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Factors of ADL/IADL associated with negative symptoms in long-term inpatients with schizophrenia

Tomoe EBISU¹, Takeshi HASHIMOTO¹, Tomomi SAKURAI¹,
Tomonori SAWADA², Yoshiki KAWASHIMA², Kayano YOTSUMOTO¹

Abstract

Objective: Long-term inpatients with schizophrenia often struggle with negative symptoms, hindering their discharge. Understanding the factors contributing to negative symptoms is vital for facilitating their eventual discharge. This study aimed to identify factors related to negative symptoms in long-term inpatients with schizophrenia, with a focus on assessing ADL/IADL performance and sociodemographic variables.

Methods: Negative symptoms and ADL/IADL were assessed using the Negative Scale in the Positive and Negative Syndrome Scale, and General Behavior in the Rehabilitation Evaluation Hall and Baker. Sociodemographic variables were collected from the medical records. A multiple linear regression analysis was conducted after selecting the candidate variables by the tests of no correlation.

Results: The study included 73 long-term inpatients with schizophrenia, with an average age of 61.2 ± 11.2 years. Multiple linear regression analysis identified the Social Activity score in the General Behavior as a significant predictor of negative symptom severity (B: 0.38, CI: 0.23–0.53).

Conclusion: Our findings highlighted the importance of addressing negative symptoms in long-term inpatients with schizophrenia. Psychosocial therapy interventions should prioritize improving social activities, encompassing interpersonal interactions, free-time activities, and optimizing the overall activities.

Key Words

Schizophrenia, Negative symptoms, ADL/IADL, Positive and Negative Syndrome Scale (PANSS), Rehabilitation Evaluation Hall and Baker (REHAB)

¹Department of Rehabilitation Science, Kobe University Graduate School of Health Sciences, Tomogaoka 7-10-2, Suma-ku, Kobe, Hyogo 654-0142, Japan.

²The Utsumi Jijin Medical Corp Arima Hospital, Shimoyamaguchi 1637-5, Yamaguchi-cho, Nishinomiya, Hyogo 651-1412, Japan.

Introduction

Despite Japan's extensive efforts over the last half-century to move individuals with mental illness from hospitals to community living, the challenge of long-term hospitalization persists. This is especially true for those with schizophrenia, who have been hospitalized for over a year, known as long-term hospitalization¹⁾. The "Reform Vision for Health, Medical Care, and Mental Health Welfare" initiative was launched from 2004 to 2013 to promote the discharge of long-term inpatients, but the goal of reducing their numbers was not achieved. As of 2022, there were still approximately 100,000 long-term inpatients with schizophrenia, making up around 60% of all long-term psychiatric care beds²⁾. This highlights the ongoing inadequacy of the transition to community-based care. Therefore, there is a need to establish effective interventions to facilitate their discharge, which requires a comprehensive investigation of inpatient characteristics.

Estimates suggest that a proportion, ranging approximately between 19% and 51%, of long-term inpatients with schizophrenia in Japan expressed a lack of interest in being discharged³⁻⁷⁾. Regrettably, since the conclusion of the aforementioned national initiative in 2013, there has been a stagnation in this trend, with the percentage persisting at approximately 21% to 40%^{8,9)}. Notably, among the various hindering factors of discharge, negative symptoms associated with schizophrenia emerge as contributing factors¹⁰⁾.

These symptoms have a direct impact on their daily living activities¹¹⁻¹³⁾, and while pharmacotherapy can have limited effectiveness, psychosocial therapy has been recommended in combination with medication¹⁴⁾. There is moderate evidence that psychosocial therapy improves negative symptoms¹⁵⁾. However, it remains unclear which specific activities of daily living (ADL)/instrumental activities of daily living (IADL) should be targeted to address negative symptoms through psychosocial therapy. Additionally, various sociodemographic factors have been associated with negative symptoms^{9,16-18)}.

This study aimed to explore factors related to negative symptoms in long-term inpatients with schizophrenia, with a focus on assessing ADL/IADL performance and sociodemographic variables. By identifying these factors, the study can help inform the development of interventions that combine psychosocial therapy and pharmacotherapy to address negative symptoms better, ultimately promoting successful transitions to community living.

Methods

Setting and participants

This study was conducted at a private psychiatric hospital in a Japanese city, which comprised two open and five closed wards. The inclusion criteria were as follows: (1) diagnosis of schizophrenia, as defined by the International Statistical Classification of Diseases (10th Revision); (2) hospitalization for more than 1 year; (3) no communication difficulties because of their symptoms; and (4) no plan for discharge during the study period from March 16 to 29, 2016. All inpatients who met these criteria were

informed of this study to obtain the maximum sample size.

Assessments and measurements

The following sociodemographic variables were collected from the medical records: age (years), sex (men/women), age of onset (years), duration of illness (years), number of hospitalizations (times), duration of hospitalization (years), and antipsychotic dosage (chlorpromazine equivalent, mg/day).

Functioning was assessed using the Japanese version of the Global Assessment of Functioning (GAF) scale—a measure that rates psychological, social, and occupational functioning on a scale of 1 to 100—which is reliable and valid^{19,20}.

Psychiatric symptoms were assessed using the Japanese version of the Positive and Negative Syndrome Scale (PANSS), which is reliable and valid²¹. The maximum score for the 30-item PANSS is 210 points, with higher scores indicating more severe psychiatric symptoms. In this study, the PANSS and GAF scales were administered by 14 psychiatrists, who were the attending physicians of the respective participants.

The General Behavior section of the Japanese version of the Rehabilitation Evaluation Hall and Baker (REHAB) was used to assess ADL/IADL. The REHAB is a 23-item behavior rating scale designed to assess people with major psychiatric handicaps in an institutional setting²². The reliability and validity of REHAB have been established^{23,24}. General Behavior comprises 16 items, categorized into the following five subscales: Social Activity, Disturbed Speech, Self-care, Community Skills, and Speech Skills. Social Activity in the General Behavior comprises six items: items 8 to 13²². The assessment items are as follows: interpersonal interactions in the ward (item 8), interpersonal interactions outside the ward (item 9), free-time activities (item 10), overall amount and speed of activities (item 11), amount of speech (item 12), and spontaneity of speech (item 13). Items 8, 9, 12, and 13 assess performance related to interpersonal interactions. Compared to item 11, item 10 assesses the performance of activities based on the interest in free time. Disturbed Speech consists of two items²²: meaning of speech (item 14) and clarity of speech (item 15). Self-care includes five items²²: table manners (item 16), maintaining hygiene (item 17), dressing appropriately (item 18), putting one's belongings in order (item 19), and amount of caregiver assistance (item 20). Community Skills comprises two items²²: money management (item 21) and use of public facilities (item 22). Speech Skills is included in Social Activity and is composed of two items²²: items 12 and 13. The scores of General Behavior are from 0 to 9 points per item; higher scores of General Behavior mean more severe behavior disability level²². Staff observe inpatients over 1 week and complete the scale at the end of the week based on their observations²². In this study, REHAB was independently administered to each participant by two staff members²²—a nurse and an occupational therapist—according to the recommendations of the manual²². Notably, 31 nurses and 10 occupational therapists administered it. For each participant's score on each item of General Behavior, the mean value of the scores²² of nurses and occupational therapists was used.

Deviant Behavior, another section of the REHAB, was similarly assessed by nurses and occupational

therapists. Deviant Behavior, consisting of seven items, measures instances of difficulty or embarrassment, such as incontinence, physical violence, and talking to oneself²³⁾. Deviant Behavior scores ranged from 0 to 2 points per item, with higher scores indicating more frequent deviant behavior²²⁾.

Statistical analysis

Multiple linear regression methods were used for multivariate analysis of independent variables associated with negative symptoms in long-term inpatients with schizophrenia. Based on the objective of this study, the candidates for the independent variables were as follows: the five subscales of General Behavior, age, sex, age of onset, duration of illness, number of hospitalizations, duration of hospitalization, and antipsychotic dosage. For the multivariate models, independent variables with $p < 0.1$ ²⁵⁾ in the test of no correlation between the Negative Scale score in PANSS and other variables were selected to enter in the model. The correlation ratio η^2 for nominal variables and the Spearman correlation coefficient for all other variables were calculated. One of the model creation conditions for multiple linear regression analysis was set as the “number of independent variables used in the model” $\times 10 \leq$ sample size²⁵⁾. A forward-backward stepwise selection method was employed²⁵⁾, and the Variance Inflation Factor ≥ 10 was set as the criterion of multicollinearity²⁵⁾. The normality of the residuals was examined²⁵⁾ using the Shapiro–Wilk test, and the presence or absence of outliers (≥ 3 SD²⁵⁾) was confirmed. All significance levels were set at $p < 0.05$ except for the criteria above for selecting independent variables for entry into the model. Statistical analysis was performed using Bell Curve for Excel version 4.04 (Social Survey Research Information Co., Ltd.).

Ethical considerations

The written and oral study explanation was provided to all inpatients who met the eligibility criteria. It was explained that participation in the study was voluntary and not compulsory, and consent could be withdrawn at any time, even after the initial consent. All participants provided written informed consent for participation in the study and publication. The Institutional Review Board of Utsumi Jijin Medical Corp Arima Hospital approved this study (approval date: February 29, 2016).

Results

Eligibility was confirmed for all 317 inpatients, of whom 103 met the inclusion criteria. Of them, 30 declined to participate in the study. The remaining 73 inpatients (men/women = 29/44) included in this study provided informed consent. They were inpatients in one open ward and four closed wards.

Table 1 shows the characteristics of the participants. The mean age was 61.2 ± 11.2 years, and the duration of hospitalization was 11.6 ± 8.6 years. The Negative Scale score was 26.2 ± 8.2 points. The total General Behavior score was 62.6 ± 22.2 points.

Tables 2 and 3 present the results of the test of no correlation. Variables with $p < 0.1$ were Social Activity score, Disturbed Speech score, Self-care score, Speech Skills score, and duration of hospitalization. After confirming that the “number of independent variables used in the model” $\times 10 \leq$ sample size²⁵⁾ was established, these five variables were used as independent variables for the multiple linear regression

methods.

Table 4 displays the results of the multiple linear regression analysis with forward-backward stepwise selection, and the results of the analysis of variance were significant ($p < 0.001$). Specifically, only the Social Activity score for General Behavior was included in the model (partial regression coefficient: $B = 0.38$, $p < 0.001$). The coefficients of determination (R^2) and the Durbin–Watson ratio were 0.26 and 1.87, respectively. The residuals showed a normal distribution, and no outlier exceeded three times the standard deviation.

Table 1. Characteristics of participants

	Min	Max	Mean ± SD		
Sociodemographic variables					
Age (years)	27	81	61.2	±	11.2
Age of onset (years)	13	60	26.7	±	12.3
Duration of illness (years)	3	62	35.2	±	12.9
Number of hospitalizations (times)	1	26	5.3	±	4.8
Duration of hospitalization (years)	1	37	11.6	±	8.6
Antipsychotic dosage* (mg/day)	0	2575	673.4	±	425.7
GAF scale [0-100] (points)	11	56	27.9	±	8.4
PANSS					
Total [30-210] (points)	45	145	100.0	±	27.1
Positive Scale [7-49] (points)	7	42	23.6	±	7.3
Negative Scale [7-49] (points)	10	45	26.2	±	8.2
General Psychopathology Scale [16-112] (points)	24	74	50.2	±	14.1
REHAB					
Deviant Behavior [0-14] (points)	0	8	2.2	±	1.9
General Behavior					
Total [0-144] (points)	24.5	121.5	62.6	±	22.2
Social Activity [0-54] (points)	4.5	52.0	25.2	±	11.1
Disturbed Speech [0-18] (points)	0	13.5	4.4	±	3.7
Self-care [0-45] (points)	0	34.0	11.7	±	8.1
Community Skills [0-18] (points)	9.5	18.0	15.9	±	2.8
Speech Skills [0-18] (points)	0	17.5	5.2	±	4.1

n=73 (men/women= 29/44), Min: Minimum, Max: Maximum, SD: Standard deviation

*Chlorpromazine equivalent, GAF: Global Assessment of Functioning

PANSS: Positive and Negative Syndrome Scale, REHAB: Rehabilitation Evaluation Hall and Baker

Table 2. Correlations between negative symptoms and ADL/IADL

		REHAB General Behavior				
		SA	DS	SC	CS	SS
PANSS						
Negative Scale	r	0.49	0.24	0.45	0.09	0.45
	p	0.00	0.04	0.00	0.45	0.00

r: Spearman correlation coefficient

PANSS: Positive and Negative Syndrome Scale

REHAB: Rehabilitation Evaluation Hall and Baker

SA: Social Activity, DS: Disturbed Speech, SC: Self-care

CS: Community Skills, SS: Speech Skills

Table 3. Correlations between negative symptoms and sociodemographic variables

Sociodemographic variables								
		Age	Sex	Age of onset	Duration of illness	Number of hospitalizations	Duration of hospitalization	Antipsychotic dosage*
PANSS								
Negative Scale	r	-0.16	0.00 ⁺	-0.15	0.05	-0.06	0.20	0.11
	p	-0.17	0.60 ⁺	-0.19	0.69	-0.62	0.09	0.37

r: Spearman correlation coefficient, ⁺Correlation ratio η^2 , PANSS: Positive and Negative Syndrome Scale

*Chlorpromazine equivalent

Table 4. Multiple linear regression analysis for negative symptoms in long-term inpatients with schizophrenia

	B	β	p	95% CI
Social Activity	0.38	0.51	0.00	0.23, 0.53
constant term	16.72		0.00	12.62, 20.83

 $R^2=0.26$, Adjusted $R^2=0.25$, ANOVA $p<0.001$

B: Partial regression coefficient

 β : Standardized partial regression coefficient

CI: Confidence interval

Discussion

This study explored the factors of ADL/IADL and sociodemographic variables associated with negative symptoms in long-term inpatients with schizophrenia who were hospitalized after the implementation of the state policy from 2004 to 2013, to facilitate the discharge of long-term inpatients in Japan. The development of alternative and effective methods for their discharge is crucial.

The multiple linear regression model generated a Durbin–Watson ratio of 1.87, which was close to 2.

The result indicated no data regularity²⁵⁾. The residuals showed a normal distribution, and no outliers exceeded three times the standard deviation. These results satisfied the essential conditions²⁵⁾ for multiple linear regression analyses. However, both the value of R^2 and the partial regression coefficient were relatively small. The results of this model were insufficient for predicting negative symptoms in long-term inpatients with schizophrenia. This preliminary result suggested that only social activities had a small influence on negative symptoms among ADL/IADL in long-term inpatients with schizophrenia. Regarding sociodemographic variables, only the duration of hospitalization was chosen as a candidate for the independent variable. However, this was not included in our model. The duration of hospitalization was not a predictor of negative symptoms in long-term inpatients with schizophrenia.

The correlation of negative symptoms with ADL/IADL in long-term inpatients with schizophrenia has been previously reported¹¹⁻¹³⁾; however, the results of the present study showed that, among ADL/IADL, only social activities were predictive of negative symptoms. These results indicated that targeted psychosocial therapy to improve social activities may contribute to an improvement in negative symptoms. Social Activity, in General Behavior, assessed interpersonal interactions, free-time activities, and overall amount and speed of activities. In long-term inpatients with schizophrenia, reduced opportunities for interpersonal interactions are attributable to the continuation of routine daily life activities during institutional care. Disabilities regarding interpersonal interactions were reportedly severe²⁶⁾ and had a moderate-to-high correlation with negative symptoms in such patients²⁷⁾. Sugibayashi et al. reported shorter staff care time for the long-term than for short-term inpatients with schizophrenia²⁸⁾. Thus, if staff members communicate more frequently and politely with these patients when providing care, the interpersonal interactions of long-term inpatients with schizophrenia could be improved. In long-term inpatients with schizophrenia, decreased spontaneous free-time activities may be secondary disabilities that are incurred due to long-term hospitalization. Long-term inpatients with schizophrenia demonstrated low spontaneity in performing daily activities, and many of their activities were undertaken as part of their ward schedules²⁹⁾. Therefore, helping these inpatients perform activities that reflect their preferences and values may encourage their spontaneous engagement in free-time activities. The overall amount of daily activities, such as shopping and cleaning, of long-term inpatients is less than that of community-dwelling patients because staff members usually perform many activities for the inpatients. Long-term inpatients with schizophrenia undertook fewer types of daily activities than community-dwelling individuals with schizophrenia²⁹⁾. Thus, providing options for activities, including those outside the ward, and assistance with performing the activities, may optimize the overall amount of activities undertaken by long-term inpatients with schizophrenia. In contrast to pharmacotherapy, a key strength of psychosocial therapy is its ability to target individual patients, activities, and environmental factors. Thus, in long-term inpatients with schizophrenia, psychosocial therapy that improves social activities may particularly contribute to the improvement of negative symptoms. The implications of this study pertain to the following suggestions for psychosocial therapy: 1) providing activities that involve interpersonal interactions, 2) encouraging spontaneous free-

time activities, and 3) optimizing the overall amount and speed of activities. Summarily, psychosocial therapy focusing on suggestions 1) and 2) is thought to lead to the achievement of 3). In psychosocial therapy for long-term inpatients with schizophrenia, supporting 1), 2), and 3) may effectively improve negative symptoms that are difficult to treat with antipsychotics alone.

According to the 2022 national survey²⁾ in Japan, approximately 74% of all long-term inpatients with schizophrenia were aged 40–75 years. The proportion by the duration of hospitalization²⁾ was as follows: 1–5 years group (approximately 39%), 5–10 years group (approximately 23%), 10–20 years group (approximately 21%), and 20 years or more (approximately 17%). In a 2018 national survey³⁰⁾ conducted in Japan, the mean antipsychotic dosage of long-term inpatients with schizophrenia was 828.2 mg/day. According to previous studies in Japan, the GAF scale scores were 30.5 ± 5.0 points³¹⁾, and the majority of scores were within 21–30 points³²⁾. The mean Negative Scale scores were in the range of 23–24 points^{33–35)}. The mean total scores of the General Behavior items were in the range of 51–58 points^{36,37)}. In summary, the age, duration of hospitalization, antipsychotic dosage, GAF scale score, Negative Scale score, and the total score of the General Behavior in the study participants did not differ significantly from those of national surveys and previous reports. Therefore, the results of this study may be roughly applicable to the Japanese inpatient population who remain hospitalized.

This study has some limitations. First, the participants were recruited from only one hospital, and the sample size was small. Future research should involve multicenter studies with larger sample sizes. Second, 30 of the inpatients who met the inclusion criteria during the study period declined to participate. Their influence on the results cannot be excluded. Third, the cognitive function of the participants was not assessed. Since cognitive impairment is an important core symptom of schizophrenia, the characteristics of the participants in this study may not have been fully explained. Fourth, both the value of R^2 and the partial regression coefficient were relatively small. These results were preliminary. Future studies should be carried out to obtain a model with higher explanatory power.

Conclusion

Psychosocial therapy that focuses on improving social activities among ADL/IADL, including interpersonal interactions, free-time activities, and optimizing the overall amount and speed of activities, may effectively improve the negative symptoms of the majority of long-term inpatients with schizophrenia in Japan. Future studies should explore the effectiveness of such psychosocial therapy interventions.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of interest

The authors declare no potential conflicts of interest in relation to the research, authorship, or publication of this article.

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