Development of a Self-assessment Behavioral and Psychological Symptoms of Dementia Competency Scale for Care Teams at Long-Term Geriatric Care Facilities[1]

Abstract

Understanding the behavioral and psychological symptoms of dementia (BPSD) is important for caregivers in long-term geriatric care facilities. In this study performed in 43 long-term care facilities, we evaluated the ability of caregivers to recognize BPSD through the development and validation of self-assessment scales. Reliability and validity of the scales were determined using Cronbach's alpha coefficient, the test/retest method, exploratory factor analysis, confirmatory factor analysis, criteria-related validity, and construct validity. We analyzed cross-sectional data from 310 participants. Factor analysis showed a positive correlation for all scale items (r_s = .43–.73). Significant correlations arose from the test/retest method (r_s = .48–.76). The α coefficient of all items except one was .70 or more, indicating sufficient reliability. Criteria-related validity (r_s = .43–.73) and construct validity (r_s = .13–.52) revealed a positive correlation. The BPSD Team Care Self-Assessment Scale is reliable and could ensure BPSD competency in caregivers.

[1]**Abbreviations:** BPSD, behavioral and psychological symptoms of dementia; CMIN, chi-squared value; GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; RMR, root mean square residual; RMSEA, root mean square error of approximation; CFI, comparative fit index; TLI, Tucker–Lewis index

Keywords: behavioral and psychological symptoms of dementia; team care; Self-Assessment Scale; geriatric long-term care facilities

Introduction

Dementia is associated with a range of behavioral and psychological symptoms such as repetitive behavior and mood disturbances including depression, agitation, psychosis, sleep disruption, and social inappropriateness. The prevalence of behavioral and psychological symptoms of dementia (BPSD) is extremely high among residents of geriatric long-term care facilities. Up to 90% of those with dementia develop BPSD, which can lead to serious complications.[1] A previous study of 21 clinicians has shown that the use of validated BPSD assessments is not part of routine clinical practice.[2] Cognitive function, deteriorating relationships with other residents, and persistent demands in relation to daily living create difficulties in evaluating BPSD.[3,4] There is also a lack of standardized tools for cognitive assessment[5] and neuropsychiatric symptoms[6] in dementia.

BPSD can be exacerbated by abuse from professional caregivers and a lack of knowledge and skills that enable staff members to prevent BPSD or react appropriately. According to a survey by Japan's Ministry of Health, Labour and Welfare, the causes of elder abuse by professional caregivers in long-term care settings are "problems related to education, knowledge, and long-term care skills" (60.1%), followed by "problems related to employee stress and emotion control" (26.4%).[7] Improving the competency of professional caregivers with regard to skills and knowledge about BPSD is, therefore,

an important social issue that can ensure better quality geriatric care. Hence, it is imperative that facility staff have the skills to evaluate BPSD and determine when intervention is required.[8]

Most previous studies of BPSD care have focused on the origins and causes of the difficulties experienced by nursing care professionals. These studies shed light on such factors from a psychological perspective.[9–12] McCabe et al. verified the effectiveness of a BPSD protocol designed to alleviate BPSD and improve professional caregivers' self-efficacy and stress through training.[13] However, their study focused on the skills required by professional caregivers and their psychological aspects. These methods, which aim to improve the care skills of individual professionals, may be limited to certified professionals who have completed basic professional education or have substantial experience. In other words, they focus on the individual performance of professional caregivers. The nature of these methods gives rise to a structure in which the individual professional caregiver who fails to calm a resident with BPSD will be held responsible for the consequences. Meanwhile, inexperienced caregivers may be unaware that a lack of effective communication among staff can impact their psychological well-being, competency, and skills. In addition to this context, it is important to note that effective BPSD team care strategies remain to be elucidated. Indeed, BPSD team care may be a useful strategy to address the delivery of care among inexperienced caregivers as well as the maintenance of team care skills.

The aim of this study was to create a scale to provide indicators for professional caregivers to objectively understand their own individual care skills. The scale could be used to establish evaluation indicators to be shared among professionals in different areas and confirm a professional caregiver's knowledge and skills regarding the signs of BPSD. Good teamwork is determined by interactions that are derived from collaboration and working toward fulfilling roles in an environment where adequate support is available for team members to achieve care goals.[14] In addition, teams could use complementary skills to address each other's shortcomings and evaluate each other during team care meetings, leading to improved BPSD care through more effective teamwork.

Materials and Methods

Design

A cross-sectional study to develop a BPSD team care self-assessment scale was conducted. This was a mixed-methods study involving the development of questionnaire items in a focus group setting, followed by a pretest of the questionnaire and the main survey.

Development of the questionnaire items in a focus group setting

A focus group interview was conducted with 29 participants (entry-level, mid-level, and leader caregivers, nurses, social workers, care managers, and nutritionists). One

additional participant had agreed to take part, but could not because of work commitments. Participants were divided into groups of five and six. They discussed the following topics in relation to team-based BPSD care: successful experiences, reasons for successful problem-solving within the team, and issues to be addressed in providing team-based care.

The collected data were transcribed from the interviews and data that matched the six concepts of Dickinson and McIntyre's model of teamwork[15] were extracted. We ensured the precision of the analysis and content validity by consulting a researcher with expertise in qualitative research. Following the examination, 55 items were selected, comprising the following: 11 items pertaining to team orientation for the "input" step (e.g., "I share an understanding of the orientation of team care with other team members"); five leadership items (e.g., "Staff are available who can mediate arrangements between multiple professionals") and seven monitoring items (e.g., "I collect information that helps me imagine the personality of residents") for the "throughput" step; seven feedback items (e.g., "I support my team members when they face difficulty in providing care"), nine coordination items (e.g., "I collaborate with multiple other institutions and share the information of residents with BPSD"), and 16 backing-up behavior items (e.g., I ask all staff to reduce the volume of their voice in order to ensure a quiet environment) for the "output" step (Supplementary Table 1).

To scrutinize the BPSD Team Care Self-Assessment Scale and examine its content validity, a pretest was conducted. We recruited 25 employees at a geriatric long-term care facility with five or more years of experience to participate in the pretest. Pretest participants were recruited from the departments that participated in the focus group interviews, and the distribution of the pretest was determined by the facility manager.

The following documents were sent to the managers of the participating facilities: a summary of the study, a letter of invitation, an anonymous self-administered questionnaire form, and a comment sheet for the manager to provide his or her opinions (e.g., whether the questionnaire form contained any question items that were difficult to answer, whether any question items overlapped, and whether the question items could be applied to real-world settings). Completed questionnaire forms were collected through envelopes provided and sent back to the researchers.

Responses were obtained from 19 participants (eight general caregivers, nine leader and chief caregivers, one nurse, and one registered nutritionist). We checked the returned questionnaire forms for data skewness as well as ceiling and floor effects. One sentence was revised, as it did not convey the intended meaning of the question clearly based on responses written in the free text box. All 55 question items were adopted.

A return postcard requesting participation in the study was sent to 235 geriatric long-term care facilities that were members of the Japanese Council of Senior Citizens

Welfare Service. Of these, 43 agreed to participate. Ten copies of the participant information form and the anonymous, self-administered questionnaire form were sent to the directors of the 43 facilities. The survey period was from June 25 to July 25, 2019.

The standard sample size criterion for factor analysis was at least 5–10 times the number of variables observed. In relation to the validity of sample sizes, Comfrey and Lee[16] suggested the following ratings: 50 = very poor, 100 = poor, 200 = fair, 300 = good, 500 = very good, and over 1,000 = excellent. We set a recruitment target of 400 participants, roughly equivalent to 10 people from each facility, to obtain the number of samples needed for meaningful statistical analyses. Facilities were asked to randomly select 10 people from all care staff who dealt mainly with direct care. To ensure voluntary participation, we asked the directors of the facilities to avoid handing the participants the questionnaires in person but instead to distribute them indirectly (i.e., by putting them in individual lockers). The completed forms were collected using a placement method. The completed forms were put into a collection box, and all collected forms were gathered and returned to the return envelope provided.

We collected information about participant characteristics including sex, age, job type, position, social welfare-related certifications, number of years of experience, floor structure of the facility, type of employment, and current health condition. The 55 questions used in the pretest were subsequently shuffled and assigned new numbers.

Participants were asked to answer each question on a five-point scale from “not applicable at all” to “very applicable.” Higher scores indicated more successful BPSD team care.

Data Analysis

Cronbach’s alpha coefficient and the test/retest method were used to estimate the reliability coefficient of the scale. An alpha coefficient higher than a threshold value indicates that the internal consistency of the scale is high.[17] In general, an α coefficient of .7 or more is considered to be acceptable[18] and that an α coefficient of .8 or more ensures internal consistency. The retest was conducted three weeks after the initial test. Spearman’s correlation coefficients were calculated for all the items and subordinate items, and Spearman’s rank correlation coefficient (r_s) was used to study the relationship between the test and retest; a r_s between .1 and .3 indicated a weak relationship, between .3 and .5 indicated a moderate relationship, between .5 and 1 indicated a strong relationship, and 1 indicated a perfect relationship.[19]

Since the normality of the data could not be confirmed in the exploratory factor analysis, we applied the method of least squares, as it does not require hypothesizing a distribution. Promax rotation was also performed. For factor validity, an exploratory factor analysis of all 55 items of the draft scale was initially performed (least squares method, Promax rotation). A factor analysis (least squares method, Promax rotation)

was then run again for each factor to confirm the substructure of each factor extracted in the previous factor analysis. To estimate the number of factors to retain, we used the criterion of a factor loading of .35 or higher.

Next, confirmatory factor analysis through structural equation modeling was performed to confirm the validity of the factor structure obtained through the exploratory factor analysis. The model is considered to be a good fit if the chi-squared value (CMIN) is not significant, that is, if the goodness-of-fit index (GFI) is ≥ .90. However, nowadays, ≥ 0.95 is expected.[20] Ideally, the adjusted goodness-of-fit index (AGFI) is ≥ .90, which, in turn, means GFI ≥ AGFI. The root mean square residual (RMR) should be as close to .00 as possible. A root mean square error of approximation (RMSEA) of ≤ .050, a comparative fit index (CFI) of ≥ .95, and a Tucker–Lewis index (TLI) close to 1.00 all suggest a good fit.[20]

Next, we examined the validity of these criteria. The correlation coefficients between the BPSD Team Care Self-Assessment Scale subfactor and teamwork measure subfactor for nursing teams, which was developed by Misawa et al.,[21] were calculated. The teamwork measure for nursing teams regards communication as a behavioral variable for conveying information and, hence, a key link between other teamwork factors. The correlations with the criteria obtained simultaneously were examined for the concurrent validity of the scale. Spearman's rank correlation coefficient was

calculated because the normality of the scale could not be validated. Although a validity coefficient considered to be reasonable may depend on the impact of its results and nature of the scale, a coefficient of 0.70 is generally accepted as adequate.[22]

To evaluate construct validity, we calculated the correlation coefficients between the total score for group identification the subfactors of job satisfaction. As group identification is an indicator of "team sustainability," the seven items of the Karasawa Group Identification Scale[14] were used for the analysis. The group identification scale consists of the following two subfactors: identification of the group and identification of the group's members. The scale has high reliability and validity.[14] Participants were asked to answer on a seven-point scale ranging from "not at all appropriate" =1 to "extremely appropriate" =7. Since member job satisfaction is a specific indicator of "member satisfaction," Adachi's 33-item job satisfaction scale[23] was used for the analysis. This scale is composed of four subscales: "salary," "work environment," "interpersonal relationships," and "job responsibilities." This scale has high reliability and validity. Participants were asked to answer questions pertaining to the following four facets on a four-point scale ranging from "disagree" =1 to "agree" =4: "salary," "work environment," "interpersonal relationships," and "job responsibilities." The terms "company," "external (to the company)," and "clients" in this scale were changed to "facility," "the public," and "residents," respectively. Before making these changes, permission to do so was obtained from the scale developer. Further, Amos 24.0J was

used for structural equation modeling and SPSS 25.0J for Windows for all other analyses.

Ethical Considerations

This study was conducted after obtaining approval from the research ethics committee of [blinded for review]. Participants were deemed to have provided consent to participate in the study by returning the questionnaire.

Results

A total of 346 questionnaires were collected (response rate: 80.4%), of which 310 were valid responses (valid response rate: 89.5%). Participant characteristics are shown in Table 1.

Exploratory Factor Analysis

The mean and SD scores of the 55 items of the BPSD Team Care Self-Assessment Scale were calculated and checked for a skewed distribution of responses. The mean ±1 did not exceed the upper limit (five points) or lower limit (one point) for any item; therefore, all items were analyzed further. The Kaiser–Meyer–Olkin validity index was .93 and Bartlett's sphericity test result was significant ($\chi 2 = 2477.18$, df = 153, $p < .001$), a prerequisite for the sample to perform the factor analysis.

Factor analysis (least squares method, Promax rotation) was performed on the 55 items of the BPSD Team Care Self-Assessment Scale. The results indicated three factors that corresponded to Dickinson and McIntyre's teamwork component model,[15] namely, "input," "throughput," and "output." These factors were assigned the following names: "communication that enhances team orientation (19 items)," "leader-initiated communication (21 items)," and "communication that facilitates the growth of the BPSD team (15 items)." Subsequently, to examine the factor structure of each item in more detail, factor analysis (least squares method, Promax rotation) of the substructure of each factor was performed. In the factor analysis by item group, the number of factors was determined based on changes in the eigenvalue by ≥ 1.0, and the interpretability of the scree plots. Items with a loading of less than .35 were removed. The results of the exploratory factor analysis of the three factors are described as follows.

Factors Associated with Communication that Enhances Team Orientation

A two-factor solution was used and the following two items were removed: "I have built a close relationship with the families of residents and understand their needs" and "I support my team members when they face difficulty in providing care." The first factor was composed of 12 items that represented the aspects required for building a team. The factor was therefore referred to as "team building through mutual support." The second

factor was composed of five items that indicated the quality of multidisciplinary collaboration within the team. The factor was accordingly referred to as “mutual support between multiple professions” (Supplementary Table 2).

Factors Associated with Leader-Initiated Communication

A two-factor solution was used and the following two items were removed: “I assess the sleep of residents at night” and “I review the current care if the resident continues to exhibit emotional disorders.” The first factor was composed of 13 items representing leader behaviors that can lead team members to observe BPSD and prevent potential symptoms. Hence, the factor was referred to as “leadership for supporting team members in improving care skills.” The second factor was composed of six items pertaining to the avoidance of the onset and worsening of BPSD. The factor was therefore referred to as “work to prevent BPSD exacerbation” (Supplementary Table 3).

Factors Associated with Communication that Facilitates the Growth of the BPSD Team

A three-factor solution was adopted and the following two items were removed: “I understand the interests, curiosities, and favorite activities and objects of residents and take them into account when I care for them” and “I assume the psychological condition of residents with BPSD based on their verbal behavior and treat them while respecting their dignity.” The first factor was composed of five items covering modulating

measures taken as required to provide seamless BPSD care and was referred to as "mutual growth." The second factor was composed of five items pertaining to the timely assessment of the information about and changes in residents and the sharing of information among team members. This factor was referred to as "sharing information on daily changes." The third factor was composed of three key items for BPSD care and was referred to as "acquiring care skills focused on comfort" (Supplementary Table 4).

Reliability Testing

Significant moderate to strong correlations were observed for all items in the test/retest method (r_s =.48–.76). Thereafter, we calculated the scores for the subscales of the BPSD Team Care Self-Assessment Scale and their reliability coefficients. The α coefficients for all the items except "sharing information on daily changes" (α=.69) were .70 (Table 2).

Confirmatory Factor Analysis

Confirmatory factor analysis was performed to validate the factor structure obtained through the exploratory factor analysis. All the standardized path coefficients of the observed variables were strongly correlated. The goodness-of-fit indices were as follows: CMIN = 16.141, GFI = .983, AGFI = .956, RMR = .236, CFI = .996, RMSEA = .043 (90% confidence interval [CI]: .000, .084), and TLI = .991 (Figure 1).

Criterion-Related Validity

The calculation indicated positive correlations for all the factors (r_s =.43–.73), confirming concurrent validity (Table 2).

Construct Validity

For construct validity, the results indicated weak to strong positive correlations for the following items: “team building through mutual support” and “mutual growth through collaboration between multiple professions” in the “factor for communication that enhances team orientation;” “leadership for supporting team members in improving care skills” and “work toward BPSD exacerbation prevention” in the “factor for leader-initiated communication;” and “mutual growth,” “sharing information on daily changes,” and “acquiring care skills focused on comfort” in the “factor for communication that facilitates the growth of the BPSD team” (r_s =.25–.71). Overall, there were weak or almost no correlations with items related to “salary.” There were also low to moderate positive correlations with all the subfactors of job satisfaction (r_s =.13–.52; Table 3).

Discussion

The results show that the scale developed in this study covers the aspects of BPSD care thoroughly and that the scale has content validity and reliability. Care teams need to focus on the issues faced by professional caregivers with limited experience with BPSD care to improve the effectiveness of team care. Curyto and Vriesman evaluated the

Knowledge of Dementia Competencies Self-Assessment Tool to help direct care workers assess their knowledge of seven dementia competencies, finding performance on items assessing competencies rated as the most important to be significantly related to training in these competencies. The direct care workers in day care obtained higher scores than those in home care settings.[24]

In a pilot randomized controlled trial, a web-based tool for family caregivers to assess, manage, and track BPSD found that its use resulted in a significant decrease in caregiver stress.[25] A Thai-language scoring system for BPSD was shown to be reliable and valid for administration by non-physician healthcare personnel,[26] but no English version of this exists at present. Indeed, language and cultural differences are likely to be important when studying the needs of caregivers for patients with dementia, with one study of Hispanic family caregivers showing Internet and technology use deficits among Spanish- but not English-speaking participants.[27] Other caregiver-reported measures exist, including the Integrated Palliative care Outcome Scale for Dementia,[28] although this has limited supportive psychometric data. Caregiver-reported symptoms of patients with dementia can be used to classify patients into different stages of dementia.[29]

A randomized controlled trial evaluated the effect of a psychoeducational intervention on family caregivers of individuals with dementia and found no effect on BPSD but reduced caregiver burden, reduced depressive symptoms, and increased self-

confidence,[30] suggesting that such an intervention can improve caregiver outcomes when delivered to the community. Our scale can measure aspects of team care as well as those that observe the signs of BPSD and lead to appropriate care. Therefore, regardless of the level of BPSD care skills, they may help a team to consider feasible and effective care.

Savaskan reported that alterations in multiple neurotransmitter systems are involved in the pathogenesis of BPSD.[1] Because of multimorbidity and polypharmacy, therapies for BPSD are difficult and require continuous clinical observation of patients. Furthermore, it can be difficult to treat these conditions separately because they are all comorbidities. Thus, preventive interventions are important for residents at risk of developing BPSD. It is also essential to take measures to prevent exacerbation if a resident shows onset of BPSD. However, caregivers with limited knowledge of BPSD and limited care skills for BPSD are unlikely to notice early symptoms. Therefore, they are likely to fail to provide preventive care. Communication from leaders works effectively in such situations. Fukui et al.[10] reported that experienced care workers with certifications were able to build effective relationships. Specifically, they stated that caregivers who understood and responded to “repeated complaints” built successful relationships, dealing appropriately with the needs of elderly residents and their “repeated appeals to return home.” Their findings suggest that success in providing nursing care to people with dementia largely depends on empirical knowledge.[31]

However, it is important that all team members, regardless of experience, have the ability to assess at the same level.[1] The role of the leader in managing the work of inexperienced staff is important as well. Khan et al.[32] reported that 65% of caregivers responsible for managing BPSD needed support in practical problem-solving. Salas et al.[33] also reported that gaps in abilities and experience among team members could be addressed by adjusting and monitoring the pace of each member of the BPSD team as well as collective activities such as checking whether certain members have more knowledge or more advanced skills than others. Koder et al. reported that staff rated behavioral concerns at a group level with senior nursing staff as the most important for developing behavioral strategies.[11] This can be achieved by providing team members with opportunities to share information on daily changes in residents and communicating their thoughts on BPSD care within the team. Our scale can objectively evaluate the BPSD care skills of team members and assess the factors that contribute to effective teamwork, which may help improve BPSD care skills among team members and promote teamwork in caregivers. The exploratory factor analysis showed that the components of each of the three extracted substructures corresponded almost perfectly to the conceptual elements of Dickinson and McIntyre's teamwork model that emphasizes that communication influences teamwork at all points in this loop.[15]

Cohen et al.[34] also noted that proactive communication among team members was associated with team success and better performance. For instance, BPSD team

members understood their current situation, proposed measures for improvement, supported each other, and resolved conflicts. Moreover, person-centered BPSD care provided by a multidisciplinary team was effective not only for building relationships among team members and residents with BPSD, but also for improving the skills of facility staff.[35] Effective teamwork in BPSD care can be achieved through the growth of the BPSD team, which can be facilitated when team members share their understanding of BPSD care. The primary objective of BPSD team care is to help the entire team work on their care skills and improve their overall capabilities. Ensuring prophylactic interventions and interventions to avoid exacerbating BPSD may help prevent the onset and worsening of BPSD.

To examine construct validity, we drew on Hackman's team effectiveness standards[36] to calculate the correlation coefficients with group identification and job satisfaction. Low to extremely high positive correlations were observed for the subscales of the BPSD Team Care Self-Assessment Scale. The Misawa Nurse Teamwork Measurement Scale[21] is supported by the basic assumptions of Dickinson and McIntyre's[15] teamwork model. Therefore, the newly devised scale may be considered to measure teamwork in the same manner as the nurse teamwork measurement scale from Misawa et al.,[21] which shows that members of a high-quality BPSD team are proud to be part of the team and have an emotional attachment to it.

Additionally, there were low to moderate positive correlations between job satisfaction and the subscales of the BPSD Team Care Self-Assessment Scale. These findings correspond with those of existing research,[21] namely, that the members of a BPSD team that provides high-quality team care are highly satisfied with their jobs. Weak correlations were observed overall with "salary." Of the four sub-concepts of Adachi's Job Satisfaction Scale, "work environment," "interpersonal relationships," and "job responsibilities" were considered to be close to the team care concept of this study. However, "salary" and "team care" are different concepts, and almost no correlation could be confirmed. This finding corresponds to the research by Misawa et al.,[21] who explained that perceptions of salary were associated with the systems in the organization, such as the human resources department, rather than the quality of teamwork. In our confirmatory factor analysis, sufficient values were observed for all the indicators; thus, a good fit was achieved. Therefore, the factor validity of the BPSD Team Care Self-Assessment Scale was verified.

Limitations and Scope for Further Research

The BPSD Team Care Self-Assessment Scale developed here helps overcome some of the challenges of BPSD care. Better personalized care can be provided by assessing and promoting caregivers' dementia competencies. However, further research is needed on the development and achievements of dementia care competencies.

This study was supported by care facilities across Japan, from Hokkaido to Kyushu, but only 18.3% of the facilities that were contacted agreed to participate. Therefore, the findings of this study may have limited generalizability. Further, selection bias may have affected the results. Going forward, it would be important to recruit more participants so that the scale can be refined and applicable to a wider range of people.

Conclusion

A BPSD team with good communication, follow-up, and self-evaluation systems can provide comprehensive care for BPSD. Strategies that enhance the management skills of BPSD care staff are essential for the successful treatment of elderly people with dementia.

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Table 1: Participants' attributes

	No. of participants	(%)	Mean	SD
Sex				
Women	208	(67.1)		
Men	102	(32.9)		
Age			40.20	10.2
10s	1	(0.3)		
20s	44	(15.0)		
30s	105	(35.8)		
40s	86	(29.4)		
50s	44	(15.0)		
60s	13	(4.4)		
Job type (multiple answers permitted)				
Certified care worker	232	74.8		
Helper level 1–3 (has completed induction training)	75	24.2		

Care manager	57	18.4		
Social worker	12	3.9		
Dementia care specialist	8	2.6		
Lead social worker	42	13.5		
Nurse (nursing associate)	35	11.3		
Childcare worker	15	4.8		
Registered dietitian	5	1.6		
Physical therapist	6	1.9		
Other	22	7.1		
No social welfare-related certifications	6	1.9		
Number of years of experience at nursing care facilities			13.10	7.4
< 1 year	3	0.9		
1–5 years	45	14.5		

6–10 years	83	26.8
11–15 years	57	18.4
16–20 years	64	20.6
21–25 years	25	8.1
26–30 years	13	4.2
≥ 31 years	5	1.6
No answer	15	4.8
Job type		
General caregiver	128	41.3
Leader/Supervisor/Chief	135	43.5
Facility director	1	0.3
Other	43	13.9
No answer	3	1.0
Floor structure		
Conventional special nursing home	140	45.2
Unit-type special nursing home	131	42.3
Group home	8	2.6

Mixture of shared rooms and units	11	3.5
Other	17	5.5
No answer	3	1.0
Type of employment		
Full-time	284	91.6
Part-time	24	7.7
No answer	2	0.6
Current health condition		
Very healthy	42	13.5
Somewhat healthy	228	73.5
Somewhat unhealthy	33	10.6
Very unhealthy	5	1.6
No answer	2	0.6

SD, standard deviation

Table 2: Correlations between the descriptive statistics, Cronbach's alpha, and items of the BPSD Team Care Self-Assessment Scale

Scale	Median	Interquartile range: the 25th percentile	Interquartile range: the 75th percentile	Mean	SD	α	Nurse team orientation (r_s)	Nurse leadership (r_s)	Nurse team process (r_s)
Communication that enhances team orientation						0.805			
Team building through mutual support	3.40	3.00	3.89	3.43	0.685	0.892	0.73**	0.64**	.69**

Mutual support between multiple professions	3.71	3.29	4.00	3.72	0.824	0.838	0.58**	0.59**	.59**
Leader-initiated communication						0.796			
Leadership for supporting team members in improving care skills	3.31	2.92	3.62	3.28	0.830	0.882	0.66**	0.61**	.62**
Work toward BPSD exacerbation prevention	3.80	3.40	4.20	3.14	0.586	0.825	0.50**	0.46**	.43**
Communication that facilitates the growth of the BPSD team						0.782			
Mutual growth	3.40	3.00	3.80	3.33	0.946	0.776	0.62**	0.56**	.62**

Sharing information on daily changes	3.80	3.40	4.00	3.7	0.155	0.691	0.51**	0.47**	.52**
Acquiring care skills focused on comfort	4.00	2.75	4.30	3.89	0.713	0.756	0.52**	0.46**	.58**

* p < .05, ** p < .01

r_s, Spearman’s rank correlation coefficient; SD, standard deviation; α, coefficient; Cronbach's α

Table 3. Correlations between the BPSD Team Care Self-Assessment Scale and work aspects

Item	Group identification	Salary	Workplace environment	Interpersonal relationship	Job description
Communication that enhances team orientation					
Team building through mutual support	.249**	.285**	.401**	.522**	.421**
Mutual support between multiple professions	.643**	.238**	.453**	.456**	.400**
Leader-initiated communication					

Leadership for supporting team members in improving care skills	.709**	.241**	.407**	.376**	.438**
Work toward BPSD exacerbation prevention	.434**	.226**	.312**	.199**	.342**
Communication that facilitates the growth of the BPSD team					
Mutual growth	.623**	.232**	.406**	.414**	.375**
Sharing information on daily changes	.666**	.127*	.311**	.350**	.331**
Acquiring care skills focused on comfort	.432**	.168**	.304**	.439**	.341**

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

Supplementary Table 1: Creating the scale draft

Team orientation
1. I have access to meetings where attendees with any level of experience can freely discuss slight changes in residents and propose ideas for improving care.
2. I determine a care plan by achieving an agreement with multiple other professionals.
3. I share an understanding of the orientation of team care with other team members.
4. I feel a sense of unity with the team and peace of mind, even when I am providing care on my own.
5. The members of my team love nursing care work.
6. The members of my team are highly motivated to contribute to the team in achieving care goals.
7. The members of my team recognize each other’s strengths and growth.

8. I share my rationale for each care task with other team members.

9. I share an understanding with other team members that activities are effective in dealing with core symptoms.

10. I share an understanding with other team members that inappropriate responses to residents can worsen their irritation and anxiety as well as BPSD.

11. I share the information of residents with other team members in order to prevent residents from resisting care, such as refusing toilet assistance and bathing.

Leadership

1. Staff are available who can mediate arrangements between multiple professionals.

2. The members of my team collaborate with each other while providing care, including medical care.

3. I practice the following behaviors when communicating with residents: touching, making eye contact, smiling, speaking softly, and nodding.

4. I provide different types of care depending on how reduced the resident's ADL level is.

5. Whenever I notice, I help other staff who are struggling to deal with BPSD that has manifested due to changes in the environment, such as short stays.
Monitoring
1. All members of my team check in with each other to make sure that none of them are facing difficulty in providing care.
2. I adopt an innovative approach to communicating unified care.
3. I collect information that helps me imagine the personality of residents.
4. I can add or amend information as required, so that the information of residents will not always be that which was collected when they were registered as new residents.
5. The members of my team have specialist knowledge and skills in BPSD care.
6. I review current care when a resident continues to exhibit emotional disabilities such as restlessness and irritation.
7. My workplace has sufficient human and environmental resources to help improve BPSD care.

Feedback
1. I assess the sleep of residents during the night (a feeling of deep sleep and sleep duration).
2. I am given opportunities to reflect on BPSD care that our team has provided.
3. I support my team members when they face difficulty in providing care.
4. Each member of my team can demonstrate their strengths and special capabilities in terms of care skills.
5. I have built a close relationship with the families of residents and understand their needs.
6. I evaluate the current care to ensure that it is aligned with the everyday rhythm of the resident.
7. My team has a system that helps its members grow.
Coordination
1. All my team members adjust their schedules efficiently so that they can secure time for both providing care and creating records.

2. I am given opportunities to seek advice from people in a variety of other professions.

3. I collaborate with multiple other institutions and share the information of residents with BPSD.

4. I am given opportunities to learn about BPSD care together with all other team members.

5. I have the motivation to learn about BPSD care.

6. I feel that senior staff encourage seamless communication.

7. My team members laugh a lot together.

8. My team members closely communicate with each other and share information when they face difficulty in providing BPSD care. No team member struggles alone.

9. It is easy to build an emotionally connected relationship within my team.

Backing-up behaviors

1. I respect the sense of “comfort” in the residents when I care for them.

2. I assume the psychological condition of residents with BPSD based on their verbal behavior and treat them while respecting their dignity.

3. I ask all staff to reduce the volume of their voice in order to ensure a quiet environment.

4. I understand that a relationship of trust can be built with residents by giving them peace of mind.

5. All of my team members understand changes in the symptoms of short-stay residents.

6. I do not disparage the residents when they are living in their memories of the past, as I am able to put myself in their shoes.

7. I understand the interests, curiosities, and favorite activities and objects of residents, and take them into account when I care for them.

8. I can find out what I need to do to calm a resident with BPSD while maintaining a receptive attitude toward them.

9. I do not force a resident to stop moving when they wish to go home or are restless. I try to understand the intent of their behavior.

10. I understand that a resident can become agitated if I pretend to listen to them or deny their self-victimization. With this in mind, I review the current care and measures.

11. When a resident exhibits marked emotional disorders, such as depression, anxiety, irritation, or agitation, I take a different approach to care.

12. When urinary or fecal incontinence, unhygienic behaviors, or resistance to nursing care, such as verbal and physical violence, are present, I assess the signs of BPSD in considering care.

13. I assess the progression of core symptoms.

14. I know that the quality of sleep affects BPSD; therefore, I provide care to residents after checking their state of wakefulness.

15. I can give residents a role by taking their personality and demeanor into account.

16. People in various professions are involved in my unit. We provide care together.

Supplementary Table 2: Analysis of items in “communication that enhances team orientation”

	Factor load		
	1	2	Commonality
Factor 1: Team building through mutual support			
1. The members of my team recognize each other’s strengths and growth.	**0.934**	-0.216	0.642
2. It is easy to build an emotionally connected relationship within my team.	**0.874**	-0.097	0.657
3. The members of my team are highly motivated to contribute to the team in achieving care goals.	**0.846**	-0.060	0.650
4. All members of my team check in with each other to make sure that none of	**0.746**	0.019	0.577

	them are facing difficulty in providing care.			
5.	The members of my team love nursing care work.	**0.587**	0.088	0.423
6.	My team members laugh a lot together.	**0.557**	0.093	0.390
7.	My team has a system that helps its members grow.	**0.538**	0.221	0.500
8.	I share an understanding of the orientation of team care with other team members.	**0.520**	0.164	0.414
9.	I feel that senior staff are encouraging seamless communication.	**0.480**	0.221	0.425
10.	I feel a sense of unity with the team and peace of mind, even when I am providing care on my own.	**0.416**	0.405	0.567

11. Whenever I notice, I help other staff who are struggling to deal with BPSD that has manifested due to changes in the environment, such as short stays.	**0.396**	0.191	0.296
12. I adopt an innovative approach to communicating unified care.	**0.357**	0.353	0.425
13. I have built a close relationship with the families of residents, and understand their needs.	0.343	0.331	0.382
Factor 2: Mutual support through collaboration between multiple professions			
1. I determine a care plan by achieving an agreement with multiple other professionals.	-0.107	**0.790**	0.519
2. The members of my team collaborate with each other when providing care,	-0.090	**0.752**	0.482

including medical care.			
3. I am given opportunities to seek advice from people in a variety of other professions.	0.035	**0.667**	0.479
4. Staff are available who can mediate arrangements between multiple professionals.	-0.010	**0.637**	0.398
5. People in various professions are involved in my unit. We provide care together.	0.158	**0.525**	0.414
6. I support my team members when they face difficulty in providing care.	0.190	0.272	0.181
Factor contribution	7.210	6.150	

The inter-factor correlation coefficient between was .68.

Factor extraction methods: Non-weighted least squares

Method of rotation: Promax with Kaiser's normalization[a]

Supplementary Table 3: Analysis of items in "leader-initiated communication"

	Factor		
	1	2	Commonality
Factor 1: Leadership for supporting team members in improving care skills			
1. I ask all staff to reduce the volume of their voice in order to ensure a quiet environment.	**0.761**	-0.133	0.441
2. I evaluate the current care to ensure that it is aligned with the everyday rhythm of the resident.	**0.682**	-0.022	0.442
3. I do not force a resident to stop moving when they wish to go home or are	**0.623**	-0.078	0.318

	restless. I try to understand the intent of their behavior.			
4.	I collaborate with multiple other institutions and share with them the information of residents with BPSD.	**0.597**	0.023	0.378
5.	My workplace has sufficient human and environmental resources to help improve BPSD care.	**0.570**	0.081	0.403
6.	When a resident exhibits marked emotional disorders, such as depression, anxiety, irritation, or agitation, I take a different approach to care.	**0.497**	0.260	0.514
7.	I understand that a resident can become agitated if I pretend to listen to them or deny their self-victimization. With this in mind, I review the current care and measures.	**0.488**	0.198	0.426

8. I collect information that helps me imagine the personality of residents.	**0.468**	-0.063	0.177
9. I share the rationale for each care task with other team members.	**0.457**	0.203	0.393
10. I am given opportunities to reflect on BPSD care that our team has provided.	**0.435**	0.288	0.467
11. The members of my team have specialist knowledge and skills in BPSD care.	**0.429**	0.312	0.489
12. I share an understanding with other team members that inappropriate responses to residents can worsen their irritation and anxiety as well as BPSD.	**0.404**	0.338	0.490
13. I do not disparage the residents when they are living in their memories of the past, as I am able to put myself in their shoes.	**0.358**	0.034	0.148
Factor 2: Work toward the prevention of BPSD exacerbation			

1.	I share an understanding with other team members that activities are effective in dealing with core symptoms.	-0.210	**0.947**	0.634
2.	I know that the quality of sleep affects BPSD; therefore, I provide care to residents after checking their state of wakefulness.	-0.165	**0.817**	0.486
3.	I have the motivation to learn about BPSD care.	0.066	**0.526**	0.335
4.	I assess the progression of core symptoms.	0.298	**0.491**	0.555
5.	I am given opportunities to learn about BPSD care together with all other team members.	0.210	**0.438**	0.379
6.	When urinary or fecal incontinence, unhygienic behaviors, or resistance to nursing care, such as verbal and physical violence, are present, I assess the	0.316	**0.382**	0.434

signs of BPSD in considering care.			
7. I assess the sleep of residents during the nighttime	0.260	0.328	0.307
8. I review the current care if the resident continues to exhibit emotional disorders.	0.282	0.309	0.376
Factor contribution	7.010	6.590	

The inter-factor correlation coefficient between was .77.

Factor extraction methods: Non-weighted least squares

Method of rotation: Promax with Kaiser's normalization[a]

Supplementary Table 4: Analysis of items in “communication that facilitates the growth of the BPSD team”

	Factor load			
	1	2	3	Commonality
Factor 1: Mutual growth				
1. All my team members adjust their schedules efficiently so that they can secure time for both providing care and creating records.	**0.682**	-0.135	0.081	0.420
2. I can find out what I need to do in order to calm a resident with BPSD while maintaining a receptive attitude toward them.	**0.587**	-0.071	0.200	0.468
3. Each member of my team can demonstrate their strengths and special	**0.580**	0.312	-0.104	0.574

	capabilities in terms of care skills.				
4.	My team members closely communicate with each other and share information when they face difficulty in providing BPSD care. No team member struggles alone.	**0.502**	0.053	0.115	0.388
5.	I can give residents a role by taking their personality and demeanor into account.	**0.378**	0.136	0.125	0.332
Factor 2: Sharing information on daily changes					
1.	I provide different types of care depending on how reduced the resident's ADL level is.	-0.265	**0.681**	0.308	0.548
2.	I can add or amend information as required, so that the information of	0.166	**0.629**	-0.077	0.493

	residents will not always be that which was collected when they were registered as new residents.				
3.	I have access to meetings where attendees with any level of experience can freely discuss slight changes in residents and propose ideas for improving care.	-0.013	**0.603**	-0.066	0.306
4.	I share the information of residents with other team members in order to prevent residents from resisting care, such as refusing toilet assistance and bathing.	0.010	**0.416**	0.252	0.385
5.	All of my team members understand changes in the symptoms of short-stay residents.	0.306	**0.409**	-0.155	0.312

6. I understand the interests, curiosities and favorite activities and objects of residents, and take them into account when I care for them	0.290	0.321	0.105	0.412
7. I assume the psychological condition of residents with BPSD based on their verbal behavior, and treat them while respecting their dignity.	0.219	0.279	0.265	0.455
Factor 3: Acquiring care skills focused on comfort				
1. I understand that a relationship of trust can be built with residents by giving them a peace of mind.	0.102	-0.139	**0.827**	0.651
2. I practice the following behaviors when communicating with residents: touching, making eye contact, smiling, speaking softly, and nodding.	0.067	0.039	**0.674**	0.560

3. I respect the sense of “comfort” in the residents when I care for them.	0.124	0.143	**0.433**	0.401
Inter-factor correlation		0.696	0.659	
			0.665	
Factor contribution	4.670	4.650	4.390	

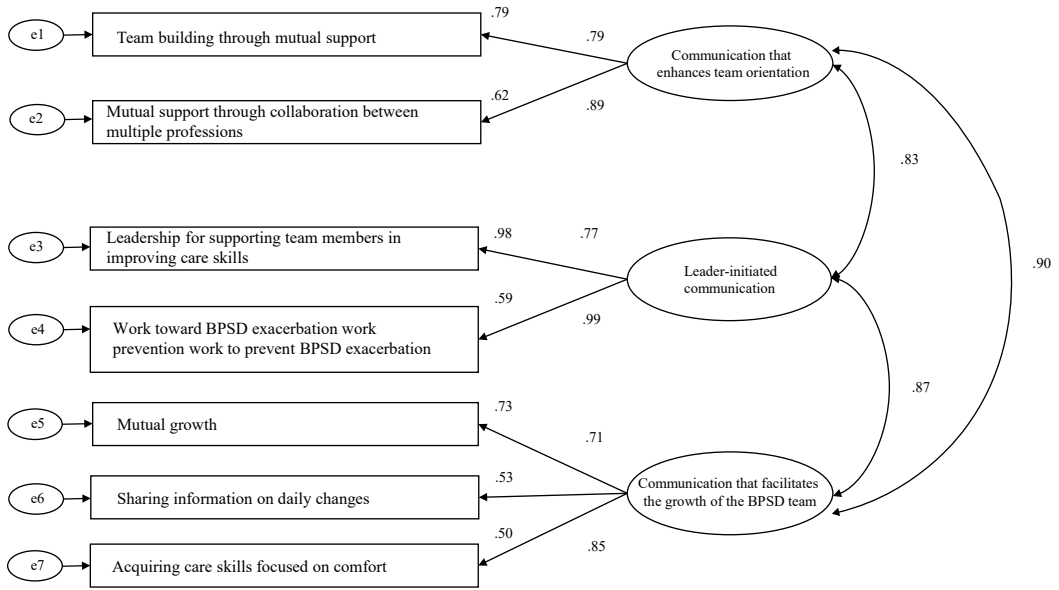
The inter-factor correlation coefficient between was .70,.66,.67

Factor extraction methods: Non-weighted least squares

Method of rotation: Promax with Kaiser’s normalization[a]

Figure Caption

Figure 1 Results of the confirmatory factor analysis


e1
Team building through mutual support
.79
.79
e2
Mutual support through collaboration between multiple professions
.62
.89
Communication that enhances team orientation
.83
e3
Leadership for supporting team members in improving care skills
.98
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e4
Work toward BPSD exacerbation work prevention work to prevent BPSD exacerbation
.59
.99
Leader-initiated communication
.90
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e5
Mutual growth
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e6
Sharing information on daily changes
.53
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Acquiring care skills focused on comfort
.50
.85
Communication that facilitates the growth of the BPSD team