

## Predictors for the length of stay of emergency psychiatric patients

Fumito KOIZUMI<sup>1, 3)</sup>, Kotaro OTSUKA<sup>1, 4)</sup>,  
Jin ENDO<sup>1, 2)</sup>, Emina HONTA<sup>1)</sup>, Hirotaka SATO<sup>1)</sup>,  
Hikaru NAKAMURA<sup>2)</sup> and Akio SAKAI<sup>4), \*</sup>

<sup>1)</sup> Department of Neuropsychiatry, School of Medicine,  
Iwate Medical University, Morioka, Japan

<sup>2)</sup> Department of Disaster and Community Psychiatry, School of Medicine,  
Iwate Medical University, Morioka, Japan

<sup>3)</sup> Department of Critical Care, Disaster and General Medicine, School of Medicine,  
Iwate Medical University, Morioka, Japan

<sup>4)</sup> Iwate Mental Care Center, Morioka, Japan

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### Abstract

Clinical evaluation and the length of stay (LOS) of the patients surveyed for patients admitted to the psychiatric ward of a general hospital via emergency psychiatry. The goal was to identify factors related to the hospitalization period, which would prove useful in formulating a hospitalization and medical care plan. The population was 250,625 patients who visited Iwate Prefecture Advanced Emergency Medical Service Center and First and Second Outpatient department, in Iwate Medical University Hospital. Of the 13,899 emergency psychiatric patients, 2,144 patients who were directly admitted to the psychiatric ward were selected as subjects. We considered predictors for the prolongation or reduction of LOS. Consequently, psychotic symptoms

and insomnia as chief complaints, and state of hallucination-delusion were identified as predictors for the prolongation of LOS. Adversely, F2, being employed, administration of psychotropics, physical treatment and voluntary hospitalization were identified as predictors for the reduction of LOS. From this study, the categories related to the LOS of patients admitted to the psychiatric department of a general hospital via emergency psychiatry were summarized as follows: gender, psychotic symptoms, psychiatric diagnosis, social life functions, treatment status, and voluntary treatment. From these results, we conclude that the LOS can be predicted in order for effective intervention to be implemented.

*Key words* : *length of stay (LOS), predictors, prolongation of LOS, reduction of LOS, emergency psychiatry*

### I. Introduction

Predicting the length of stay (LOS)<sup>1, 2)</sup> for individual patients is vital for the admission,

the creation of a suitable medical environment and the establishment of a treatment plan for hospitalized patients.

In an ordinary LOS in psychiatric care, a wide range of factors are involved, such as the severity of psychotic symptoms, classification of the patient's condition, and

\* Vice president of Iwate Medical University

Corresponding author: Kotaro Otsuka

kotaro29@df6.so-net.ne.jp

selection of treatment. Up to this point, factors leading to the prolongation of the LOS have been indicated, such as: suicidal intent<sup>3)</sup>, unemployment<sup>4)</sup>, side effects of drugs<sup>4)</sup>, history of untreated primary disease<sup>4)</sup>, female gender<sup>5)</sup>, physical restraint<sup>5)</sup>, electroconvulsive therapy (ECT)<sup>5)</sup>, schizophrenia/other psychotic disorders<sup>6-8)</sup>, severity of symptoms<sup>9)</sup>, physical complications<sup>10)</sup>, and complications accompanying substance dependence<sup>9)</sup>. However, while reports exist on the LOS in psychiatric clinic wards and psychiatric departments in general hospitals, a detailed consideration of the LOS in patients who were admitted to a psychiatric ward via emergency psychiatry services has not been conducted thus far.

In this study, the clinical evaluation and LOS of patients who were admitted to the psychiatric ward via emergency psychiatry services were surveyed and the predictors of the LOS were identified, and the results are expected to prove useful in formulating a suitable hospitalization and medical care plan.

## II. Materials and Methods

Iwate Medical University has a base hospital for emergency psychiatric care in an area with a population of 400,000 (Morioka district). It has a facility with 1st and 2nd emergency outpatient (hereafter, 1<sup>st</sup> and 2<sup>nd</sup>), which operate 24-hours a day, 365-days a year, as well as an annexed facility, Iwate Prefecture Advanced Emergency Medical Service Center (hereafter, center). Both have psychiatrists handling all psychiatric emergency cases from the initial visit to treatment. The patients have a wide range of emergency psychiatric problems such as

acute phase psychotic symptoms, psychiatric symptoms with an anxiety-related background such as hyperventilation symptoms, serious suicide attempts and self-injuries, side effects from psychotropic drugs, physical complications, and so on. Treatment outcomes in the emergency outpatient department include admission to the psychiatric ward, hospitalization in an emergency center/ICU/physical department, transfer to a psychiatric care facility, returning home, and so on.

The population consisted of 250,625 patients who visited the primary and secondary emergency rooms of Iwate Medical University Hospital (hereafter, this hospital) and the center during the 8 years between January 1, 2003 and December 31, 2010. Of the 13,899 patients who visited the emergency psychiatry department we expected, the 849 were admitted to an emergency ward, 10,423 returned home, and the 483 who were either admitted to another hospital or department, passed away, or were put on outpatient standby. The subjects selected were 2,144 patients who were admitted directly from the emergency outpatient department to the psychiatric ward.

Psychiatric evaluation and diagnosis conducted by 11 emergency department psychiatrists or Iwate Medical University psychiatrists on duty under the supervision of 1 senior psychiatrist (mental health designated physician) while filling out the "Emergency Department Patient Reception Information Sheet". The evaluation items included: gender, age, visit classification (new patient, re-visit), transport classification (Center, 1<sup>st</sup> and 2<sup>nd</sup>), existence of a cohabiter, employment status, other hospitals visited if any, chief

complaint, psychiatric state, international statistical classification of diseases and related health problems (ICD)-10 diagnosis<sup>11)</sup>, life events, medication adherence, physical treatment, psychotropic drug administration, psychotropic drug prescription, psychotherapy, form of hospitalization, and so on. In addition, the LOS (days) was surveyed for each subject based on the patient summary at the time of discharge from the psychiatric department.

As for statistical analysis, in order to clarify the factors related to the LOS, a multiple linear regression analysis (stepwise method) was conducted with each survey item as the explanatory variable and the number of hospitalization days as the dependent variable. SPSS 22.0J for Windows was used for the statistical analysis, and the significance level for each examination was 5%, and the p value was indicated by number. Data with items which allowed personal identification were excluded, and consideration was given to the protection of personal information during data management and processing. This study was approved by the Ethics Committee of Iwate Medical University, School of Medicine.

### III. Results

#### 1. Breakdown of survey items (Table 1)

The mean value of the LOS for all subjects (2,144 cases) was  $22.2 \pm 68.8$  days. Its median was 3 days. Regarding basic attributes, males constituted a small percentage at 36.5%, the average age was  $38.9 \pm 16.8$  years, 73.2% had cohabiters, and 23.3% were employed. Concerning visit classification, 41.6% were new patients, as for transport classification, those who visited the center constituted 42.4%, and as for hospital visited, 16.2%

visited this hospital, while 39.7% visited other hospitals.

47.7% had suicide-related behavior as the chief complaint at the time of the emergency outpatient department visit, followed by physical complaint (21.1%), psychomotor excitement (8.7%), psychotic symptoms (6.9%), anxiety (4.0%), suicidal intent (3.8%), alcohol-related (2.1%), agitation or restlessness (1.7%), insomnia (1.4%), other (1.3%), and depression (0.4%), you give percentages, so the reader can see that it is in order.

Under psychiatric state, depressive state constituted 25.2%, followed by clouding of consciousness (19.8%), anxiety (15.0%), hallucination-delusion (14.4%), psychomotor excitement (8.6%), only physical symptoms (5.3%), inebriation (5.2%), stupor (2.8%), manic state (1.4%), and other (0.8%), you give percentages, so the reader can see that it is in order.

The ICD diagnosis at the time of the visit was: F3 (27.8%), F2 (24.3%), F4 (22.5%), F1 (6.8%), F6 (6.0%), F0 (4.9%), other (3.1%), F7 (2.5%), epilepsy (0.9%), in that order (diagnosis suspended: 27 cases, 1.3%). 44.7% experienced a life event at the time of the emergency visit, and 22.2% had good medication adherence. Regarding treatment following an emergency outpatient visit, 57.0% had physical treatment, 39.3% had psychotherapy, 15.4% had psychotropic drug administration, and 2.1% had psychotropic drug prescription. Under hospitalization form, 76.1% were admitted voluntarily, and of the involuntary admissions, 22.1% were subject to medical care and protection hospitalization, 0.8% were subject to temporary hospitalization, 0.7%

Table 1. Background factors among emergency psychiatric patients

Survey items	Frequency (%) or mean $\pm$ SD
Mean hospitalization term	22.2 $\pm$ 68.9
Gender	
Male	782 (36.5)
Female	1362 (63.5)
Mean age	38.9 $\pm$ 16.8
Visit classification	
New visit	892 (41.6)
Re-visit	1252 (58.4)
Transport classification	
1st and 2nd	1235 (57.6)
Center	909 (42.4)
Cohabiter	
Yes	1570 (73.2)
No	387 (18.1)
Unknown	187 (8.7)
Employment status	
Yes	499 (23.3)
No	1441 (67.2)
Unknown	204 (9.5)
Hospital visited	
This hospital	347 (16.2)
Other hospitals	851 (39.7)
None	946 (44.1)
Chief complaint	
Self-injury $\cdot$ Suicide	1023 (47.7)
Physical complaint	452 (21.1)
Psychomotor excitement	186 (8.7)
Psychotropic symptoms	149 (6.9)
Anxiety	85 (4)
Suicidal intent	81 (3.8)
Alcohol	44 (2.1)
Restlessness	36 (1.7)
Insomnia	30 (1.4)
Depression	30 (0.4)
Other	28 (1.3)
Psychiatric state	
Depressive	541 (25.2)
Consciousness clouding	425 (19.8)
Insecurity	322 (15.0)
Hallucination-delusion	308 (14.4)
Psychomotor excitement	184 (8.6)
Physical symptoms only	114 (5.3)
Inebriation	111 (5.2)
Stupor	61 (2.8)
Manic	30 (1.4)
Other	48 (0.8)
ICD diagnosis	
F0	105 (4.9)
F1	146 (6.8)
F2	520 (24.3)
F3	595 (27.8)
F4	483 (22.5)
F6	128 (6.0)
F7	54 (2.5)
Other	66 (3.1)
Epilepsy	20 (0.9)
Diagnosis suspended	27 (1.3)
Life event	
Yes	958 (44.7)
No	1049 (48.9)
Unknown	137 (6.4)
Medication adherence	
Good	476 (22.2)
Poor	866 (40.4)
Not medicated	449 (20.9)
Unknown	353 (16.5)
Treatment	
Psychotherapy	
Yes	843 (39.3)
No	1301 (60.7)
Physical treatment	
Yes	1223 (57.0)
No	921 (43.0)
Psychotropic drug administration	
Yes	330 (15.4)
No	1814 (84.6)
Psychotropic drugs prescription	
Yes	44 (2.1)
No	2100 (97.9)
Type of admission	
Voluntary	1631 (76.1)
Medical care and protection	474 (22.1)
Emergency involuntary	16 (0.7)
Emergency	17 (0.8)
Involuntary	5 (0.2)
Unknown	1 (0.1)
Total	2144 (100.0)

Table 2. Predictors for the length of stay by multiple linear regression analysis among emergency psychiatric patients

	Non-standardizing coefficient		Standardizing coefficient	t	p value	95% reliable section of B	
	B	Standard error	Beta			Lower limit	Upper limit
Hallucination-delusion (Psychiatric state)	31.890	6.455	0.161	4.940	<0.001	19.230	44.549
Male	20.672	3.384	0.143	6.110	<0.001	14.036	27.309
Physical treatment (treatment)	-11.478	3.578	-0.081	-3.208	0.001	-18.495	-4.461
Psychotropic drug administration (treatment)	-13.898	4.766	-0.071	-2.916	0.004	-23.246	-4.549
Voluntary (Type of admission)	-9.637	3.893	-0.058	-2.475	0.013	-17.274	-2.001
Psychotic symptoms (chief complaint)	20.072	8.023	0.072	2.502	0.012	4.335	35.808
F2 (ICD-10 diagnosis)	-12.595	4.635	-0.077	-2.717	0.007	-21.687	-3.504
Employed	-9.837	3.745	-0.062	-2.627	0.009	-17.182	-2.492
Insomnia (chief complaint)	26.685	13.244	0.047	2.015	0.044	0.708	52.662

were subjected to emergency treatment hospitalization, and 0.2% were hospitalized by legal control. There was 1 case in which the hospitalization form was unknown due to the fact that past admission records were destroyed.

## 2. Results of multiple linear regression analysis (Table 2)

According to the results of multiple linear regression analysis, concerning significant standardizing random variables, 4 items, namely, males ( $\beta = 0.143$ ), psychotic symptoms as the chief complaint ( $\beta = 0.072$ ), insomnia as the main complaint ( $\beta = 0.047$ ), and hallucination delusion under the psychiatric state ( $\beta = 0.161$ ), were extracted factors with positive standardizing coefficient regarding LOS. Five items, namely F2 ( $\beta = 0.077$ ) under ICD diagnosis, being employed ( $\beta = -0.062$ ), having psychotropic drug administration ( $\beta = -0.071$ ), having physical treatment ( $\beta = -0.081$ ), and

optional admission under hospitalization form ( $\beta = -0.058$ ), were extracted as factors with negative standardizing coefficient regarding LOS.

## IV. Discussion

### 1. Summary of the subjects

Regarding the average LOS at psychiatric hospitals, term of stay varies, ranging from short-term stays of 15 days in England<sup>7)</sup> and 63 days at Ethiopia's state mental hospital<sup>6)</sup> to long-term stays of 219 days in South Africa<sup>12)</sup>. It is assumed that the psychiatric care service system of the respective countries is reflected in the differences in the LOS; however, differences also occur due to the respective hospital functions. For example, even within South Africa, the LOS is 11 days in general hospitals, but quite short, at 7 days, at district hospitals<sup>12)</sup>. According to the Organization for Economic Cooperation and Development (OECD) report of 2014, a substantial difference

could be seen in the LOS between countries. For example, the said term of psychiatric care in European countries is approximately 36 days, whereas it is 298.1 days in Japan (Ministry of Health, Labor and Welfare, 2011), manifesting quite a difference<sup>13)</sup>.

We examined the LOS in the acute phase psychiatric treatment facilities of various countries. The term in the acute phase psychiatric unit at Nigeria's teaching hospital, for example, was 23.0~28.8 days<sup>14,15)</sup>, and according to several other survey results, the range was between 10.5 days and 43 days<sup>7, 8, 16-18)</sup>. On the other hand, the LOS in Japan was 75 days<sup>18)</sup>, and as with psychiatric care facilities in general, the impression is that the term is somewhat long by comparison.

The survey result obtained herein, namely 22.2 days, was close to that in the report on the LOS (median 22 days) in the general hospital psychiatric department presented by Addisu, et al.<sup>19)</sup> However, while the former represents the LOS at the general hospital psychiatric department via the emergency psychiatry outpatient department, the latter does not necessarily represent cases that have gone through emergency psychiatry. Therefore, if the subject selection conditions were to be equalized, it would be highly probable that the term for the latter may be further reduced.

## 2. Factors that lead to the prolongation of the LOS

### 1) Male gender

Sociodemographic factors such as age, gender, marital status and place of residence are said to influence the LOS in psychiatric care facilities<sup>6, 14, 15, 19)</sup>.

In prior studies, Warren et al. have

pointed out that being a male is a factor in the prolongation of LOS, and other factors such as an illness duration of 12-17 years, being 65 years or older, receiving medical assistance, use of physical restraint, cognitive disorder diagnosis, personality disorder diagnosis, and so on, also contribute to the prolongation thereof<sup>20)</sup>. In addition, Lelliot et al. reported that prolonged LOS cases of males are closely related to schizophrenia and psychotic disorder<sup>21)</sup>. As far as these reports are concerned, it assumed that prolongation of LOS in male patients is linked to a severe psychiatric condition.

On the other hand, there are reports indicating that the LOS of male patients in psychiatric care facilities is short. For example, Wolff et al. have pointed out that in psychiatric care facilities, factors linked to a reduced LOS are substance dependence, need for physical treatment and male gender<sup>1)</sup>. Additionally, Thompson et al. report that the median LOS for male patients in psychiatric care facilities in England was 14 days, whereas the LOS for female patients was 17 days<sup>7)</sup>. Furthermore, according to a report by . Rosa et al., the median LOS of male patients in psychiatric care facilities was 22 days, and 25 days for female patients, indicating the male LOS to be shorter<sup>22)</sup>.

As shown above, there is no consistent view regarding LOS and gender among psychiatric care facilities in general. However, in this study, after considering confounding factors, the a male gender was linked to the prolongation of LOS. At the very least, this is thought to indicate that in the acute phase treatment in general hospital psychiatric departments, male gender is a factor in the

prolongation of LOS.

- 2) Psychotic symptoms as the chief complaint, hallucination-delusion as the psychiatric state

Furthermore, the results of this study indicate a correlation between the prolongation of LOS and psychotic symptoms. Normally, in cases where patients show psychotic symptoms as their main complaint or exhibit hallucination-delusion as the psychiatric state at the time of the visit, the first illness which requires identification is schizophrenia. Regarding the LOS by diagnosis in psychiatric departments of general hospitals, there have been reports indicating 34.2 days for schizophrenia, 32.6 days for other psychotic disorders, 24.5 days for bipolar disorder, 23.7 days for depressive disorder and 25.1 days for brief psychotic disorder, revealing that schizophrenia patients have the longest LOS<sup>19)</sup>. Quite a few reports also correlate schizophrenia and non-affective disorder with LOS<sup>6-8)</sup>. Furthermore, in addition to schizophrenia as factors for the prolongation of LOS, Nakanishi et al. cite compulsory admission, old age, requirement of outpatient treatment service, and requirement of adjustment in community care by a nurse, and others<sup>23)</sup>.

Psychotic symptoms and state of hallucination-delusion occur not only in patients with schizophrenia but also in those with brain tumors and organic mental disorders such as meningitis. With the latter, because examination and treatment of the target illness are required, it is common for the LOS to become prolonged. It is said that factors such as the severity of the psychiatric disorder and physical complications<sup>9-10, 14)</sup> are

factors contributing to the prolongation of LOS, and cases such as organic/symptomatic psychiatric disorder with hallucination-delusion are considered to have both of the above.

In cases where the patients manifest psychotic symptoms or hallucination-delusion and were admitted to the psychiatric department of a general hospital via emergency psychiatry, a prolonged LOS due to the building of a support system after the diagnosis needs to be taken into account.

- 3) Insomnia as the main complaint

According to past surveys at this hospital, 95% of insomnia patients have returned home after the visit<sup>24)</sup>, implying that hospitalization was not required for many patients with insomnia as the main complaint. However, apart from insomnia itself, insomnia should not be dismissed with the uniform treatment of hypnotics prescription and home rest. The reason is that in the field of psychiatry, behind the insomnia complaint may exist such various underlying conditions as depression, schizophrenia, bipolar disorder and anxiety disorder.

For example, in schizophrenia patients, there have been reports of strong manifestations of positive and negative symptoms, depressive mood and anxiety symptoms<sup>25)</sup>. In addition, . Shekunov et al. indicate insomnia as a stressor in 8 suicide attempt patients admitted to surgical/medical wards in addition to uncontrollable pain, anxiety and agitation, acute delirium, and psychosocial difficulties, and so on<sup>26)</sup>.

Multiple psychiatric symptoms and illnesses are often behind insomnia complaints, and it is probable that by the time a visit is made to the emergency psychiatry department, such

conditions have progressed. Therefore, in cases where the patients have been admitted to a psychiatric ward, it is thought that the treatment for the illness causing insomnia was required, leading to the prolongation of LOS as a result.

### 3. Factors related to short LOS

#### 1) F2 under the ICD diagnosis

F2, namely, illnesses within the scope of schizophrenia, was extracted as a LOS-reducing factor. This may seem contradictory to the previously-mentioned results of psychotic disorder and state of hallucination-delusion being linked to a prolonged LOS. The explanation for this may be that these are cases in which the patient has a primary care physician who has diagnosed the illness and has developed a treatment plan at an early stage, or the patient has been transferred to another hospital, thus accounting for the shorter LOS.

#### 2) Employment

For cases in which the patients are employed, it is thought that because their social functions are maintained to a certain degree, these patients are not applicable as heavy service consumers<sup>27)</sup> who require transfer to a hospital bed for a prolonged LOS; thus, the LOS is relatively short.

However, in the case of melancholy-type depression patients, their personality background of “being serious to a fault with a strong sense of responsibility”<sup>28-32)</sup> often results in premature discharge from the hospital and return to the workplace. Such reduction of LOS is not favorable by any means, and the doctor overseeing the treatment is required to determine the adequate timing for the discharge.

#### 3) Psychotropic drug administration

In emergency psychiatry, psychotropic drugs are often administered when the patient suffers from anxiety or psychomotor excitement. In this hospital, the guidelines of the Japanese Association for Emergency Psychiatry<sup>30)</sup> are applied as a basis for administering drugs for acute phase anxiety/agitation and excitement conditions. The fact that adequate drug therapy was carried out may have contributed to the reduction in the hospitalization and treatment period. In addition, recently, psychotropic drug administration has become widespread regardless of the severity of the condition, and there is a possibility that the patients who received psychotropic drug administration at the emergency outpatient department may have had relatively mild symptoms at the time of the emergency visit.

#### 4) Physical treatment

The subjects of this study were patients who were directly admitted to the psychiatric ward via the emergency outpatient, and do not include severe physical cases which required hospitalization in an emergency ward or ICU. Therefore, many of the patients who received physical treatment at the time of the emergency visit had self-injury or suicide attempt as their chief complaint and chose drug overdose as the method thereof.

Physical treatment in such cases includes head CT to identify the state of consciousness clouding, chest X-ray and blood sampling to verify aspiration pneumonia, intravenous injection and gastric lavage, and so on. Because most of the physical treatment intervention had already been completed at the emergency outpatient stage, there was



a tendency for the treatment target to be reached at an early stage, resulting in an early discharge.

However, with cases of self-injury and suicide attempt cases, although the treatment during hospitalization was given from the perspective of reattempt prevention, if an early discharge is taken into consideration, such intervention must be made promptly. Utilization of an effective intervention method is necessary, such as the reattempt prevention program (ACTION-J)<sup>33)</sup>, with suicide attempter care and case management as forms of intervention.

#### 5) Optional hospitalization

According to the systematic review by Kallert et al., patients who were admitted voluntarily had a reduced LOS in comparison to those who were involuntarily admitted<sup>34)</sup>. There are other reports indicating that compulsory hospitalization is linked to a prolonged LOS<sup>8,35)</sup>. In addition, even if the hospitalization is via the emergency psychiatry, if voluntary admission is possible, a positive therapeutic relationship is achieved through the treatment initiative of the patients themselves<sup>36)</sup>. It is thought that the LOS is reduced in cases of voluntary admission due to fact that the medical professionals and patients share a treatment target from an early stage after admission, resulting in the smooth progress of the treatment.

#### 4. Predictive factors of LOS of emergency psychiatric patients

In the emergency psychiatry scene, there are cases in which information from the patients themselves is insufficient due to hallucination-delusion or stupor, or information prior to the visit is lacking. Therefore, the

prediction of LOS is difficult.

In this study, the LOS of psychiatric emergency patients who were admitted to a general hospital psychiatric ward via emergency psychiatry service was examined. As a result, four factors which led to a prolonged LOS were extracted, namely, male gender, psychotic symptoms as the chief complaint, hallucination-delusion as the psychiatric state, and insomnia as the main complaint. There were five factors which led to a reduced LOS, namely F2 under the ICD diagnosis, being employed, psychotropic drug administration, physical treatment and voluntary hospitalization.

These could be summarized in categories such as gender, psychiatric symptoms, psychiatric diagnosis, social life functions, treatment status and initiative in treatment. Based on the results of this study, it is anticipated that the LOS could be predicted so as to implement a more effective intervention. Lastly, the following were regarded as limitations of the study: Only patients who were hospitalized at the psychiatric ward of a general hospital via the psychiatric emergency service were selected as subjects for this study, and cases examined at psychiatric clinics as well as admission cases examined via the emergency center were excluded.

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## 精神科救急外来受診者の入院期間の予測因子

小泉文人<sup>1),3)</sup>, 大塚耕太郎<sup>1),4)</sup>,  
遠藤 仁<sup>1),2)</sup>, 本多笑奈<sup>1)</sup>, 佐藤広隆<sup>1)</sup>,  
中村 光<sup>2)</sup>, 酒井明夫<sup>4),\*</sup>

<sup>1)</sup> 岩手医科大学, 神経精神科学講座

<sup>2)</sup> 岩手医科大学, 災害・地域精神医学講座

<sup>3)</sup> 岩手医科大学, 救急・災害医学講座

<sup>4)</sup> 岩手県こころのケアセンター

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### 要旨

精神科救急経由で総合病院精神科へ入院した患者について, 患者の臨床評価と入院期間を調査し, 入院期間に関わる因子を同定することで適切な入院医療計画の策定に役立てることを目的とした. 岩手県高度救命救急センターおよび岩手医科大学附属病院一次二次外来を受診し精神科救急対応となった患者 13,899 件の中で精神科病棟に直接入院した 2,144 件を対象とし, 入院期間の長期化および短縮に関連する予測因子を検討した. その結果, 長期化に関わる因子では男性, 主訴の精神病症状と不眠, 状態像の

幻覚妄想状態, 短縮に関わる因子では international statistical classification of diseases and related health problems-10 診断の F2, 就労有り, 向精神薬投与, 身体的処置, 自発的入院が抽出された. 本研究により精神科救急を利用した総合病院精神科入院患者の入院期間に関連する次元は性別, 精神症状, 診断, 社会生活機能, 治療状況, 治療の自発性と要約できる. 本研究の結果から, 入院期間を予測し円滑な介入が期待される.

\* 岩手医科大学副学長