

**Table 1** Obstacles, challenges, lessons learned and solutions in implementing community-oriented mental health care (continued)

	Obstacles and challenges	Lessons learned and solutions
<i>Government</i>	Inadequate human resources for delivery of mental health care in relation to the level of need in the population	<ul style="list-style-type: none"> <li>- Assessment of population level needs for primary care and specialist mental health care services.</li> <li>- Build capacity of health workers engaged in providing general health care and mental health care in community.</li> <li>- Training current health and mental health professionals in community-oriented mental health care.</li> </ul>
	Brain drain, failure to retain talent, staff retention, and weak career ladders	<ul style="list-style-type: none"> <li>- UN agencies/international NGOs assure sustainability of their projects/programmes.</li> <li>- Exchange programmes between countries.</li> <li>- Set period of time medical students/registrars have to serve in their countries or rural areas.</li> <li>- Task shifting/function differentiating of psychiatrists to use their ability in their area of speciality.</li> <li>- Create financial incentives and reputation systems for psychiatrists who engage in community mental health.</li> <li>- Train other (less "brain drainable") health professionals to deliver mental health care.</li> <li>- Payment for education may be attached to the allocation and preservation of resources to address equitable distribution and to prevent emigration without appropriate reimbursement.</li> </ul>
	Non-sustainable, parallel programmes by international NGOs	<ul style="list-style-type: none"> <li>- Close relations with ministries and other stakeholders and international NGOs.</li> <li>- Mental health plan in place, so NGOs can help achieve these goals sustainably.</li> <li>- Government to be proactive in collaborating with NGOs and private-public partnership.</li> </ul>
<i>Organization of the local mental health system</i>	Need to design, monitor, and adjust organization of mental health system	<ul style="list-style-type: none"> <li>- This includes plan for local, regional, and central mental health services based on public health need, full integration with primary care, rational allocation of multi-disciplinary workforce, development of information technology, funding, and use of existing facilities. All stakeholder groups can be involved in developing, monitoring, and adjusting plan.</li> <li>- Set implementation plan with clear coordination between services.</li> <li>- Development of policy/implementation plan with number of service needed per population.</li> <li>- Role differentiation of the hospital, community and primary care services, and private and public services, using catchment area/capitation system with flexible funding system.</li> <li>- Prioritization of target groups, especially people with severe and persistent mental illness.</li> </ul>
	Lack of a feasible mental health programme or non-implementation of mental health programme	<ul style="list-style-type: none"> <li>- Make programme highly practical by identifying resources available, tasks to be completed, allocation of responsibilities, timescales, reporting and accountability arrangements, progress monitoring/evaluation systems.</li> </ul>
	Need to specify developmental phases	<ul style="list-style-type: none"> <li>- Planners and professional leaders to design 5 and 10 year plans.</li> </ul>
	Poor utilization of existing mental health facilities	<ul style="list-style-type: none"> <li>- Improve awareness of benefits of facilities and services.</li> <li>- Specify pathways to care.</li> <li>- Inbuilt monitoring quality of care, especially process and outcome phases.</li> </ul>
	Need to include non-medical services	<ul style="list-style-type: none"> <li>- Include families, faith-based social services, NGOs, housing services, vocational services, peer-support services, and self-help services. All stakeholders involved in designing system.</li> <li>- Moving key tasks such as initial assessment and prescribing using a limited and affordable formulary to specially trained staff who are available at the appropriate local level.</li> <li>- Identify leaders to champion and drive the process.</li> <li>- More involvement in planning, policy making and leadership and management.</li> </ul>
Lack of multi-sectoral collaboration, e.g., including traditional healers, housing, criminal justice, or education sectors	<ul style="list-style-type: none"> <li>- Development of clear policy/implementation plan by all stakeholders.</li> <li>- Collaborate with other local service to identify and help people with mental illness.</li> <li>- Provision of information/training to all practitioners.</li> <li>- Establish multi-sectoral advisory and governance groups.</li> <li>- Familiarization sessions between practitioners in the Western and local traditions.</li> </ul>	
Poor availability or erratic supplies of psychotropic medication	<ul style="list-style-type: none"> <li>- Educate policy makers and funders about the costs/benefits of specific medications.</li> <li>- Provide infrastructure for clozapine monitoring.</li> <li>- Monitoring prescribing patterns of psychotropic medication.</li> <li>- Drug revolving funds, public-private partnerships.</li> </ul>	
<i>Professionals and practitioners</i>	Need for leadership	<ul style="list-style-type: none"> <li>- Psychiatrists and other professionals need to be involved as experts in planning, education, research, and overcoming inertia and resistance in the current environment.</li> </ul>
	Difficulty sustaining in-service training/adequate supervision	<ul style="list-style-type: none"> <li>- Training of the trainers by staff from other regions or countries.</li> <li>- Shifting of some psychiatric functions to trained and available practitioners.</li> <li>- Lobby hard to ensure this is a priority and integral to the mental health plan.</li> </ul>

**Table 1** Obstacles, challenges, lessons learned and solutions in implementing community-oriented mental health care (continued)

	Obstacles and challenges	Lessons learned and solutions
<i>Professionals and practitioners</i>	High staff turnover and burnout, or low staff morale	<ul style="list-style-type: none"> <li>- Introduction of recovery oriented services.</li> <li>- Collect case examples of recovery.</li> <li>- Build trust by involving staff leaders in oversight and decision making committees.</li> <li>- Sponsor social events to enable staff to team build in non-work situations.</li> <li>- Emphasize career-long continuing training programmes.</li> <li>- Training of supervisors.</li> <li>- Provide opportunities for attending out of area professional meetings.</li> <li>- Equip with sufficient skills and support.</li> </ul>
	Poor quality of care/concern about staff skills	<ul style="list-style-type: none"> <li>- Ongoing training and supervision.</li> <li>- Create and disseminate guidelines for professionals.</li> <li>- Cultivate psychiatrists' clinical skills, so that they are preserved in spite of the variety of new commitments.</li> <li>- Third party evaluation.</li> <li>- Encourage and reward quality by awards and similar processes.</li> </ul>
	Professional resistance, e.g., to community-oriented care and service user involvement	<ul style="list-style-type: none"> <li>- Government and professional societies promote the importance of community-oriented care and service user involvement.</li> <li>- Task shifting/function differentiating of psychiatrists to use their abilities more broadly in their area of speciality and work with a range of stakeholders including consumers and carers/families.</li> <li>- Develop training in recovery-oriented psychosocial rehabilitation as part of training of new psychiatrists, including at medical schools in LAMICs.</li> <li>- Collect case examples of recovery and successfully implemented community mental health initiatives.</li> </ul>
	Dearth of relevant research to inform cost-effective services and lack of data on mental health service evaluation	<ul style="list-style-type: none"> <li>- More funding on research, for both qualitative and quantitative evidence of successfully implemented examples of community-oriented care.</li> </ul>
<i>Users, families, and other advocates</i>	Failure to address disparities (e.g., by ethnic, economic groups)	<ul style="list-style-type: none"> <li>- All key stakeholders involved; advocacy for under-represented groups to develop policies and implementation plans.</li> </ul>
	Need for advocacy	<ul style="list-style-type: none"> <li>- Users and other advocates may be involved in all aspects of social change, planning, lobbying the government, monitoring the development and functioning of the service system, and improving the service system.</li> </ul>
	Need for self-help and peer support services	<ul style="list-style-type: none"> <li>- Users to lead these movements.</li> </ul>
	Need for shared decision making	<ul style="list-style-type: none"> <li>- Users and other advocates must demand at all levels that the system shift to value the goals of users and families and that shared decision making become the norm.</li> <li>- Continuing professional education on human rights and staff attitudes emphasizing attention to preferences of consumers and carers.</li> </ul>

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**Hospital Readmission and First-Time Admitted Patients  
 with Schizophrenia: Smoking Patients had Higher  
 Hospital Readmission Rate than Non-Smoking Patients**

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 Ken Mayahara, Yoshio Matsumoto, and Junichi Hirakawa*

## HOSPITAL READMISSION IN FIRST-TIME ADMITTED PATIENTS WITH SCHIZOPHRENIA: SMOKING PATIENTS HAD HIGHER HOSPITAL READMISSION RATE THAN NON-SMOKING PATIENTS\*

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### ABSTRACT

*Objectives:* To consider smoke-free policies for the patients with schizophrenia, the present study examined how smoking behavior is related to hospital readmission among patients with schizophrenia. *Methods:* A retrospective study was conducted in 2007 on 460 discharged patients with schizophrenia who voluntarily admitted in the participating psychiatric hospitals at first time. We reviewed smoking status, readmissions, and other variables including socio-demographic characteristics, process of care, and

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social functioning at discharge using the Global Assessment of Functioning scale (GAF). *Results:* The rate of cigarette smoking in this study was 42.2%. The rate of smoking was significantly higher in males (56.1%) than in females (26.2%). Mean GAF score at discharge was slightly higher in smoking patients than non-smoking patients ( $g = 0.18$ ). Cox proportional hazard model revealed that hospital readmission rate was significantly higher in smoking patients than non-smoking patients after controlling for all other variables (HR = 1.78). *Conclusions:* Non-smoking patients had fewer hospital readmissions than smoking patients. This finding could be a reason to promote cessation of smoking which might provide positive influences on prognosis of schizophrenia.

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**Key Words:** schizophrenia, smoking, hospital readmission

### INTRODUCTION

Smoking is harmful to personal health, and it also has adverse effects on the health service resource required to treat smoking-related illnesses [1]. In fact, according to the U.S. Department of Health and Human Services, smoking is the most documented cause of disease in the history of biomedical research [2]. As results of anti-smoking measures of these understandings, smoking rates around the world have declined each year [3, 4]. Consequently, health care facilities are increasingly implementing policies that ban smoking on their premises in response to the demonstrated health hazards of tobacco smoking on a global basis [5]. However, this is not the case for psychiatric patients, who are about twice as likely to smoke as others [6]. Especially for patients with schizophrenia, the prevalence of smoking is significantly higher (45-88%) than in the general population (22%) [6-8]. This is because there is often the perception that smoking patients should not be targeted since smoking is one of the few subjective pleasures available to those afflicted [9]. Therefore, there is a reluctance to implement a smoke-free policy in psychiatric inpatient units. Previous studies have examined the negative effects of cigarette smoking, such as increased mortality and the requirement of higher doses of antipsychotic medications in patients with schizophrenia [10]; however, fewer studies have focused on the psychiatric outcomes of cigarette smoking among this population. It is worthwhile to understand the psychiatric outcomes of cigarette smoking among patients with schizophrenia to consider smoke-free policies for individuals with mental illness. In the present study, we therefore examined how smoking behavior is related to hospital readmission among patients with schizophrenia.

## METHODS

### Participants

This study is a part of a nationwide research project on outcomes of discharged patients with schizophrenia by Japanese Association of Psychiatric Hospitals (JAPH). Figure 1 illustrates the selection process. Of the 1,215 JAPH member hospitals, 526 hospitals (43.3%) participated in the study.

Participants of the study were discharged patients with schizophrenia who were voluntarily admitted in the participating psychiatric hospitals for the first time. Among the hospitals, 21,396 inpatients with schizophrenia diagnosed by ICD-10 were discharged and received psychiatric outpatient services during a period of April 2004 and March 2005. We randomly recruited 4,176 patients from 21,396 patients using a systematic sampling method. For the present study, we used 460 patients who were:

1. aged between 20 years and 64 years old, and
2. voluntarily admitted to psychiatric hospitals for the first time.

We focused on first admitted patients because history of previous hospitalization is the strongest predictor of readmission [11]. Furthermore, we focused on the patients with a voluntarily basis admission to avoid confounding variables as much as possible. This study was approved by Japanese Association of Psychiatric Hospitals and Institutional Review Board of National Center of Neurology and Psychiatry.

### Questionnaire

A record administrator in each hospital retrospectively reviewed medical charts of the patients, completed the questionnaires, and returned them to the study office in 2007. The questionnaire consisted of:

1. socio-demographic characteristics (gender, age, onset age, sex, and disease duration);
2. smoking;
3. process of care (use of seclusion or restraint and antipsychotic medication at discharge); and
4. outcomes (GAF; the Global Assessment of Functioning scale score at discharge and hospital readmission).

In the present study, current smoking status (smoking or non-smoking) was obtained from medical charts. As for the definition of seclusion or restraint in the present study, it was based on the Mental Health Act in Japan. The definition of seclusion is to place a patient alone in a locked room, and the definition of restraint is to use a restraint strap or belt, or other equipment to restrict the movement of

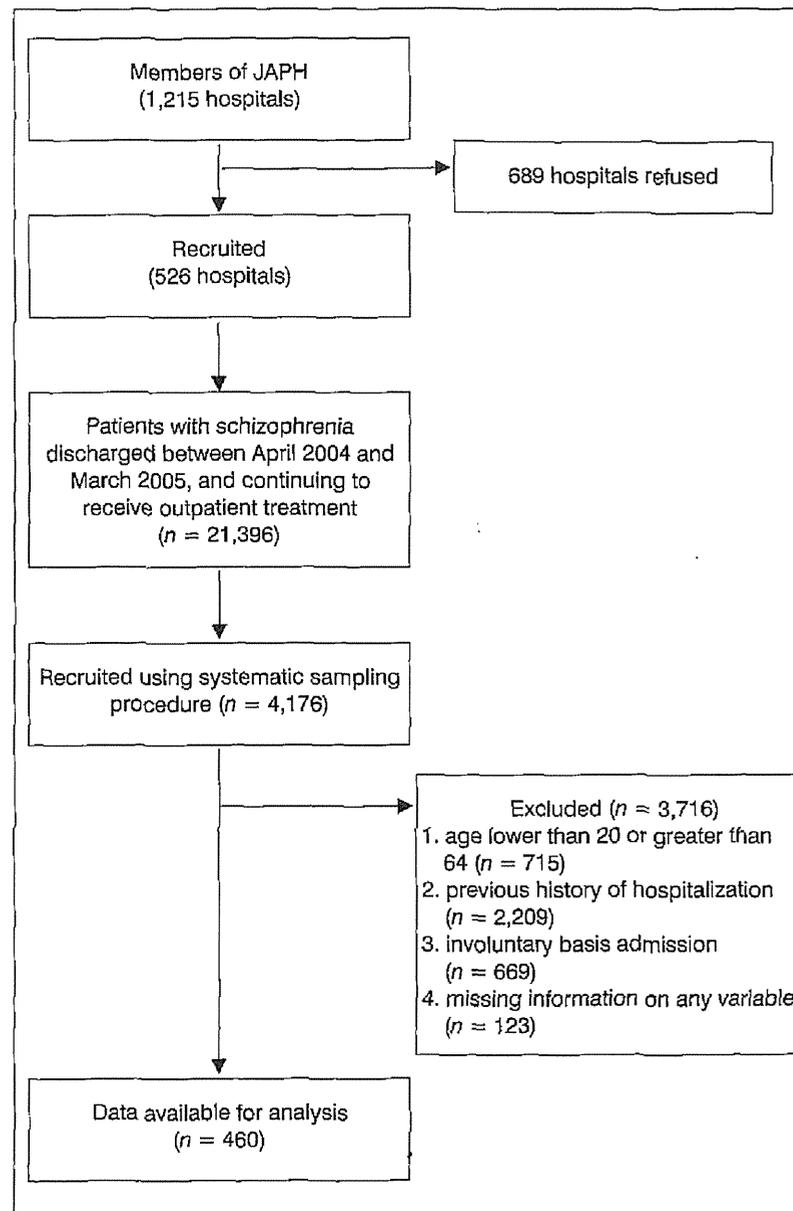


Figure 1. Flow diagram of the patients' selection.

patients. As for antipsychotic medication, we used dosages and number of typical and atypical antipsychotics. All dosages of antipsychotic drugs were converted into chlorpromazine equivalents (CPZ) [12, 13]. Also, the GAF scale is a measure of global severity of illness in the DSM-III-R multi-axial system (axis V) [14] used by mental health clinicians and physicians to rate subjectively the social, occupational, and psychological functioning of adults. The GAF scale was used for the present study because it is the most commonly used global assessment instrument for psychiatric patients with an easily and quickly administered measure of global severity of illness [15, 16].

**Hospital Readmission**

This is the retrospective study conducted in 2007. The participants were the patients who were discharged from April 1, 2004 to March 31, 2005. After discharging, they were followed until December 31, 2006, their last visit of outpatient clinic or the first day of readmission. The mean entire study period was 510 days (range: 21 months–33 months, *SD* = 334 days).

**Statistical Analyses**

To describe patients' characteristics, we computed standardized mean differences (Hedges's *g* statistic) for continuous variables and odds ratio for categorical variables [17]. Cox proportional hazard model was used to describe the relationship between smoking status and time to readmission while controlling for other predictor variables [18]. Finally, predicted survival probabilities for participants without readmission were estimated to examine the smoking effect on the readmission probability by holding all other variables constant. In estimating predicted survival probabilities, we controlled for the effects of age, onset age, sex, disease duration, seclusion, physical restraint, GAF scores, CPZ equivalent, and number of typical and atypical antipsychotics. All statistical tests were two-tailed, with  $\alpha$  level set at 0.05. Data were analyzed using R version 2.7.1. [19].

**RESULTS**

There were 194 smokers (42.4%) and 266 non-smokers (57.8%). Table 1 shows characteristics among discharged schizophrenic patients. The rate of smoking was significantly higher in males (56.1%) than in females (26.2%). In addition, mean GAF score at discharge was slightly higher in smokers than non-smokers ( $g = 0.18$ ), and readmission rate was significantly higher in smokers than non-smokers ( $OR = 1.88$ ). The study length was slightly shorter in smokers than in non-smokers ( $g = -0.16$ ).

The Cox proportional hazard model fits the data well (logrank test = 34.0,  $df = 14, p < .05$ ). Even after controlling for age, onset age, sex, disease duration,

Table 1. Sample Characteristics

Characteristic	Smoker ( <i>n</i> = 194)	Non-smoker ( <i>n</i> = 266)	Effect size <sup>a</sup> (95% CI)
Mean age (s.d.)	40.7 (10.7)	39.7 (12.3)	0.08 (-0.10 to 0.27)
Mean onset age (s.d.)	27.5 (8.4)	27.4 (10.8)	0.02 (-0.17 to 0.20)
Sex (female, %)	28.9	59.4	0.28 (0.19 to 0.41)
Mean disease duration (years, s.d.)	13.9 (9.9)	13.1 (10.6)	0.08 (-0.11 to 0.26)
Seclusion (yes, %)	14.9	12.0	1.29 (0.74 to 2.21)
Restraint (yes, %)	4.6	3.0	1.56 (0.58 to 4.30)
Antipsychotic medication at discharge			
Mean chlorpromazine equivalent (mg, s.d.)	639.6 (540.7)	663.8 (618.9)	-0.04 (-0.23 to 0.14)
Number of typical antipsychotic (%)			
0	36.1	43.2	1
1	34.5	30.5	1.36 (0.87 to 2.11)
2	20.1	15.8	1.52 (0.90 to 2.59)
3 or more	9.3	10.5	1.06 (0.54 to 2.05)
Number of atypical antipsychotic (%)			
0	25.8	21.1	1
1	66.0	65.0	0.83 (0.59 to 1.30)
2	8.2	13.9	0.49 (0.24 to 0.97)
Mean GAF score* at discharge (s.d.)	58.1 (14.2)	55.3 (16.1)	0.18 (-0.00 to 0.37)
Mean study length (days, s.d.)	470.2 (334.5)	524.3 (335.6)	-0.16 (-0.35 to 0.02)
Readmission (%)	49.5	34.2	1.88 (1.29 to 2.75)

<sup>a</sup>Effect size refers to standardized mean differences for continuous variables and odds ratios for categorical variables. CI = Confidence interval.

seclusion, physical restraint, GAF scores, CPZ equivalent, and number of typical and atypical antipsychotics between the groups, non-smoking patients are less likely to be readmitted than smoking patients (hazard ratio = 1.78, 95%CI = 1.31–2.42). Figure 2 shows the predicted survival probabilities for without readmission as a function of the number of days after discharge. A quarter of the smoking group had readmitted within 170 days, whereas a quarter of the non-smoking group had readmitted within 440 days.

## DISCUSSION

The present study examined how smoking behavior is related to hospital readmission among patients with schizophrenia. The study found that non-smoking patients with schizophrenia have lower rates of hospital readmission than smoking patients even after controlling variables including gender and the

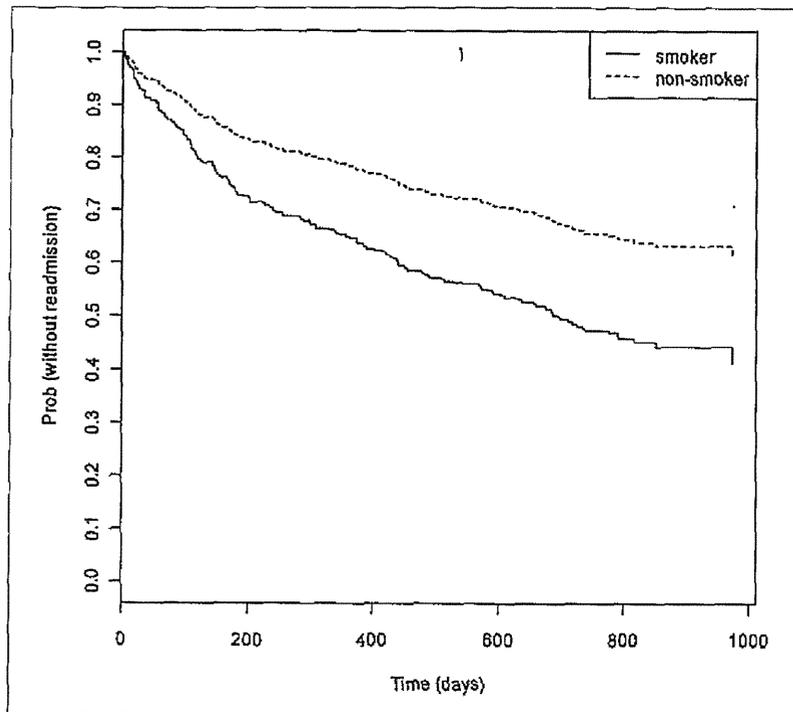


Figure 2. Predicted survival probabilities for without hospital readmission among patients with schizophrenia.

GAF scores. The result is similar to a previous study [20] in which current smokers had a significantly greater number of hospitalizations compared to non-smoking patients. Also, several studies have noted that the rate of hospital readmission increased if patients with schizophrenia have comorbid substance use disorders [21, 22]. Akvardar et al. [21] identified the prevalence of substance use and abuse among a group of schizophrenic patients and the result indicated that the smokers had an earlier onset of illness and increased number of hospitalizations. The other studies also indicate that comorbid substance use disorders present with complications to the effective treatment of the patients [23], and are associated with a wide range of negative outcomes including increased rates of relapse and hospital readmission in patients with schizophrenia [22] and the notion of these studies supports the current study.

Second, the smoking rate of the male patients is 56.1% and the smoking rate of the female patients is 26.2%. This is also consistent with previous studies [24–26] that cigarette smoking is much less common in female patients with schizophrenia than in males. Also, the present study shows that the mean GAF score at discharge among smoking patients is slightly higher than non-smoking patients. To our knowledge, there are no previous studies that assessed the relationships between smoking and the severity of illness with the GAF scale. All previous studies have reported that the disease is more severe in the smoking patients than in the non-smoking patients [27], and positive symptoms and negative symptoms are nearly unchanged with smoking cessation [7, 28]. Thus, it is considered that nicotine itself does not have direct effects to these symptoms [29]. The result of our study is not completely consistent with previous studies. However, recent molecular level's studies have reported that general cognitive function and sensory gating is improved by a neuronal nicotinic acetylcholine receptor (nAChR) agonist drug in the case of the patients with schizophrenia [30, 31]. The result of the present study would be explained if nicotine improves cognitive function. At the present stage, it is clear to see that further investigations are necessary.

There is no doubt that cigarette smoking has harmful effects physically. The current study found that smoking also affects negatively on hospital readmission in individuals with schizophrenia, an important health outcome. To the best of our knowledge, this is the first study which focused on first admitted schizophrenic patients on a voluntarily basis. This could allow us to factor out a bias that the history of previous hospitalization affects hospital readmission.

However, the study had some limitations. This study is a part of a nationwide research project on outcomes of discharged patients with schizophrenia, the contents of questions covered widely and shallowly so that questions regarding cigarette smoking were limited to concurrent smoking status. The present study data did not include daily smoking amounts which could be a potential confounding factor to explain the association between smoking status and readmission. Also, the study focused on first voluntarily admitted patients to avoid

confounding variables as much as possible; however, the generalizability of the results is correspondingly decreased.

## CONCLUSION

The present study found that cigarette smoking influences negatively on psychiatric outcomes such as hospital readmission. This finding could be a reason to promote cessation of smoking more strongly among inpatients with schizophrenia. Because of the long history of tobacco use in the psychiatric population, special consideration may be needed to promote smoke-free policies [32].

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## The effect of an educational leaflet on depressive patients' attitudes toward treatment

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### ABSTRACT

Improving patient adherence to antidepressant treatment is an important issue. Patients' attitudes toward symptoms, results, causes, disease course, and effective treatment of depression can influence their adherence to therapy. We aimed to assess the efficacy of an educational leaflet designed to improve patients' attitudes toward depression and antidepressant treatment. Participants were one hundred twenty-two outpatients of three psychiatric clinics in Japan who met the DSM-IV criteria for depression. Patients in the intervention group received an educational leaflet at the start of the study. Participants filled in The Antidepressant Compliance Questionnaire (ADCQ) and Beck Depression Inventory (BDI) before and after the intervention. Intervention group showed greater improvements on the total score of ADCQ, the score on the "positive beliefs regarding antidepressants" subscale. They maintained the scores on the "perceived doctor–patient relationship" subscale, where the control group lowered those scores. No significant difference in improvement in BDI scores was observed between groups. The intervention using an educational leaflet had a significant positive impact on patients' attitudes toward depression and antidepressant treatment. Our results indicate that the educational leaflet is an effective tool for enhancement of face-to-face education by medical professionals. Trial registration UMIN000002981, [www.umin.ac.jp/ctr/index.htm](http://www.umin.ac.jp/ctr/index.htm).

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### 1. Introduction

Adherence to antidepressant treatment is frequently low for patients with depressive disorders (Katon et al., 1992; Myers and Branthwaite, 1992; Simon et al., 1993; Demyttenaere and Haddad, 2000). One study showed that approximately 28% of patients had stopped taking antidepressants during the first month of therapy, and 44% had stopped by the third month of therapy (Lin et al., 1995). Clinical guidelines recommend that antidepressant treatment should be continued for 4–6 months after the acute episode, and continued treatment reduces the risk of relapse (Ceddes et al., 2003). Improving patient adherence to antidepressant treatment is an important issue.

Patients' attitudes toward symptoms, results, causes, disease course, and effective treatment of depression influence their perceptions on the costs and benefits of treatment, which subsequently will affect their adherence to therapy (Delgado, 2000). It is important to supply patients with sufficient information to improve their adherence to therapy (Bull et al., 2002).

Even if a doctor believes he has provided a patient with complete information, the patient does not always agree (Bull et al., 2002). Patient education by nurses and pharmacists can be an effective way to supply patients with sufficient information (Vergouwen et al., 2003). However, as these means of communication are costly, they cannot always be provided. A complementary tool, accessible anytime, which provides patients with basic information about depression and antidepressant treatment, is desirable.

A leaflet, which is easily accessible to patients, is a simple method of supplying information. However, the benefit of using it has not been examined fully. One study that examined the effect of leaflets on improvement of depression and actual drug-taking behavior failed to show a positive effect of leaflets (Peveler et al., 1999). We thought that patients' attitudes about treatment may be affected by information contained in a leaflet. If patients are able to have basic information and have a positive attitude toward depression and antidepressant treatment by reading a leaflet, treatment and education would probably be facilitated.

Our hypothesis in this study is that a leaflet is effective in improving the attitudes of patients toward antidepressants and depression. The aim of this study is to examine the effect of a leaflet, which provides information about symptoms, results, causes, disease course, and

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effective treatment of depression, on attitudes of patients toward antidepressants and depression.

## 2. Methods

### 2.1. Participants

This study was conducted from October 1, 2005 to February 28, 2006. Three private psychiatric clinics agreed to participate in this study. Two of these clinics were in Tokyo and one was in Fukuoka, a regional hub city of the Kyushu district.

We asked participating clinics to recruit all outpatients who met the DSM-IV criteria for major depressive disorder, dysthymic disorder, and depressive disorder not otherwise specified. Doctors gave their patients a brief explanation of this study. After that, clerks in charge of this study explained our study to patients and asked for their participation. In each clinic, the clerks alternately allocated patients who agreed to participate to the intervention group or the control group. Doctors did not know whether their patients participated in the study or not, and were not informed about the allocation. The total number of participants was 122; 61 were in the intervention group and 61 were in the control group. Information on the number and characteristics of patients who refused to participate were not available.

The institutional review board of the National Center of Neurology and Psychiatry approved this study. Participants provided written informed consent.

### 2.2. Intervention

We developed an original leaflet as an intervention tool. The leaflet contained the following information: 1) A checklist of subjective problems associated with depressive disorders or treatment. The list also showed which page to read to obtain information on the problem. 2) Patient education, including a) basic information on depressive disorders, b) triggers for the development of depressive disorders, c) drug therapy for depressive disorders, d) treatment other than drug therapy, e) how to cope with stress in daily life, f) how to prepare to return to work, and g) how to treat a person with a depressive disorder. 3) A checklist for preparing for the next consultation. The checklist included the following topics; symptoms, medication, treatment, daily life, personal relationships, life at school or one's workplace, family, one's personality, thoughts about the future, the past and public aid available. Patients were suggested to organize their concerns regarding these topics and to check whether they were urgent or not. By doing so, they would be able to consult doctors efficiently and communication would be facilitated.

Patients in the intervention group received the leaflet at the start of the study, and patients in the control group received the leaflet after completion of the study.

### 2.3. Main outcome measures

We used the Antidepressant Compliance Questionnaire (ADCQ) (Demyttenaere et al., 2004), Japanese version (Koyama et al., 2006) to assess patients' attitudes and beliefs about depression and antidepressants. The validity of this scale was confirmed by the co-author of this article (Koyama et al., 2006). This scale consists of 33 items and four subscales. (1) Perceived doctor–patient relationship. This component refers to aspects of the doctor–patient interaction (e.g. “My doctor has explained depression sufficiently to me” and “My doctor takes sufficient time to discuss my emotional problem”). (2) Preserved autonomy. This component refers to the possible effects of antidepressants on the patient's personality (e.g. “Your body can become addicted to antidepressants” and “Antidepressants can alter your personality”). (3) Positive beliefs on antidepressants. This component refers to items that are related to the patient's beliefs on the mechanism of antidepressants, and on how to comply with the treatment regimen (e.g. “My emotional problems are solved by the antidepressants” and “If you forget to take the antidepressants on a certain day, it's better to take an additional dose the following day”). (4) Partner agreement. This component refers to the attitude of the partner of the depressed patient towards diagnosis and treatment (e.g. “My partner agrees that antidepressants are a suitable treatment for my condition” and “My partner agrees that depression is the correct diagnosis for my condition”) (Demyttenaere et al., 2004). A high ADCQ score represents a positive attitude toward depression and antidepressant treatment. We used the Beck Depression Inventory (BDI) to assess the severity of depression. Both of these scales were self-reported.

### 2.4. Procedure

We conducted the survey at participants' visits. At visit one, patients filled in the consent form and the ADCQ and BDI. Patients in the intervention group also received the leaflet. At visit three, the patients filled in ADCQ and BDI again. After completing the ADCQ and BDI at visit three, patients in the control group received the leaflet. Clerks in charge of this study distributed and collected these documents. We did not ask them to provide verbal education or endorsement along with the leaflet. Doctors did not have the opportunity to know the reactions of individual patients.

### 2.5. Statistical analysis

Differences between the intervention and control groups were analyzed on an intention-to-treat basis. Demographic and clinical variables of patients were compared

between groups by use of *t*-test or chi-square test. We conducted repeated measures ANOVAs with ADCQ scores and BDI scores as outcomes, comparing the effect of group (intervention v. control)  $\times$  time (visit one (baseline) v. visit three (post-intervention)) with treatment duration as a covariate, where group was a between-subject factor and time and treatment duration were within-subject factors. We used SPSS 13.0.1 for Windows (SPSS Inc, Chicago, Ill) for the analysis. The significance level was set at  $P < 0.05$ .

## 3. Results

Demographic characteristics of participants are shown in Table 1. No significant differences were observed between groups. All participants completed assessments before and after the intervention (Fig. 1).

Table 2 shows the summary of ANOVA. The effect of interaction between group and time were significant in the total score of ADCQ (effect size  $\eta^2 = 0.05$ ), scores on the “perceived doctor–patient relationship” subscale ( $\eta^2 = 0.04$ ) and the “positive beliefs regarding antidepressants” subscale ( $\eta^2 = 0.07$ ), scores on items “My doctor listens properly to what I think about antidepressants” ( $\eta^2 = 0.03$ ) and “Antidepressants make me stronger so I will be able to deal more efficiently with my problems” ( $\eta^2 = 0.05$ ).

There were significant interactions between time and group and treatment duration regarding scores of the “perceived doctor–patient relationship” subscale ( $\eta^2 = 0.05$ ) and the “positive beliefs regarding antidepressants” subscale ( $\eta^2 = 0.08$ ), and the score of the item “My doctor listens properly to what I think about antidepressants” ( $\eta^2 = 0.03$ ). To look closer, we divided patients according to their treatment duration. Since the median of the treatment duration was 25 months, we set the cutoff point at two years. Among patients whose treatment duration were within two years, the intervention group showed greater improvements on the positive beliefs regarding antidepressants subscale score compared with the control group ( $F(1,55) = 5.55$ ,  $P < 0.05$ ). As for scores of the “perceived doctor–patient relationship” subscale and the item “My doctor listens properly to what I think about antidepressants”, interactions between time and group failed to reach significance. When patients had gone through treatment for more than two years, the effects of the interaction between time and group were not significant.

Regarding BDI scores, no significant main effects were observed.

## 4. Discussion

We examined the effect of an educational leaflet about depression on patients' perceptions of depression and antidepressant treatment using the ADCQ, Japanese version. As we mentioned in the Introduction, our hypothesis was that a leaflet was effective in improving the attitudes of patients toward antidepressants and depression. Our analysis showed that improvement in the total ADCQ score was significantly greater in the intervention group than in the control group. In other words, patients' attitudes and beliefs regarding depression and antidepressants became more positive with the receipt of the leaflet.

Improvement in the total ADCQ score was greater in the intervention group than in the control group. The leaflet, which provided information on depression and antidepressant treatment, appeared to lead to positive changes in patients' attitudes toward this disease and treatment of it. Before making the leaflet, we sought information on patients' common concerns and misunderstandings that often lead to non-adherence. In our leaflet, we stressed information dealing with these concerns in the Question and Answer section.

The scores of the subscale “perceived doctor–patient relationship” and the ADCQ item “My doctor listens properly to what I think about antidepressants”, which was included in the subscale, showed the same trend. Patients in the intervention group maintained their scores when patients in the control group lowered their scores. This finding may reflect an improvement in the patient's way of consulting with a psychiatrist, based on the knowledge they got from the leaflet (e.g.

**Table 1**  
Demographic characteristics of participants.

	Intervention group (n=61)		Control group (n=61)		Statistical value
	n	mean % or S.D.	n	mean % or S.D.	
Age (years)	40.1	10.8	40.0	8.8	$t(120) = 0.34$
Male	42	68.8	42	68.9	$\chi^2(1) = 1.00$
Number of months from the initial visit	39.7	45.6	50.8	52.1	$t(119) = 1.24$
GAF*	65.6	17.6	67.0	15.5	$t(109) = 0.44$
Education (years)	14.8	2.1	15.3	1.6	$t(119) = 0.171$
Occupation	19	31.1	21	34.4	$\chi^2(7) = 5.11$
professional					
Clerk	19	31.1	14	23.0	
Sales rep	7	11.5	10	16.4	
Housewife	4	6.6	2	3.3	
Student	3	4.9	1	1.6	
Sales person	1	1.6	3	4.9	
Manual laborer	0	0.0	1	1.6	
Other	8	13.1	9	14.8	
Marital status	31	50.8	30	49.2	$\chi^2(4) = 2.24$
Single	25	41.0	27	44.3	
Divorced	4	6.6	3	4.9	
Bereaved	1	1.6	0	0.0	
Other	0	0.0	1	1.6	

No significant difference was found.

\* The Global Assessment of Functioning.

knowledge on treatment and adverse effects). As a result, the doctor might have been able to offer clear-cut answers which enabled patients to sustain their satisfaction with the relationship. Improvement in the score of the subscale “positive beliefs on antidepressants” was significantly greater in the intervention group than in the control group. On the three scores described above, the effect of intervention showed limitations according to treatment duration. It appears that intervention with educational leaflets is more effective for patients with a shorter history of treatment. When a patient has a long history of treatment, one's experience of treatment might have a greater effect on one's attitude regarding antidepressant therapy than

external information (i.e., the leaflet). Since this phenomenon was observed only in limited scales, it is difficult to determine the association between the duration of treatment and the overall effectiveness of the leaflet from this result alone. Although part of the leaflet seems to have a stronger effect on patients with a shorter history of treatment, considering the other benefits of using it, we believe that providing information by leaflets has significance for all patients.

Improvement in scores on the item “Antidepressants make me stronger so I will be able to deal more efficiently with my problems” was significantly greater in the intervention group than in the control group. Depression is often attributed to the mentality or personality of the affected person, and many people think medication is not adequate to cope with a mental problem. Such beliefs seem to be related to nonadherence to antidepressant treatment (Jorm et al., 2005), so we stressed the following concepts in the educational leaflet: medication is one of the several effective tools for recovery, and mental problems are similar to physical problems. In our leaflet, we included this message with a bright font: “An antidepressant is similar to a cane for a person with a bone fracture. Until you recover enough to walk by yourself, don't hesitate to accept its help.”

This study has some limitations. Since our survey did not include patients' actual adherence to therapy, it was impossible to examine changes in actual drug-taking behavior. Demyttenaere, who developed the Antidepressant Compliance Questionnaire, mentioned their investigation on the predictability of compliance behavior with antidepressants by the scale (Demyttenaere et al., 2004), but the result has not been published yet. Future studies are needed to examine whether positive changes in attitude toward treatment lead to improvement in actual patient adherence to it.

We were not able to obtain the information on the participation rate and characteristics of patients who refused to participate. So we cannot exclude the possibility of our overestimating the effectiveness of the intervention, because our participants could be more willing to take in information than were patients who refused to participate.

We did not employ random allocation, but it did not seem to affect the result because main outcome measures of this study were self-reported.

At present, only three studies that use the Antidepressant Compliance Questionnaire have been published because the scale was developed in 2004. Compared with Danish patients with depressive disorders (Kessing et al., 2005), our subjects showed relatively positive attitudes toward depression and antidepressant treatment. So far, we do not have sufficient external data to determine relatively how positive our subjects were.

Finally, no significant difference in improvement in the BDI score was observed between groups. We do not believe it owed to the statistical power because the effect size of the group was very small ( $\eta^2 = 0.00$ ). The result was in accordance with previous studies (Vergouwen et al., 2003). In this study, the educational leaflet positively changed patients' attitudes regarding depression and antidepressant treatment. A positive attitude regarding treatment is likely to improve patient adherence to it, which will probably lead to a better prognosis. However, the duration of our research was too short to observe an improvement in depressive symptoms.

In conclusion, the educational leaflet that focused on depressive symptoms and treatment succeeded in changing patients' attitudes positively. The advantage of the leaflet is that it provides basic information in an easily accessible format. With such basic information, patients can consult their doctor and other medical staff about the treatment they are undergoing more efficiently. The leaflet is an effective tool for enhancement of face-to-face education by medical professionals.

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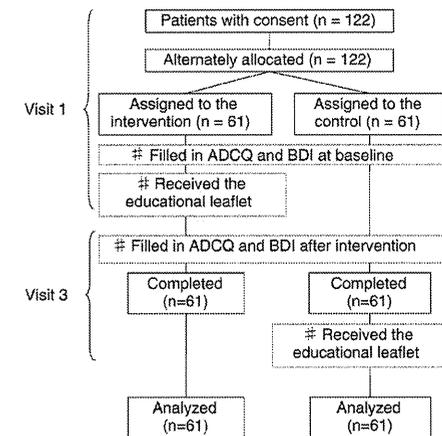


Fig. 1. Participant flowchart. # = Procedure.

**Table 2**  
Summary of ANOVA and adjusted mean scores of ADCQ<sup>a</sup> and BDI.

Source	df	F value	Subscales of ADCQ				Items of ADCQ		BDI total		
			ADCQ total	Perceived doctor-patient relationship	Preserved autonomy	Positive beliefs regarding antidepressants	Partner agreement	Item 2		Item 33	
<b>Between-subjects variable</b>											
Group	1	1.31	1.75		0.15	0.06		1.91	0.03	0.10	1.26
Treatment duration	1	1.81	0.07		3.16	0.46		0.22	0.82	0.02	6.50*
Group × Treatment duration	1	0.02	0.04		0.08	1.48		0.99	1.37	1.65	0.12
<b>Within-subjects variable</b>											
Time	1	1.12	0.04		5.82**	0.10		0.42	0.16	0.80	1.00
Time × Group	1	6.84**	4.60*		2.31	9.95**		0.27	4.05*	6.15*	0.11
Time × Treatment duration	1	2.67	3.94		3.09	0.04		0.60	0.15	0.47	0.16
Time × Group × Treatment duration	1	1.89	6.50*		0.36	10.84**		0.37	4.14*	2.83	0.03
<b>Mean score adjusted by treatment duration (SE)</b>											
Intervention (pre)		12.0 (0.18)	3.3 (0.06)		3.0 (0.06)	2.8 (0.05)		3.1 (0.09)	3.5 (0.09)	2.1 (0.1)	16.9 (1.4)
Intervention (post)		12.3 (0.19)	3.3 (0.06)		3.0 (0.06)	2.9 (0.05)		3.1 (0.09)	3.5 (0.09)	2.3 (0.1)	15.5 (1.4)
Control (pre)		11.9 (0.18)	3.2 (0.06)		3.0 (0.06)	2.8 (0.05)		2.9 (0.09)	3.5 (0.09)	2.0 (0.1)	14.3 (1.4)
Control (post)		11.7 (0.19)	3.1 (0.06)		3.1 (0.06)	2.8 (0.05)		2.9 (0.09)	3.3 (0.09)	2.0 (0.1)	13.6 (1.4)

Item 2: My doctor listens properly to what I think about antidepressants.

Item 33: Antidepressants make me stronger so I will be able to deal more efficiently with my problems.

<sup>a</sup> The range of scores of ADCQ subscales and items were 1–4 and the range of total score of ADCQ was 4–16. For subscales and the total score, decimal figures are possible.

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

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## FEATURE ARTICLE

# Formal Caregiver Burden in Dementia: Impact of Behavioral and Psychological Symptoms of Dementia and Activities of Daily Living

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The purpose of this study was to identify the impact of the behavioral, psychological, and functional symptoms of dementia on the burden of formal caregivers. A cross-sectional study was conducted among formal caregivers caring for residents with dementia in Japan. The Zarit Caregiver Burden Interview (ZBI) personal strain items, the Personal Self-Maintenance Scale (PSMS), and the Troublesome Behavior Scale (TBS) were used to assess the level of formal caregiver burden, activities of daily living (ADL), and behavioral and psychological symptoms of dementia (BPSD), respectively. The data from 445 respondents were analyzed using multiple linear regression analyses to predict the burden on formal caregivers. Disruptive behaviors, such as aggression, screaming, and a low ADL levels among residents with dementia were significantly correlated with higher formal caregiver burden. The results of this study support a positive relationship between BPSD, low ADL levels, and formal caregiver burden in caring for residents with dementia. These results illustrate the various characteristics of the burdens on staff members compared with those faced by individuals who provide informal care. (*Geriatr Nurs* 2010;31:246-253)

It is widely known that behavioral and psychological symptoms of dementia (BPSD) are associated with burdens for informal caregivers.<sup>1-4</sup> Recently, the development of support and psychological interventions for informal caregivers of people who have dementia, such as interactive support groups and psychoeducational programs, has increased.<sup>5,6</sup>

Several studies have reported on the relationship between staff stress and the behavior of residents with dementia.<sup>7,8</sup> The effectiveness of staff training programs to reduce BPSD in people with dementia or alleviate stress in nurses has also received attention.<sup>9</sup> These studies did not take into consideration other aspects of residents with dementia, such as their functional performance, when examining the stress level associated with caregiving. Caregiving activities such as physical transfers and assistance at the toilet were reported to be strenuous aspects of working in a nursing home,<sup>10</sup> and thus may increase stress levels when working with a resident who exhibits disruptive behaviors. The purpose of this study was to consider the disruptive behaviors and functioning levels of residents and their impact on formal caregiver burden.

Dementia has been identified as a significant health concern in Japan, and the number of older Japanese people with dementia has been steadily increasing. Approximately 80 percent of the older people admitted to care facilities in Japan are estimated to have dementia.<sup>11</sup> In 2002, there were approximately 1.5 million elderly persons who were classified as having dementia and needed care provided by the long-term care insurance system in Japan; half of these were living at home and the other half were living in nursing homes, geriatric care facilities and hospitals.<sup>11</sup>

The aim of this study was to investigate the impact of BPSD and functional performance (ADL level) on the perceived burden to formal caregivers of people with dementia, such as nurses and direct care workers who work in hospitals and geriatric care facilities. Our hypothesis was that when there are both behavioral and functional needs in people with dementia, the burden for formal caregivers is higher.

## Methods

### Subjects

The study subjects were formal caregivers, such as nurses and direct care workers, who take care of residents in dementia specialty care units in psychiatric hospitals and geriatric care facilities.

In Japan, patients/residents with dementia reside in psychiatric hospitals, nursing homes, geriatric care facilities, and long-term care units in general hospitals. Dementia specialty units (both in psychiatric hospitals and geriatric care facilities) are, however, the only units authorized by the government to be "specialized dementia care units" under the Japanese reimbursement system. All residents must have a diagnosis of dementia to be admitted into dementia specialty units.

### Procedure

The facilities in this project were members of the Japanese Association of Psychiatric Hospitals (JAPH), representing 87.1% of all psychiatric beds in Japan, or JAPH membership hospital-related geriatric care facilities. We randomly sampled 212 (50%) units (143 hospital units and 69 geriatric care facility units) among the 426 psychiatric hospitals that were members of the Japanese Association of Psychiatric Hospitals (JAPH) or JAPH membership hospital-related geriatric care facilities.

On each unit, 3 resident-caregiver dyads were randomly selected and invited to participate in the study. Residents were eligible to participate if they had a diagnosis of dementia (diagnosed by psychiatrists according to *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., criteria,<sup>12</sup> which was a newly confirmed diagnosis in this survey), and no exclusion criteria were set. Caregivers were eligible to participate if they were the formal primary caregiver of the selected resident, and there were no exclusion criteria. We did not restrict enrollment to specific occupations of the formal caregivers. After each resident's guardian and the caregiver agreed to participate in the study, the caregiver completed questionnaires about his or her age, sex, relationship to the resident, and the subjective burden regarding the formal care of the resident. They also completed questionnaires about the resident's demographic variables.

Upon completion, the questionnaires were sent back to the authors with ID numbers instead of resident and staff names. The data were collected from December 2000 to March 2001.

Of the 636 resident-caregiver dyads in 212 units that we invited to participate, 160 units participated in our study and returned 480 completed questionnaires (480/636 = 75.5%). We did not obtain information from the 52 facilities that refused to participate in our study, so we could not confirm whether there were any differences between the facilities that participated or those that refused participation. Because we excluded 35 cases with incomplete or invalid answers (on any of the following: the burden scale of the staff, cognitive levels, ADLs, and degree of BPSD of the resident), there were 445 respondents (445/636 [= 212 × 3] = 70.0%) included in the study. None of the descriptive characteristics differed significantly between the 445 participants with complete forms and the 35 participants with missing data.

### Measures

**Subjective burden.** The degree of perceived burden was measured by the Zarit Caregiver Burden Interview (ZBI).<sup>13</sup> The ZBI consists of 21 questions measuring various aspects of caregiver burden and a single global rating of caregiver burden. The ZBI employs 5-point scales, with responses ranging from *never* to *nearly always*, that are scored from 0 to 4, with higher scores indicating greater caregiver distress. The reliability and validity of the Japanese ZBI has been verified, and it has also been shown that the demographic distribution of the score of the Japanese version has a similar trend to that of the original version.<sup>14</sup>

To assess the formal caregiver burden, we used the 12 personal strain items<sup>15</sup> of the ZBI. Examples include, "Do you feel strained when you are around the care receiver?" and "Do you feel that the care receiver asks for more help than needed?" The total scores of the 12 items can range from 0 to 48.

**ADLs.** Each resident's basic ADL level was assessed by the Japanese version of the Personal Self-Maintenance Scale (PSMS).<sup>16,17</sup> The PSMS includes 6 items on the performance of physical activities such as toileting, feeding, dressing, grooming, walking, and bathing, with a lower total score indicating greater impairment in the

**Table 1.**  
Estimated Loadings of 14 Questionnaire Items of the Troublesome Behavior Scale (TBS): An Item Factor Analysis with the Principal Factor Method and Promax Rotation (N = 445)

	BPSD	Mean	SD	Factor 1	Factor 2	Factor 3
<b>TBS Factor 1: Affecting Others</b>						
Physical, verbal aggression	0.83	1.35		<b>.703</b>	.054	-.088
Ill-natured denial, distortion	1.33	1.56		<b>.684</b>	-.138	.191
Quarrelling with others	1.28	1.43		<b>.624</b>	.093	.061
Crying, screaming	0.68	1.29		<b>.615</b>	.036	-.099
Interfering with staff members	0.67	1.32		<b>.554</b>	.163	-.037
Repetition, clinging	1.20	1.57		<b>.549</b>	-.151	.120
Restless, noisy at night	0.75	1.24		<b>.548</b>	.210	-.124
<b>TBS Factor 2: Health Risk</b>						
Vain deeds/Meaningless action	1.07	1.58		-.007	<b>.519</b>	.175
Pica (eating nonfood items)	0.48	1.13		-.042	<b>.601</b>	-.032
Toileting in inappropriate places/ touching or grabbing stool	0.88	1.37		.134	<b>.600</b>	-.091
Wandering	1.93	1.82		.238	<b>.375</b>	.133
<b>TBS Factor 3: Attached to Things</b>						
Hiding, losing things	0.59	1.23		-.024	.046	<b>.753</b>
Rummaging, gathering things	0.67	1.32		-.168	.290	<b>.644</b>
False accusation	0.53	1.10		.281	-.273	<b>.472</b>
Eigenvalue				4.439	1.733	1.438
% variance				31.7	12.4	10.3

Bold figures indicate loadings >0.3.

BPSD = behavioral and psychological symptoms of dementia; Affecting Others = behavior that might affect others; Health Risk = behavior that raises concerns for the resident's health; Attached to Things = getting attached to things.

ADL. The Japanese version of the PSMS has been proved valid and reliable.<sup>17</sup>

**Cognitive impairment.** The Mini-Mental State Examination (MMSE)<sup>18</sup> was used to evaluate cognitive impairment. The MMSE has a maximum score of 30 points, and a lower score indicates greater cognitive impairment. The Japanese version of the MMSE has been proved to have adequate sensitivity and specificity for detecting cognitive deficits in neurological patients,<sup>19</sup> and this scale is also widely used outside of Japan.<sup>20</sup> **BPSD.** BPSD was measured by the Troublesome Behavior Scale (TBS),<sup>21</sup> which was developed in Japan. Caregivers completed 14 questions concerning the frequency in the preceding month (0 = *never* to 4 = *once or more every day*) of a variety of behaviors in people with dementia. Examples of the behaviors include "being restless and/or noisy at night," "wandering," and "physical and/or verbal aggression." The TBS has been proved a reliable and valid instrument for assessing the BPSD of people with dementia.<sup>22</sup>

There are 2 versions of the TBS: one is based on ward or institutional observation, and the other is based on home observation. In our study, the institutional version was used.

We adopted the scoring method of the authors of the TBS<sup>22</sup>; they used the estimated loadings of the factor analysis of the scale, and they noted that the factor structure of the TBS differs between subject groups.<sup>22</sup> For this reason, a factor analysis was performed on all 14 BPSD items of the TBS so that we could categorize the resident behaviors in our participants into BPSD types. The analysis showed 3 behavior factors: behaviors that might affect others (factor 1), behavior that raises concerns for the resident's health (factor 2), and getting attached to things (factor 3). The labels of these factors were named by mutual agreement of the researchers, who are familiar with dementia care. Each of the items is presented in Table 1.

For all of the subjects, we computed the scores for each of the 3 factors with the estimated

**Table 2.**  
**Demographics of Residents and Their Formal Caregivers (N = 445)**

Variable	Mean (SD) or %	
<b>Resident</b>		
Age of resident	79.4 (8.5)	[54–102]
Female resident	66.5%	
Diagnosis (AD/VaD/Others)	44.3% / 51.0% / 6.7%	
PSMS score	0.9 (1.4)	[0–6]
MMSE score	8.7 (6.9)	[0–30]
TBS: TBS 1 factor score	4.2 (4.2)	[0–17.1]
TBS 2 factor score	2.2 (2.3)	[0–8.8]
TBS 3 factor score	1.1 (1.8)	[0–7.5]
Length of stay (days)*	625.3 (811.7)	[4–6447]
<b>Formal Caregiver</b>		
Age of caregiver	40.4 (10.3)	[21–64]
Female caregiver	80.0%	
Occupation: Nurse	76.6%	
Direct care worker	23.0%	
Others	0.5%	
Years of experience	11.9 (8.9)	[0–40]
Length of contact with the resident (weeks) <sup>†</sup>	63.4 (107.7)	[1–1300]
ZBI Personal Strain Score	8.8 (7.1)	[0–36]

Figures in brackets are ranges. The number of subjects varied because of missing responses. AD = Alzheimer's disease; VaD = vascular dementia; PSMS = Physical Self-Maintenance Scale; MMSE = Mini-Mental State Examination; TBS = Troublesome Behavior Scale; TBS 1 = behavior that might affect others; TBS 2 = behavior that raises concerns for the resident's health; TBS 3 = getting attached to things; ZBI: Zarit Caregiver Burden Interview.

\*Total sample is 433.

<sup>†</sup>Total sample is 440.

<sup>‡</sup>Total sample is 443.

loadings. Factor loadings >0.30 were included in the score calculation.

### Statistical Analyses

Pearson's product-moment correlations were used to evaluate the bivariate associations among staff burden, ADL (PSMS score), cognitive level (MMSE score), and 3 types of BPSD (computed with the estimated loadings of the 3 factors of the TBS items) of the residents with dementia.

Hierarchical multiple linear regression analyses were then used to test the association of the burden on the staff with 1) demographic characteristics of the resident (age, sex, and diagnosis), 2) ADL level and cognitive level of the resident (PSMS score and MMSE score), and 3) 3 types of BPSD (computed with the estimated loadings of the 3 factors of the TBS items), entered in that order. For the burden score to be a dependent variable, a square root transformation of the ZBI score ( $x = \sqrt{[ZBI + 0.5]}$ ) was used because of the skewed distribution of the ZBI score.

SPSS (15.0J for Windows; SPSS Inc., Chicago, IL) was used to test distributional assumptions and perform statistical analyses of the data. *P* values < 0.05 were considered statistically significant (2-tailed).

### Results

#### Characteristics of the Residents and the Formal Caregivers

The demographic characteristics of the 445 residents with dementia and their formal caregivers are presented in Table 2.

The average total score (SD) of the ZBI personal strain items was 8.3 (7.5) and 9.1 (7.0) for male care recipients and female care recipients, respectively.

#### Bivariate Analyses

The ZBI personal strain score for the caregivers was significantly negatively correlated with the PSMS score and the MMSE score of the residents ( $r = -.22, P < .001$ ;  $r = -.15,$

**Table 3.**  
**Hierarchical Multiple Linear Regression Analyses Predicting the Burden\* of Formal Caregivers of Residents with Dementia (N = 445)**

	Model 1		Model 2		Model 3	
	Beta	<i>P</i>	Beta	<i>P</i>	Beta	<i>P</i>
Female	.081	.096	.091	.053	<b>.091</b>	<b>.026</b>
Age	-.004	.935	-.024	.605	-.034	.408
AD or not	-.044	.352	-.045	.337	-.020	.615
PSMS			<b>-.224</b>	<b>&lt;.001</b>	<b>-.185</b>	<b>&lt;.001</b>
MMSE			-.071	.186	-.023	.634
TBS 1					<b>.458</b>	<b>&lt;.001</b>
TBS 2					.047	.324
TBS 3					.057	.199
Adjusted <i>R</i> <sup>2</sup>	.001		.067		.311	
$F(3, 441) = 1.14$			$F(5, 439) = 7.39^{\dagger}$		$F(8, 439) = 26.10^{\ddagger}$	
$\Delta$ Adjusted <i>R</i> <sup>2</sup>	—		.066 <sup>†</sup>		.245 <sup>†</sup>	

Bold figures indicate significant standardized regression coefficients (beta coefficients) in the models.

AD = Alzheimer's disease; PSMS = Physical Self-Maintenance Scale (low score indicates low activities of daily living functioning); MMSE = Mini-Mental State Examination (low score indicates low cognitive functioning); TBS = Troublesome Behavior Scale (a high score indicates a high frequency of the behavioral and psychological symptoms of dementia); TBS 1 = behavior that might affect others; TBS 2 = behavior that raises concerns for the resident's health; TBS 3 = Getting attached to things.

\*A square root transformation of the ZBI score  $x = \sqrt{[ZBI + 0.5]}$  was used as a burden score.

<sup>†</sup>*P* < 0.001

*P* = .002, respectively). Positive correlations were found between the ZBI personal strain score and the scores for TBS factor 1: "behavior that might affect others" ( $r = .52, P < .001$ ); factor 2: "behavior that raises concerns for the resident's health" ( $r = .26, P < .001$ ); and factor 3: "getting attached to things" ( $r = .20, P < .001$ ).

#### Regression Analyses of Burden for Formal Caregivers

The result of the hierarchical multiple linear regression analysis predicting caregiver burden is shown in Table 3. Sociodemographic characteristics of the residents, that is, age, sex, and diagnosis (Alzheimer's disease or not) of the residents, explained less than 1% of the variation in the burden score. The addition of the PSMS (ADL) and MMSE (cognitive level) scores to the sociodemographic characteristics increased the explained variance in the burden score, with 7 points of change in the *R*<sup>2</sup> value. When the 3 factors of TBS (types of BPSD) were added, the resulting model explained an additional 25% of the variance in the burden on formal caregivers. The final model (model 3) explained 31%

of the variance in the burden score. Among the categories of age, sex, diagnosis, PSMS score, MMSE score, and the 3 TBS factors, the categories that significantly correlated with the burden score were female sex, a low PSMS score, and TBS factor 1 ("behaviors that might affect others").

### Discussion

The findings from this study indicated that impaired function, female sex, and aggressive and other types of inappropriate behaviors, such as quarrelling and screaming, were associated with formal caregiver burden. Behaviors that might affect others, such as aggression, ill-natured denials, quarrelling, and screaming, were the strongest predictors of formal caregiver burden. This finding was consistent with the data about informal caregiver burden, as shown by Matsumoto and colleagues,<sup>1</sup> showing that aggression and irritability cause high distress in caregivers caring for people with dementia in the community. Rodney<sup>20</sup> studied the relationship between stress for nurses and the aggression of residents and found that interacting with highly

aggressive residents produced significantly more stress for nurses than did interacting with less aggressive residents. We can easily imagine that aggressive behavior places a heavier burden on the people who care for that person.

Moreover, formal caregivers who work in units are in charge of a number of residents—at times, more than 15. This arrangement means that a caregiver has to take care of a person who is showing aggression while attempting to protect other residents from the aggressor. However, we could not confirm the impact of the arrangement in our study because we did not collect data for the actual number of residents that each caregiver was in charge of in this study.

The fact that the BPSD, as 1 of the predictors of the burden for formal caregivers, accounted for 24.5% of the variance is consistent with the report in which Yamaguchi et al. (as cited in Mine<sup>24</sup>) found that caring for BPSD was one of the most difficult physical and psychological burdens for formal caregivers in Japanese geriatric care facilities.

In the present study, factor 2 behaviors, such as wandering, meaningless action, and toileting in inappropriate places, were not predictors of a burden on the formal caregiver. In home care settings, BPSD has been known to cause distress among caregivers,<sup>1-4</sup> and wandering behavior has been shown to place a high strain on informal caregivers.<sup>25</sup> Wandering requires intense supervision because of possible injury from falls and exposure to danger (e.g., going out and getting lost) in both a facility setting and a home-care setting, but in terms of which setting gives rise to greater concern among caregivers, it might be different. For example, caring for a loved one and his or her safety may create greater stress than caregiving in a formal situation, or formal caregivers' knowledge and confidence, as well as the resources available to them, maintain resident safety. For example, in institutions, there may be locked units and other resources that help to ensure safety.

Low ADL levels was also one of the predictors of caregiver burden. Generally, no direct relationship has been found between informal caregiver burden and dementia and deficits in ADL<sup>3,4</sup>; however, for formal caregivers, in addition to BPSD, ADL deficits in residents with dementia were related to caregiver burden. Hasson and Arnetz<sup>10</sup> reported that the transfer of care recipients to and from a bed or chair and assisting at

the toilet were physically strenuous for the staff of nursing homes. It is possible that for formal caregivers, the burden of caring for multiple individuals with ADL deficits may increase stress.

We could not find a reason why female care recipients were more difficult to care for after adjusting for ADL, cognitive level, and BPSD. Although the standardized regression coefficient was not as high as for other significant variables (behavior that might affect others and ADL), there is a need for further research for this care recipient gender issue. In Japan, there are more than 3 elderly females for every elderly male in the residential care setting, and this imbalance increases when one considers the population that actually requires the highest level of care.<sup>26</sup>

Because the BPSD, particularly behaviors affecting others, are the strongest predictors of formal caregiver burden, it may be worth working toward preventing BPSD such as aggression. There is increasing research examining factors associated with aggressive behaviors in residents with dementia.<sup>27-29</sup> At the same time, new research shows that there are effective interventions focusing on restoring residents to their highest possible functional and physical status, such as restorative care intervention in nursing homes.<sup>30</sup> Seeking to reduce or prevent BPSD, such as aggression, and trying to adopt the caring strategy to restore and maintain the function of people with dementia will heighten the quality of life in people with dementia and may also lessen the burden of the caregivers.

### Limitations

We asked each unit to sample 3 residents and asked their formal primary caregiver to complete the staff questionnaire. Therefore, there were caregivers who completed only 1 questionnaire regarding their burden, whereas others may have filled out 2 or 3 questionnaires regarding their burden for each of the residents for whom they provide primarily care. We could not distinguish between the caregivers who filled out multiple questionnaires because the surveys were anonymous and there was no further identifier to determine whether the caregiver filling in the same gender and same age working in the same unit indicated the same person. For this reason, we determined that the weight of the single caregiver variable would be different and decided not to adopt the caregiver variables into the

multiple regression analyses. Because the caregiver variables, such as sociodemographic variables and attitudes, had a relationship with staff stress and satisfaction,<sup>31</sup> further research with different sampling methods is needed to describe the formal caregiver's burden in relation to the resident and caregiver variables in a formal care setting.

### Implications

This study investigated the burden of formal caregivers who care for people with dementia. The findings highlight the impact of behaviors that might affect others, such as aggression and screaming, and low ADL level on the caregivers' burden.

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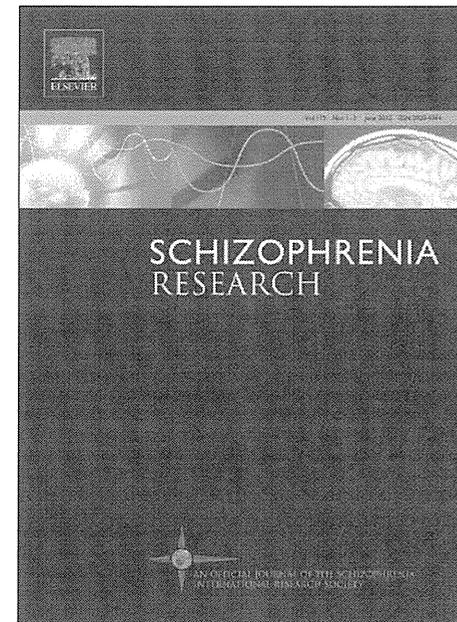
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## Prevalence of diabetes and antipsychotic prescription patterns in patients with schizophrenia: A nationwide retrospective cohort study

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### ABSTRACT

**Introduction:** Despite an increasing concern that atypical antipsychotics seem to have a stronger diabetogenic risk than conventional antipsychotics, little information is available on the prevalence of diabetes among schizophrenia patients, and prescription patterns for patients with comorbid schizophrenia and diabetes in Japan.

**Objectives:** To compare the prevalence of diabetes between schizophrenia patients and the general population and to investigate whether diabetes status correlates the prescription patterns of antipsychotics at hospital discharge.

**Methods:** Schizophrenia patients who were discharged between April 2004 and March 2005 and who continued to receive outpatient treatment from 526 hospitals were included in this retrospective open cohort study. We collected information about the doctor diagnosis of diabetes during hospitalization, and drug prescriptions for schizophrenia at hospital discharge using medical charts.

**Results:** The overall prevalence of diabetes was 8.6% among patients with schizophrenia. Compared with the general population, the estimates of diabetes prevalence in the schizophrenia population were 2.6–10.8 percentage point higher among males aged 30–49 years, and 1.9–9.9 percentage point higher among females aged 40–59 years. The odds of being prescribed conventional antipsychotics were about 2 times higher among patients with diabetes than without diabetes, relative to atypical and combination of conventional and atypical antipsychotics. These results were robust across various sensitivity analyses.

**Conclusion:** When treating schizophrenia patients with preexisting diabetes, psychiatrists need to monitor the occurrence of diabetes regularly regardless of antipsychotic class, strike a balance, and provide the most efficacious antipsychotic medication.

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### 1. Introduction

Schizophrenia is associated with impaired glucose tolerance as well as increase prevalence and incidence of diabetes (Bushe and Holt, 2004; Holt et al., 2005; Rouillon and Sorbara, 2005). The prevalence of diabetes among schizophrenia

patients ranges from 2 to 20% (Chien et al., 2009; Cohen et al., 2006a,b; De Hert et al., 2006; Dixon et al., 2000; Hung et al., 2005; Mukherjee et al., 1996; Philippe et al., 2005; Regenold et al., 2002; Ryan et al., 2003; Sernyak et al., 2003; Subramaniam et al., 2003; Suvisaari et al., 2008; Tabata et al., 1987; Voruganti et al., 2007). Compared with the general population, these estimates of prevalence are 2–5 times higher among patients with schizophrenia (Chien et al., 2009; Cohen et al., 2006a; De Hert et al., 2006; Suvisaari et al., 2008).

Several factors may contribute to concurrent schizophrenia and diabetes. For example, hereditary factors, early environmental factors, lifestyle, and side effects of antipsychotics are

likely to be important contributing factors for diabetes among schizophrenia patients (Holt et al., 2004). Although atypical antipsychotics are considered first line treatment for patients with schizophrenia (Falkai et al., 2005; National Institute for Clinical Excellence, 2003), there has been increasing concern that atypical antipsychotics seem to have a stronger diabetogenic risk than conventional antipsychotics (Cohen, 2004). Given a serious health risk, the combined American Diabetes Association and American Psychiatric Association consensus committee concluded that regular monitoring for the occurrence of diabetes is important for all patients receiving atypical antipsychotics (American Diabetes Association et al., 2004).

In Japan, 7 atypical antipsychotics (risperidone since 1996, perospirone since 2001, quetiapine since 2001, olanzapine since 2001, aripiprazole since 2006, bionanserin since 2008, and clozapine since 2009) have been approved for the treatment of schizophrenia. However, olanzapine and quetiapine have been contraindicated in the presence of diabetes since 2002, because it was reported that 2 out of 9 cases died of diabetic coma during treatment with olanzapine between February 2001 and December 2001 and 1 out of 13 cases died during treatment with quetiapine between February 2001 and September 2002. Based on these reports, regular monitoring for the occurrence of diabetes is recommended when using all atypical antipsychotics (Murasaki et al., 2008).

However, a meta-analytic review has not ascertained whether treatment with atypical antipsychotics involves an increased diabetes risk compared to that with conventional antipsychotics (Smith et al., 2008). Smith et al. (2008) focused on a sample of 11 studies in patients with schizophrenia, where atypical antipsychotics were compared with conventional antipsychotics and diabetes was an outcome. They reported that atypical antipsychotics were associated with a small increased relative risk [RR] for diabetes compared with conventional antipsychotics (RR, 1.32; 95% confidence interval [CI], 1.15–1.51). Furthermore, a systematic meta-analysis of Japanese studies examining the relationship between atypical antipsychotic use and hyperglycemia-related adverse events suggests that, compared with olanzapine and quetiapine, the diabetes risk of other atypical antipsychotics was not significantly different (Okumura et al., 2010). Okumura et al. (2010) focused on a sample of 6 studies in Japanese patients with schizophrenia, where olanzapine and quetiapine were compared with risperidone and perospirone, and fasting plasma glucose and diabetes were outcomes. They reported that olanzapine and quetiapine were not associated with an increased weighted mean difference [WMD] for hyperglycemia-related adverse event compared with other atypical antipsychotics (WMD,  $-0.07$ ; 95% CI  $-0.32$  to  $0.19$ ). The 2 meta-analytic reviews found poor methodological quality in most studies and were only able to make tentative conclusions about the potential risk for diabetes during treatment with atypical antipsychotics (Okumura et al., 2010; Smith et al., 2008).

To the best of our knowledge, no multicenter study has ever investigated the prevalence of diabetes among Japanese schizophrenia patients. Moreover, little is known about the prescription pattern for patients with comorbid schizophrenia and diabetes. This research aims (1) to compare the prevalence of diabetes between schizophrenia patients and the general population in Japan, and (2) to investigate whether diabetes

status correlates the prescription patterns of antipsychotics at hospital discharge.

### 2. Methods

#### 2.1. Study population

Data for the present study were collected as a part of a larger study funded by the Japanese Association of Psychiatric Hospitals (JAPH). The main theme of this project examined the effectiveness of day care activities and antipsychotics for discharged patients with schizophrenia. The details regarding this project have been provided elsewhere (Kobayashi et al., submitted for publication; Mayahara et al., 2007). Briefly, we conducted a retrospective open cohort study of 1215 member hospitals of the Japanese Association of Psychiatric Hospitals (JAPH) in 2007. Our study population comprised all schizophrenia patients who were discharged between April 2004 and March 2005 and who continued to receive outpatient treatment from JAPH member hospitals. A systematic sampling technique was used to take every fifth schizophrenia patient from the medical records. The exclusion criteria were (1) age  $<20$  or  $>99$  years, (2) the absence of information on gender, diabetes status during hospitalization, or prescriptions for antipsychotics at hospital discharge. Our study protocol was approved by the ethics committees of the JAPH and the National Center of Neurology and Psychiatry.

#### 2.2. Assessment

A record administrator from each hospital retrospectively reviewed patient medical charts. We collected information as follows: (1) socio-demographic characteristics (gender and age), (2) psychiatric characteristics (duration of schizophrenia, length of hospitalization, and Global Assessment of Functioning (American Psychiatric Association, 2000) score at hospital discharge), (3) clinical measures during hospitalization (body mass index, fasting plasma glucose, HbA<sub>1c</sub> level, systolic blood pressure, diastolic blood pressure, total cholesterol, neutral fats, history of myocardial infarction or angina, and history of other physical illness), (4) a doctor diagnosis of diabetes during hospitalization, and (5) drug prescriptions for schizophrenia at hospital discharge. In addition, we collected information about (1) psychiatric rehospitalization within 18 months of hospital discharge, (2) use of daycare services after hospital discharge, and (3) status of smoking and non-smoking during hospitalization, although we did not use these variables in the present study.

#### 2.3. Definition of diabetes

In schizophrenia data from the present study, we defined a case of diabetes as a patient (1) being diagnosed with diabetes during hospitalization, and (2) not receiving olanzapine or quetiapine that are contraindicated for diabetes patients. This definition could result in a conservative estimate of diabetes because there would be a substantial under-recognition of diabetes among patients with schizophrenia (Voruganti et al., 2007).

In general population data from the National Health and Nutrition Survey, which was a population-based study

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conducted by the Ministry of Health, Labour and Welfare of Japan in November 2006 (Ministry of Health, 2006), individuals were categorized as having diabetes on the basis of an  $HbA_{1c} \geq 6.1\%$  or current diabetes treatment. In this survey, a total of 4296 people aged  $\geq 20$  years were randomly selected from the Japanese population using a cluster sampling procedure.

#### 2.4. Definition of antipsychotic prescription patterns

We extracted all antipsychotic prescriptions for both regular and when-required use at hospital discharge. Prescription patterns reported in this study represent the single point prevalence at the time of hospital discharge. We classified antipsychotics as conventional and atypical drugs. Conventional antipsychotics included chlorpromazine, levomepromazine, thioridazine, prochlorazine, prochlorperazine, trifluoperazine, perphenazine, fluphenazine, chlorpromazine hydrochloride-promethazine hydrochloride-phenobarbital, haloperidol, bromperidol, timiperone, floropipamide, spiperon, moperone, pimozide, sulphiride, nemonapride, sultopride, tiapride, caripramine, clozapamine, mosapramine, xypertine, zotepine, haloperidol decanoate, and fluphenazine decanoate. Atypical antipsychotics included risperidone, perospirone, quetiapine, and olanzapine. Aripiprazole, bionanserin, and clozapine were not included in the study because they were not approved for use until the study period.

#### 2.5. Statistical analyses

The age- and gender-specific prevalence of diabetes among schizophrenia patients was obtained and compared with the prevalence of diabetes among general population which was investigated by the National Health and Nutrition Survey (Ministry of Health, 2006). Furthermore, we investigated whether diabetes status correlates the prescription patterns of antipsychotics at hospital discharge, using multinomial logistic regression (Long, 1997) with gender and age as controlled variables. In a similar manner, antipsychotic prescription drug patterns were compared between patients with and without diabetes. A  $p$  value of  $<0.05$  was considered statistically significant. All analyses were conducted using R 2.8.1 (R Development Core Team, 2008).

#### 2.6. Sensitivity analyses

In the above analyses, we considered patients receiving olanzapine or quetiapine not to have diabetes, because these antipsychotics are contraindicated in the presence of diabetes. However, there are possibilities that psychiatrists prioritize the management of psychosis over concerns about the potential metabolic abnormalities of olanzapine and quetiapine. In addition, because antipsychotics may have a differential propensity to cause weight gain (Leucht et al., 2009), there are possibilities that antipsychotics with a high propensity to cause weight gain (for example, olanzapine) may be avoided in patients with a high body mass index [BMI], regardless of diabetes status. Recognizing that the results might be influenced by the definition of diabetes and by adjusting for BMI, we conducted sensitivity analyses. We repeated our analyses (1) defining a case of diabetes as a patient being diagnosed with

diabetes during hospitalization, irrespective of their prescribed antipsychotics, and not adjusting for BMI, (2) defining a case of diabetes as a patient being diagnosed with diabetes during hospitalization and not receiving olanzapine or quetiapine, and adjusting for BMI, and (3) defining a case of diabetes as a patient being diagnosed with diabetes during hospitalization, irrespective of their prescribed antipsychotics, and adjusting for BMI.

### 3. Results

#### 3.1. Participants

Fig. 1 illustrates the selection process. Between April 2004 and March 2005, 21,396 patients with schizophrenia were discharged and continued to receive outpatient treatment from 526 JAPH member hospitals. A total of 4176 patients were selected by a systematic sampling procedure. We excluded 327 patients using the exclusion criteria. In total, 3849 patients with schizophrenia remained for analysis.

The cohort characteristics are summarized in Table 1. Males and females were equally represented in the study population with a mean age of 45.3 (standard deviation [SD], 14.3) years. The mean disease duration was 17.8 (SD, 12.8) years. Of all patients, 34.3% were cases of schizophrenia who were hospitalized for the first time. The median length of hospitalization was 86 (inter quartile range, 36–193) days. The mean Global Assessment of Functioning (American Psychiatric Association, 2000) score at hospital discharge was 55.1 (SD, 16.0). Conventional antipsychotics were used by 28.3% patients, atypical antipsychotics were used by 31.2%, and a combination of conventional and atypical antipsychotics were used by 40.6%. We did not use information about fasting plasma glucose and  $HbA_{1c}$  level to define diabetes status in schizophrenia data from the present study, because of substantial proportions of missing data on these variables (28.5% and 82.3%, respectively).

#### 3.2. Prevalence of diabetes

The overall prevalence of diabetes was 8.6% (95% CI, 7.7–9.5) among patients with schizophrenia. The age- and gender-specific prevalence of diabetes is summarized in Table 2. The highest prevalence (19.3%) occurred in male patients aged  $\geq 70$  years, whereas the highest prevalence (14.2%) in female patients occurred in groups aged 50–59 years and  $\geq 70$  years. There was a significantly higher prevalence of diabetes in subgroups of schizophrenia patients ( $p < .05$ ) when data from individuals in the same age group were compared in a survey of the Japanese general population (Ministry of Health, 2006). The differences between proportions were 2.56–10.77 percentage points among male patients aged 30–49 years, and 1.89–9.92 percentage points among female patients aged 40–59 years. Diabetes-related clinical measures (e.g., body mass index) were higher than those without diabetes (Table 1).

#### 3.3. Prescription patterns of antipsychotics at hospital discharge

Relative to atypical antipsychotics, keeping gender and age constant, the adjusted odds of being prescribed conventional antipsychotics were 2.00 times greater (95% CI, 1.49–2.69) among patients with diabetes than those without diabetes (Table 3). Moreover, relative to the combination of conventional

and atypical antipsychotics, the odds of being prescribed conventional antipsychotics were 1.84 times greater (95% CI, 1.41–2.41) among patients with diabetes (Table 3). Among conventional antipsychotics, the presence of diabetes significantly increased the odds of being prescribed levomepromazine, haloperidol, and zotepine (Table 4).

#### 3.4. Sensitivity analyses

We conducted sensitivity analyses to evaluate the influence of the definition of diabetes and adjusting for BMI. Details of sensitivity analyses are provided in Supplemental Tables. First, to evaluate the influence of the definition of diabetes, analyses were performed in which we defined a case of diabetes as a patient being diagnosed with diabetes during hospitalization, irrespective of their prescribed antipsychotics. The overall prevalence of diabetes was 8.9% (95% CI, 8.0–9.8) of the 3849 patients with schizophrenia. After adjusting for gender and sex, odds of being prescribed conventional antipsychotics were higher among patients with diabetes than without diabetes, relative to atypical (odds ratio [OR], 1.85; 95% CI, 1.38–2.47) and combination of conventional and atypical antipsychotics (OR, 1.73; 95% CI, 1.32–2.25).

Second, to evaluate the influence of adjusting for BMI, analyses were performed in which we defined a case of diabetes as a patient being diagnosed with diabetes during hospitalization and not receiving olanzapine or quetiapine. The overall prevalence of diabetes was 8.8% (95% CI, 7.8–9.8) of the 2921 patients with schizophrenia. After adjusting for gender, sex, and BMI, odds of being prescribed conventional

antipsychotics were higher among patients with diabetes than without diabetes, relative to atypical (OR, 1.81; 95% CI, 1.29–2.54) and combination of conventional and atypical antipsychotics (OR, 1.71; 95% CI, 1.26–2.33).

Finally, to evaluate the influence of the definition of diabetes and adjusting for BMI, analyses were performed in which we defined a case of diabetes as a patient being diagnosed with diabetes during hospitalization, irrespective of their prescribed antipsychotics. The overall prevalence of diabetes was 9.1% (95% CI, 8.0–10.1) of the 2921 patients with schizophrenia. After adjusting for gender, sex, and BMI, odds of being prescribed conventional antipsychotics were higher among patients with diabetes than without diabetes, relative to atypical (OR, 1.71; 95% CI, 1.22–2.39) and combination of conventional and atypical antipsychotics (OR, 1.58; 95% CI, 1.17–2.15).

### 4. Discussion

Our study had 3 major findings. First, the prevalence of diabetes among patients with schizophrenia was 8.6%. Second, compared with the prevalence of diabetes in the Japanese general population, the estimates in the schizophrenia population were 2.56–10.77 percentage point higher among males aged 30–49 years, and 1.89–9.92 percentage point higher among females aged 40–59 years. Third, the odds of being prescribed conventional antipsychotics were 2.00 and 1.84 times greater for patients with diabetes than without diabetes, relative to atypical and a combination of conventional and atypical antipsychotics respectively. Among conventional antipsychotics, the odds of being prescribed levomepromazine, haloperidol, and zotepine were greater in

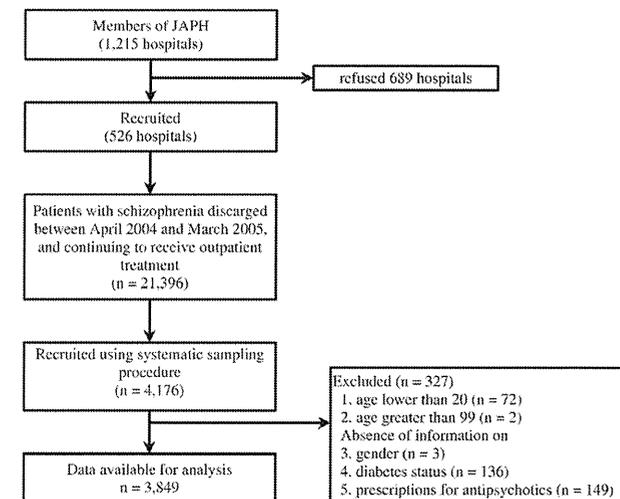


Fig. 1. Flow diagram.

**Table 1**  
Sample characteristics.

Characteristics (percentage of data available)	Total (n = 3,849)	Diabetes	
		Without (n = 3,517)	With (n = 332)
<b>1. Socio-demographic</b>			
Female <sup>a</sup> (100%)	1942 (50.5)	1790 (50.9)	152 (45.8)
Age at hospital discharge <sup>b</sup> , year (100%)	45.3 (14.3)	44.5 (14.3)	53.9 (11.2)
<b>2. Psychiatric characteristics</b>			
Duration of schizophrenia <sup>b</sup> , years (96.9%)	17.8 (12.8)	17.2 (12.8)	24.2 (12.0)
Number of hospitalization <sup>b</sup> (99.8%)			
1	1320 (34.3)	1237 (35.2)	83 (25.0)
2	696 (18.1)	644 (18.3)	52 (15.7)
3	440 (11.4)	402 (11.4)	38 (11.4)
4 or more	1386 (36.0)	1228 (34.9)	158 (47.6)
Length of hospitalization <sup>c</sup> , days (100%)	86 (36–193)	86 (37–193)	82 (32–189)
GAF score at hospital discharge <sup>b</sup> (96.7%)	55.1 (16.0)	55.2 (16.1)	53.3 (15.4)
<b>3. Clinical measures during hospitalization</b>			
Body mass index <sup>b</sup> , kg/m <sup>2</sup> (75.9%)	23.9 (4.6)	23.8 (4.6)	25.6 (4.4)
Fasting plasma glucose <sup>b</sup> , mg/dl (71.5%)	97.6 (33.4)	92.0 (31.7)	145.6 (73.2)
HbA <sub>1c</sub> level <sup>b</sup> , % (17.7%)	6.8 (6.5)	6.5 (7.8)	7.3 (3.6)
Systolic blood pressure <sup>b</sup> , mmHG (94.2%)	118.2 (35.4)	117.4 (35.6)	127.1 (30.9)
Diastolic blood pressure <sup>b</sup> , mmHG (94.0%)	73.6 (27.2)	73.1 (27.4)	78.8 (24.1)
Total cholesterol <sup>b</sup> , mg/dl (86.5%)	186.6 (42.2)	186.1 (41.7)	192.4 (46.8)
Neutral fats <sup>b</sup> , mg/dl (70.1%)	123.1 (85.6)	120.7 (82.9)	147.7 (106.9)
History of myocardial infarction or angina <sup>b</sup> (89.1%)	84 (2.2)	64 (1.8)	20 (6.0)
History of other physical illness <sup>b</sup> (94.6%)	826 (21.5)	690 (19.6)	136 (41.0)
<b>4. Antipsychotic class at hospital discharge<sup>a</sup> (100%)</b>			
Conventional	1088 (28.3)	935 (26.6)	153 (46.1)
Atypical	1199 (31.2)	1124 (32.0)	75 (22.6)
Combination of conventional and atypical	1562 (40.6)	1458 (41.5)	104 (31.3)

<sup>a</sup> Qualitative variables are expressed as frequency and percentage in parentheses.  
<sup>b</sup> Quantitative variables are expressed as mean and standard deviation in parentheses.  
<sup>c</sup> Length of hospitalization is expressed as median and inter quartile range in parentheses.

patients with diabetes than without diabetes. These results were robust across various sensitivity analyses.

The overall prevalence of diabetes was 8.6% in our cohort of 3849 schizophrenia patients, which was close to the prevalence of diabetes in the Taiwanese schizophrenia study (7.9%) (Chien et al., 2009), lower than that in the United States (10.8–12.5%) (Dixon et al., 2000), and higher than that in France (2.2%) (Philippe et al., 2005). This discrepancy might reflect ethnicity, different ages of the sample, and the definition of having diabetes in the individual studies.

Compared with the general population, schizophrenia patients revealed a higher prevalence of diabetes in males aged 30–49 years and females aged 40–59 years, which was similar to previous studies (Chien et al., 2009; Subramaniam et al., 2003). Subramaniam et al. (2003) found a higher prevalence of diabetes among schizophrenia patients aged 30–59 years but lower

among those aged 60–69 years, compared to the general population in Singapore. Chien et al. (2009) found a higher prevalence of diabetes among schizophrenia patients aged 20–49 years (OR, 2.2–3.8) but a similar prevalence among those aged 50 years or above (OR, 0.8–1.4), compared to the general population in Taiwan. Our results confirm the findings of these previous studies that young schizophrenia patients are more vulnerable to diabetes.

Finally, the odds of being prescribed conventional antipsychotics were higher among patients with diabetes than those without diabetes, relative to atypical and a combination of conventional and atypical antipsychotics. Especially, among conventional antipsychotics, the presence of diabetes significantly increased the odds of being prescribed levomepromazine, haloperidol, and zotepine. One possible explanation for these findings is that most psychiatrists consider all atypical

**Table 2**  
Age- and gender-specific prevalence of diabetes in patients with schizophrenia and general population in Japan.

Age	Males					Females				
	Schizophrenia		General <sup>a</sup>		RD (95% CI)	Schizophrenia		General <sup>a</sup>		RD (95% CI)
	n	DM (%)	n	DM (%)		n	DM (%)	n	DM (%)	
20–29	317	0.9	114	0.0	0.95 (–0.12 to 2.01)	278	0.7	166	0.0	0.72 (–0.27 to 1.71)
30–39	496	5.2	212	0.5	4.74 (2.56 to 6.92) <sup>*</sup>	414	1.7	395	0.5	1.19 (–0.23 to 2.61)
40–49	406	11.3	207	4.8	6.53 (2.29 to 10.77) <sup>**</sup>	382	7.1	363	2.2	4.87 (1.89 to 7.85) <sup>*</sup>
50–59	418	14.6	350	13.1	1.49 (–3.40 to 6.39)	472	14.2	525	8.2	5.99 (2.07 to 9.92) <sup>*</sup>
60–69	187	15.0	389	14.7	0.27 (–5.93 to 6.48)	276	11.6	523	12.8	–1.21 (–5.95 to 3.53)
70 ≤	83	19.3	472	21.2	–1.92 (–11.18 to 7.33)	120	14.2	580	15.3	–1.13 (–8.03 to 5.76)

<sup>\*</sup> p < .05.  
<sup>a</sup> Data are from the Ministry of Health, Labour and Welfare of Japan (2006); DM = Diabetes Mellitus; RD = Rate Difference; CI = Confidence Interval.

**Table 3**  
Prescription pattern of antipsychotic class among patients with comorbid schizophrenia and diabetes.

Diabetes	Antipsychotics, %			AOR (95% CI)	
	Conventional (n = 1088)	Atypical (n = 1199)	Combination (n = 1562)	Conventional vs Atypical (ref)	Conventional vs Combination (ref)
Without	85.9	93.7	93.3	2.00 (1.49–2.69) <sup>*</sup>	1.84 (1.41–2.41) <sup>**</sup>
With	14.1	6.3	6.7		

AOR = age and gender Adjusted Odds Ratio; CI = Confidence Interval; ref = reference.  
<sup>\*</sup> p < .05.

antipsychotics as being of similar risk for the development of diabetes, because 2 atypical antipsychotics are contraindicated in the presence of diabetes among schizophrenia patients. However, meta-analytic reviews suggest that the association between atypical antipsychotics and diabetes risk remains controversial because of the poor methodological quality in most studies (Okamura et al., 2010; Smith et al., 2008). Furthermore, although little is known about the risk of diabetes during antipsychotic treatment in patients with preexisting diabetes, 1 case–control study indicated that the new use of both conventional and atypical antipsychotics is associated with a significant increase in hospitalization for hyperglycemia among patients with preexisting diabetes (RR, 1.50; 95% CI,

1.29–1.74) (Lipscombe et al., 2009). Therefore, considering the fact that the odds of being prescribed conventional antipsychotics are higher among patients with diabetes, it is necessary to further investigate whether such practices are somewhat reasonable.

This study has some limitations. First, the medical chart data may have been inaccurate or incomplete, and there may have been misclassification in the identification of diabetes. Second, the prevalence of diabetes may be underestimated because there would be a substantial under-recognition of diabetes among patient with schizophrenia (Voruganti et al., 2007). Third, the study design is a retrospective open cohort study, so the observed associations should be interpreted

**Table 4**  
Prescription pattern of antipsychotics among patients with comorbid schizophrenia and diabetes.

General drug name	Diabetes, %		
	Without (n = 3517)	With (n = 332)	AOR
<i>Conventional antipsychotics</i>			
Levomepromazine	27.7	34.0	1.37 (1.07–1.74) <sup>*</sup>
Haloperidol	22.8	33.4	1.57 (1.22–2.00) <sup>*</sup>
Chlorpromazine	15.2	19.3	1.31 (0.98–1.76)
Chlorpromazine hydrochloride, promethazine hydrochloride, and phenobarbital	14.9	17.8	1.30 (0.96–1.77) <sup>*</sup>
Zotepine	11.8	16.6	1.66 (1.21–2.27) <sup>*</sup>
Bromperidol	6.5	8.7	1.28 (0.85–1.93)
Sulpiride	4.9	5.7	0.99 (0.61–1.63)
Haloperidol decanoate	3.1	4.8	1.43 (0.83–2.48)
Sultopride	3.4	3.6	1.21 (0.65–2.24)
Propicazazine	2.8	3.3	1.00 (0.52–1.90)
Timiperone	1.3	1.8	1.43 (0.59–3.44)
Tiapride	0.6	1.8	1.97 (0.78–4.99)
Clocapramine	0.6	1.5	1.75 (0.65–4.73)
Thioridazine	1.1	1.2	0.99 (0.34–2.83)
Fluphenazine	0.9	1.2	1.26 (0.43–3.67)
Floropipamide	0.5	0.9	1.73 (0.40–6.09)
Mosapramine	0.6	0.9	1.16 (0.34–3.97)
Pimozide	0.5	0.6	1.24 (0.30–6.03)
Nemonapride	0.7	0.6	1.10 (0.25–4.84)
Fluphenazine decanoate	1.4	0.6	0.40 (0.09–1.65)
Moperone	0.1	0.3	1.87 (0.20–17.39)
Prochlorperazine	0.1	0.0	NA
Trifluoperazine	0.1	0.0	NA
Perphenazine	0.9	0.0	NA
Spiperone	0.3	0.0	NA
Caripramine	0.1	0.0	NA
Oxypertine	0.5	0.0	NA
<i>Atypical antipsychotics</i>			
Risperidone	44.8	45.5	1.14 (0.90–1.43)
Perospirone	8.9	10.5	1.33 (0.91–1.95)
Quetiapine	10.7	0.0	NA
Olanzapine	21.4	0.0	NA

AOR = age and gender Adjusted Odds Ratio; CI = Confidence Interval; NA = Not Available.  
<sup>\*</sup> p < .05.

carefully. For example, we cannot rule out the possibilities that previous response or non-response to specific antipsychotics would also predict prescription patterns of antipsychotics at hospital discharge. Fourth, potential limitation of this study is the use of discharged patients with schizophrenia, which may limit generalizability of the results to those patients who undergo long-term hospitalization, those who are treated on outpatient department basis, and those who do not come for treatment.

## 5. Conclusion

Our study highlights a high prevalence of diabetes among patients with schizophrenia, and high odds of being prescribed conventional antipsychotics for patients with comorbid schizophrenia and diabetes. When treating schizophrenia patients with preexisting diabetes, psychiatrists need to monitor the occurrence of diabetes regularly regardless of antipsychotic class, strike a balance, and provide the most efficacious antipsychotic medication.

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### Contributors

Drs. Mayahara, Matsumoto, and Hirakawa designed the study and collected the data. Dr. Ito supervised the study design. Dr. Okumura analyzed data and wrote the first draft of this manuscript. Drs. Okumura, Ito and Kobayashi contributed to the development of the manuscript. All authors contributed to and approved the final manuscript.

### Conflict of interest

All authors declare that they have no conflicts of interest.

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### Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.schres.2010.02.1061.

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## Comparison of characteristics of suicide attempters with schizophrenia spectrum disorders and those with mood disorders in Japan

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### ABSTRACT

Suicidality in patients with schizophrenia is high. To clarify the characteristics of suicidal behavior in patients with schizophrenia, we investigated suicide attempters with schizophrenia spectrum disorders in comparison with patients with mood disorders. One hundred patients with schizophrenia spectrum disorders and 155 patients with mood disorders admitted to an emergency department after a suicide attempt were interviewed in detail on items concerning 1) demographic characteristics, 2) previous suicidal behavior, and 3) index suicidal behavior. Differences between the two groups were subsequently analyzed. Patients with schizophrenia spectrum disorders showed a lower incidence of previous deliberate self-harm, and a higher incidence of a subsequent suicide attempt more than 1 year after the previous suicide attempt as well as a higher lethality of index suicide attempt compared to patients with mood disorders. Furthermore, the most common motive for making a suicide attempt in patients with schizophrenia spectrum disorders was having a mental problem. This study revealed the factors associated with suicide attempts among Japanese patients with schizophrenia spectrum disorders, and the nature of these factors makes it difficult to predict future attempts. This makes clear the importance of continuous long-term follow-up with careful attention to the mental symptoms and psychological burden for such patients.

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### 1. Introduction

It is generally acknowledged that over 90% of those who commit suicide have a psychiatric diagnosis at the time of death (Bertolote and Fleischmann, 2002; Cavanagh et al., 2003). The presence of psychiatric illness is an important risk factor for suicide, and different risk profiles may emerge for different diagnoses (Fawcett et al., 1987). Among the various psychiatric illnesses, schizophrenia (19–46%) and mood disorders (28–62.4%) account for a high portion of suicide attempters/victims, and are known to be the most frequent risk factors for suicide (Proulx et al., 1997; Steblaj et al., 1999; Ran et al., 2004; Haukka et al., 2008).

As means to decrease the suicide rate in patients with mood disorders, some studies have suggested the effectiveness of an educational program for improving the diagnosis and treatment

provided by general practitioners (GPs) and the development of screening tools for depression (Rutz et al., 1992; Chiu et al., 2003; Henriksson and Isacson, 2006; Szanto et al., 2007).

A study by Dassori et al. (1990) reported that depression, suicidality in the past, and impairment in adaptive function are the best discriminators between suicidal and nonsuicidal patients with schizophrenia. Despite these findings and a high lethality of suicide attempts in such patients, a strategy for suicide prevention has not yet been established (Radomsky et al., 1999; Hunt et al., 2006b). It may be due to the fact that patients with schizophrenia often fail to communicate their suicidal intent directly (Breier and Astrachan, 1984; Funahashi et al., 2000), and life events – which are established risk factors for suicide in general populations – seem to be less prominent before suicide in patients with schizophrenia (Heila et al., 1999).

In Japan, few studies investigating the characteristics of suicide attempters with schizophrenia have been reported to date (Ichimura et al., 2005). The present study presents the findings from a consecutive series of suicide attempters with schizophrenia who were admitted to an emergency department. We compare the characteristics of patients with schizophrenia to those of patients with mood disorders, both of

which are the most common psychiatric disorders in suicide attempters, in order to clarify the characteristics of patients with schizophrenia who attempt suicide.

### 2. Methods

#### 2.1. Subjects

The present study was performed at the Advanced Critical Care Medical Center, Yokohama City University Medical Center, in Yokohama, a city which has over 3.6 million inhabitants. The center receives all patients with potentially fatal conditions from the southern area of the city. Suicide attempters account for 13.0% on average (April 1, 2003–March 31, 2008) of all admitted patients.

The study subjects were 255 patients consecutively admitted to the center after suicide attempts between April 1, 2003 and September 30, 2008, and who met the criteria for schizophrenia spectrum disorders (schizophrenia and other psychotic disorders) or mood disorders according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth edition (DSM-IV). Individuals with both schizophrenia and mood disorder were assigned either to the schizophrenia group or the mood disorder group according to their symptoms as follows: DSM-IV 295.70 Schizoaffective Disorder (schizophrenia spectrum disorders) and DSM-IV 296.94 Major Depressive Disorder, Single episode, Severe, with the characteristics with psychosis (mood disorders). Suicide attempt was defined as any intentional self-destructive act with suicidal ideation. Deliberate self-harm was defined as intentional, direct injuring of body tissue without suicidal intent. The presence of suicidal ideation was confirmed by two attending psychiatrists.

Patients were included in our analyses only once; if they were readmitted during the study period, data from only the first admission were analyzed. The attending psychiatrists performed face-to-face interviews with all patients admitted after a suicide attempt and made a psychiatric diagnosis.

#### 2.2. Assessment of the characteristics of suicide attempters

The following aspects were assessed by interview: 1) demographic characteristics, 2) previous suicidal behavior, and 3) index suicidal behavior. The demographic characteristics included the following four items: age, sex, educational level, and living situation. Educational level was divided into two categories according to the educational system in Japan: those with up to the compulsory 9 years of school education, and those with high school education and beyond. The index suicidal behavior comprised the following seven items: 1) period after previous suicide attempt, 2) method of suicide attempt, 3) usage of alcohol and other drugs just before the attempt, 4) motive of suicide attempt, 5) surgery under general anesthesia required following the attempt, 6) presence of somatic complications, and 7) psychiatric treatment recommended by psychiatrists after discharge. Any surgery under general anesthesia was counted as an indicator of higher medical severity (Bacanis, 2001).

The motive of suicide attempt was divided into the following six categories: 1) mental problem (psychological symptoms caused by a psychiatric disease or other subjective symptoms associated with depression), 2) family relations, 3) human relations (workplace or school) and male–female relationships, 4) somatic complications, 5) financial situation, and 6) other reasons.

The study protocol was approved by the ethics committee of Yokohama City University School of Medicine, and conforms to the provisions of the Declaration of Helsinki in 1995. We obtained informed consent from all participants and their anonymity was preserved.

#### 2.3. Statistical analysis

A chi-square test was used to explore the differences between patients with schizophrenia spectrum disorders and mood disorders in regard to gender, living status, and educational level. A *t*-test was used to compare the differences between patients with schizophrenia spectrum disorders and mood disorders for age. A logistic regression analysis was used to determine the difference between patients with schizophrenia spectrum disorders and mood disorders for previous suicidal behavior, and index suicidal behavior. In the logistic regression model, we used age and gender as adjustment variables. Statistical analyses were conducted using SPSS for Windows Version 16.0. A probability level of  $p < 0.05$  was considered statistically significant.

### 3. Results

#### 3.1. Demographic characteristics

Fig. 1 shows the demographic characteristics of suicide attempters for the two diagnostic groups. Subjects ranged in age from 14 to 88 years, 44.7% ( $N = 114$ ) were male and 55.3% ( $N = 141$ ) were female; 100 (39.2%) were diagnosed with schizophrenia spectrum disorders and 155 (60.8%) with mood disorders. The mean age of patients with mood disorders was significantly higher than that of those with schizophrenia spectrum disorders (mean  $\pm$  standard

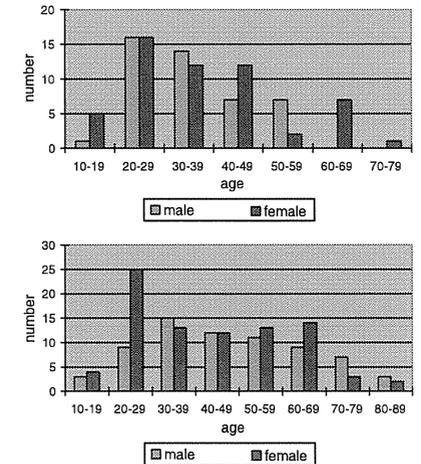


Fig. 1. Age distribution of 255 (male = 114, female = 141) suicide attempters by diagnostic group. The upper panel shows the number of patients with schizophrenic spectrum disorders by sex, and the lower panel shows the number of patients with mood disorders by sex. Mean age was 36.8  $\pm$  13.6 ( $M \pm S.D.$ ) in patients with schizophrenia spectrum disorders and 44.8  $\pm$  18.1 ( $M \pm S.D.$ ) in patients with mood disorders.

deviation (SD), 44.8  $\pm$  18.1 years and 36.8  $\pm$  13.6 years, respectively;  $p < 0.05$ ). There were no significant differences between patients with schizophrenia spectrum disorders and those with mood disorders in regard to sex, educational level, or living situation (Table 1).

#### 3.2. Previous suicidal behavior

The data on previous suicidal behavior are shown in Table 2. A history of deliberate self-harm was found in 27 (27.0%) patients with schizophrenia spectrum disorders and 49 (31.6%) patients with mood disorders. Previous suicidal behavior was found in 42 (42.0%) patients with schizophrenia spectrum disorders and 54 (34.8%) patients with mood disorders. The results of logistic regression analyses examining the differences between the two diagnostic groups are shown in Table 3. The presence of previous deliberate self-harm was significantly less likely in those with schizophrenia spectrum disorders than in those with mood disorders ( $p < 0.05$ ).

No significant difference in previous suicide attempt was shown between the two diagnostic groups.

Table 1  
Demographic characteristics of 255 suicide attempters by diagnostic group.

	Schizophrenia spectrum disorders (N = 100)	Mood disorders (N = 155)	Total (N = 255)
Sex			
Male	45 (45.0)	69 (44.5)	114 (44.7)
Female	55 (55.0)	86 (55.5)	141 (55.3)
Education level			
Compulsory education	27 (27.0)	36 (23.2)	63 (24.7)
High school education and beyond	69 (69.0)	111 (71.6)	180 (70.6)
Living situation			
Alone	20 (20.0)	26 (16.8)	46 (18.0)
With someone	76 (76.0)	125 (80.6)	201 (78.8)

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**Table 2**  
Previous suicidal behavior of 255 suicide attempters, by diagnostic group.

	Schizophrenia spectrum disorders (N = 100)	Mood disorders (N = 155)	Total (N = 255)
	N (%)	N (%)	N (%)
Previous deliberate self-harm $\geq 1$	27 (27.0)	49 (31.6)	76 (29.8)
Previous suicide attempts $\geq 1$	42 (42.0)	54 (34.8)	96 (37.6)

### 3.3. Index suicidal behavior

Table 4 shows the detailed index suicidal behavior results for the two diagnostic groups. The results of logistic regression analyses examining the differences for seven items of index suicidal behavior are shown in Table 5. Patients with schizophrenia spectrum disorders and mood disorders differed significantly on all characteristics examined.

#### 3.3.1. Period after previous suicide attempt

A quarter of patients (25%) with schizophrenia spectrum disorders attempted suicide more than 1 year after the previous suicide attempt, compared with 13.5% with mood disorders, indicating a significantly higher rate of attempt among patients with schizophrenia spectrum disorders ( $p < 0.05$ ).

#### 3.3.2. Method of suicide attempt

The most common method of suicide attempt was drug overdose (40.0%), followed by jumping from a height (27.0%) and laceration (14.0%) in patients with schizophrenia spectrum disorders, compared with also drug overdose (49.7%), followed by laceration (20.0%) and jumping from a height (7.7%) in those with mood disorders. The method of jumping from a height was significantly more frequent in patients with schizophrenia spectrum disorders ( $p < 0.05$ ).

#### 3.3.3. Usage of alcohol or other drug just before the attempt

Sixteen (16.0%) patients with schizophrenia spectrum disorders used alcohol or other drug just before the attempt, compared with 57 (36.8%) patients with mood disorders, indicating such usage was significantly less common in patients with schizophrenia spectrum disorders ( $p < 0.05$ ).

#### 3.3.4. Motive of suicide attempt

The most common motive of suicide attempt was a mental problem (45.0%), followed by other reason (11.0%) and family relations (10.0%) in patients with schizophrenia spectrum disorders, whereas it was family relations (21.9%), followed by a mental problem (19.4%) and financial situation (13.5%) in patients with mood disorder. Thus, having a mental problem was significantly more common in patients with schizophrenia spectrum disorders ( $p < 0.05$ ).

#### 3.3.5. Experience of surgery under general anesthesia

The frequency of those who required surgery under general anesthesia in the emergency department was significantly higher in patients with schizophrenia spectrum disorders (35%) than in those with mood disorders (18.7%) ( $p < 0.05$ ).

**Table 3**  
Logistic regression analysis for comparison of suicide attempters with schizophrenia and mood disorders in regard to previous suicidal behavior.

	Adjusted OR (CI 95%)	p value
Previous deliberate self-harm (+)	0.435 (0.214–0.884) <sup>b</sup>	0.021 <sup>a</sup>
Previous suicide attempt (+)	1.299 (0.735–2.293) <sup>a</sup>	0.368

<sup>a</sup>  $p < 0.05$ .

<sup>b</sup> Odds ratio (OR) adjusted for sex and age.

**Table 4**  
Index suicidal behavior of 255 suicide attempters, by diagnostic group.

	Schizophrenia spectrum disorders (N = 100)	Mood disorders (N = 155)	Total (N = 255)
	N (%)	N (%)	N (%)
Period after previous suicide attempt			
More than 1 year	25 (25.0)	21 (13.5)	46 (18.0)
Less than 1 year	8 (8.0)	27 (17.4)	35 (13.7)
No previous suicide attempt	43 (43.0)	77 (49.7)	120 (47.1)
Method of suicide attempt			
Drug overdose	40 (40.0)	77 (49.7)	117 (45.9)
Gas	1 (1.0)	7 (4.5)	8 (3.1)
Poisoning	4 (4.0)	9 (5.8)	13 (5.1)
Hanging	0 (0.0)	11 (7.1)	11 (4.3)
Jumping from a height	27 (27.0)	12 (7.7)	39 (15.3)
Traffic death	7 (7.0)	3 (1.9)	10 (3.9)
Burning	5 (5.0)	3 (1.9)	8 (3.1)
Laceration	14 (14.0)	31 (20.0)	45 (17.6)
Other	2 (2.0)	2 (1.3)	4 (1.6)
Usage of alcohol or other drug just before the attempt	16 (16.0)	57 (36.8)	73 (28.6)
Motive of suicide attempt			
Mental problem	45 (45.0)	30 (19.4)	75 (29.4)
Family relations	10 (10.0)	34 (21.9)	44 (17.3)
Human (work place and school) and male-female relationships	8 (8.0)	15 (9.7)	23 (9.0)
Somatic problem	2 (2.0)	12 (7.7)	14 (5.5)
Financial situation	3 (3.0)	21 (13.5)	24 (9.4)
Other reason	11 (11.0)	16 (10.3)	27 (10.6)
Experience of surgery under general anesthesia	35 (35.0)	29 (18.7)	64 (25.1)
Presence of somatic complications	47 (47.0)	44 (28.4)	91 (35.7)
Psychiatric treatment after discharge			
Hospital treatment	45 (45.0)	35 (22.6)	80 (31.4)
Outpatient treatment	35 (35.0)	95 (61.3)	130 (51.0)
None or refusal	1 (1.0)	9 (5.8)	10 (3.9)
Surgical	13 (13.0)	11 (7.1)	24 (9.4)

#### 3.3.6. Somatic complications

Forty-seven (47.0%) patients with schizophrenia spectrum disorders had somatic complications compared with 44 (28.4%) patients with mood disorders ( $p < 0.05$ ).

#### 3.3.7. Psychiatric treatment recommended after discharge

Forty-five (45.0%) patients with schizophrenia spectrum disorders were recommended to receive psychiatric hospital treatment after discharge from the emergency department, compared with 22.6% of

**Table 5**  
Logistic regression analysis for comparison of suicide attempters with schizophrenia and mood disorders in index suicidal behavior.

	Adjusted OR (CI 95%)	p value
Length from previous suicide attempt		
More than 1 year	2.829 (1.371–5.836) <sup>a</sup>	0.005 <sup>a</sup>
Method of suicide attempt		
Jumping from a height	3.905 (1.843–8.278) <sup>a</sup>	0.000 <sup>a</sup>
Used alcohol or other drug just before the attempt (+)	0.312 (0.163–0.597) <sup>a</sup>	0.000 <sup>a</sup>
Motive of suicide attempt		
Mental problem	4.336 (2.323–8.095) <sup>a</sup>	0.000 <sup>a</sup>
Surgery under general anesthesia (+)	2.561 (1.401–4.681) <sup>a</sup>	0.002 <sup>a</sup>
Somatic complications	3.161 (1.772–5.640) <sup>a</sup>	0.000 <sup>a</sup>
Psychiatric treatment after discharge		
Hospital treatment	4.124 (2.236–7.607) <sup>a</sup>	0.000 <sup>a</sup>

<sup>a</sup>  $p < 0.05$ .

<sup>b</sup> Odds ratio (OR) adjusted for sex and age.

patients with mood disorders, indicating a significant difference between the groups ( $p < 0.05$ ).

## 4. Discussion

The findings of the present study revealed a number of factors in which suicide attempters with schizophrenia spectrum disorders differed significantly from those with mood disorders.

The relative mean age of suicide attempters was lower in patients with schizophrenia spectrum disorders, which is in agreement with a previous finding on psychological autopsy for the two diagnostic groups (Hunt et al., 2006a). In addition to this demographic characteristic, we found a clear difference between the two groups in terms of suicidal behavior; patients with schizophrenia spectrum disorders had a higher lethality of attempt than those with mood disorders. Surgery under general anesthesia and somatic complications were more frequent in patients with schizophrenia spectrum disorders than in those with mood disorders. Radomsky et al. (1999) reported that the degree of lethality of recent suicide attempts was more severe in patients with schizophrenia spectrum psychosis than in patients with affective psychoses, and Hunt et al. (2006b) also reported that the methods of suicide used by individuals with schizophrenia, compared to those without schizophrenia, were more often of a violent and lethal nature.

Similarly to other studies, we found a significant association between patients with schizophrenia spectrum disorders and the suicide method of "jumping from a height" (Hu et al., 1991; Kreyenbuhl et al., 2002; Hunt et al., 2006b). Cantor et al. (1989) reported that individuals with schizophrenia affected by hallucinations were frequently among those who jumped to their death. It is unclear why just over a quarter of patients with schizophrenia in our study tried to commit suicide by jumping. Aside from the influence of hallucinations, another factor might be the lack of hesitation to complete an act in patients with schizophrenia (Breier and Astrachan, 1984; Harkavy-Friedman et al., 1999), and the impulsivity of such patients (Feltous, 2008). The rate of usage of alcohol or another drug just before the attempt was higher among patients with mood disorders in our study. These patients might use alcohol and drugs to relieve anxiety and prepare themselves for what they have already determined to do. The result that patients with schizophrenia spectrum disorders rarely used alcohol or another drug in such a situation might reflect their lack of hesitation in completing a decided act.

With regard to motive for the suicide attempt, 45% of suicide attempters with schizophrenia spectrum disorders attempted suicide due to a mental problem. This is in contrast to the various motives reported by patients with mood disorders (family relations: 21.9%, mental problem: 19.4%, financial situation: 13.5%, etc.). Baca-Garcia et al. (2005) speculated that attempts may be more frequently associated with life stressors in patients with depression than in those with schizophrenia. These findings could imply that the suicidal behavior is closely related to mental symptoms in patients with schizophrenia spectrum disorders compared to those with mood disorders. The need for frequent psychiatric hospitalizations after treatment in the emergency department and the motive of suicide being a mental problem confirm that patients with schizophrenia spectrum disorders require intense psychiatric treatment after a suicide attempt.

It has often been estimated that the risk of suicide is the highest during the first year after an attempt and appears to decline over time (Johansson Fridell et al., 1996; Suominen et al., 2004; Tidemalm et al., 2008). We found that a quarter of patients with schizophrenia spectrum disorders attempted suicide more than 1 year after the previous attempt. Moreover, we confirmed a lower rate of deliberate self-harm – a predictor of later suicide attempt (Owens et al., 2002; Zahl and Hawton, 2004; Mann et al., 2008) – in patients with schizophrenia spectrum disorders than in those with mood disorders ( $p < 0.05$ ). These results further support the hypothesis that it is difficult to forecast the risk of suicide attempt for patients with schizophrenia spectrum

disorders. Thus, patients with schizophrenia spectrum disorders should be continuously monitored over the long-term after suicide attempt.

There were a number of limitations to this study. This was due to the very important methodological limitation was that we did not conduct structured interviews with suicide attempters to diagnose psychiatric disorder. In addition, their suicide attempt was confirmed by the presence of suicide intent on their attempt; we did not use a scale to obtain detailed information on their intent. This was due to the very short period of hospitalization in our emergency department. Another limitation is that the motive for suicide was not distinctly classified according to, for example, psychological symptoms caused by a psychiatric disease or other subjective symptoms associated with depression. Finally, this study was limited in scope by the relatively narrow range of demographic and suicidal behavior data collected. We could not adequately evaluate more complex variables such as age at onset of illness (duration of illness), treatment before the attempt, and drug discontinuation; it is likely that, in the schizophrenia group, the first suicide attempt frequently occurred around the time of the first psychotic episode (Treméau et al., 2005).

This study is the first to provide findings important for understanding the nature of suicide attempters with schizophrenia spectrum disorders and mood disorders in Japan, a country where the increasing suicide rate is a serious social problem. We conclude that the characteristics of suicide attempters with schizophrenia spectrum disorders are quite different from those of attempters with mood disorders. Despite the several limitations of this study, the most important finding is that the risk of later suicide attempt continues over the long-term in patients with schizophrenia spectrum disorders. Thus, it is vital that we share knowledge about the continuity of suicide risk, and pay close attention to the psychological burden for schizophrenic patients. Such knowledge and understanding among psychiatrists and other mental health professionals should be investigated in the future. In addition, a larger and more detailed study is warranted to verify our findings and clarify the nature of the mental problems experienced by suicide attempters with schizophrenia.

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