may contribute to short-term functional improvement in patients with dementia, consistent with the results of the present study [39,40]. In alcohol use disorder, longer hospitalization has been associated with improved short-term outcomes through enhanced abstinence maintenance and increased engagement in pharmacological and psychosocial interventions. Accordingly, the positive association between LOS and improvement observed among patients with alcohol use disorder in this study is consistent with prior evidence [41].

In contrast, the lack of a significant association between longer hospitalization and improvement among patients with substance use disorder in this study supports previous findings that short- to medium-term inpatient treatment alone is insufficient to address the chronic and relapsing nature of substance use disorders [42]. Despite having longer lengths of stay and higher readmission rates than patients with other psychiatric conditions, the long-term abstinence benefits of inpatient-only treatment for substance use disorder remain limited. Instead, continuity of care after discharge, particularly linkage to community-based pharmacotherapy, counseling, and recovery-oriented programs, has been identified as a critical determinant of sustained recovery [41,42]. Taken together, the diagnostic heterogeneity demonstrated in this study suggests that policy approaches aimed at uniformly reducing psychiatric LOS may be inappropriate. Rather, optimal inpatient strategies should be tailored by diagnostic group, distinguishing conditions such as schizophrenia, dementia, and alcohol use disorder, where extended hospitalization may facilitate improvement from substance use disorder, for which post-discharge community-based addiction treatment may play a more central role.

4.3 Study Limitations

Several limitations should be considered when interpreting the findings of this study. First, the analysis was based on secondary data from the National Hospital Discharge Injury Surveillance System, which relies on routinely collected administrative records rather than prospectively designed clinical assessments [43]. As such, measurement validity may be constrained by the structure and purpose of administrative coding. In particular, the dichotomous classification of discharge outcomes as “improved” or “not improved” may not adequately capture subtle clinical changes, functional recovery, or patient-reported outcomes that are increasingly emphasized in contemporary mental health research. Second, several important clinical factors known to influence both LOS and discharge outcomes, including baseline symptom severity, pharmacotherapy, electroconvulsive therapy, psychosocial interventions, family support, and community resources, were unavailable in this administrative dataset. The absence of these covariates raises the possibility of residual confounding. Additional factors such as admission-level insight, treatment adherence, and post-discharge service availability also could not be accounted for, potentially confounding the observed LOS-outcome associations [44]. Third, diagnostic subgroup classification was based on the primary discharge diagnosis, and substance-related disorders, including alcohol and other psychoactive substances, were grouped together using KCD codes. This aggregation may mask clinically meaningful heterogeneity within diagnostic categories. Moreover, administrative datasets often do not clearly distinguish between psychiatric admissions and hospitalizations primarily related to intoxication, withdrawal management, or substance-related medical complications. This limitation restricts causal interpretation of the observed

absence of a significant association between prolonged LOS and improvement among patients with substance use disorders [43].

Fourth, although our analysis did not detect a statistically significant non-linear association between LOS and clinical improvement within the observed range of hospitalization durations, the possibility of threshold or saturation effects cannot be excluded. Future studies incorporating a wider distribution of inpatient durations and alternative modeling approaches may help identify potential inflection points at which the marginal benefit of extended hospitalization diminishes.

Fifth, the imbalance in the number of patients categorized as improved versus not improved may affect the precision of the estimates. While this reflects the actual distribution of the national discharge records, disproportionate outcome frequencies can affect model stability, particularly in interaction analyses. In particular, the very wide confidence interval observed for the dementia subgroup in the interaction model (OR = 2.38, 95% CI 0.10, 40.9) indicates substantial statistical imprecision. This imprecision is likely attributable to limited subgroup sample size and sparse covariate patterns, suggesting potential instability of the interaction estimate. Accordingly, the magnitude of the dementia-specific LOS effect should be interpreted cautiously rather than as definitive evidence of a strong association.

Finally, because this study was conducted within the healthcare system of a single country, characterized by specific psychiatric bed distributions, insurance structures, and discharge planning practices, external validity may be limited [45]. The structural features of the Korean mental health system may shape LOS patterns differently from those in other countries. Replication using external administrative datasets and prospective clinical cohorts in diverse healthcare contexts is therefore warranted to confirm the generalizability of these findings.

4.4 Future Perspectives

Future studies should examine non-linear LOS-outcome relationships using restricted cubic spline models or piecewise regression to identify diagnosis-specific inflection points where marginal inpatient benefits diminish—particularly valuable for establishing evidence-based LOS reimbursement thresholds. Future research should prioritize three concrete policy directions informed by these diagnosis-specific LOS-outcome patterns. First, diagnosis-specific discharge planning pathways should be established: schizophrenia patients with strong LOS benefits (OR = 5.27) require extended stabilization (mean improvement group LOS: 21.5 days), dementia patients (OR = 2.38) need sustained behavioral management, alcohol use disorder patients (OR = 2.21) benefit from 10–14-day withdrawal protocols, whereas substance use disorder patients showing no LOS benefit (OR = 0.60) should transition rapidly to community care. Second, mandatory community linkage thresholds are recommended: Assertive Community Treatment referral for schizophrenia/dementia cases exceeding population mean LOS (21.5 days, improvement group), and immediate addiction clinic transfer for substance use disorders regardless of duration, given limited inpatient gains. Third, reimbursement structures should shift from uniform per diem payments to diagnosis-differentiated models rewarding process measures: enhanced payments for schizophrenia/dementia cases achieving documented stabilization (mirroring OR = 5.27/2.38 benefits) versus standard rates for substance use disorders, where prolonged LOS yields no clinical advantage (OR = 0.60). These evidence-based strategies, grounded in national discharge data, would optimize resource allocation across Korea's high psychiatric bed utilization context.

5 Conclusions

This nationwide study revealed diagnosis-specific patterns in the association between psychiatric inpatient LOS and clinical improvement at discharge. Extended hospitalization was linked to higher improvement odds in schizophrenia, dementia, and alcohol use disorders, but showed limited benefit for other substance use disorders and modest gains for mood disorders, indicating that uniform inpatient duration policies may be suboptimal. Optimizing psychiatric care requires diagnosis-tailored strategies integrating adequate inpatient duration with robust community linkages, particularly post-discharge addiction and mental health services. Future nonlinear modeling and pathway analyses for high-impact diagnostic groups are essential to define optimal length-of-stay ranges and inform evidence-based mental health promotion policies.

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Availability of Data and Materials: The Korea National Hospital Discharge In-depth Injury Data used in this study can be obtained at https://www.kdca.go.kr/injury after registration.

Ethics Approval: This study was reviewed by the Institutional Review Board of Gachon University. The board determined that the study was exempt from ethical review in accordance with relevant laws and regulations (No.: 1044396-202507-HR-151-01). As this study involved the analysis of de-identified secondary data, the requirement for informed consent was waived by the IRB.

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