Effects of intervention by trained care managers on advance care planning engagement among long-term care service users in Japan: a pre- and post-pilot comparative study across multiple institutions

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Abstract

Background: A majority of Japanese care managers lack medical qualifications, feel uncomfortable discussing future medical choices and believe that it is not their responsibility.

Objectives: As there is a paucity of care manager intervention studies, this study aimed to measure changes in advance care planning engagement among long-term care service users before and after intervention by care managers with communication training.

Design: A multi-institutional pre- and post-pilot comparative study

Methods: A multi-institutional pre- and post-trial study was performed from August 2022 to January 2023 (trial ID: 000048573). Nine trained care managers communicated with 30 long-term care service users regarding advance care planning, and the pre- and post-trial advance care planning engagement scores were compared. Additionally, the post-trial impact of events score was investigated.

Results: All 30 long-term care service users completed the trial. The advance care planning engagement score increased after the trial. The sample size was considered adequate for future trials. Years of experience as a care manager, impact of events score, and having a clinical frailty scale of $\geqslant 5$ were significant explanatory variables that affected the objective variable of the difference between pre- and post-trial advance care planning engagement score.

Conclusion: This study on the impact of advance care planning communication interventions by trained care managers offers insights into determining appropriate sample sizes and identifying factors influencing future research outcomes. Advance care planning engagement of long-term care service users might change before and after intervention by care managers through advance care planning communication.

Trial registration: University Hospital Medical Information (UMIN) Network Trial ID: 000048573.

Keywords: advance care planning, case managers, community, frailty

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Introduction

Advance care planning (ACP) is important during the treatment of acute illness in the hospital and during long-term care service provided after discharge from the hospital.[1] Community healthcare workers also play an important role in the same.[2] Occupations that play a key role in ACP remain unclear. Physicians, nurses, and social workers have varying medical knowledge, caregiving techniques, and communication skills.[3] Among them, nurses may play the most important role in ACP.[4]

The main role of care managers is to coordinate home care services within the scope of long-term care insurance. However, in 2018, the Japanese Ministry of Health, Labor and Welfare made a major policy change. Not only doctors, nurses, and social workers, but also care managers were identified in the guidelines as the professionals who promote ACP.[5]

In Japan, many care managers do not have medical qualifications, such as nurses. According to the Ministry of Health, Labour and Welfare statistics, for the past 23 years until 2020, many non-medical professionals have passed the examinations for care managers (44.2% were care workers, 11.0% were life consultants, and 6.4% were social workers), whereas the percentage of medical professionals, such as nurses (23.9%) and doctors (2.1%), was small.[6] As a result, care managers are uncomfortable having conversations about future healthcare choices and feel it is not their role to engage in those.[7]

Care managers should be involved in ACP, but there may also be barriers to this and little evidence that care managers are involved in ACP.[8,9]

In other countries other than Japan, the role of care managers or case managers, as they are called in other countries, in the community is debatable. Although care managers recognized their role in the ACP, they did not believe that ACP was properly performed within their services. Written ACPs and long-term care service users who completed the ACP are notably few. Furthermore, these written documents are of low quality.[10] This situation is the same in Japan.

In Japan, the importance of multi-professional collaboration in the community, including care managers, has been pointed out.[11] In the community, medical knowledge is not the only important capability contributing to ACP promotion. For example, lay navigators also play a role in ACP.[12] Care managers can serve as a link between healthcare professionals and long-term care service users.

Recently, an ACP engagement scale has been developed, which may be useful for measuring the effectiveness of ACP interventions conducted by care managers on care service users. ACP engagement refers to the user's readiness and self-efficacy to perform ACP.

International studies using the ACP engagement scale as an outcome have demonstrated abundant evidence[13]; however, evidence from Japan is scarce. Although in one Japanese study, the ACP engagement scale was used as a secondary endpoint, where trained nurses conducted ACP interventions on individuals enrolled in an online survey company.[14]

In a pilot study from the United States, nine case managers participated in an ACP intervention; the four-item ACP engagement scale was used in this previous study.[15] All nine managers were also asked to find 1–3 clients, resulting in a total of 12 clients enrolled.[15] A Canadian report describes two before and after comparative studies of an online intervention using a website and a 55-item ACP engagement scale, although no case manager intervention was conducted. Both studies had similar results, which were as follows: baseline, 2.9 (0.8) versus 2.9 (0.8); and follow-up (6–12 weeks) 3.5 (0.7) versus 3.5 (0.8).[16,17] However, no study in Japan has used this scale to measure the effectiveness of ACP interventions conducted by care managers on care service users.

Since cultural differences are obvious in ACP research, it is significant to conduct a study in Japan.[18–21] If this intervention is effective, it may demonstrate the effectiveness of ACP conducted by care managers and, in turn, improve the end-of-life of community-dwelling individuals with long-term care needs.

This study aimed to examine changes in ACP engagement of long-term care service users before and after ACP intervention by trained care managers, estimate the effectiveness of the intervention, and obtain information on sample size and confounding factors necessary to conduct future large-scale studies.

Methods

Definition of ACP

As described in the Japan Geriatrics Society statement, ACP is a process that supports people in making decisions and accords respect to each individual as a human being about their future medical and long-term care needs.[22]

What are regular visits and what are ACP communication visits?

In Japan, care managers are required to make regular visits to the homes of long-term care service users every month or every 3 months depending on the level of care needed. ACP communication visits are conducted at the same time as regular visits. Before any visit, care managers informed the long-term care service users that they would need an extra 60 min for the ACP communication, and users confirmed and approved such visiting times The protocol specified an interval between 6 and 12 weeks for the ACP engagement questionnaire before and after the ACP communication intervention. In all 30 cases, a one-time (approximately 60 min) ACP communication was planned during that period. However, no prohibition was set against the second ACP communication during that period if requested by the user.

Study design and intervention

Before and after comparison study and intervention by trained care managers

As for the ACP communication intervention, we conducted approximately 1 h of communication according to the content of the ACPiece program[23–25] we developed. The target sample size was set at 30 cases.

Outline and degree of training in the ACPiece program

- A program, named ACPiece, is held every 2 months.
- The program is sustainable, hands-on, and facilitated by volunteers from past ACPiece trainees and is free of charge.
- The program consists of brief lectures and experiential training, including scenario reading, role-playing, and group work.
- The program helps long-term care service users express their reserved emotions and perceive the care manager as an understanding partner. This is very important in Japan, where real emotions are often not expressed. In ACPiece, these emotions are called "pieces."
- This program enhances communication among care managers who struggle with discussing future healthcare choices but are skilled at observing these emotions because of their frequent contact with long-term care service users (Table 1).

Survey procedure

Participants then completed a questionnaire and had an ACP dialog with the care manager. Participants' anonymity was preserved.

By August 2022, the study protocol was fixed, and study information was made available on the University Hospital Medical Information (UMIN) Network in Japan (trial ID: 000048573). The trial started on September 15, 2022, the 30th case was enrolled on December 8, 2022 and the follow-up was completed on January 26, 2023.[26]

Participants

Nine care managers from nine in-home care support offices conducted an ACP communication intervention for 30 long-term care service users who agreed to participate in the study. Nine ACP-trained care managers were recruited and were asked to conduct the ACP intervention with 3–4 long-term care service users per person at a rate of two per month.

Nine care managers were selected who had attended at least one ACPiece program[23–25] and who did not have a nursing or other medical certification.

The inclusion criteria for selecting the long-term care service users were as follows: users assigned to a care manager; users aged $\geqslant$65 years; users who are able to communicate about ACP; users with family members who can discuss ACP with them; and users with a medical provider who can discuss ACP with them. The exclusion criteria were as follows: users who had an ACP history; users whose care managers judged that they were mentally unstable and that ACP intervention or questionnaire survey would be undesirable; users with physical problems and for whom ACP is not desirable; and users receiving $<$12 weeks of care

Table 1. ACPiece program.

Contents	Time (min)
1. Lecture on ACP overview	15
2. Role play to experience repetition and silence skills	40
3. Interactive training to pick up ACP-related words and phrases from the life story of the case scenario	25
4. Role play to initiate ACP	40
5. Role play to listen to the anxiety, concerns, and what you value in your life, and your thoughts on life	40
6. Role play to listen about who is the person's advocate	40
7. Role play to listen to how much the person intends to delegate to the advocate	55
8. Role play to discuss future healthcare choices with the person and his/her advocate	70
9. Group work to learn ethical approaches when there is a conflict of values and opinions between the care professional and the individual and his/her advocate	60

ACP, advance care planning.

manager's intervention. To avoid the need for adjustments based on the history of ACP implementation by long-term care service users, users with a history of ACP implementation were excluded.

Demographic data of the care service users was obtained, which included age, gender, education, marital status, number of family members, relationship to caregiver, living location, religion, and clinical frailty scale.[27,28] The demographic data of care managers were obtained, which included age, years of experience as a care manager, experience in implementing ACP as a care manager, and nursing certification. Demographic data on the relationship between long-term care service users and care managers were obtained, as well as the duration of the relationship. The duration of the relationship denotes the number of years that long-term care service users and care managers have been involved.

Factors such as age, gender, educational history, frailty, and social support related to health literacy appeared to influence the implementation of ACP.[29,30]

The number of individuals who dropped out in each of the following stages was noted: evaluation of eligibility criteria, inclusion, implementation of ACP intervention, follow-up after intervention, and analysis after completion of follow-up.

Questionnaires and measurement

The primary endpoints are the ACP engagement scale score before and at 6–12 weeks after the intervention. We used the ACP engagement scale developed by Sudore et al.[31] and validated for reliability and validity in Japanese by Okada et al.[32] as an outcome measure. The 15-, 9-, and 4-item versions have been tested for reliability and validity in Japanese.

The number of care managers as interventionists, sample size of long-term care service users, duration of the intervention, and which questionnaire to select from the 15-, 9-, and 4-ACP engagement scales, which have been tested for reliability and validity in Japanese, were determined on the following three grounds: (1) the feasibility of conducting ACP intervention while fulfilling the traditional care manager role under the long-term care insurance system; (2) a paper[15] on ACP intervention by case managers in the United States; and (3) a questionnaire that included content relevant to the ACP training programs, including the role plays on discretionary authority. Only the 15-item ACP engagement scale includes items that consider discretionary authority. The 15-item

ACP engagement scale was assessed twice, just before the ACP intervention and at 6–12 weeks after the intervention. The items are represented on a five-point Likert scale, with higher scores indicating greater engagement.

The secondary endpoint is the impact of events scale (IES) score at 6–12 weeks post-intervention. This is a scale for assessing psychological trauma that was developed by Weiss[33] Reliability and validity have also been confirmed in Japanese by Asukai et al.[34] A cutoff value of $\geqslant$24 was considered traumatic, whereas of $<$24 was considered nontraumatic. The ACP engagement score was set as the primary endpoint and the IES as a secondary endpoint. The former can evaluate the benefits of ACP communication, and the latter can assess the harms of ACP communication. In other words, the latter could reinforce the results of the former, which supports our selection of IES as a secondary evaluation item.

A sample size of 30 long-term care service users was planned. We calculated the sample size from similar studies,[16,17] and the sample size required for this study was 16. However, this assumption was not necessarily valid because of the different cultures, intervention methods, and number of items on the ACP engagement scale. Therefore, a pilot study in which the sample size was not calculated in advance was conducted. In pilot studies, 30 cases are generally considered statistically reasonable.[35,36] Thus, a sample size of 30 cases was chosen.

Statistical analysis

Data from participants who consented to participate in the study and completed questionnaires before and after the ACP communication between the care manager and participant were analyzed. No data were missing. Continuous variables are presented as means and standard deviation, and categorical variables as frequencies and percentages.

For the primary endpoint, p values, 95% confidence intervals (CIs), and effect sizes for scores before and after ACP communication are presented. p Values $<$0.05 were considered statistically significant. Effect sizes by Cohen's d of 0.2, 0.5, and 0.8 were considered small, medium, and large, respectively.[37] For the secondary endpoints, the scores and cutoff values were compared. The cutoff value for this score is 24.

The sample size needed to conduct future large-scale studies was calculated.

For each of the nine care managers, the change in ACP engagement before and after the intervention was calculated.

In the multiple regression analysis, the objective variable was the difference in ACP engagement scores before and after, and the explanatory variables were the long-term care service user's age, sex, clinical frailty score, education, religion, living alone status, age of the care manager, years of experience, history of ACP implementation, questionnaire completion intervals before and after the intervention, years of involvement between long-term care service users and care managers, and IES score values.

However, the correlation between the explanatory variables "years of involvement between long-term care service users and care managers" and "care managers' ACP implementation history" became nonnegligible. The Variance Inflation Favtor (VIF) value of "care managers' ACP implementation history" was 9.30, which raised multicollinearity concerns. Therefore, we removed "care managers' ACP implementation history" from the explanatory variables. Consequently, the VIF values for all explanatory variables were $<$3.19, thus avoiding the multicollinearity problem.

We examined whether these explanatory variables had a statistically significant effect on the objective variable and whether adjusting for several explanatory variables changed their effects.

Microsoft Excel 2016 MSO (version 2022) provided by Microsoft Corporation, USA and EZR version 1.55 were used to perform statistical analyses.

The reporting of this study conforms to the Standards for QUality Improvement Reporting Excellence (SQUIRE 2.0) reporting guidelines.[38] We have uploaded a checklist, which was completed according to these guidelines, as a Supplemental File.

Results

Table 2 presents the characteristics of long-term care service users: 90% had a clinical frailty scale score of 3–6, and 96.7% were classified under

Table 2. Characteristics of long-term care service users and care managers.

Characteristics of long-term care service users	***n* = 30**
Age (years), mean (standard deviation)	81.9 (8.2)
Sex, *n* (%)	
Man	7 (2.33)
Woman	23 (76.7)
Educational history, *n* (%)	
Above university	2 (6.7)
High school	13 (43.3)
Junior high school	12 (40.0)
Below elementary school	3 (10.0)
Marriage history, *n* (%)	
Yes	30 (100.0)
No	0 (0.0)
Number of cohabiting families, *n* (%)	
One person	14 (46.7)
Two persons	10 (33.3)
More than three persons	6 (20.0)
Primary caregiver, *n* (%)	
Husband	2 (6.7)
Wife	7 (23.3)
Eldest son	8 (26.7)
Eldest son's wife	1 (3.3)
Eldest daughter	6 (20.0)
Second daughter	2 (6.7)
Younger brother	1 (3.3)
Younger brother's wife	1 (3.3)
Younger sister	1 (3.3)
Mother	1 (3.3)
Living location, *n* (%)	
Home	30 (100.0)
Elderly care facility	0 (0)
Religion of belief, *n* (%)	
Yes	14 (46.7)
No	16 (53.3)
Clinical frailty scale, *n* (%)[a]	
1–2	1 (3.3)
3–4	14 (46.7)
5–6	13 (43.3)
7–9	2 (6.7)
Characteristics of the care managers	***n* = 9**
Age (years), mean (standard deviation)	53.3 (8.9)
Years of experience as a care manager, mean (standard deviation)	13.9 (3.9)
Experience in performing advance care planning (ACP), *n* (%)	
Yes	8 (88.9)
No	1 (11.1)
Nurse certification, *n* (%)	
yes	0 (0.0)
no	9 (100.0)
Characteristics of care managers and long-term care service users	
Years of mutual involvement, mean (standard deviation)	4.8 (3.3)

[a]The clinical frailty scale is a nine-point score of frailty by Rockwood et al.[27]

Care Level ⩽2 by the Japanese long-term care insurance system. All care managers lacked medical qualifications, akin to nurses.

None of the 30 long-term care service users dropped out of the study, and they were not prohibited by protocol from having a second ACP communication during the study. However, only one ACP communication, which took approximately 60 min, was conducted. ACP communication included not only the

Table 3. ACP engagement scale score changes before and after ACP communication in 30 long-term care service users.

ACP engagement score (all scales 1–5)[a]						
	Mean	SD	Range	95% CI	*p* Value	Cohen's *d*
			Min-Max			
Before	2.00	0.50	1.13–3.02	1.82–2.18	<0.01*	2.068
After	3.54	0.84	2.07–5.00	3.24–3.84		

ACP engagement scale score increased after ACP communication.
*$p < 0.01$.
[a]The ACP Engagement Score is a 15-item score by Sudore et al.[31]
ACP, advance care planning; CI, confidence interval; SD, standard deviation.

selection of an advocate, future life-prolonging treatment, and mediation so that patients could ask questions to attending physicians but also what long-term care service users value in their daily lives and what are nonnegotiables.

The ACP engagement scale score changes before and after the ACP communication are shown in Table 3. The ACP engagement score of 30 care service users was 2.00 on average before ACP communication with care managers; however, it increased to 3.54 after ACP communication with care managers. The *p* value was <0.01 and effect size was 2.68. Additionally, previous literature[17] has stated that an increase in the mean by more than 1 is a clinically meaningful change. Based on the above, ACP engagement scale scores increased statistically significantly after the ACP communication.

The mean ± standard deviation of the impact of event scale at 6–12 weeks after ACP intervention was 8.73 ± 12.05, which was below the cutoff value of 24.

Estimated sample sizes for future randomized controlled trials are shown in Table 4. The sample size of 30 cases, which is the sample size of this study, seemed to have sufficient power.

As shown in Table 5, six of the nine care managers provided ACP interventions to three care service users and another three care managers provided ACP interventions to four care service users. Of the nine care managers, the provision of ACP before and after the intervention by eight

Table 4. Estimated sample sizes for future randomized controlled trials.

	1 – β (power)			
	0.7	0.8	0.9	0.95
α = 0.05	4	5	5	6
α = 0.01	6	7	7	8
α = 0.001	9	10	11	11

For an effect size of 2.068 and two-tailed test, the sample size required per group for future randomized controlled trials was estimated using alpha error, beta error, and power. The 30 cases used in this study were considered to be a sufficient sample size.

ACP care led to the enhancement of the ACP engagement scores.

Multiple regression analysis performed using the stepwise method (Table 6) resulted in an adjusted *R*-squared value of 0.4738. The pre- and post-intervention difference in ACP engagement scale as the objective variable was significantly affected by the explanatory variables, including years of experience as a care manager, IES score, and having a clinical frailty scale of 5 or higher.

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Table 5. Pre- and post-comparison of ACP engagement scores for each of the nine care managers.

No.	Before	After	Difference	*t* Value	*p* Value	95% CI	es
1	3.2	5	1.8	−4.423	0.0475*	−3.37 to −0.047	2.55
1	2.27	4.6	2.33				
1	2.93	3.93	1				
2	1.8	3.4	1.6	−27.45	0.001**	−1.88 to −1.37	15.85
2	2.33	3.87	1.54				
2	1.73	3.47	1.74				
3	2.67	3.47	0.8	4.732	0.0419*	−2.291 to −0.109	2.73
3	1.8	3.47	1.67				
3	1.8	2.93	1.13				
4	1.93	3.6	1.67	11.43	0.0014**	−2.301 to −1.299	5.72
4	1.67	3.33	1.66				
4	1.8	4.07	2.27				
4	1.4	3	1.6				
5	3.07	3	−0.07	−1.113	0.3817	−1.314 to 0.774	0.64
5	2.33	3.07	0.74				
5	1.93	2.07	0.14				
6	1.93	2.87	0.94	−10.955	0.0016**	−1.594 to −0.876	5.48
6	1.2	2.53	1.33				
6	2.2	3.4	1.2				
6	1.13	2.6	1.47				
7	1.53	2.73	1.2	−5.627	0.0111*	−3.73 to −1.035	2.81
7	1.87	4.53	2.66				
7	1.8	5	3.2				
7	2.2	4.67	2.47				
8	1.73	2.8	1.07	−20.93	0.0023**	−1.178 to −0.776	12.08
8	1.4	2.33	0.93				
8	1.67	2.6	0.93				
9	2.27	4.4	2.13	−22.51	0.002**	−2.779 to −1.887	12.99
9	1.93	4.4	2.47				
9	2.6	5	2.4				

ACP engagement scores increased after ACP communication with eight of nine care managers and long-term care service users. No. denotes the number given to each of the nine care managers.
*$p < 0.05$. **$p < 0.01$
ACP, advance care planning; CI, confidence interval; es, effect size.

Table 6. Multiple regression analysis with pre- and post-ACP engagement score differences as objective variables.

Variable	All explanatory variables				Stepwise method			
	Estimate	SE	*t* Value	*p* Value	Estimate	SE	*t* Value	*p* Value
Intercept	2.915	2.601	1.121	0.277	2.437	1.144	2.130	0.044*
Age of users	0.001	0.019	0.046	0.964				
Sex	−0.304	0.278	−1.093	0.289				
CFS*	0.621	0.274	2.266	0.036*	0.613	0.238	2.571	0.017*
Education	−0.158	0.308	−0.513	0.615				
Religion	0.014	0.311	0.045	0.965				
Living alone	0.344	0.243	1.416	0.174	0.275	0.200	1.374	0.183
Age of the care managers	−0.033	0.021	−1.559	0.136	−0.030	0.017	−1.790	0.087
Experience$	0.111	0.039	2.809	0.012*	0.116	0.035	3.346	0.003**
Interval‡	−0.021	0.016	−1.295	0.212	−0.019	0.012	−1.573	0.129
Duration of the relationship§	0.015	0.038	0.388	0.703				
IES Score	−0.036	0.011	−3.332	0.004**	−0.037	0.010	−3.768	0.001**

Estimate denotes the regression coefficient estimate. Continuous variables included age, years of experience as a care manager, duration of the questionnaire survey, years of involvement between long-term care service users and care managers, and the IES scores. Sex was set as 0 and 1 for males and females, respectively. CFS was set as 0 for less than 5 and 1 for 5 or more. Education was set as 0 for less than a high school diploma and 1 for a high school diploma or higher. Religion was set as 0 for "no" and 1 for "yes." For whether or not living alone, it was set as 0 for nonliving alone and 1 for living alone.
*The clinical frailty scale is a nine-point score of frailty by Rockwood et al.[27]
$Experience denotes the number of years of experience as a care manager.
‡Interval denotes the duration of the questionnaire survey using the ACP engagement scale.
§The duration of the relationship denotes the number of years the long-term care service users and care managers have been involved.
*$p < 0.05$. **$p < 0.01$.
ACP, advance care planning; CFS, clinical frailty scale; IES, impact of events scale; SE, standard error.

Discussion

To the best of our knowledge, this study suggests that trained Japanese care managers might increase the ACP engagement among care service users as a result of ACP communication interventions. To the best of our knowledge, there are only a few articles focusing on the interventions of ACP communication for care managers, both in the English-speaking world and in Japan. Notably, Detering et al.[39] observed that among older adults receiving home care in Australia, those who discussed ACP with their own case manager were more likely to initiate ACP communication than those who were referred to an ACP facilitator. They named the former the facilitator model and the latter the referral model. The facilitator model is advantageous because ACP can take place in the care service user's home, usually as part of care, and within the context of an already ongoing relationship. The model of our study corresponds to the facilitator model. Additionally, Feuz et al.[40] described the importance of communication in these environments. Nouri et al.[15] described the usefulness of ACP toolkit used by care managers, rather than care managers' ACP communication, using ACP engagement as the outcome. Herein, we used a trained ACP communication intervention rather than a toolkit, unlike the study by Nouri et al. Moreover, while Nouri et al.'s study showed improvements only in ACP engagement readiness, our study showed improvements in ACP engagement readiness as well as self-efficacy.

The most important finding of the present study is that it demonstrated the feasibility of conducting ACP dialog while providing care management under the Japanese long-term care insurance system. Moreover, this study allowed us to obtain

estimated sample sizes and identify confounders for future studies. Ours was a pilot study, but the resulting sample size of 30 cases was sufficiently powerful. However, consideration should be given to the lower baseline ACP engagement scores compared with the studies by Sudore et al.[13] and Nouri et al.[15]

A particularly interesting finding of this study is that the intervention by Japanese care managers, who do not have medical qualifications unlike nurses and who were hesitant to implement ACP, resulted in positive ACP engagement changes among long-term care service users.[6–9] ACP interventions provided by eight of the nine care managers improved ACP engagement scores among long-term care service users.

This study also indicated that information on factors should be adjusted in future randomized controlled trials to ensure that there is no difference between the control and intervention groups.

These factors included the care service users' attributes, including clinical frailty scale. Other factors included years of experience as a care manager and the degree of emotional distress of the long-term care service user. Factors that increased ACP engagement scores before and after ACP communication between care managers and care service users were that care service users (1) had a clinical frailty scale of $\geqslant 5$, (2) care managers had more years of care management experience, and (3) care service users had less psychological trauma. These findings were not obtained in the study by Nouri et al.[15]

The present study has six limitations. First, it is only a pilot study. Second, it is a before and after comparative investigation without a control group. Third, to ensure feasibility, the protocol was designed to allow a wide interval between the first and second questionnaires (6–12 weeks), which may have influenced the results. Multiple regression analysis showed that this interval did not necessarily affect ACP engagement. However, the interval should be kept as constant as possible. Fourth, care managers assisted the study participants in completing the questionnaire, as the feasibility of the study was a priority. Our research group was unable to prepare a researcher other than the care manager, to assist care service users in answering the questionnaire. Therefore, care service users were likely to respond with higher ACP engagement scores because they presume that care managers are looking for higher ACP engagement scores. However, care managers were well aware and careful not to do so. However, we believe that another researcher should have assisted the study participants. Fifth, we cannot rule out the possibility of selection bias, in which care managers chose care service users whose ACP engagement scores were likely to improve before and after the intervention. Sixth, the sparsity or density of the relationship between the care manager and long-term care service users was assumed to affect the difference between pre- and post-ACP engagement scores. However, we could not objectively measure the depth of such a relationship. Thus, we could not rule out the effect of the depth of the relationship between the care manager and long-term care service users on the pre- and post-ACP engagement score differences.

Conclusion

In conclusion, the ACP dialog intervention by care managers is feasible. This study allowed us enabling estimation of sample sizes for larger studies and identifying confounding factors. Engagement of long-term care service users for ACP might change before and after intervention by care managers through ACP communication.

A randomized controlled trial is desirable as a future research design.

Declarations

Ethics approval and consent to participate

The present study was approved by the Institutional Review Board of the National Center for Geriatrics and Gerontology (No. 1262) and conformed to the provisions of the Declaration of Helsinki (as revised in Brazil, 2013). Care managers verbally explained the study to the participants with a written description of the study and obtained written consent from the participants.

Consent for publication

All participants agree to the publication of this study.

Author contributions

Shozo Okochi: Conceptualization; Data curation; Investigation; Methodology; Project administration; Resources; Visualization; Writing - original draft; Writing – review & editing.

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Mitsunori Nishikawa: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing – original draft; Writing – review & editing.

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Competing interests
The authors declare that there is no conflict of interest.

Availability of data and materials
The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Supplemental material
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