博士論文

論文題目 　　Comparison of services by psychiatric multidisciplinary

outreach teams with and without consumer-providers

in terms of service content, hospital admission

and other outcomes

（精神科ピアサポーターの有無による、精神科多職種

アウトリーチチームが提供するサービス間における

サービス内容、入院およびその他のアウトカムの比較）

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Contents

Abstract

Purpose: This study examined whether having consumer providers (CPs) in psychiatric multidisciplinary outreach teams was associated with a lower risk of hospitalization, improved social functioning and problem behaviors.

Methods: A retrospective cohort study was conducted as a part of the Japan Outreach Model Project 2011-2014. Outreach teams were classified into those with (10 teams) and without CPs (22 teams). Hospitalization during follow-up was assessed based on medical records. Social functioning (Global Assessment of Functioning, GAF) and problem behaviors (Social Behavior Schedule, SBS) of clients were assessed at baseline and at 6-month follow-ups. The amount and content of the service provided were measured. The difference in hospitalization during the follow-up between teams with and without CPs was analyzed by Kaplan-Meier survival curves and a Cox proportional hazards model. Changes in social functioning and problem behavior were compared between clients cared for by the two types of team. Amount and content of the service were also compared between the two groups.

Results: Average follow-up periods were 405 and 397 days for clients cared for by teams with and without CPs (n=108 and 184), respectively. The clients treated by teams with CPs had a significantly decreased probability of hospitalization (HR=0.53; 95%CI, 0.31 to 0.89 in Cox proportional hazards models adjusting for baseline characteristics). A six-month change

in GAF or SBS was not significantly different between the two groups. The teams with CPs spent a longer time in coordination within a team and support for clients and family.

Conclusion: Psychiatric multidisciplinary outreach teams with CPs showed a lower rate of hospitalization during the follow-up. Having CPs in such outreach teams may decrease hospitalization among clients.

Definition of Terms

1) Severe (Serious) Mental Illness (SMI): A mental, behavioral, or emotional disorder (excluding developmental and substance use disorders); Diagnosable currently or within the past year; Of sufficient duration to meet diagnostic criteria specified within the Diagnostic and Statistical Manual of Mental Disorders (DSM); and, Resulting in serious functional impairment, which substantially interferes with or limits one or more major life activities.

2) Recovery: Subjective personal belief that it is possible for someone to regain a meaningful life, despite serious mental illness, not based on psychiatric models and diagnostic criteria.

3) Peer Support: In general, support by persons who are in a similar situation or have had a similar experience, or mutual support from others who face the same challenge. In mental health area, a system of giving and receiving help founded on key principles of respect, shared responsibility, and mutual agreement about what is helpful.

4) Consumer provider(s): Individuals with a serious mental illness who are trained to use their experiences to provide recovery-oriented services and support to others.

5) Empowerment: A core concept of WHO's vision of health promotion; a multidimensional social process through which individuals and groups gain better understanding and control over their lives. As a consequence, they are enabled to change their social and political environment to improve their health-related life circumstances.

Introduction

1. Access barriers to psychiatric services and prognosis

Among those with mental illness who live in the community, many are not connected to services due to various factors despite the need to receive appropriate psychiatric services. This has become a worldwide problem and also exists in Japan [1-4]. For example with schizophrenia, not having treatment during the first 2 – 5 years after onset determines a poor long-term prognosis [5]. Thus shortening the duration of untreated psychosis is considered important for improving prognosis [6,7]. Furthermore, relapse is often seen among people who quit medication after the initial contact for treatment [8]. Critically, psychiatric symptoms and social impairment become chronic as a result of repeated relapses, with less probability of remission [9]. As such, providing psychiatric services with appropriate timing for untreated patients of mental illness and patients that have suspended treatment is important in order for people to continue their lives in the community while having a mental illness. In fact, in 2014, only 44.7% of persons with any mental illness received psychiatric services in the United States [10].

One reason associated with limited access to psychiatric services among people with mental illness is related to behavioral characteristics of the disease [11]. For example, hallucinating experiences and paranoia for schizophrenia patients are, "Something that is

actually being experienced right now", so when people around them point out that "It may be a mental illness", schizophrenia patients may claim that, "This is a fact and I am not sick", "I do not need treatment or medication" and they refuse to use psychiatric services [12-14].

Another reason is public stigma toward mental illness and persons with mental illness from local residents. Public stigma makes it hard for persons with mental illness to access psychiatric service [15,16]. Persons often worry about neighbors and about receiving negative community opinion and even negative effects at work [10]. As a result, there is tremendous reluctance to access any psychiatric service [17].

2. Peer support and peer supporter in the mental health area

In general, peer support is described as "support by persons who are in a similar situation or have had a similar experience", or "mutual support of each other by those who face the same challenge". In the mental health area, Mead has defined peer support [18] as "a system of giving and receiving help founded on key principles of respect, shared responsibility, and mutual agreement of what is helpful". Peer support has an affinity to 'Recovery' concept, subjective personal belief that it is possible for someone to regain a meaningful life, despite serious mental illness [19-21], not based on psychiatric models and diagnostic criteria. "It is about understanding another's situation empathically through the shared experience of emotional and psychological pain". META Services, Arizona, summarized this more

specifically: peer support is composed of mutuality (giving and receiving help and support with respect based on a shared experience), empathy (understanding through the personal experience of having "been there"), engagement (sharing personal recovery experiences "If she/he can do it, so can I"), wellness (focusing on each person's strengths and wellness), and friendship (promoting recovery through relationship and friendship). Peer support is in widespread use as a key method in the psychiatric service and mental health of Europe, America, and Oceania [22-28].

Peer supporters, persons providing peer support to others, are referred to by various names depending on the form of their activity, and there is no single definition for peer support and peer supporter. When such persons are employed as workers, not volunteers, they are called "Peer Staff" or "Peer Specialist", "Peer Provider", "Consumer specialist", etc. In particular, consumer providers (CPs) are defined as individuals with a serious mental illness who are trained to use their experiences to provide recovery-oriented services and support to others [29].

Peer support has been theoretically classified into three subgroups by previous studies [30,31]: 1) Mutual support groups in which relationships are thought to be reciprocal in nature, even if some participants are viewed as more experienced or skilled than others; 2) Peer-support services in which support is primarily uni-directional, with one or more clearly defined peer supporters offering support to one or more program participants (support is

separate from or additional to standard care provided by mental health services); and 3) Peer

mental health service providers: people who have used mental health services and are

employed to provide part or all of the standard care delivered by a mental health care service

(i.e., the difference from standard care would be the provider rather than the role).

3. Possible benefits of peer support

According to the classifications mentioned above, previous studies of mutual support

indicated significant effects on quality of life, symptoms of depression and anxiety, and

empowerment, but no significant effects on hospital admission, symptoms of psychosis, and

recovery [32,33]. Previous studies of peer-support also indicated significant effects on

duration of admission, symptoms of depression and anxiety, and empowerment, but no

significant effects on hospital admission, symptoms of psychosis, quality of life, recovery,

hope, and satisfaction [34-42].

It has also been indicated that taking part in peer support activities promoted the recovery

of peer supporters themselves and the promotion of a ripple effect for improving social

awareness in the community as a whole and for reducing the stigma associated with mental

illness for the other professional team members who worked with peer supporters [43-46]. In

contrast, however, some studies demonstrated that there were role conflicts and confusion,

lack of policies and practices around confidentiality, poorly defined job structures and lack of

support for peer supporters [46,47]. Further studies are needed in order to examine various effects on clients as well as other professional members in multidisciplinary teams and of peer supporter themselves.

4. Multidisciplinary outreach programs for persons with severe mental illness and CP participation

In Western countries, as the care for people with mental illness transitioned to community-based approaches, various community care programs were developed and provided according to each country's resources and system [48]. Multidisciplinary outreach programs such as Assertive Community Treatment (ACT) [49-53] and Assertive Outreach (AO) [51,54-58] were effective approaches that reduced hospital admission, the costs of hospital care, and improved outcomes and patient satisfaction [50] in various countries, including Japan. The target population of ACT and AO are restricted to patients who are mainly dealing with severe mental illness (SMI) or high users of mental health services and patients with difficulties maintaining contact with services. The assignment of CPs is clearly indicated as necessary to secure the quality of an ACT program [59]. Some teams of AO also employ peer supporters as CPs [55].

There are studies regarding the effect of CPs in a psychiatric multidisciplinary team that have been deployed since the 1990s [60], and conducted in ACT and AO programs. Two

randomized controlled trials and one quasi-experimental study reported that participation of

clients with severe mental illness in multidisciplinary outreach teams showed a significant

decrease in hospital admission and/or shorter hospital days [61-64]. In comparison, six other

studies did not find a significant decrease in these hospital-related outcomes [35,41,60,65-67].

Among five other studies, three found that the participation of CPs increased engagement in

services and social relationships among clients [35,41,68]; but two studies failed to find

significant differences [60,63]. One study indicated a significantly positive association on a

client's personal recovery [67], but many other studies found no statistically significant

improvement of social functions [35,41,65] and psychiatric symptoms [37,65]. Thus, it is still

not fully clear if the participation of CPs in psychiatric outreach programs will decrease

hospital admission and improve social function and psychiatric symptoms.

5. History of mental health and welfare of persons with mental illness in Japan

After chlorpromazine, a typical antipsychotic drug, was developed in 1952,

deinstitutionalization was promoted in Western countries and psychiatric services were

deployed in local communities. In Japan, however, with the Mental Health Law effective in

1950 as momentum, psychiatric hospitals were established one after another and the number

of psychiatric beds in Japan exploded. As a result, many patients with mental illness ended up

being hospitalized in psychiatric hospitals, and their lives were separated from local

communities and residents on a long-term basis. Even in modern times, the number of psychiatric beds per capita in Japan is overwhelmingly higher than other countries, and the average length of a psychiatric hospital stay is much longer when compared to other countries [4,69]. In terms of public stigma toward mental illness and persons with mental illness, it has become clear that mutual communication improves understanding when local residents acquire knowledge about mental illnesses [70]. Compared to Western countries with advanced deinstitutionalization, one of the reasons for the high stigma in Japan is thought to be the little opportunity for most persons to interact with mentally ill persons due to policies centered on hospitalization.

Barriers to access to psychiatric services in Japan have been greatly affected by the changes in laws and systems that have been enforced after the Meiji Restoration and in recent years. When someone has a mental health problem, 70% of Japanese people seek support from experts, but about 50% feel ashamed when their friends find out about their use of psychiatric services [71]. As a result, the proportion of Japanese people who access psychiatric services is about half of the proportion in other developed countries [72]. Poor access due to economic and geographic problems in Japan is not significant as a cause when compared to other countries [73]. As such, it is thought that cognitive causes such as stigma are major factors for why people with mental illness are not being connected to psychiatric services.

As a result of not having a service introduction at the appropriate timing when treatment is necessary, psychiatric symptoms gradually worsen, and people with mental illness can increasingly encounter problems with their families, work, or neighbors, and they end up being hospitalized involuntarily, often in a form that the patients themselves do not want [74]. This is one of the reasons that Japan has a high ratio of involuntary hospitalization in overall hospitalization when compared to other countries [74,75].

6. The Japanese Outreach Model Project and CPs participation

Based on this history in Japan, in recent years support for people who live in the community with mental illness and their families in the form of the continuation of community living has been promoted over depending on hospitalization [76,77]. By concentrating the functions of an inpatient ward into acute-phase treatment, lengthening of the hospitalization of new inpatients is prevented. In addition, policies are now implemented to prevent new hospitalization and readmission by enhancing outpatient care, day-care, outreach such as psychiatrist visit and home-visit nursing, and social welfare to support independence and other needs in the community [78].

In Japan, a home-visit nursing system covered by public health insurance has been provided since 1986 in order to prevent relapse and to support daily life in the community. However, once clients stop regular visits to psychiatrists and medication, they tend to easily

relapse and be admitted to hospital. Therefore, there has been a push for more intensive, multi-professional, and adaptable programs for persons with severe mental illness including for those that have suspended treatment and the untreated.

In 2011, the Japanese Ministry of Health, Labor and Welfare established the Japanese Outreach Model Project (JOMP), which provides multidisciplinary outreach services to prevent hospital admission [79]. The main target population of JOMP are persons/patients with difficulties maintaining contact with psychiatric services, while the target population of ACT and AO are restricted to patients who are suffering from SMI or high users of mental health services and patients with difficulties maintaining contact with services. All the services are multi-professional and ACT and JOMP include peer staff. All the services provide 24/7 services and use case management. The ratios of patient and clinical staff are as follows: 12:1 at ACT, more than 10:1–12:1 at AO and JOMP has a range from 3:1 to 20:1 with an average of 6:1. Only the JOMP duration of patient contact must be several months or longer because service users are evaluated regarding the necessity of JOMP every 6 months.

Additionally, for people who are currently continuing long-term hospitalization, there is closer cooperation with social resources of administrative agencies and private businesses in addition to considerations about willingness to leave the hospital by staff inside and outside of the hospital and support for a gradual community transition. Here, peer support activities by peer supporters that are users of psychiatric services themselves are increasing.

Additionally, support is increasing for community transition for inpatients with long-term psychiatric hospital stay, peer supporters provide the emotional support and coordination of family relations to the subjects [80-82].

Having CPs join the psychiatric multidisciplinary outreach team to provide emotional support to clients who are resistant to treatment and the distinctive technology of early construction of a therapeutic relationship is thought to be effective for getting patients out of crisis condition thru a smooth introduction of treatment and by minimizing hospitalization. Additionally, the transition to a client centered, effective, and high-quality service, promotion of understanding of the disease by the people involved with the clients, and expansion of community support by improving upon stigma perceptions is anticipated to improve by having CP involved in visit activities with the multidisciplinary team and by participating/speaking in conferences inside and outside of the team. The involvement of CPs is also thought to affect hospitalization indirectly.

To date, however, it is unclear whether the participation of CPs in a psychiatric multidisciplinary outreach team targeting clients with difficulties maintaining the contact with psychiatric services, like JOMP, is associated with a decrease in hospitalization. This type of outreach program may be more promising in decreasing hospitalization compared to programs like ACT and AO targeting more severe clients. It has not, however, been fully investigated whether the participation of CPs in a JOMP-like program improves social

function or problem behaviors.

7. Purpose of this study

The purpose and hypothesis of this retrospective cohort study was to examine whether psychiatric multidisciplinary outreach teams with CPs were associated with a lower risk of client hospital admission/readmission, and improvement in social functioning and problem behavior compared to teams without CPs.

<center>**Methods**</center>

Study design

This study was a retrospective cohort study conducted from October 2011 to the end of January 2014.

Japanese Outreach Model Project (JOMP)

1) Setting and project goals

The goal of the Japanese Outreach Model Project was to prevent hospitalization of persons/patients with severe mental illness who had a high possibility of hospital admission/readmission if they applied to typical services under regular Japanese outpatient care funded by public insurance, and were transferred into regular Japanese outpatient care.

This Project led by the Ministry of Health, Labour and Welfare [79] recruited from the 47 prefectures in Japan. All expenses of the model project were paid from the national budget. Twenty-four prefectures applied and implemented the project and 21 participated in this study. Data was collected from 32 multidisciplinary outreach teams within the 21 prefectures that agreed to participate. JOMP reduced readmission rates and the length of hospital stay compared to regular outpatient care provided thru public insurance [83].

2) Target populations and participant (client) criteria

JOMP provides multidisciplinary outreach services for persons with severe mental illness diagnosed as ICD-10 F0, F2, and F3, who have a high possibility of hospital admission/readmission if they applied to typical services provided thru regular Japanese outpatient care. However, teams could provide services to clients with diagnosis other than F0, F2, and F3, when a Management Committee approved necessary services by JOMP.

Clients were classified according to treatment condition: 'treatment suspended', 'untreated', '*Hikikomori* (social withdrawal)', and 'discharged after long-term admission or repeated admission in the short term'.

3) JOMP multidisciplinary outreach teams and services

Multi-professional outreach teams implemented JOMP by providing medical and social services including support for: daily living tasks, communication, mental and physical health, social life and family care. Services were provided 24 hours a day seven days a week (24/7) in a community setting.

Prefectural governments entrusted JOMP to medical institutions. Each entrusted medical institution established a unit of the department of outpatient care of a psychiatric hospital, with a visiting nurse station, and community activity support centers. Most of the medical institutes entrusted by JOMP were private hospitals. The catchment area was defined as

'within a 30-minute driving time'.

The Ministry of Health, Labour and Welfare prescribed JOMP team criteria that a team must includes psychiatrist, and full-time nurse or psychiatric social worker or occupational therapist. Apart from these positions, each team leader could organize team members that included clinical psychologist, pharmacist, nutritionist, medical clerk and consumer provider, who were not funded by public insurance at that time, in addition to a psychiatrist, nurse, social worker, and occupational therapist. Table 1 shows the variation in occupations in a team.

Table 1. The variation in occupations in a team[a]

	Teams with CPs (n=10)		Teams without CPs (n=21)	
	Mean	SD	Mean	SD
Variation in occupations[b]	5.3	1.0	4.2	1.3

SD, Standard deviation
a) Data from 31 teams (see Figure 1)
b) Exclude CPs

Table 2 shows prescribed unique and special services of JOMP. After passing assessment by the Management Committee, teams were able to provide additional services that were not funded by public insurance as of 2011, such as multiple visits per a day, visiting a place of need for clients that was not their home, accompanying clients to clinic, etc.

Table 2. List of unique and special services of JOMP which were not funded by public insurance as of 2011

Visiting Services by clinical psychologist, pharmacist, nutritionist, consumer-provider, etc.
Multi-member (3 or more) visiting
Multi-time visiting per a day
Visiting outside home
Attend on service user to psychiatrist

4) Client selection process and Management Committee

Each team and prefectural governments was responsible for promoting information about the launch of teams and service targets to other medical institutions, welfare service providers, local government officers, and community residents via public relations magazines and Internet services. Consults and service requests for teams were received mainly from a health center and medical institutions. Also, some requests were from welfare service providers, police, and educational institutions. After teams received consultations, the Management Committee assessed the necessity of JOMP services in accordance with inclusion criteria.

Management Committee members were composed of administrative officers of health centers and the local community, commissioned welfare volunteers, members of patient and family advocacy groups, other service providers and academic experts. A Management Committee was required to hold regular meetings at a minimum of once per month if there was no consultation or service request. Condition reports and service directions of ongoing clients were shared and discussed in the Management Committee along with screening for

new candidates. Another role of the Management Committee was to build cooperation and a liaison system between teams, other medical service providers, welfare service providers, and local government service. CPs talked about their disease experience, perspectives toward clients, and thereby promoted understanding toward clients and further developed effective care procedure.

Consumer providers (CPs) in this study

Of the 32 teams that participated in this study, 10 teams added CPs as team members and a total of 17 CPs were members of a multidisciplinary outreach team. Table 3 shows demographics and personal CP backgrounds. In this model project, the government did not set written criteria for CPs. The majority of CPs were males in their 40s diagnosed with: schizophrenia, schizotypal, delusional, or other non-mood psychotic disorders (coded ICD-10 F2). At the time of the interview the average number of clients visited at home was eight and average length of time participating in JOMP was 17 months.

Team psychiatrists or directors recruited CPs based on a lengthy stable condition, experience with peer support activities, and interest in working with a multidisciplinary team as a CP. This meant that CPs had dual roles as peer supporter and client. At the time, they were not able to receive structured training as a consumer provider because the certified training program was not available in Japan. However, the average amount of prior

experience as a peer supporter was 34 months and there were two participants who were

taking CP developmental training during the time the interviews were conducted. Each team

through the project budget officially employed the CP. Whether or not CPs express 'I am a

CP' to clients was up to the CP.

Table 3. Characteristics of consumer providers[a] (n=9)

Age range	Diagnosis (ICD-10)	Previous experience as a consumer provider	Months participating in outreach service	Number of home visits
30s	F2	Yes	15	1
40s	F2	Yes	23	4
40s	F2	Yes	4	0
30s	F2	No	16	7
40s	F3	No	17	10
40s	F2	No	17	10
40s	F2	Yes	17	4
40s	F3	No	22	0
60s	F2	Yes	23	2

a) Of the 17 CPs working in this model project, 9 CPs answered.

Data collection

Clients were recruited from October 2011 to July 2013 and followed up until January 2014.

Hospital admission was measured during the follow-up based on medical records. Other

survey data was also collected from medical records at baseline and 6 months follow-up. At

the baseline, client characteristics that were assessed included clinical condition,

socio-demographic data, social functioning and problematic behavior. Client treatment

condition and outcomes including social functioning and problematic behavior were assessed

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at baseline and 6 months follow-up from medical records. Each team staff anonymized participant data and entered the data into a computer database.

Measures

1) Socio-demographic and clinical characteristics of clients at baseline

Socio-demographic and measured clinical variables included: sex, age, marital status, living status, psychiatric diagnosis (ICD-10), treatment status, social functioning, and problem behaviors.

Age was assessed using 8 categories ('10s', '20s', '30s', '40s', '50s', '60s', '70s', and '80s+') and used as a continuous variable. Marital status was assessed using 5 categories ('Currently married', 'Never married', 'Separated', 'Widowed', and 'Divorced'). Marital status was dichotomized ('Married' or not) because only married status' clients had spouses. Married clients are able to expect to receive some financial and daily life supports from spouses. Living status was assessed using categories (living with father, mother, brother/sister, spouse, son/daughter, uncle/aunt, friend, other, and living alone). Living status was dichotomized ('Living alone' or not) because financial and daily life support for clients might be different if there was/were housemate(s) or not. Also, previous studies indicated that families' expressed emotion style affects the relapse rate in schizophrenia in client families [92].

Psychiatric diagnosis was assessed by a team psychiatrist using the ICD-10 classification of mental and behavioral disorders, diagnostic criteria for research [84].

Treatment status at baseline was composed of persons who were in 'suspended treatment', 'untreated', '*Hikikomori* (social withdrawal)', 'discharged after long-term admission or repeated admission in the short term'. '*Hikikomori*' cases were only included when a psychiatric diagnosis was given by a team psychiatrist, and treatment status was 'suspended treatment or untreated'. Finally, treatment status was dichotomized into 'clients with a status of 'suspended treatment or untreated' and 'discharged after long-term admission or repeated admission in the short term'.

Social functioning was measured by the Global Assessment of Functioning (GAF) [85]. GAF was developed for the overall assessment of psychological, social, and occupational functioning on a hypothetical continuum of mental health/illness rating 1 (persistently and serious impaired) to 100 (no symptoms, superior functioning). GAF reflects a need for multidimensional information, is known worldwide, and has been translated into many languages and used in many outcome studies.

Problem behaviors were measured by the Social Behavior Schedule (SBS) [86,87]. SBS was designed for the use with a person with mental illness admitted to a hospital over a long-term and living in the community. It covers 21 behavioral areas, which describe major difficulties exhibited by patients with long-term impairments that usually result in

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dependence on or admission to a hospital. The SBS is scored using a Likert scale from 0 (no problem) to 4 (serious problem). It includes items relating to positive psychotic symptoms as well as negative behavioral items. A high score (max 78) on the scale indicates increased behavioral difficulty. SBS is designed for nurses and other co-medicals to evaluate clients' problematic bahaviour without special training. In this study, SBS were used to evaluate clients because evaluators included not only psychiatrists, but persons from other occupations.

Social functioning and problematic behaviour were measured to evaluate changes by receiving outreach services and to consider associations with hospital admission/readmission. GAF and SBS were measured by team staffs that took part in a service-start visit, every 6 months evaluation, service-end visit, and last visit before hospital admission.

Researchers and the Ministry of Health, Labour and Welfare held seminars two times for representatives of all teams about how to evaluate clients by using the measures and input questionnaire. Each representative participated in a seminar and subsequently conveyed the information to other team members.

2) Client treatment condition and outcome

Client treatment condition and outcome were measured with service-start date, service-end date and current state/the reason for service-end. Client reason for terminating service use

was recorded using the following categories: still using the service, terminating the service because he/she switched to regular outpatient care, terminating the service because he/she became an inpatient, terminating the service due to moving outside the service area, and service terminated because of death.

3) Multidisciplinary team characteristics

Multidisciplinary team characteristics were measured by the variation in occupations and total number of clients. Occupation variation included: psychiatrist, nurse, social worker, occupational therapist, clinical psychologist, pharmacist, dietician, medical clerk, etc., counting only staff who took part in home visit.

4) Team staff activity logs

Staff member activity logs were recorded for each visit during the service period in order to assess the amount and content of care provided. Data included: date of visit, travel-time for visit, service time (minutes), care categories, client ID and staff ID. If multiple team members dealt with a same case at the same time, they recorded the IDs of all participating members. The total amount of service was assessed for each client ID. Care categories were created for the content of a psychiatric home visit following classifications in previous studies [88,89]. The care categories were composed of 12 types of services: "Case management with clients",

"Case management without clients", "Assistance with daily living task", "Develop and maintain personal relationships", "Family support", "Medical support for psychiatric symptoms", "Support for physical health", "Social life and financial support", "Housing services", "Vocational and educational support", "Empowerment", and "Conference". Each team recorded all their data in a computer database.

Statistical analysis

1) Analysis preparation

The collected data had a two-level hierarchal structure, i.e., 'client personal' (Level 1) and 'teams providing services' (Level 2). Clients of this study received services from a particular team in charge of their area of residence. Before analysis, a team ID was given to each multidisciplinary team. In addition, a client ID was given to each client. Clients belonged to either a multidisciplinary team with or without CPs ('care by team with CP or 'care by team without CP, respectively).

2) Changes in social functioning and problematic behavior

A paired t-test was performed in order to test for significant changes in social functioning and problem behaviour over time. Additionally, two-sample t-tests were conducted to test for any significant differences after 6 months from baseline between clients having care provided

by teams with/without CPs.

3) Effect of receiving services provided by a multidisciplinary outreach team with CPs on hospital admission

Client length of stay in a community was calculated based on service-start date and service-end date. Person-time was calculated from service-start date until service-end including hospital admission or end of follow-up (January 31, 2014). The Kaplan-Meier survival curve was calculated in order to examine the effect of receiving services provided by a multidisciplinary outreach team with CPs on hospital admission. Univariable (Model 1) and multivariable (Model 2) Cox proportional hazard regression models were also conducted, estimating hazard ratios (HRs) and 95% confidence intervals (95% CIs), with number of days since a service start as the time scale. The multivariable models (Model 2) were adjusted for age category in increments of 10 years, sex, diagnosis, marital status, living status, problem behavior (SBS score), and social functioning (GAF score) at baseline. Additionally, we analyzed the category of treatment condition. Multi-level Cox regression models were conducted with random intercepts. In Model 1, only type of multidisciplinary outreach teams was entered. Model 2 was adjusted for personal level (Level 1) variables such as age, sex, diagnosis, marital status, living status, problematic behavior, and social functioning. Model 3 were additionally adjusted for group level (Level 2) variables such as the variation in

occupations and the total number of clients in JOMP.

These univariable, multivariable, and multi-level Cox proportional hazard models were also conducted by treatment condition (clients with a status of 'suspended treatment or untreated' or 'discharged after long-term admission or repeated admission in the short term') at baseline. Because compared with 'suspended treatment or untreated', those who were in crisis and not given any treatment, 'discharged after long-term admission or repeated admission in the short term' were already given treatment at baseline.

4) Service content and amount provided by multidisciplinary outreach teams

Activity logs were analyzed in order to describe service content and amount. Care content and amount (minutes) of provided services to clients were integrated by a month from service-start to end of service-end, separated by groups cared for by teams with/without CPs. Additionally, a t-test was performed in order to test for significance between groups cared for by teams with/without CPs.

5) Statistical methods

Data were analyzed with the use of 'ttest', 'stcox', and 'mestreg' procedures in STATA software, version 14.1. Statistical tests were two-sided, with a significance level at 5 %.

Ethical considerations

This was an observational, retrospective study developed on databases, and did not include any intervention or randomization, thus it does not imply any additional risk to patients. This study was conducted in accordance with international standards for epidemiological studies, as established in the *International Guideline for Ethical Review of Epidemiological Studies* [90]. The Research Ethics Committee of St. Luke's College of Nursing approved this study (11–032).

JOMP teams were informed of the purpose, methods, measurements and right to withdraw from the study without penalty. All data were collected anonymously by using IDs for participants and staff. All understood that their anonymity would be protected when presenting or publishing the results.

Results

Among 541 possible participants who were assessed by the Management Committee, 126 were excluded because they did not meet JOMP inclusion criteria. These 126 excluded candidates did not have a baseline assessment and activity log. Additionally, 47 clients who received services for less than 6 months at the end of September 2014 were excluded from the analysis because their 6-month evaluations were not conducted. Finally, 76 persons who had missing values necessary for multivariate analysis were excluded. A total of 292 participants (clients) from 31 teams fulfilled the inclusion criteria and were subjected to the analysis (Figure 1).
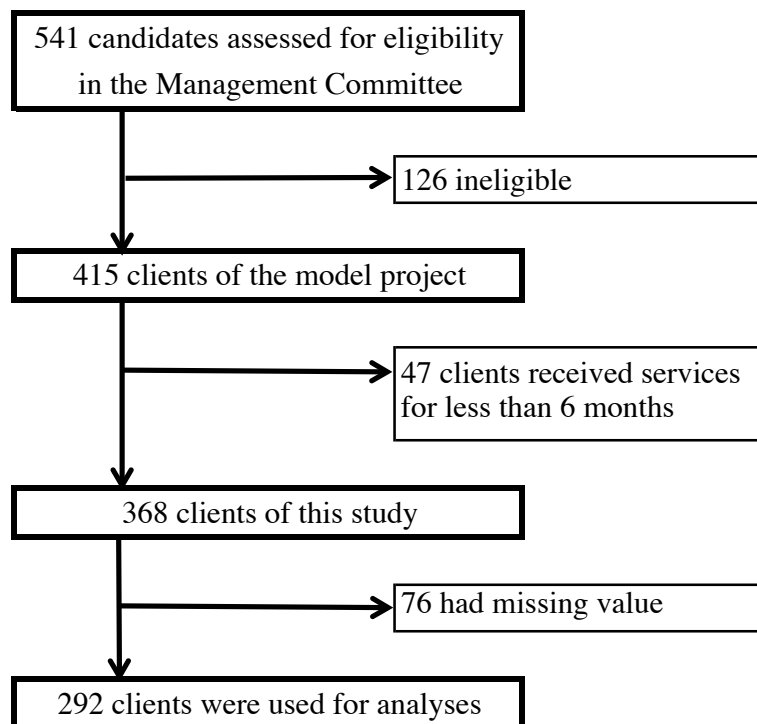
Figure 1. Flow chart

Of the 47 dropped clients that received services for less than 6 months, socio-demographic status, social functioning and problematic behaviour were not significantly different with clients of groups cared for by teams without CPs (Table 4-1 & 4-2).

Table 4-1. Socio-demographic characteristics and clinical condition of dropped clients received services for less than 6 months (n=47)

	Clients cared by teams with CPs n=24		Clients cared by teams without CPs n=23		
	n	%	n	%	total
Treatment condition (n=46)					
Suspended treatment	13	56.5	14	60.9	27
Untreated	5	21.7	3	13.0	8
Hikikomori	2	8.7	1	4.4	3
Long stay/Repeated	3	13.0	5	21.7	8
		$\chi2 = 1.37, \ p = 0.71$			
Sex					
Male	11	45.8	11	47.8	22
Female	13	54.2	12	52.2	25
		$\chi2 = 0.02, p = 0.89$			
Age					
10s	3	12.5	0	0.0	3
20s	1	4.2	1	4.4	2
30s	2	8.3	1	4.4	3
40s	4	16.7	6	26.1	10
50s	5	20.8	8	34.8	13
60s	7	29.2	4	17.4	11
70s	2	8.3	2	8.7	4
80s+	0	0.0	1	4.4	1
		$\chi2 = 6.23, p = 0.51$			
Marital Status					
Married	4	16.7	3	13.0	7
		$\chi2 = 0.12, p = 0.73$			
Living Status					
Living alone	10	41.7	5	21.7	15
		$\chi2 = 2.15, p = 0.14$			
Diagnosis (ICD10) (n=46)					
F0	0	0.0	1	4.6	1
F1	0	0.0	2	9.1	2
F2	17	70.8	12	54.6	29
F3	3	12.5	6	27.3	9
F4	1	4.2	0	0.0	1
F99	3	12.5	1	4.6	4
		$\chi2 = 6.79, p = 0.24$			

Significant at *p<.05, **p<.01

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Table 4-2. Social functioning and problematic behaviour of dropped clients received services for less than 6 months (n=47)

	Clients cared by teams with CPs		Clients cared by teams without CPs	
	Mean	SD	Mean	SD
GAF score	42.8	10.7	46.7	16.9
(n=11 vs 22)	t = 0.69, df = 31, p = 0.50			
SBS score	20.0	9.5	19.6	13.3
(n=18 vs 18)	t = -0.10, df = 34, p = 0.92			

SD, Standard deviation; df, degrees of freedom
GAF, the Global Assessment of Functioning; SBS, the Social Behavior Schedule
Significant at *p<.05, **p<.01

Of the 76 dropped clients who had a missing value, any socio-demographic status was not

significantly different with clients of groups cared for by teams without CPs (Table 5).

Table 5. Socio-demographic characteristics and clinical condition of dropped clients who had missing value (n=76)

	Clients cared by teams with CPs n=26		Clients cared by teams without CPs n=50		
	n	%	n	%	total
Treatment condition					
Suspended treatment	14	53.9	31	62.0	45
Untreated	3	11.5	5	10.0	8
Hikikomori	6	23.1	4	8.0	10
Long stay/Repeated	3	11.5	10	20.0	13
	χ2 = 3.90, p = 0.27				
Sex					
Male	14	53.9	35	70.0	49
Female	12	46.2	15	30.0	27
	χ2 = 1.95, p = 0.16				
Age					
10s	2	7.7	1	2.0	3
20s	2	7.7	6	12.0	8
30s	5	19.2	9	18.0	14
40s	7	26.9	14	28.0	21
50s	3	11.5	11	22.0	14
60s	5	19.2	7	14.0	12
70s	2	7.7	0	0.0	2
80s+	0	0.0	2	4.0	2
	χ2 = 7.93, p = 0.34				
Marital Status					
Married	5	19.2	8	16.0	13
	χ2 = 0.13, p = 0.72				
Living Status					
Living alone	41	38.0	82	44.6	15
	χ2 = 2.15, p = 0.14				
Diagnosis (ICD10)					
F2	18	69.2	35	70.0	53
F3	2	7.7	4	8.0	6
F4	2	7.7	1	2.0	3
F99	4	15.4	10	20.0	14
	χ2 = 6.79, p = 0.24				

Significant at *p<.05, **p<.01

Characteristics of socio-demographic and clinical condition at baseline

In groups cared for by teams with CPs, the number of male clients (n=55, 50.9%) was slightly greater than that of females (n=53, 49.1%). The largest number of client were in their 40's (n=22, 20.4%), followed by 30's and 50's with 20 (19.4%). Most (90.7%) clients were not married. Forty-one clients (38.0%) were living alone. The above results were not significantly different with clients of groups cared for by teams without CPs (Table 6-1).

ICD-10 diagnosis of clients in the group cared for by teams with CPs was mostly F2 (78.7%). The proportion of F2 was greater than that for clients in the group cared for by teams without CPs (73.9%). The largest number in terms of treatment condition for clients in the group cared for by CPs at baseline was 'suspected treatment' (68.5%). The proportion of 'suspected treatment' was significantly greater than for clients in the group cared for by teams without CPs (53.3%).

Table 6-1. Socio-demographic characteristics and clinical condition of clients at baseline (n=292)

	Clients cared by teams with CPs n=108		Clients cared by teams without CPs n=184		
	n	%	n	%	total
Treatment condition					
Suspended treatment	74	68.5	98	53.3	172
Untreated	18	16.7	22	12.0	40
Hikikomori	6	5.6	15	8.2	21
Long stay/Repeated	10	9.3	49	26.6	59
		$\chi 2 = 14.59$, $p < .01$**			
Sex					
Male	55	50.9	108	58.7	163
Female	53	49.1	76	41.3	129
		$\chi 2 = 1.67$, $p = 0.20$			
Age					
10s	2	1.9	2	1.1	4
20s	7	6.5	13	7.1	20
30s	21	19.4	40	21.7	61
40s	22	20.4	33	17.9	55
50s	21	19.4	42	22.8	63
60s	16	14.8	26	14.1	42
70s	12	11.1	18	9.8	30
80s+	7	6.5	10	5.4	17
		$\chi 2 = 1.34$, $p = 0.99$			
Marital Status					
Married	10	9.3	15	8.2	25
		$\chi 2 = 0.11$, $p = 0.74$			
Living Status					
Living alone	41	38.0	82	44.6	123
		$\chi 2 = 1.22$, $p = 0.27$			
Diagnosis (ICD10)					
F0	7	6.5	10	5.4	17
F1	0	0.0	4	2.2	4
F2	85	78.7	136	73.9	221
F3	5	4.6	17	9.2	22
F4	3	2.8	5	2.7	8
F6	1	0.9	0	0.0	1
F7	1	0.9	1	0.5	2
F8	0	0.0	2	1.1	2
F99	6	5.6	9	4.9	15
		$\chi 2 = 7.68$, $p = 0.47$			

Significant at *p<.05, **p<.01

The average GAF score in the group cared for by teams with CPs (41.4, SD 13.8) at baseline was higher than in the group cared for by teams without CPs (38.7, SD 14.1), and was not significant. The average SBS scores in the group cared by teams with CPs (25.3, SD 11.9) at baseline was significantly higher than in the group cared by teams without CPs (22.1, SD 11.2) (Table 6-2).

Table 6-2. Social functioning and problematic behaviour of clients at baseline (n=292)

	Clients cared by teams with CPs n=108		Clients cared by teams without CPs n=184	
	Mean	SD	Mean	SD
GAF score	41.4	13.8	38.7	14.1
	t = -1.60, df = 290, p = 0.11			
SBS score	25.3	11.9	22.1	11.2
	t = -2.27, df = 290, p = 0.02*			

SD, Standard deviation; df, degrees of freedom
GAF, the Global Assessment of Functioning; SBS, the Social Behavior Schedule
Significant at *p<.05, **p<.01

Total clients of a team in the group cared for by teams with and without CPs were 10.8 (min. 2, max. 29, SD 8.3) and 8.8 (min. 1, max. 30, SD 6.4), respectively (Table 7).

Table 7. Total clients of a team in the group cared for by teams

	Teams with CPs (n=10)		Teams without CPs (n=21)	
	Mean	SD	Mean	SD
Total number of clients	10.8 [a]	8.3	8.8 [b]	6.4

SD, Standard deviation; df, degrees of freedom
a) min.= 2, max.= 29
b) min.= 1, max.= 30

Change in social functioning and problematic behaviour

A decrease in average SBS scores between baseline and 6 months follow-up was significantly greater for the group cared for by teams with CPs than the groups cared for by teams without CPs in clients who were discharged after long-term admission or repeated admission in the short term (Table 8-6). No significant difference was found in the decrease in SBS scores between the two groups in the total sample or in the suspended treatment and untreated clients cared for by teams with and without CPs (p>0.05). There was no significant difference in improvement of average GAF scores between baseline and 6 months follow-up between the two groups in the total sample or each of the subgroups (Table 8-1, 8-2, 8-3, 8-4, 8-5).

Table 8-1. Change of social functioning of all clients (n=292)

| | GAF | | | | | |
| | Baseline | | 6 months | | Δ (6 months - baseline) | |
	Mean	SD	Mean	SD	Mean	SD
Clients cared by teams with CPs	41.2	13.9	46.4	16.8	5.2	11.7
	n=100, t=-4.45, df=99, p<.01					
Clients cared by teams without CPs	38.5	13.8	43.3	16.1	4.8	12.9
	n=173, t=-4.96, df=172, p<.01					
					t=-0.22, p=0.83	
					Cohen's d = -0.27	

GAF, the Global Assessment of Functioning
SD, Standard deviation; df, degrees of freedom
Paired t-test was conducted to test significant change of GAF/SBS scores.
Two sample t-test was conducted to test significant difference of Δ (6 months - baseline) between teams with and without CPs.
Significant at *p<.05, **p<.01

Table 8-2. Change of problematic behaviour of all clients (n=292)

| | SBS | | | | | |
| | Baseline | | 6 months | | Δ (6 months - baseline) | |
	Mean	SD	Mean	SD	Mean	SD
Clients cared by teams with CPs	25.9	12.0	22.2	12.8	-3.7	9.5
	n=95, t=.78, df=98, p<.01					
Clients cared by teams without CPs	22.1	11.3	19.4	12.5	-2.7	9.1
	n=169, t=3.84, df=168, p<.01					
					t= 0.84, p=0.40	
					Cohen's d =0.11	

SBS, the Social Behavior Schedule

SD, Standard deviation; df, degrees of freedom

Paired t-test was conducted to test significant change of GAF/SBS scores.

Two sample t-test was conducted to test significant difference of Δ (6 months - baseline) between teams with and without CPs.

Significant at *p<.05, **p<.01

Table 8-3. Change of social functioning of suspended treatment/untreated clients (n=233)

| | GAF | | | | | |
| | Baseline | | 6 months | | Δ (6 months - baseline) | |
	Mean	SD	Mean	SD	Mean	SD
Clients cared by teams with CPs	40.8	14.2	45.5	16.8	4.6	11.3
	n=91, t=-3.93, df=90, p<.01**					
Clients cared by teams without CPs	37.0	13.2	42.0	15.4	5.0	13.0
	n=128, t=-4.31, df=127, p<.01**					
					t=0.18, p=0.86;	
					Cohen's d =-0.25	

GAF, the Global Assessment of Functioning

SD, Standard deviation; df, degrees of freedom

Paired t-test was conducted to test significant change of GAF/SBS scores.

Two sample t-test was conducted to test significant difference of Δ (6 months - baseline) between teams with and without CPs.

Significant at *p<.05, **p<.01

Table 8-4. Change of problematic behaviour of suspended treatment/untreated clients (n=233)

| | SBS | | | | | |
| | Baseline | | 6 months | | Δ (6 months - baseline) | |
	Mean	SD	Mean	SD	Mean	SD
Clients cared by teams with CPs	25.6	12.2	22.5	13.0	-3.2	9.7
	n=87, t=3.03, df=86, p<.01**					
Clients cared by teams without CPs	23.6	10.9	20.5	12.4	-3.0	9.5
	n=122, t=3.54, df=121, p<.01**					
					t=0.09, p=0.93	
					Cohen's d =0.13	

SBS, the Social Behavior Schedule

SD, Standard deviation; df, degrees of freedom

Paired t-test was conducted to test significant change of GAF/SBS scores.

Two sample t-test was conducted to test significant difference of Δ (6 months - baseline) between teams with and without CPs.

Significant at *p<.05, **p<.01

Table 8-5. Change of social functioning of long-stay/repeated clients (n=59)

| | GAF | | | | | |
| | Baseline | | 6 months | | Δ (6 months - baseline) | |
	Mean	SD	Mean	SD	Mean	SD
Clients cared by teams with CPs	44.7	9.8	55.3	15.4	10.7	14.6
	n=9, t=-2.19, df=8, p=.06					
Clients cared by teams without CPs	42.6	14.7	47.2	17.6	4.6	12.5
	n=45, t=-2.44, df=44, p=.02*					
					t=-1.30, p=0.20; Cohen's d =-0.47	

GAF, the Global Assessment of Functioning

SD, Standard deviation; df, degrees of freedom

Paired t-test was conducted to test significant change of GAF/SBS scores.

Two sample t-test was conducted to test significant difference of Δ (6 months - baseline) between teams with and without CPs.

Significant at *p<.05, **p<.01

Table 8-6. Change of problematic behaviour of long-stay/repeated clients (n=59)

| | SBS | | | | | |
| | Baseline | | 6 months | | Δ (6 months - baseline) | |
	Mean	SD	Mean	SD	Mean	SD
Clients cared by teams with CPs	29.1	9.1	19.8	10.7	-9.4	3.5
	n=8, t=7.57, df=7, p<.01**					
Clients cared by teams without CPs	18.4	11.5	16.6	12.2	-1.8	8.0
	n=47, t=1.51, df=46, p<.14					
					t=0.63, p=0.01* Cohen's d =1.00	

SBS, the Social Behavior Schedule

SD, Standard deviation; df, degrees of freedom

Paired t-test was conducted to test significant change of GAF/SBS scores.

Two sample t-test was conducted to test significant difference of Δ (6 months - baseline) between teams with and without CPs.

Significant at *p<.05, **p<.01

Association between receiving services provided by a multidisciplinary outreach team with CPs and hospital admission

Average follow-up period of clients was 404.9 days (SD 201.8) and 396.7 days (SD 237.4) for the groups provided the service with and without CPs (n=108 and 184), respectively. A total of 20 (27.0%) and 54 (75.0%) clients were admitted to hospital for teams with and without CPs, respectively, during the follow-up. The survival curves that groups cared for by teams with CPs had a lower rate of hospital admission (Figure 2-1, 2-2, 2-3), and was statistically significant (p=0.04) (Table 9). This pattern was observed only among clients who were in suspended treatment and untreated at baseline (p=0.04), but not among clients who were discharged after long-term admission or repeated admission in the short term at baseline (p=0.95).

Table 9. Log-rank test for clients who were received services from with and without teams with CPs. (n=292)

|	Clients cared by teams with CPs		Clients cared by teams without CPs			
	n	%	n	%	χ2	p
All	20	27.0	54	75.0	4.15	0.04*
Suspended treatment/Untreated (n=233)	17	29.8	40	70.2	4.19	0.04*
Long stay/Repeated (n=59)	3	17.6	14	82.4	0.00	0.95

Significant at *p<.05, **p<.01
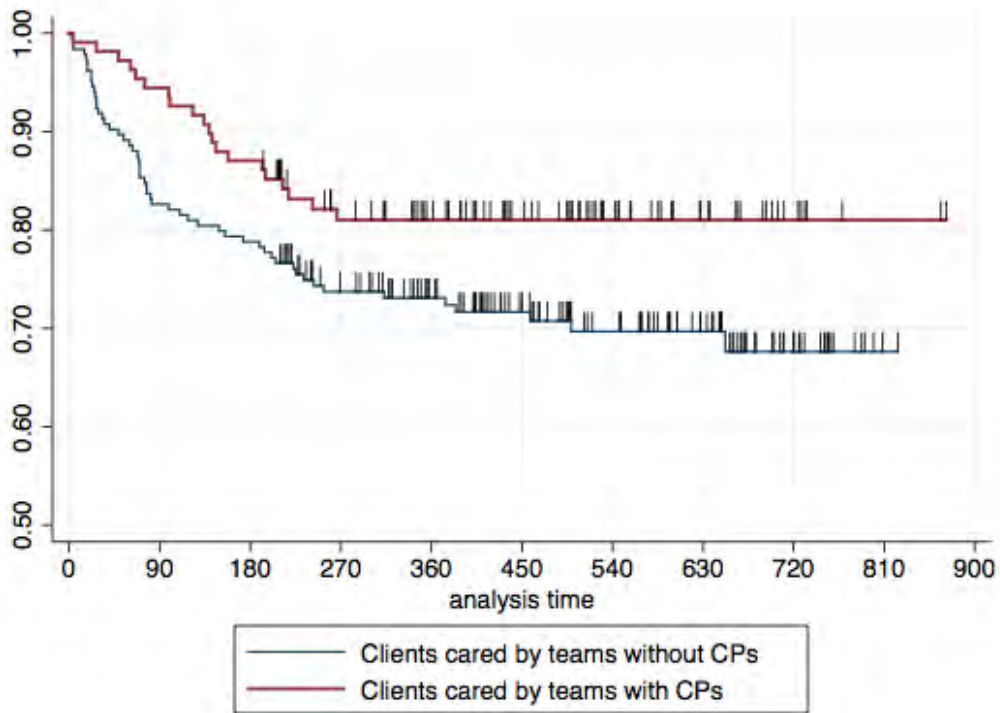
Figure 2-1. Kaplan-Meier survival curves of all clients cared by teams with and without teams with CPs (n=292)
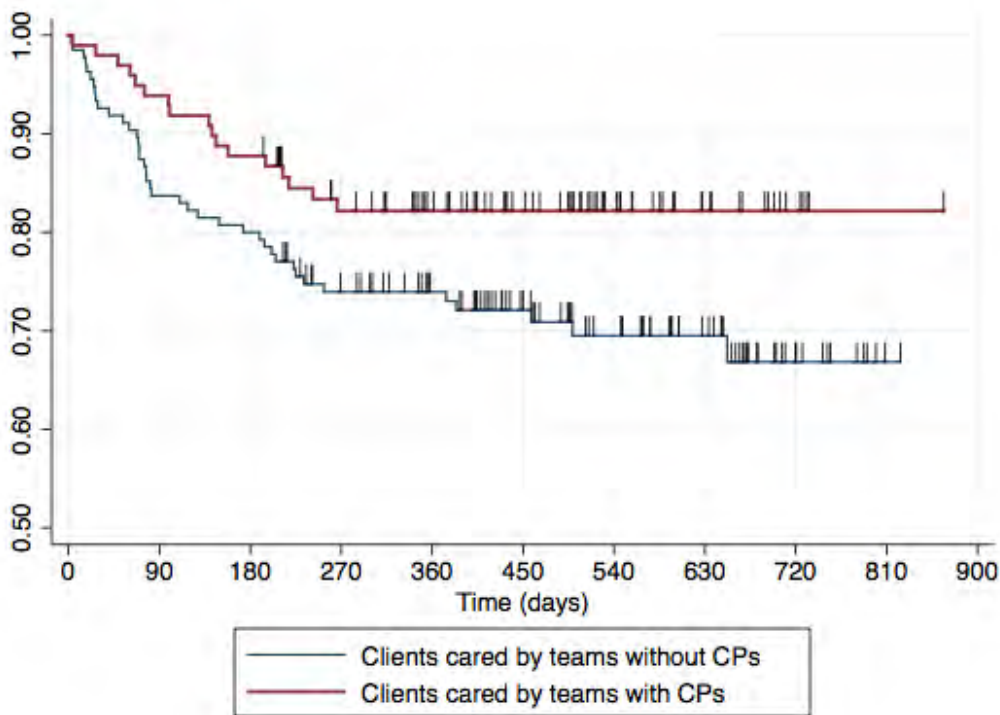
Figure 2-2. Kaplan-Meier survival curves of suspended treatment/untreated clients cared by teams with and without teams with CPs (n=233)
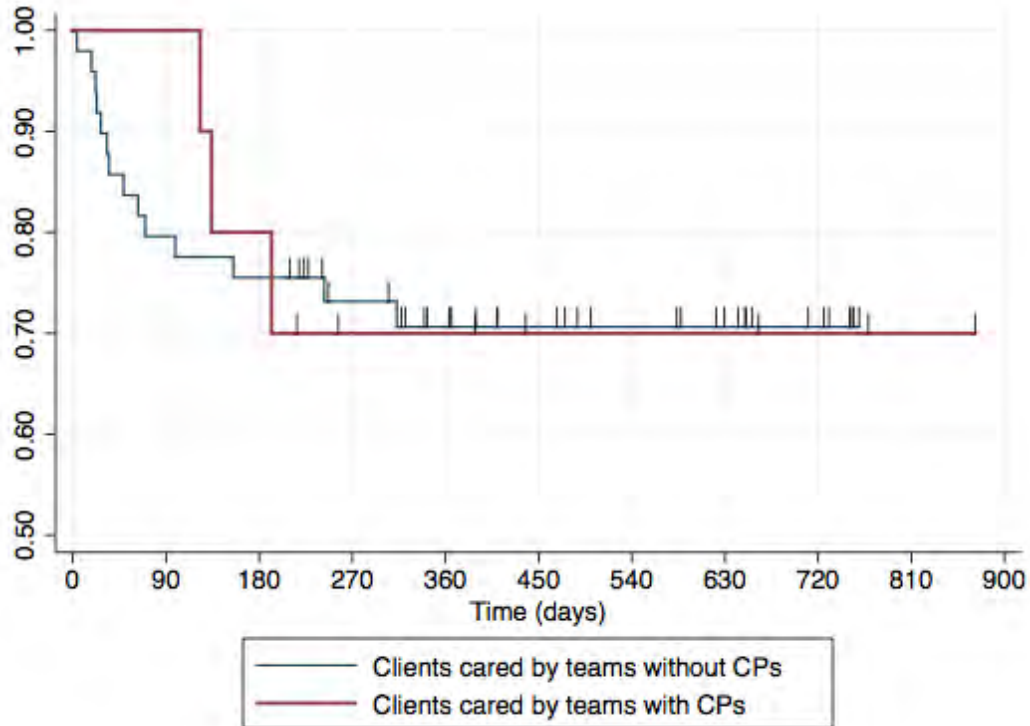
Figure 2-3. Kaplan-Meier survival curves of long-stay/repeated clients cared by teams with and without teams with CPs (n=59)

Cox proportional hazards regression with crude analysis (Model 1) indicated that the group cared for by teams with CPs had a decreased risk of hospital admission in the total sample (HR=0.59; 95%CI, 0.35 to 0.99) and among clients who were in suspended treatment or untreated at baseline (HR=0.56; 95%CI, 0.32 to 0.98). In multivariable analyses adjusted by age, sex, diagnosis, marital status, living status, problem behavior, and social functioning (Model 2), the groups cared for by teams with CPs had a decreased risk of hospital admission in the total sample (HR=0.53; 95% CI, 0.31 to 0.89) and among clients who were suspended treatment or untreated at baseline (HR=0.48; 95% CI, 0.27 to 0.86) (Table 10-1, 10-2, 10-3).

Table 10-1. Association between receiving services provided by CPs joining multidisciplinary outreach team and risk of hospital admission in all clients by using univariable and multivariable cox regression (n=292)

	Model 1					Model 2				
	HR	p	\multicolumn{3}{c}{95% CI}	HR	p	\multicolumn{3}{c}{95% CI}
Teams with CPs	0.59	0.04*	0.35	-	0.99	0.53	0.02*	0.31	-	0.89
Sex						1.46	0.13	0.90	-	2.38
Age category (10 year interval)						1.06	0.47	0.90	-	1.26
Marital status (married or not)						0.81	0.66	0.31	-	2.10
Living status (living alone or not)						0.66	0.12	0.40	-	1.11
Diagnosis (F0 to F9, F99)						0.76	0.02	0.61	-	0.96
Social functionings (GAF score)						0.99	0.25	0.96	-	1.01
Problematic behaviour (SBS score)						1.02	0.09	1.00	-	1.05

HR: Hazard Ratio, CI: Confidential Interval.

Significant at *p<.05, **p<.01

Table 10-2. Association between receiving services provided by CPs joining multidisciplinary outreach team and risk of hospital admission in suspended treatment/untreated clients by using univariable and multivariable cox regression (n=233)

	Model 1					Model 2				
	HR	p	\multicolumn{3}{c}{95% CI}	HR	p	\multicolumn{3}{c}{95% CI}
Teams with CPs	0.56	0.04*	0.32	-	0.98	0.48	0.02*	0.27	-	0.86
Sex						1.56	0.13	0.88	-	2.77
Age category (10 year interval)						1.13	0.23	0.93	-	1.38
Marital status (married or not)						0.78	0.61	0.29	-	2.06
Living status (living alone or not)						0.87	0.64	0.47	-	1.58
Diagnosis (F0 to F9, F99)						0.75	0.02	0.58	-	0.96
Social functionings (GAF score)						0.98	0.12	0.95	-	1.01
Problematic behaviour (SBS score)						1.02	0.13	0.99	-	1.05

HR: Hazard Ratio, CI: Confidential Interval.

Significant at *p<.05, **p<.01

Table 10-3. Association between receiving services provided by CPs joining multidisciplinary outreach team and risk of hospital admission in long-stay/repeated clients by using univariable and multivariable cox regression (n=59)

	Model 1					Model 2				
	HR	p	\multicolumn{3}{c}{95% CI}	HR	p	\multicolumn{3}{c}{95% CI}
Teams with CPs	0.96	0.95	0.28	-	3.35	0.64	0.56	0.14	-	2.87
Sex						0.98	0.96	0.35	-	2.75
Age category (10 year interval)						0.92	0.61	0.68	-	1.26
Marital status (married or not)						0.00	1.00	0.00	-	.
Living status (living alone or not)						0.19	0.05	0.04	-	0.97
Diagnosis (F0 to F9, F99)						1.16	0.56	0.71	-	1.89
Social functionings (GAF score)						1.00	0.88	0.94	-	1.05
Problematic behaviour (SBS score)						1.02	0.56	0.96	-	1.09

HR: Hazard Ratio, CI: Confidential Interval.

Significant at *p<.05, **p<.01

In multilevel Cox regression models, there was no significant association between receiving service provided by teams with CPs and the risk of hospital admission, either crude (Model 1), adjusted for the level 1 variables (Model 2), or additionally adjusted for level 2 variables (Model 3) (all p >0.05) in the total sample, while the estimated HRs (0.57-0.75) were slightly lower than 1 (Table 11-1). Similar findings were observed among clients who were in suspended treatment or untreated (Table 11-2). Among clients who were discharged after long-term admission or repeated admission in the short term at baseline, a HR slightly greater than 1 (1.50) was observed, but was not significant (Table 11-3).

Table 11-1. Association between receiving services provided by CPs joining multidisciplinary outreach team and risk of hospital admission in all clients by using multilevel cox regression (n=292)

	Model 1			Model 2			Model 3		
	HR	p	95% CI	HR	p	95% CI	HR	p	95% CI
Level 2 variables									
Teams with CPs	0.64	0.19	0.32 - 1.25	0.57	0.15	0.26 - 1.23	0.75	0.47	0.35 - 1.63
Variation of staff occupation							0.76	0.04*	0.58 - 0.99
Number of clients							0.99	0.72	0.96 - 1.03
Level 1 variables									
Sex				1.48	0.13	0.89 - 2.47	1.54	0.10	0.92 - 2.56
Age category (10 year interval)				1.03	0.77	0.86 - 1.22	0.99	0.90	0.83 - 1.18
Marital status (married or not)				0.82	0.70	0.31 - 2.22	0.81	0.67	0.30 - 2.15
Living status (living alone or not)				0.56	0.04*	0.33 - 0.97	0.55	0.03*	0.32 - 0.95
Diagnosis (F0 to F9, F99)				0.73	0.01*	0.58 - 0.93	0.73	0.01*	0.58 - 0.92
Social functionings (GAF score)				0.98	0.16	0.96 - 1.01	0.98	0.19	0.96 - 1.01
Problematic behaviour (SBS score)				1.03	0.07	1.00 - 1.06	1.02	0.11	0.99 - 1.05

HR: Hazard Ratio, CI: Confidential Interval.

Significant at *p<.05, **p<.01

Table 11-2. Association between receiving services provided by CPs joining multidisciplinary outreach team and risk of hospital admission in suspended treatment/untreated clients by using multilevel cox regression (n=233)

	Model 1			Model 2			Model 3		
	HR	p	95% CI	HR	p	95% CI	HR	p	95% CI
Level 2 variables									
Teams with CPs	0.65	0.24	0.32 - 1.34	0.58	0.19	0.26 - 1.31	0.71	0.41	0.31 - 1.62
Variation of staff occupation							0.80	0.11	0.61 - 1.05
Number of clients							0.99	0.74	0.95 - 1.04
Level 1 variables									
Sex				1.55	0.15	0.85 - 2.84	1.60	0.13	0.88 - 2.92
Age category (10 year interval)				1.10	0.36	0.89 - 1.36	1.06	0.59	0.85 - 1.32
Marital status (married or not)				0.78	0.63	0.28 - 2.14	0.77	0.61	0.29 - 2.09
Living status (living alone or not)				0.76	0.40	0.40 - 1.44	0.74	0.36	0.39 - 1.40
Diagnosis (F0 to F9, F99)				0.72	0.02*	0.55 - 0.94	0.72	0.01	0.55 - 0.93
Social functionings (GAF score)				0.98	0.13	0.95 - 1.01	0.98	0.15	0.95 - 1.01
Problematic behaviour (SBS score)				1.03	0.09	1.00 - 1.06	1.02	0.15	0.99 - 1.06

HR: Hazard Ratio, CI: Confidential Interval.

Significant at *$p<.05$, **$p<.01$

Table 11-3. Association between receiving services provided by CPs joining multidisciplinary outreach team and risk of hospital admission in long-stay/repeated clients by using multilevel cox regression (n=59)

	Model 1			Model 2			Model 3		
	HR	p	95% CI	HR	p	95% CI	HR	p	95% CI
Level 2 variables									
Teams with CPs	0.98	0.97	0.28 - 3.39	0.55	0.45	0.12 - 2.59	1.50	0.71	0.18 - 12.47
Variation of staff occupation							0.55	0.09	0.28 - 1.09
Number of clients							1.01	0.81	0.95 - 1.06
Level 1 variables									
Sex				0.96	0.94	0.34 - 2.72	1.14	0.81	0.39 - 3.39
Age category (10 year interval)				0.89	0.48	0.65 - 1.22	0.84	0.27	0.61 - 1.15
Marital status (married or not)				0.00	1.00	0.00 - .	0.00	1.00	0.00 - .
Living status (living alone or not)				0.17	0.04	0.03 - 0.90	0.17	0.04	0.03 - 0.95
Diagnosis (F0 to F9, F99)				1.22	0.42	0.75 - 1.98	1.26	0.36	0.77 - 2.07
Social functionings (GAF score)				1.00	0.99	0.95 - 1.06	0.98	0.62	0.92 - 1.05
Problematic behaviour (SBS score)				1.03	0.41	0.96 - 1.10	1.02	0.66	0.94 - 1.10

HR: Hazard Ratio, CI: Confidential Interval.

Significant at *$p<.05$, **$p<.01$

Comparison of process of services content and amount to clients

Table 12 shows total time (minutes) of services provided in each month from the service-start to the 6-month follow-up. Categories that were statistically significantly greater for the group cared for by teams with CPs were: "Case management without clients" and "Conference" for the entire period; "Case management with clients" and "Develop and maintain personal relationships" over the applied 5 months; and "Family support" over 4 months. In contrast, time spent for "Support for physical health" was significantly shorter in the group cared for by teams with CPs in the 1st and at 6 months.

Table 12. Service contents and amount (minutes) provided to clients by multidisciplinary outreach teams (n=292)

Service content	1m with CPs (n=108) Mean	SD	1m without CPs (n=182) Mean	SD	1m F	2m with CPs (n=103) Mean	SD	2m without CPs (n=163) Mean	SD	2m F	3m with CPs (n=101) Mean	SD	3m without CPs (n=159) Mean	SD	3m F	4m with CPs (n=98) Mean	SD	4m without CPs (n=153) Mean	SD	4m F	5m with CPs (n=97) Mean	SD	5m without CPs (n=144) Mean	SD	5m F	6m with CPs (n=96) Mean	SD	6m without CPs (n=145) Mean	SD	6m F
Case Management with clients	211.9	226.0	133.5	171.8	$F=11.11, p<.01$**	124.4	170.6	75.4	95.3	$F=9.03, p<.01$**	99.6	126.3	71.8	117.8	$F=3.25, p=.07$	107.3	125.4	59.9	95.5	$F=11.46, p<.01$**	112.8	135.1	50.8	99.0	$F=7.92, p<.01$**	135.1	46.9	46.9	95.0	$F=5.52, p=.02$*
Case Management without clients	234.9	351.5	92.3	157.9	$F=22.37, p<.01$**	186.6	277.3	62.5	123.0	$F=24.91, p<.01$**	182.4	288.0	76.6	137.7	$F=15.8, p<.01$**	258.1	396.3	68.4	141.7	$F=29.28, p<.01$**	187.8	296.3	70.5	141.5	$F=16.87, p<.01$**	186.9	260.6	62.8	138.6	$F=23.1, p<.01$**
Assistance with daily living task	85.3	318.9	68.0	226.1	$F=0.29, p=.59$	111.0	386.1	60.5	200.5	$F=1.96, p=.16$	95.1	322.8	54.1	158.3	$F=1.87, p=.17$	103.1	319.6	55.5	146.5	$F=2.56, p=.11$	88.3	238.5	64.3	169.7	$F=0.83, p=.36$	63.5	172.3	46.3	124.8	$F=0.81, p=.37$
Develop and maintain personal relationships	77.4	159.6	38.1	89.7	$F=7.23, p<.01$**	64.2	130.0	24.5	47.9	$F=12.57, p<.01$**	58.2	133.4	27.7	56.0	$F=6.52, p<.01$*	63.8	128.8	31.0	71.5	$F=6.73, p<.01$*	52.1	108.5	30.4	55.5	$F=4.12, p=.04$*	40.9	86.6	27.9	52.2	$F=2.12, p=.15$
Family support	59.6	101.4	39.7	69.0	$F=3.91, p=.05$*	70.0	134.8	32.4	63.8	$F=9.34, p<.01$**	71.5	164.3	35.4	70.4	$F=5.96, p=.02$*	76.4	181.2	39.1	81.5	$F=4.94, p=.03$*	43.1	105.7	41.3	78.8	$F=0.02, p=.88$	45.9	114.0	28.4	57.9	$F=2.47, p=.12$
Support for psychiatric symptoms	47.7	103.4	67.1	139.1	$F=1.59, p=.21$	66.9	130.1	54.3	106.7	$F=0.74, p=.39$	63.2	148.3	59.9	116.0	$F=0.04, p=.84$	76.6	164.0	68.1	145.5	$F=0.18, p=.67$	80.9	210.3	70.0	165.9	$F=0.20, p=.66$	51.4	139.1	77.6	222.5	$F=1.05, p=.31$
Support for physical health	4.8	15.2	17.0	60.4	$F=4.19, p=.04$*	5.7	18.3	13.8	52.8	$F=2.29, p=.13$	9.3	35.4	10.9	43.2	$F=0.10, p=.75$	10.3	30.5	9.1	22.1	$F=0.12, p=.73$	9.0	26.1	6.0	17.9	$F=0.98, p=.32$	3.6	12.5	9.8	28.1	$F=4.02, p=.05$*
Social life and financial support	14.5	62.0	13.2	71.9	$F=0.03, p=.87$	14.2	57.0	7.7	35.4	$F=1.34, p=.25$	11.9	53.9	3.1	20.8	$F=3.39, p=.07$	23.7	123.2	7.0	36.3	$F=2.47, p=.12$	10.7	52.2	13.5	67.0	$F=0.12, p=.73$	9.0	41.8	6.2	26.8	$F=0.41, p=.52$
Housing services	1.3	8.2	7.1	49.7	$F=1.43, p=.23$	2.9	14.2	14.1	136.8	$F=0.69, p=.41$	3.6	18.6	13.4	102.4	$F=0.91, p=.34$	3.4	15.9	11.9	59.7	$F=1.89, p=.17$	5.0	21.4	4.2	27.2	$F=0.06, p=.81$	1.0	6.7	11.6	64.6	$F=2.52, p=.11$
Vocational and educational support	2.6	13.4	1.3	15.9	$F=0.53, p=.47$	2.1	14.8	2.5	13.3	$F=0.06, p=.80$	2.9	16.2	3.1	22.8	$F=0.91, p=.34$	1.5	10.7	3.2	19.3	$F=0.57, p=.45$	1.1	7.5	3.3	18.7	$F=1.19, p=.28$	1.9	8.9	4.0	21.7	$F=0.78, p=.38$
Empowerment	49.2	138.5	44.5	157.7	$F=0.06, p=.80$	56.4	156.4	43.8	157.5	$F=0.06, p=.52$	56.4	113.9	46.0	169.3	$F=0.01, p=.93$	43.0	77.0	50.9	166.1	$F=0.19, p=.66$	46.2	105.2	48.9	145.7	$F=0.02, p=.88$	35.2	82.0	40.0	152.9	$F=0.08, p=.78$
Conference	86.4	80.1	31.9	50.4	$F=46.95, p<.01$**	67.7	61.7	28.0	37.5	$F=39.72, p<.01$**	70.7	61.4	33.5	49.5	$F=27.31, p<.01$**	70.9	67.2	27.3	39.9	$F=38.69, p<.01$**	56.1	52.9	23.3	23.3	$F=34.85, p<.01$**	55.7	61.8	24.6	31.9	$F=24.33, p<.01$**

SD: Standard deviation

Significant at *$p<.05$, **$p<.01$

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Table 13 shows service content and average amount (minutes) of services when a

consumer provider visited a client from the start of a service to the end. Consumer providers

provided "Family support", "Social life and financial support", and "Empowerment" to

clients and their families.

Table 13. Service contents and average amount (minutes) of services when consumer provider visited a client (n=89)

	Mean	SD
Assistance with daily living task	0.0	0.0
Develop and maintain personal relationships	0.0	0.0
Family support	83.6	415.7
Support for psychiatric symptoms	0.0	0.0
Support for physical health	0.0	0.0
Social life and financial support	3.6	21.1
Housing services	0.0	0.0
Vocational and educational support	0.0	0.0
Empowerment	144.6	714.8

This table includes only visiting services.

SD: Standard deviation

Discussion

In the Japanese Outreach Model Project, the group cared for by teams with CPs had a statistically significantly decreased probability of hospitalization compared to the group cared for by teams without CPs in the Kaplan-Meier analysis. Cox proportional hazards models showed a similar pattern even after adjusting for client characteristics, with a 50% reduction in the risk of hospitalization. This pattern was similar among clients who were in suspended treatment or untreated at baseline, while it was not among clients with long stay/repeated status at baseline. Multilevel Cox proportional-hazards models failed to show a statistically significant reduction in hospitalization in the group cared for by teams with CPs, which may be due to a small number of clients in a team and thus a smaller statistical power.

A decrease in average SBS scores between baseline and 6-month follow-up was significantly greater for the group cared for by teams with CPs than the groups cared for by teams without CPs in clients who were discharged after long-term admission or repeated admission in the short term at baseline.

The teams with CPs were found to spend a greater time for services such as "Case management with/without clients" and "Conference", "Develop and maintain personal relationships", and "Family support", while the teams spent less time for "Support for physical health".

An interpretation of results from "Teams with CPs" and comparison with previous studies

One should be careful in interpreting the better outcome in hospitalization among outreach teams with CPs in this study. In particular, in the multilevel Cox proportional-hazards model on the effects of team characteristics, groups cared for by teams with CPs did not show a statistically significant reduced risk of hospital admission. Team characteristics other than CPs participation may have decreased risk of hospital admission/readmission. There are four possible reasons that should be discussed related to the observation.

Firstly, the variation in occupations in a team might affect the results. Previous studies indicated multi-professional teams like ACT and AO decrease hospital admission and improve other outcomes [50], and there were more variation in occupations in teams with CPs than teams without CPs in this study (Table 1). Teams with rich variation in occupation might provide more versatile interventions from multilateral perspectives as the situation demands.

Secondly, the total number of clients per team might affect the results. In this study, there were more clients cared by teams with CPs than teams with CPs on average (Table 7). The more opportunities for team members to provide services to clients and thus increased service experiences, the more their services would improve and advance, which might have resulted in the positive results.

Thirdly, pre-existing attitudes and atmosphere of team leaders and team members might affect the results. In this model project, each team leader was able to determine team size, the number of team members, and variation in occupation within the team, including CP participation. At that time in Japan, visiting clients with CPs and other professional were not common with the exception of some ACT teams. The existence of motivation where a team wanted to hire CPs and work with them might reflect team members' understanding of and respect for unique CP advantages and skills. Thus having a shared sense about these concepts and skills like CPs within a team, not CPs participation itself, may have lead to the positive results.

Another possible reason is that although the 31 teams analyzed had an average of 9.4 nested members, the smallest team size was 1. This made applicable clients for analysis very small and it might be impossible to generate accurate statistical estimates. In order to confirm the effects of CP participation in multidisciplinary teams when considering level of team characteristics, future research should be designed in a way that nested clients are arranged in fixed numbers.

For the reasons stated above, the study has many limitations including methodological problems. However the present study still found an association between teams with CPs and a decreased risk of hospital admission during follow-up in single-level analyses. This pattern was particularly observed for clients who were in suspended treatment or untreated that were

in critical condition. It is still possible that including CPs in an outreach team may be effective in reducing hospital admission. A number of previous studies on the effect of participation by CPs in outreach programs failed to indicate a significant effect [35,41,60,65-67]. This might be because the main target clients/patients are different between ACT, AO, and JOMP. Previous studies were conducted within ACT or AO programs, which targeted clients with a severe illness with difficulties maintaining contact with services [59]. In fact, the present study did not indicate a significant effect on preventing hospital admission in clients who were discharged after a long-term admission or repeated admission in the short term, which resembled target characteristics of ACT and AO.

Possible reasons that CPs affect clients, members of multidisciplinary team and community

According to the above discussion, there were several possible reasons why clients cared for by teams with CPs had a decreased risk of hospital admission.

CPs provided a large amount of "Family support" category services (Table 13). This category includes "Family support about the instruction with a client" and "Empowerment to family" [88, 89]. Previous studies indicated that high negative expressed emotion affects the relapse rate in schizophrenia in client families [92]. CPs might reduce the risk of relapse by demonstrating appreciation to families about the hardships they have endured and by

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conveying effective tips regarding instruction with a client. Also, CPs in this study provided a large amount of "Empowerment" category services (Table 13). This category includes "enhancement of self efficacy and control" and "positive feedback" [88, 89]. These services are similar to emotional support based on shared experiences [68 or 91]. CPs might build a relationship of trust with clients to use these techniques.

Additionally, having CPs participate in team conferences might have a spill over effect on team members and other attendants. A previous study indicating that peer support activities improve the quality of services [46], and CP experiences and perspectives might promote staff understanding toward clients and develop more effective care procedures. The promotion of quality of service with respect for client experiences might earn client trust and decrease the risk of hospital admission.

This study, however, failed to find an effect for receiving service from teams with CPs on hospital admission in clients discharged after long-term admission or repeated admission in the short term. This result is consistent with previous studies conducted in ACT programs [60,67]. It is likely that such clients retain a certain set of symptoms and/or lifestyle impediments even when given focused treatment while hospitalized. Their responses to any further medication will be weak, but because they have already received treatment during hospitalization, they are less opposed than clients who have suspended treatment or are untreated towards visiting treatment and continued treatment. Clients who were discharged

after long-term admission might need support for continuous provision of medication, medical complications, nutrition, sleep, and other daily issues rather than the CPs' specialty of creating treatment relationship and offering emotional support. However, previous studies have reported effects on recovery among clients in an ACT program [67]. Clients might have also experienced other effects that were not examined in this study. There is a need to add such considerations to future studies.

Change in social functioning and problematic behavior

There was significantly more improvement in problem behavior at 6-month follow-ups among clients cared for by teams with CPs than those without CPs only in clients who were discharged after long-term admission or repeated admission in the short term at baseline. This result is not consistent with any other previous study [35,37,41,65]. The average SBS score at baseline in the group cared for by teams with CPs was statistically higher than that in the group without CPs, especially among clients who were discharged after long-term admission or repeated admission in the short term. The hospital long-stay clients who had chronic psychiatric symptoms and lack of daily living skills might have experienced a greater difficulty due to an environment change after the discharge from a hospital. Teams with CPs provided services related to communication and coordination, case management and conference more than teams without CPs (Table 6), thus the service provided by the former

teams may have filled the gaps in life between hospital and community, which may in turn have resulted in a reduction of problem behavior.

While the difference between the groups cared by teams with and without CPs was not statistically significant, the group cared for by teams with CPs showed slightly better improvement in social functioning (GAF) and problem behavior (SBS) at 6-month follow-up in the total sample. However, the group difference was small. The present study may have not enough power to detect the effect of teams with CPs on these outcomes. The effect should be investigated in a future larger-scale study.

Change in service content and amount (minutes) of care provided to clients

All CPs in this study participated in team conferences and the Management Committees (regional comprehensive conferences) held by administrative and related entities. When CPs participated in conferences, they had many chances to state their views based on personal experience regarding specific service policies and procedures for clients. The increased debate about the participants was a likely cause for longer conference times of groups cared for by teams with CPs. Additionally, there was a large number of clients with higher problematic behavior in groups cared for by teams with CPs (see Table 6-2), and it was likely that many clients were in critical condition with worsening relationships with their families and the regional community. In order to effectively support such clients who had suspended

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treatment or were untreated, staff needed to facilitate adjustment and connection not only from related administration and connected entities, but also with nearby citizens and other regional community members [93]. Efforts here likely led to longer times spent on case management.

A possible reason time why "Develop and maintain personal relationships" was high comes about due to the special characteristic of emotional support through shared experience with CPs [91]. They create shared perspectives, teams that support clients, the clients themselves, other supporters, etc., to realize positive client-staff relationships. This process required a considerable amount of time. For individuals with mental illness, the development of personal relationships is often difficult [94,95]. Additionally, untreated clients feel insecure about treatment and experience stigma from those around them [10,16,96]. Thus, it is important to support the building of a positive relationship with a team and other supporters because it influences the chance of treatment implementation and maintenance.

The reason "Family support" was longer differs with the untreated and suspended treatment. CPs, in both cases, explained to families about the client's condition and asks them how the client should be treated. It is likely that families overlap the CPs with their model of the client post-treatment and become positive about implementing treatment and their relationships towards the patients themselves. As for the untreated, the clients are often poor at recognizing their own sickness, and are hence negative towards treatment [12,14]. In such

a situation, families, despite feeling something is unusual about the client's condition, might refrain from psychiatric treatment due to a lack of knowledge, stigma or other reasons. For such families, the condition and symptoms should be explained and CPs work together with their team so that correct response methods are taken for interventions, leading to relatively longer service times. Additionally, for clients who had suspended treatment or were untreated, poor family relationships are an evident cause for resurfacing conditions [97-100]. To address such relationships, CPs intervened with their teams based on the individualized experiences of the persons concerned, likely resulting in longer service provision times.

Time spent on "Support for physical health" was statistically larger for the 1st and at 6th months in groups cared for by teams without CPs. It was pointed out earlier that clients receiving service from groups cared for by teams without CPs had a higher number of clients discharged after long-term admission or repeated admission in the short term (Table 6-1). A large proportion of these patients with long treatment times also have physical complications such as diabetes and hyperlipidemia because of side effects from long-term use of some antipsychotic drugs, poor dietary habit and fitness habit [74]. Supporting clients in adapting to a recuperative lifestyle in a new environment during the 1st month after discharge might require an inordinately large amount of time. From the 2nd month onward, groups cared for by teams without CPs always needed a certain amount of time spent towards physical maintenance while groups cared for by teams with CPs had care time reduced. This

difference may have emerged over the 6 months, eventually registering as a statistically significant difference. Clients cared by teams with CPs had a higher number of suspended treatment/untreated clients (Table 6-1). Once outreach teams successfully introduce treatment to clients, their psychiatric symptoms are likely to improve smoothly and the need for physical health support might decrease.

Limitations

The present study has several limitations. First, there is a possibility of existing unmeasured confounding variables. In order to generalize these findings, it is necessary to conduct a randomized control trial. Second, CPs working with outreach teams in this study may have had a diverse level of knowledge and skills, which may have resulted in an underestimation of the true association and also could lead to difficulty in generalization of the findings. This was done partly because certification and training regulations for CPs did not exist in Japan when this research began. In order to more accurately test the effects of adding CPs, CPs in the future should be recruited based on a certification examination or some other clear standard. Third, the inclusion criteria may have not been applied systematically to all sites. Clients in this study became eligible after consideration by investigative committees, but the selection criterion for the Management Committee did not exist uniformly across all prefectures. This also limits generalization of the study findings.

Moreover, individual team specialists were chosen at the discretion of a team leader. Team differences in occupational structure and number of staff members may have been a confounding bias. A multivariate analysis was able to adjust for some of these factors, but there were many potential unexamined related factors, especially for team structure. Fourth, as the number of clients was very small for some of the teams, a multilevel analysis was not able to produce accurate results. Fifth, GAF and SBS evaluators varied by occupation in some teams. Variations of team evaluation may also lead to an underestimation of the findings because of possibly decreased inter-rater reliability of the measures. Additionally, there is a possibility of information bias if evaluators recognized the hypothesis of the study when they examined clients. These factors need to be considered in future research, and future research needs to maintain team sizes that can hold up to statistical analysis.

Conclusion

This study came to a limited conclusion that by receiving service from multidisciplinary outreach teams that included CPs, the risk of hospitalization for clients who suspended treatment or had untreated decreased by approximately half when compared to teams without CPs. This study contributed to international accumulation of evidence about CPs and multidisciplinary outreach programs. This was the first study of this type in Asia, including Japan.

However, the chance that other team characteristics such as the experience of non-CP specialists and other staff had an effect on hospitalization risk cannot be denied. In order to achieve a more generalized conclusion about hospitalization-preventing effects when CPs join multidisciplinary outreach teams, it is necessary to pursue further research in a stricter and more controlled environment.

For the future, in order to increase quality of service and improve service outcomes, all multidisciplinary outreach team should understand CPs and incorporate their unique skills in collaborating with them.

Acknowledgements

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