## Online appendix: Detailed description of study methods and results

Detailed information on psychiatric day care and visiting nurse services in Japan

Psychiatric day care is one of the services commonly used by people with mental illness in Japan; it generally provides social skills, recreation and a daytime place to stay, but does not focus on employment services, acute care to prevent hospitalization, or specific care for people with severe mental illness. A doctor assesses the condition of the service user, but does not need to be present in the room where services are provided.

Visiting nurse services are also common in Japanese psychiatric care. Nurses and occupational therapists visit the homes of people with mental illness. They provide medical services and daily life support, but cannot prescribe medications to patients. In addition, patients using visiting nurse services also usually make regular visits to their outpatient service provider. Although a doctor determines when a patient needs a visiting nurse, the doctor does not usually visit the patient's home as a part of the service.

Appendix figure.1 CONSORT flow diagram
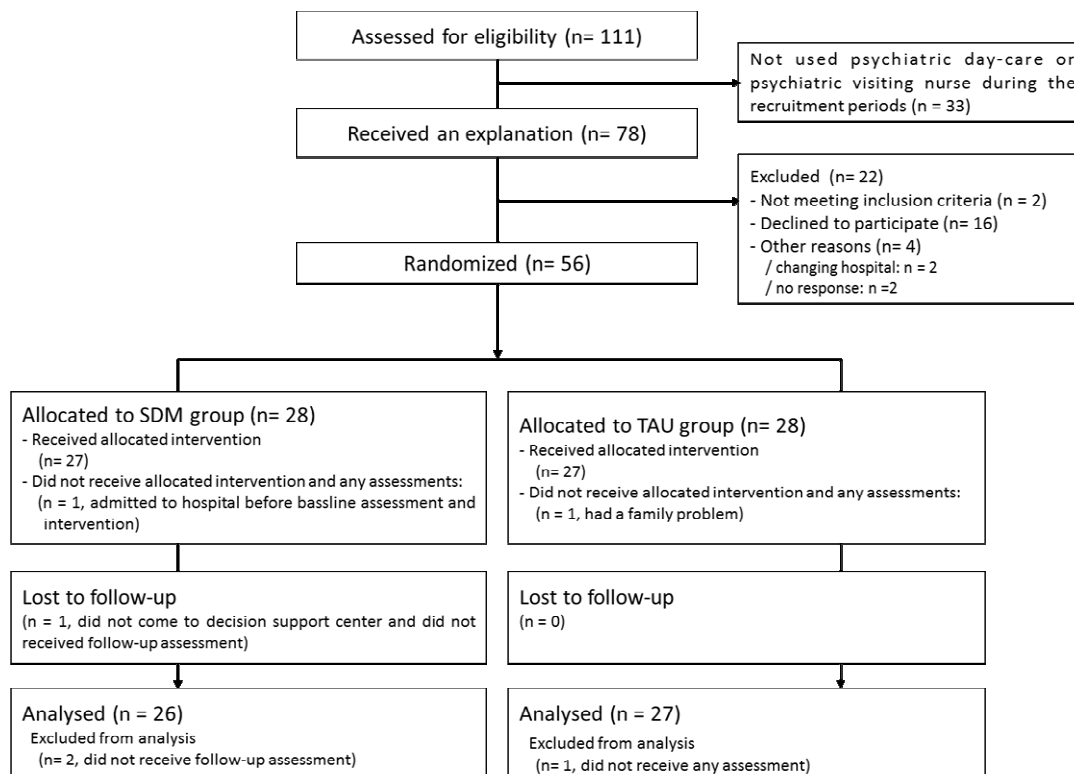
Recruitment and randomization process

Research team members explained the study to eligible patients during the recruitment period. A researcher not involved in the interventions, assessments, or data analysis generated random permuted blocks with a block size of four and stratified by site using Stata version 12. This researcher created the allocation sequence and prepared all the envelopes with allocation results for the participants. She then gave the envelopes to case managers at each site who knew the study identification number (ID) and names of participants. Case managers informed each participant of the allocation results (shared decision making group [intervention group] or treatment as usual group [control group]). Blinding service providers and participants to the group allocation was not possible based on the nature of the study.

Online appendix figure 1 describes the process and numbers of enrollment and follow-up. A total of 111 patients met inclusion criteria at the two sites. Seventy-eight patients used either psychiatric day care or visiting nurse services during the recruitment period. A total of 56 patients participated into the study (34 in the psychiatric hospital and 22 in the psychiatric clinic). They were randomly allocated into either the shared decision making (intervention) group or the treatment as usual (control) group (28 in each arm).

Details of doctors and peer support specialists

The intervention setting, included four participating doctors who a supervisor in a psychiatric day care or visiting nurse program. Three of them worked in the psychiatric hospital. Three doctors were male and one was female. Their mean age was (mean ± SD) 43.75 ± 4.50 years and their mean duration of psychiatric clinical experience was 17.63 ± 6.50 years. There were three peer support specialists in the psychiatric hospital and one in the psychiatric clinic; all participated in this project. Two were female, and mean age was 37.25 ± 5.85 years. Two peer support specialists had a primary diagnosis of schizophrenia, one had depression and one anxiety disorder. Peer supporters began their service when this study launched, and they received at least two training sessions beforehand.

Sample content of training sessions

To implement the CommonGround approach with SHARE, we provided three two-day training sessions to peer support specialists, doctors, and case mangers during the study period. One case manager and two peer support specialists in Kansas who managed the CommonGround approach participated in our training sessions and shared their skills. For example, they demonstrated how to use the shared decision making tool and how to share peer support specialists' experiences with patients. The doctors received training in the use of SHARE. Doctors were also trained how to ask questions to discuss treatment and self-management behaviors with patients, how to determine the treatment based on patients' preference and

discussion, and how to document the content of shared decision making during each medical consultation.

Detailed process of comprehensive shared decision making system

Participants assigned to in the intervention group visited the decision support centers located in one part of the room for the psychiatric day care center at each site. They first met with peer support specialists who helped them use SHARE through sharing their own recovery experiences. Patients entered the following information into SHARE during their first use of the software: visions of the future related to treatment goals that describe desired achievements (similar to personal recovery goals), key personal behaviors to promote their own mental health, a person with whom they regularly discuss their problems, and presence or absence of a crisis plan. Patients entered the following information into SHARE before every medical consultation: mental and physical health conditions, subjective medication side effects, and concerns about medication and daily community life. In the decision support center, peer support specialists helped participants use SHARE by sharing their own illness and recovery experiences, especially during their first time using SHARE. Information in SHARE was kept in both electronic and paper format. Information was shared among patients, their doctor, and their case manager. During the medical consultation, doctors were expected to confirm the patient's personal recovery goals and the number of times the patient performed key behaviors identified in the program. Doctors then proceeded with their medical consultation according to the participant's condition and concerns in SHARE. In addition, as part of shared decision making, they were expected to discuss treatment and/or self-management behaviors based on individual personal recovery goals. At the end of the medical consultation, patient and doctor determined treatment (e.g., medication type and timing/use of medication) and/or self-management behaviors for the next consultation. The doctor confirmed the content of shared decision making with the patient and entered it into SHARE.

Details of fidelity assessment

We rated our shared decision making system based on the CommonGround approach using the decision support center fidelity scale, which has 13 items (1 to 5 Likert scale for each item, score range: 13 to 65). It evaluates the structural components of the decision support center, the process of using a shared decision making tool, peer support, service providers, and supervision. Fidelity research at the two sites was conducted in February 2016. The average fidelity scale score of the two sites was 47.5±.71. (Appendix table 1). The relatively high scores for 'structural components', 'shared decision making tool process', and 'peer support' subscales might indicate that our shared decision making system partly replicated the CommonGround approach. However, our shared decision making system does not appear to follow the CommonGround approach perfectly, based on the low scores for case manager involvement and supervision system. One limitation of the fidelity assessment was that research team

members, rather than an independent assessor who is familiar with CommonGround, performed the ratings using the fidelity measure.

Online appendix table 1. Average scores of decision support center fidelity at the two sites

Factors	Number of items	Mean score	Mean score of each item
Structural components	2	9.50	4.75
Shared decision making tool process	6	24.50	4.08
Peer support	2	8.00	4.00
Direct service staff	2	2.00	1.00
Supervisor	1	3.50	3.50
Total (Range: 13-65)	13	47.50	3.65

Detailed scale information

Appendix table 2 summarizes information on the scales used in this study. Basic information on the psychometric properties of primary outcome measures and detailed information of SDM-18 are as follows:

1) Scale To Assess Therapeutic Relationship (STAR)

STAR-Clinician (rated by doctors) has three subscales: positive collaboration, emotional difficulties, and positive clinician input [1]. STAR-Patient (rated by participants) consists of three subscales: positive collaboration, positive clinician input, and non-supportive clinician input. In terms of convergent validity in a Japanese setting, the overall STAR-Clinician score was modestly significantly correlated with scores from the Empowerment Scale [2]. Internal consistency (Cronbach's alpha) for STAR-Clinician was over 0.90 [3]. In addition, the overall STAR-Patient score was significantly correlated with scores from the Japanese version of the Client Satisfaction Questionnaire - 8 [4], Empowerment Scale [2], and Medication Adherence Scale for Patients with Chronic Disease in Japan [5]. Internal consistency (Cronbach's alpha) for STAR-Patient was over 0.85 [3].

2) Interpersonal Processes of Care Survey Short Form (IPC)

The Interpersonal Processes of Care Survey Short Form (IPC) has three subscales (communication, decision making, and interpersonal style) [6]. In a Japanese setting, there were significant correlations between the IPC-Short Form and the Japanese version of the Client Satisfaction Questionnaire - 8 [4], Empowerment Scale [2], and Medication Adherence Scale for Patients with Chronic Disease in Japan [5]. Internal consistency (Cronbach's alpha) for IPC-Short Form was over 0.80 [3].

3) Patient Activation Measure (PAM)

Fujita and colleagues developed the Japanese version of the Patient Activation Measure (PAM) [7]. The PAM score was significantly correlated with the self-efficacy scale score. Internal consistency (Cronbach's alpha) and test-retest reliability (Pearson's correlation) were 0.82 and 0.75, respectively.

4) SDM-18

SDM-18 and its coding system for a psychiatric setting was developed by Salyers and her colleagues [8,9], based on the Elements of Informed Decision Making Scale, which has 9 items identifying whether a clinical decision is present and assessing quality of the clinical decision in a medical consultation [10]. SDM-18 evaluates the core components and process of shared decision making through scoring the transcripts of conversations between participants and doctors during medical consultations [8,9]. For individuals who provided consent for audio recording, medical consultations were recorded to assess the implementation of shared decision making. Two raters blinded to group allocation randomly selected 30 transcripts and rated them based on the SDM-18 manuals and supervision from a co-author who developed the SDM-18. After confirming good inter-rater reliability (weighted kappa = 0.85), the two raters independently evaluated the remaining transcripts. The frequency of medical consultations varied considerably among participants. Therefore, we computed the average SDM-18 score for several medical consultations before and during the intervention period. Higher scores indicate better discussion between participants and doctors.

5) Other measures

Regarding clinical status, the four doctors rated their participants on symptoms using the Brief Psychiatric Rating Scale (BPRS) [11], on overall functioning using the Global Assessment of Functioning (GAF) [12], and on medication side effects (the level of extrapyramidal adverse effects) using the Drug-Induced Extrapyramidal Symptom Scale

(DIEPSS) [13], Higher scores on these three measures indicate more severe symptom, lower functioning, and more severe side effects. The Japanese language version of the Morisky Medication Adherence Scale (MMAS) was also used to assess self-reported adherence [14]. In addition, we employed the following self-reported scales to assess recovery-related outcomes and service satisfaction: the Client Satisfaction Questionnaire - 8 Japanese version (CSQ-8J) [2], the Self-Identified Stage of Recovery - Parts A and B (SISR-A and B) [15], and the World Health Organization Quality of Life 26 instrument (WHO-QOL26) [16]. Higher scores on these scales indicate better adherence, higher satisfaction, higher subjective recovery, and higher QOL, respectively. Research assistants who were not involved in treatment at either site, and who were blinded to group allocation, assessed participants' weight. They also helped participants complete questionnaires, to avoid missing data.

Online appendix table 2. Summary of measures and scales used in this study

Scales [reference number] *Alphabetical order	Abbrev.	Target	n of item	Score range	High score	Evaluators
Brief Psychiatric Rating Scale [11]	BPRS	Symptom	18	18-126	Severe	Doctor
Client Satisfaction Questionnaire - 8 Japanese version [4]	CSQ-8J	Service satisfaction	8	4-32	Good	Self-rating
SDM-18 [8,9]		Implementation of shared decision making	8	0-16	Good	Raters (using audio recording data)
Drug Induced Extra-Pyramidal Symptoms Scale [13]	DIEPSS	Side-effects	9	0-36	Severe	Doctor
Global Assessment of Functioning [12]	GAF	General function	1	0-100	Good	Doctor
Interpersonal Processes of Care Survey Short Form [6]	IPC-SF	Communication	18	18-90	Good	Self-rating
Subscale 1, Communication			7	7-35		
Subscale 2, Decision making			2	2-10		
Subscale 3, Interpersonal style			9	2-45		
Morisky Medication Adherence Scale [14]	MMAS	Adherence	8	0-8	Good	Self-rating
Patient Activation Measure [7]	PAM	Active participation	13	0-100	Good	Self-rating
Scale To Assess Therapeutic Relationships in Community Mental Health Care - Clinician [1]	STAR-C	Relationship	12	0-48	Good	Doctor
Subscale 1, Positive collaboration			6	0-24		
Subscale 2, Emotional difficulties			3	0-12		
Subscale 3, Positive clinician input			3	0-12		
Scale To Assess Therapeutic Relationships in Community Mental Health Care – Patient [1]	STAR-P	Relationship	12	0-48	Good	Self-rating
Subscale 1, Positive collaboration			6	0-24		
Subscale 2, Positive clinician input			3	0-12		
Subscale 3, Non-supportive clinician input)			3	0-12		
Self-Identified Stage of Recovery Part-A & B [15]	SISR-A & B	Subjective recovery	5	5-29	Good	Self-rating
Subscale 1, Part A			1	1-5		
Subscale 2, Part B			4	4-24		
Weighing machine		Weight				Research assistant
World Health Organization Quality of Life 26 [16]	WHOQOL26	Quality of life	26	24-120	Good	Self-rating
Subscale 1, Physical health			7	7-35		
Subscale 2, Psychological health			6	6-30		
Subscale 3, Environment			8	8-40		
Subscale 4, Social relationships			3	3-15		

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Online appendix table 3. Participant demographics at baseline

	Shared decision making group (N=26)		Treatment as usual group (N=27)		Stats
	N	%	N	%	
Doctors					Fisher's exact p = .975
- Dr A	8	30.77	10	37.04	
- Dr B	4	15.38	4	14.81	
- Dr C	3	11.54	3	11.11	
- Dr D	11	42.31	10	37.04	
Sex					$\chi^2 (1)$= .195, p = .659
- Female	10	38.46	12	44.44	
Age (M±SD)	39.38±11.60		38.19±9.45		t (51) = .413, p = .681
Diagnosis					Fisher's exact p = .554
- Schizophrenia	18	69.23	19	70.37	
- Depression	2	7.69	4	14.81	
- Bipolar disorder	4	15.39	1	3.71	
- Developmental disorder	2	7.69	3	11.11	
Academic degree					Fisher's exact p= .557
- Junior high school	1	3.86	3	11.11	
- High school	15	57.69	12	44.44	
- Vocational school	4	15.38	3	11.11	
- Undergraduate	4	15.38	8	29.63	
- Master course	2	7.69	1	3.71	
Hospitalization in past year					$\chi^2 (1)$ = .151, p = .697
Hospitalized	9	34.62	8	29.63	
Accommodation					Fisher's exact p = .656
- Living with family members	20	76.92	19	70.37	
- Living alone	6	23.08	6	22.22	
- Accommodation service	0	0.00	2	7.41	
Employment					$\chi^2 (1)$ = .573, p = .449
- Competitive job	8	30.77	11	40.74	