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The word ‘Human Services’ is used when someone faces social challenges for ‘help’ or ‘support’ people.

‘Human Services’ is expanding rapidly its area such as field of social welfare, medical, nursing, clinical psychology related mental care, health promotion for aging society, assist family for infant and child care, special supporting education corresponding to vocational education, education support sector corresponding to era of lifelong learning and fluidization of employment corresponding to the area of career development.

Human Services area, if its research methods are scientific, is internationally accepted and greater development is expected by collaborative research which is performed by multinational and multi-profession.

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ORIGINAL ARTICLES

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ORIGINAL ARTICLE

Current Status and Challenges of Interprofessional Work to Promote Independence in Excretion among Older People Requiring Care and Living in Provincial Cities;

Focused on Roles of the Nursing College and Home Life Support services

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ABSTRACT

This study examined comprehensive care to promote independence in excretion in the city with such regional characteristics as a basis for discussing the roles of the nursing college with the mission of contributing to "education", "research", and "society" in this area. A questionnaire survey was conducted involving 72 professionals, who participated in a training course provided by the community-based comprehensive support center of a provincial city (study city), and their responses in a free-description style were examined by Berelson's content analysis. The current status of IPW to promote independence in excretion among older people requiring care was outlined by the following 7 categories: collaborating with professionals needed in consideration of user individuality, collecting/sharing information, performing the PDCA Cycle, providing guidance for family caregivers, respecting users' and their families' intentions, respecting various other professionals, and raising awareness to promote independence in excretion. Challenges of such IPW were classified into factors associated with current challenges and approaches required to resolve them, which were represented by 8 categories each: the former included: users' and family caregivers' personal backgrounds, barriers between medical and other institutions, deficiency of resources for collaboration, complexity of various excretion care interventions, and facilities' problems; and the latter included: education, Ingenuity for consensus-building, partnership, and ethical considerations. The results highlighted the necessity of examining the types of information to be shared, as well as the methods to share such information and make use of it for plan implementation through a series of processes, when proving care to promote independence in excretion among older people requiring care through IPW. Interprofessional education to improve management skills as a basis for promoting independence in excretion was also suggested to be required.

<Key-words>
Care to promote independence in excretion, home life support services, interprofessional working

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I. Introduction

Building a community-based integrated care system to help older people continue to live in their communities while maintaining their dignity, even when they become care-dependent, is a pressing issue for Japan. Such care requires system development to appropriately provide various types of life support, including medical, care, and welfare services, in everyday life settings. However, it is not easy for older people to continue to live in their communities, and the difficulty of maintaining independence in excretion is one of the causes. In many elderly people, forced diaper use and bed rest during hospitalization lead to a decline in walking ability and consequent lowered level of independence in excretion. Increased burdens on caregivers and a significantly lower rate of return to home among older people who are not independent in excretion and require assistance have also been reported[1,2]. Based on these findings, independence in excretion may be key to help older people continue to live in their communities, even when they become care-dependent.

As a measure to promote independence in excretion, Japan newly defined "additional fees for support to promote independence in excretion" or improve the excretory function of older people requiring care and living in long-term care insurance-covered facilities, when it revised care fees in 2018. These fees were added to evaluate the support for facility residents with excretory disorders, provided through interprofessional collaboration, and reducing diaper use is one of the requirements to calculate them. As for medical institutions, a system to evaluate their approaches to comprehensively and continuously promote independence in excretion from hospitalization to outpatient service use was launched when the medical fees were revised in 2020. Thus, approaches to promote independence in excretion are being provided according to the characteristics of each institution, but unified, integrated care is not being provided throughout medical, facility, and home settings[3]. For example, in a previous study, acute care ward nurses realized the difficulty of care to promote independence in excretion despite the shortening of hospital stays, and they needed continuous, multi-institutional interventions, as acute nursing care alone does not suffice for this purpose[4]. Another study reported that health service facilities for older people requiring care lacked information regarding independence in excretion from other institutions and understanding of the roles of other institutions/professionals to collaborate with, and these deficiencies made it difficult for them to continuously provide care, with the aim of promoting independence in excretion[5]. In home care approaches to urination, challenges associated with various factors, such as system-related issues and differences in views and motivation among professionals, were noted[6].

In home life support services, where relevant occupations vary according to users' and their families' situations, and economic and other problems related to individual users' backgrounds are intricately associated with each other, it is particularly difficult for a

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single institution to provide sufficient support. Therefore, Interprofessional work (IPW) is considered essential to support each user/family through collaboration among several institutions. In other words, home support does not provide the care that is really necessary if each occupation visits alone, but it is possible to provide care to improve the quality of life of the user by coordinating and collaborating with each occupation[7]. In terms of IPW, medical care precedes, and social welfare/social work lags behind, although the importance of IPW is also well-recognized in the latter[8]. As elements of IPW, "promotion of information-sharing", "promotion of team approaches to care", and "promotion of smoother service provision" have been reported to be important[9]. However, concerning IPW, visiting nurses and care managers find the [promotion of information-sharing] difficult, and there are discrepancies between them in the awareness of [trust-based relationships][10], revealing various challenges of IPW in home life support services. Under such circumstances, in recent years, medical universities centered on education are expected to contribute to regional cooperation and construction of a comprehensive community care system[11].

Considering such a situation, this study examined comprehensive care to promote independence in excretion in the city with such regional characteristics as a basis for discussing the roles of the nursing college with the mission of contributing to "education", "research", and "society" in this area.

II. Definition of term

As defined in a caregiving skill-up workshop held by the Japanese Council of Senior Citizens Welfare Service, independence in excretion refers to "being able to excrete using general or portable toilets, not requiring diapers or similar products for fecal management", and comprehensive care to promote independence in excretion refers to "continuously providing care to promote independence in excretion throughout public health, medical, and welfare settings".

III. Subjects and Methods

1. Study design

A qualitative, descriptive study.

2. Outline of the study area and reasons for choosing it

The study city is located in the eastern part of a prefecture with a population of 109,035, total household number of 49,630, and aging rate of 29.3% (as of April 1, 2020). In 2016, the average life expectances among males and females in the city were 79.8 (national

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average: 80.9) and 85.9 (87.1), respectively. When focusing on regional medical resources, the number of each type of heath care facilities per 100,000 population in a designated health area, including the city, is as follows: general clinics: 56.87 (national average: 69.75), general clinic beds: 70.77 (66.63), and care facilities: 9.76 (11.31). In a survey in October 2020, the most common care/support grade in the study city was Care Grade 1 (31.5%), followed by Care Grade 2 (21.9%)[12], whereas these grades accounted for 23.7 and 20.3%, respectively, in national statistics in 2019[13].

The city was chosen for the following reasons: As a tertiary care center, a hospital of the nursing college the author belongs to is available in the eastern area of the prefecture. The study city and the area with the college hospital are located in the same designated health area. Additionally, the nursing college is the only college specializing in health care in the city. This study examined comprehensive care to promote independence in excretion in the city with such regional characteristics as a basis for discussing the roles of the nursing college with the mission of contributing to “education”, “research”, and “society” in this area.

3. Subjects and methods

The subjects were professionals who participated in a web-based training course provided by the community-based comprehensive support center of a district of the prefecture as a project to expand the center’s function, with the theme “Discussing Effective Support for Family Caregivers”. Before asking these professionals to cooperate with the study, the chief of the Community-based Integrated Care Promotion Section of the city, which was in charge of the district community-based comprehensive support center organizing the training course, was provided with oral and written explanations of the study objective and ethical considerations to obtain her approval. Then, the professionals were provided with an oral explanation of the study objective and ethical considerations on the internet, while explanatory documents, including instructions for the questionnaire response, were distributed to the 37 facilities they belonged to according to the number of professionals in each, and asking the chiefs of their departments to individually distribute these documents. They responded to the questionnaire and returned their responses based on their free will. Each returned response was regarded as consent from a subject. The questionnaire survey was conducted from September 17 to October 29, 2021, using Google Forms.

4. Study items

1) Subjects’ basic attributes

As their basic attributes, the subjects’ sex, age, educational background, current occupation, length of experience in the current occupation, and type of service were asked.

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2) Current status and challenges of IPW for comprehensive care to promote independence in excretion

The subjects were also asked to describe their daily approaches to care to promote independence in excretion among users through collaboration with various other institutions/professionals and related challenges as specifically as possible.

5. Analysis

The subjects' basic attributes were organized by simple tabulation.

From their free descriptions, data representing the "current status of IPW in home life support services to promote independence in excretion among older people requiring care" and "challenges of comprehensive care to promote independence in excretion" were extracted, and their contents were analyzed using Berelson's technique. Berelson's content analysis is a method to systematically indicate descriptions in documents and data as a category system[14], and it was deemed suitable for analyzing the free descriptions obtained in the present survey. The analytical procedure was as follows: 1) creating a table of raw data, 2) determining the context units, 3) dividing them into recording units, 4) classifying these units based on semantic similarities, and 5) quantifying the frequency of appearance of recording units in each category.

The analytical procedure was performed while repeatedly deliberating with collaborative researchers. In addition, to confirm the reliability of categories, 1 collaborative researcher with experience of research using content analysis and 1 professional providing home life support services (a total of 2) were asked to reanalyze the data, and the concordance rate for categorization was calculated using a calculation formula developed by Scott, W. A.[15]. The reliability cutoff was set at 70% or higher.

6. Ethical considerations

The chief of the Community-based Integrated Care Promotion Section of the city in charge of the district community-based comprehensive support center organizing the training course and the subjects were provide with oral and written explanations of 2 considerations: the questionnaire was anonymous and this was a web-based survey using Google Forms, but individuals would not be identified as anonymization measures were adopted. Other principles, including: responses based on free will, the right to refusal, no disadvantageous treatment of those not cooperating with the study, maintenance of anonymity, protection of the study data using passwords, and their storage in a lockable vault for 10 years, were also explained.

The study was approved by the Ethics Committee of the nursing college (approval number: 03-2).

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IV. Results

Among the 72 professionals asked for cooperation, 29 responded (response rate: 40.3%), and all of them were included for analysis.

From their free descriptions, 112 context units were extracted, which were divided into 200 recording units. Among these recording units, 13 with higher abstractness and unclear descriptions were excluded, and 187 were analyzed and categorized based on semantic similarities. The current status of IPW to promote independence in excretion among older people requiring care was outlined by 7 categories, while factors associated with current challenges in care to promote such independence and approaches required to resolve them were summarized into 8 categories each. The concordance rates for the former and latter categorizations were 73.7 and 78.9%, respectively. As the rate exceeded 70% in both cases, the reliability was deemed sufficient.

1. Subject characteristics (Table 1)

There were 26 (89.7%) females and 3 (10.3%) males, and the mean age was 49.9±7.8 (range: 29 - 65). Their educational backgrounds were as follows: senior high school: 8 (27.6%), vocational school: 6 (20.7%), junior college: 6 (20.7%), and college/university: 9 (31.0%).

Their current occupations were as follows: care manager: 18 (62.1%), certified care worker: 5 (17.2%), care worker: 3 (10.3%), nurse: 2 (6.9%), and social worker: 1 (3.5%). The length of experience in the current occupation was shorter than 1 year in 3 (10.3%), 1 year or longer, but shorter than 3 years in 2 (6.9%), 3 years or longer, but shorter than 5 years in 2 (6.9%), 5 years or longer, but shorter than 8 years in 7 (24.1%), and 8 years or longer in 15 (51.8%). The type of service was home care support in 18 (62.1%), community-based comprehensive support center work in 5 (17.2%), home-visit care in 5 (17.2%), and home-visit nursing in 1 (3.5%).

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<Table1> Basic attributes

Item/Category		n	(%)
Sex			
	Female	26	(89.7)
	Male	3	(10.3)
Age a)		49.9±7.8［29～65］	
Final Education			
	Senior high school	8	(27.6)
	Vocational school	6	(20.7)
	Junior college	6	(20.7)
	College/university	9	(31.0)
Current occupation			
	Care manager	18	(62.1)
	Certified care worker	5	(17.2)
	Care worker	3	(10.3)
	Nurse	2	(6.9)
	Social worker	1	(3.5)
The length of experience in the current occupation			
	Shorter than 1 year	3	(10.3)
	1 year or longer, but shorter than 3 years	2	(6.9)
	3 years or longer, but shorter than 5 years	2	(6.9)
	5 years or longer, but shorter than 8 years	7	(24.1)
	8 years or longer	15	(51.8)
The type of service			
	Home care support	18	(62.1)
	Community-based comprehensive support center	5	(17.2)
	Home-visit care	5	(17.2)
	Home-visit nursing	1	(3.5)

a) Average Value±Standard deviation［min～max］

2. Current status of IPW to promote independence in excretion among older people requiring care (Table 2)

The current status of IPW to promote independence in excretion among older people requiring care was outlined by 7 categories (<< >>) and 55 recording units (< >). The number of recording units comprising each category was as follows: <<collaborating with professionals needed in consideration of user individuality>>: 21 (38.2%), <<collecting/sharing information>>: 21 (38.2%), <<performing the PDCA Cycle>>: 5 (9.1%), <<providing guidance for family caregivers>>: 4 (7.3%), <<respecting users' and

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their families' intentions>>: 2 (3.6%), <<respecting various other professionals>>: 1 (1.8%), and <<raising awareness to promote independence in excretion>>: 1 (1.8%).

To promote independence in excretion among older people requiring care, the professionals providing home life support services adopted measures, such as <collaborating with those providing home-visit nursing/home-visit care services> and <collaborating with those providing assistive products>, which were summarized into <<collaborating with professionals needed in consideration of user individuality>>. At this point, they collected information from several institutions/professionals, including <holding meetings of persons in charge> and <collecting information from various other institutions/professionals>, which were represented by <<collecting/sharing information>>. They made use of the collected information for <<performing the PDCA Cycle>> to promote independence in excretion, specifically by <assessing users' mental/physical conditions> and <formulating excretion care plans>. Their activities also included: <assessing users' excretory function in day care, and providing guidance for their families> and <providing motor guidance through rehabilitation specialists>, which were represented by <<providing guidance for family caregivers>>. They performed these activities, while <<respecting various other professionals>>, such as <respecting various other professionals' opinions>, in addition to <<respecting users' and their families' intentions>>, such as <respecting and sharing users' and their families' intentions>, and <<raising awareness to promote independence in excretion>> such as <promoting awareness of independence in excretion among related institutions>. Thus, they provided care to promote independence in excretion through collaboration with various other institutions/professionals.

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<Table2> Current status of IPW to promote independence in excretion among older people requiring care

Categories	Same recording unit	Recording unit (%)
collaborating with professionals needed in consideration of user individuality (21)	Collaborating with those providing home-visit nursing/home-visit care services (8)	21 (38.2)
	Collaborating with rehabilitation specialists (4)	
	Collaborating with those providing assistive products (4)	
	Collaborating with day care facilities (2)	
	Collaborating with various other professionals/institutions in consideration of user individuality (2)	
	Asking to notify users when it is time to excrete	
collecting/sharing information (21)	Sharing information (10)	21 (38.2)
	Collecting information from various other institutions/professionals (6)	
	Holding meetings of persons in charge (2)	
	Confirming information	
	Placing importance on information-sharing	
	Making use of telephones	
performing the PDCA Cycle (5)	Assessing users' mental/physical conditions	5 (9.1)
	Formulating excretion care plans	
	Monitoring	
	Continuously providing the services	
	Developing improving plans to promote independence	
providing guidance for family caregivers (4)	Providing guidance (2)	4 (7.3)
	Assessing users' excretory function in day care, and providing guidance for their families	
	Providing motor guidance through rehabilitation specialists	
respecting users' and their families' intentions (2)	Respecting users' and their families' intentions	2 (3.6)
	Sharing related challenges and users' wishes, and examining solutions together	
respecting various other professionals (1)	Respecting various other professionals' opinions	1 (1.8)
raising awareness to promote independence in excretion (1)	Promoting awareness of independence in excretion among related institutions	1 (1.8)
	Total	55 (100)

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3. Challenges of IPW to promote independence in excretion among older people requiring care

Challenges of IPW to promote independence in excretion among older people requiring care were classified into "factors associated with current challenges" and "approaches required to resolve them".

Factors associated with current challenges were represented by 8 categories and 60 recording units (Table 3). The number of recording units comprising each category was as follows: <<users' and family caregivers' personal backgrounds>>: 19 (31.7%), <<barriers between medical and other institutions>>: 10 (16.7%), <<deficiency of resources for collaboration>>: 9 (15.0%), <<complexity of various excretion care interventions>>: 8 (13.3%), <<facilities' problems>>: 5 (8.3%), <<insufficient sharing for collaboration>>: 4 (6.7%), <<other institutions'/professionals' insufficient understanding>>: 4 (6.7%), and <<unclear definition of independence>>: 1 (1.6%).

The professionals providing home life support services perceived various difficulties related to <<users' and family caregivers' personal backgrounds>>, such as <users in a bad mood>, <interventions for older people with dementia>, <lack of cooperation from families>, and <family caregivers' insufficient knowledge>, when providing care to promote independence in excretion among older people requiring care. With regard to IPW, they realized <barriers between medical and care services>, in addition to <<barriers between medical and other institutions>>, such as <difficulty in sharing information with medical institutions>, and <<other institutions'/professionals' insufficient understanding>> such as <insufficient understanding among professionals> and <insufficient relationship-building among institutions>. When collaborating, they felt that a <<deficiency of resources for collaboration>>, including a <lack of places for interprofessional meetings> and <lack of common forms>, resulted in <<insufficient sharing for collaboration>> or <insufficient information-sharing>. Furthermore, as challenges of care to promote independence in excretion, they also realized the <<complexity of various excretion care interventions>> associated with various factors, such as the <necessity of assistance according to each user's excretory rhythm> and <time-consuming>, and <<facilities' problems>>, represented by the difficulty of care interventions to promote independence in excretion due to <insufficient manpower for caregiving> in day care facilities. They also noted an <<unclear definition of independence>> or <undetermined definition of independence> as another challenge.

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<Table3> Challenges of IPW to promote independence in excretion among older people requiring care

Categories	Same recording unit	Recording unit (%)
users' and family caregivers' personal backgrounds (19)	Refusal of intervention due to a sense of shame (3) Difficulty in notifying of the desire to excrete (2) Users' motivation Users in a bad mood Users who do not admit toileting failures Interventions for older people living alone Interventions for older people with dementia Poor awareness of excretion and communication difficulties Avoidance of fluid intake Economic problems Lack of cooperation from families Family caregivers' insufficient knowledge Difficulties faced by family caregivers during the night-time Family caregivers' limited caregiving skills Poor awareness of excretion Users' and/or families' refusal of helpers	19 (31.7)
barriers between medical and other institutions (10)	Barriers between medical and care services (3) Difficulty in sharing information with medical institutions (2) Insufficient collaboration with medical institutions (2) Insufficient awareness of home life support among medical institutions (2) Psychological distance in communication with medical institutions	10 (16.7)
deficiency of resources for collaboration (9)	Lack of places for interprofessional meetings (5) Difficulty in participating in the training course, as it starts late Insufficient human resources for coordination Insufficient resources to resolve challenges Lack of common forms	9 (15.0)
complexity of various excretion care interventions (8)	Assistance according to each user's excretory rhythm (2) Time-consuming (2) Difficulty in accurately assessing users' ADL Difficulty in understanding the situation due to a limited number of visits Reduced excretory behaviors when returning to home Necessity of considering various risks and cleaning up after excretion	8 (13.3)
facilities' problems (5)	Insufficient manpower for caregiving (3) Insufficient manpower and time for caregiving (2)	5 (8.3)
insufficient sharing for collaboration (4)	Insufficient information-sharing (2) Insufficient goal- and challenge-sharing (2)	4 (6.7)
other institutions'/professionals' insufficient understanding (4)	Insufficient understanding among professionals Disagreements among professionals Insufficient relationship-building among institutions Differences in motivation among professionals	4 (6.7)
unclear definition of independence (1)	Undetermined definition of independence	1 (1.6)
	Total	60 (100)

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Approaches required to resolve these challenges were summarized into 8 categories and 72 recording units (Table 4). The number of recording units comprising each category was as follows: <<education>>: 24 (33.4%), <<Ingenuity for consensus-building>>: 24 (33.4%), <<partnership>>: 8 (11.1%), <<ethical considerations>>: 5 (6.9%), <<environmental arrangements>>: 4 (5.6%), <<guidance for family caregivers>>: 3 (4.2%), <<temporal arrangements>>: 2 (2.7%), and <<specialized institutions>>: 2 (2.7%).

When providing comprehensive care to promote independence in excretion among older people requiring care, the professionals in home life support services perceived the necessity of extensive <<education>> not only to acquire <knowledge of excretion> and/or <abilities and skills needed for partnership>, but also to learn about collaboration. They were aware of the necessity of <<Ingenuity for consensus-building>>, including determining <means of information-sharing> and <settings for information-sharing>, and building <<partnership>>, covering <support using one's specialty> and <trust-based relationships-building>. They also noted the necessity of respecting users, and providing interventions for them and their family caregivers, which were classified as <<ethical considerations>> for users, including <respecting users' self-esteem>, <<environmental arrangements>>, including <suggestions for comprehensive improvement of living environments>, and <<guidance for family caregivers>>, including <family guidance>. They found it necessary to make temporal arrangements, such as creating a <temporal leeway>, and having <<specialized institutions>>, specifically <specialized institutions for excretion care> available, in order to implement these measures.

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<Table4> Approaches required to resolve these challenges

Categories	Same recording unit	Recording unit (%)
Education (24)	Knowledge of excretion (8) Recognition of support to promote independence (3) Supervisor training and assignment (3) Knowledge of dementia (2) Abilities and skills needed for partnership (2) Caregiving skills Work experience in excretion care Characteristics of older people Care with ethical considerations Human resources for family guidance Recognition of individualized care Time for education	24 (33.4)
Ingenuity for consensus-building (24)	Means of information-sharing (9) Settings for information-sharing (5) Information-sharing (3) Opinion exchange (2) Goal-sharing Problem-sharing Awareness-sharing Understanding of personal information	24 (33.4)
Partnership (8)	Interprofessional work (4) Support using one's specialty Trust-based relationship-building Collaboration including users and their families Provision of unified care	8 (11.1)
Ethical considerations (5)	Respect for users' self-esteem (3) Ethical consideration (2)	5 (6.9)
environmental arrangements (4)	Environmental arrangements (3) Suggestions for comprehensive improvement of living environments	4 (5.6)
guidance for family caregivers (3)	Family guidance (2) Understanding of users' excretory rhythms among their families	3 (4.2)
temporal arrangements (2)	Temporal leeway (2)	2 (2.7)
specialized institutions (2)	Specialized institutions for excretion care (2)	2 (2.7)
	Total	72 (100)

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V. Discussion

In a community-based integrated care system, system development is required to provide necessary services while ensuring that communities fulfill their roles in promoting "self-/mutual help, cooperation, and public assistance", and organically connect to each other[16]. However, in communities, professionals providing support tend to belong to different institutions, and need to collaborate beyond their organizations/institutions, which makes team approaches to care very difficult[17]. Therefore, to clarify the current status and challenges of IPW to promote independence in excretion among older people requiring care, this study examined professionals providing home life support services in a provincial city. Based on the results obtained, we examined comprehensive care to promote independence in excretion in the city with such regional characteristics as a basis for discussing the roles of the nursing college with the mission of contributing to "education", "research", and "society" in this area.

1. Current status and challenges of IPW to promote independence in excretion among older people requiring care and living in provincial cities

Among the categories outlining the current status of IPW to promote independence in excretion among older people requiring care, [collaborating with professionals needed in consideration of user individuality] and [information collection/-sharing] consisted of the highest numbers of recording units. On the other hand, the professionals realized [insufficient sharing for collaboration], which is really needed to promote independence in excretion, and [users' and family caregivers' personal backgrounds] or their circumstances, such as users' motivation, diseases, and financial status, and family caregivers' problems, were shown to be associated with these difficulties. It should be particularly noted that care to promote independence in excretion requires individualized approaches, as reported in a previous study, highlighting the necessity of helping users appropriately urinate according to their urinary function level[18]. Thus, uniform care provided by a single profession does not suffice to cope with different situations, and therefore, public health, medical, and welfare service providers are expected to provide individualized care according to each user's needs through collaboration. However, with changes in the household structure due to aging, the environment surrounding family caregivers has also changed, increasing the complexity and variety of the support needed by them[19]. It is likely that variations in the ADL level among older people requiring care themselves due to aging and diseases are also making it difficult to provide care to promote independence in excretion in consideration of personal backgrounds.

Next, among the categories summarizing challenges of IPW, [barriers between medical and other institutions] consisted of the highest number of recording units. In a previous study, care managers' tendency to recognize these challenges as "resulting from psychological distance in communication with medial institutions" was noted[20]. The

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results of the present study, where care managers accounted for 60%, were similar to this. The barriers to medical institutions perceived by professionals providing home life support services were represented by <poor awareness of home life support among medical institutions> and <psychological distance in communication with medical institutions>, indicating the necessity of resolving [other institutions'/professionals' insufficient understanding] as a future challenge. [Deficiency of resources for collaboration], such as places for collaboration and common forms, was another cause of the difficulty of IPW for care to promote independence in excretion. Based on these findings, the major challenges of IPW for care to promote independence in excretion among older people requiring care may be "processes for collaboration" and "managing skills to promote independence in excretion". Focusing on these 2 points, concrete measures for comprehensive care to promote independence in excretion are discussed as follows:

First, concerning "processes for collaboration", the results of the present study examining the current status of IPW suggest that many professionals understand [information collection/-sharing] is the central part of "collaborating with various other professionals". However, as defined by Matsuoka[21], "collaboration" is a continuum, and it signifies interrelationships. In other words, collaboration is not simply collecting/sharing information, and those collaborating should have common definitions and purposes, and provide care to promote independence in excretion among older people requiring care through a series of processes. However, the present study revealed that they face 2 challenges, [insufficient sharing for collaboration] and [unclear definition of independence], in this aspect, and lack a common understanding of inter-institutional relationships. As a factor that makes IPW difficult, Kumazawa et al.[22] noted that a lack of unified definitions or purposes confuses professionals about what information they should share. Similar results were also obtained in the present study. In particular, it is inferred that individualized care to promote independence in excretion is difficult based only on written information, such as summaries, as care to promote independence in excretion is characterized by the [complexity of various excretion care interventions]. Now that community health collaborative pathways and discharge coordination rules are available, some communities begin to utilize these, but there are still various issues to be addressed such as difficulty in sharing support policies between medical and care services[23]. As the results of the present study indicate the necessity of examining the types of information to be shared, as well as the methods to share such information and make use of it for plan implementation through a series of processes, future studies should examine specific methods for sharing, covering the use of ICT, which has markedly advanced over these years.

As for another major challenge, "management skills to promote independence in excretion", [education] was the approach required by professionals providing home life support services to resolve challenges of IPW, consisting of the highest number of recording units, and represented by a variety of identical recording units such as

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<knowledge of excretion>, <characteristics of older people>, and <abilities and skills needed for partnership>. The professionals providing home life support services perceived the necessity of education to manage independence in excretion. Especially, in care management, care managers play an important role. They are expected to appropriately assess excretory disorders, and resolve problems by efficiently and economically combining formal/informal medical, nursing, and care services[24]. However, it has been noted that among care managers with educational backgrounds that markedly vary, few are able to appropriately conduct urinary assessment[25]. Therefore, while improvements in care managers' care management skills related to urination are also expected, education focusing on IPW (interprofessional education: IPE) at a practical level is needed, as it is difficult for individual professionals to collaborate with various other professionals, and provide such care through a series of processes based only on their personal competence[26]. IPE is defined as "professionals from different areas collaborate and learn together in the same place how to improve the quality of care, as well as about each other"[27]. It has been shown that professionals' perceptions of other professionals change, and their awareness of other professionals' functions and roles raises after participating in IPE programs[28], and sharing challenges in the same place improves their collaboration skills[29]. Thus, by learning together through IPE programs, it becomes possible for professionals to build closer relationships with various other professionals, and resolve "disagreements among medical, care, and welfare professionals" and "insufficient understanding of various other professionals[30]. This indicates that IPE that also deals with care management related to independence in excretion, such as education to acquire knowledge of excretion and education needed for collaboration, and human development for this purpose are also required.

2. Roles of the nursing college in comprehensive care to promote independence in excretion

With an aging rate, average life expectancy, and Care Grade certification rate similar to national values, the study city may be a typical area representing Japan's aging society. Furthermore, 1 nursing college is located in the study city, and the city and a hospital of this college are located in the same designated health area. The last point of discussion is the roles of the nursing college with the mission of contributing to "education", "research", and "society" in comprehensive care to promote independence in excretion in the city with such regional characteristics.

In a community-based integrated care system, it is necessary to develop original systems in consideration of regional characteristics and changes in situations, and community collaboration system-building and operation structuring through active public-industry-academia-government collaboration are indispensable[31]. There have already been some projects, where a college/university and community collaborated to establish a community-based integrated care system[32], and approaches to "education" and "social contribution" were also actively adopted. In the present study, professionals

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providing home life support services strongly perceived the necessity of [education] for comprehensive care to promote independence in excretion. In this respect, the nursing college as the only college specializing in health care in the city should play an important role in educating professionals, who provide comprehensive care to promote independence in excretion, such as helping them acquire knowledge of excretion, and learn about older people's characteristics. It may also be necessary for the college to provide educational approaches for community residents, such as giving open lectures on care to promote independence in excretion, in order to build systems for such care with residents, and support this through collaboration with the city. Moreover, as it was revealed that professionals providing home life support services in the city strongly perceived barriers to medical institutions, the roles of the college and its hospital in removing these barriers may also be significant. Promoting collaboration requires good leaders and those who support them[33]. Therefore, it may be very important for the hospital, which is located in the same designated health area as the city and playing a central role in the health system for the eastern part of the prefecture, to demonstrate leadership, and promote the establishment of public health, medical, and welfare services. The result supports the feasibility for the hospital and nursing college to promote IPW beyond the barriers between medical and other services by building a closer relationship between them such as more actively collaborating and providing training courses for professionals together.

VI. Study Limitations and Future Challenges

This study examined professionals who participated in a training course provided by a single community-based comprehensive support center in a provincial city, and 60% of them were care managers working for home care support facilities. Therefore, the results may not accurately represent the current status or challenges of IPW to promote independence in excretion in provincial cities. As a future challenge, it may be necessary to examine appropriate measures for the nursing college as an educational institution to collaborate with the city in comprehensive care to promote independence in excretion, and to formulate IPE plans in consideration of regional characteristics.

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ORIGINAL ARTICLE

The Relationship Between Midwifery Practical Skills Evaluation and Midwifery Experience Among Young Midwives Working at Perinatal Medical Centers in Japan

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ABSTRACT

The purpose of this study was to clarify the association between the level of midwifery skills evaluation and midwifery experience in maternity care among young midwives with two to four years of experience, excluding new midwives with one year of experience among those with less than five years of experience working at perinatal medical centers in Japan. The survey was conducted among consenting midwives in 38 cooperating facilities. The subjects of the survey were randomly selected from 407 perinatal mother and child healthcare centers in Japan, and 38 midwives who cooperated were surveyed. Maternity care skills (20 items on pregnancy, 41 items on labor, 34 items on the puerperium and neonatal period) in the training guide for newly-graduated midwives were used as survey items. Responses were received from 102 (42.1%) midwives, of which 99 (97.1%) were valid responses. Twenty-seven (27.3%) were in their second year of midwifery experience, 33 (33.3%) in their third year, and 29 (39.4%) in their fourth year. The percentage of "able to do" response was high for 17 items in <diagnosis and care during pregnancy>, 37 items in < Diagnosis and care during labor >, and 31 items in < Diagnosis and care in puerperal and neonatal periods>. The percentage of responses other than "possible" was high for items in the high-risk diagnosis and care in all periods. In terms of "maternal transport care" and " mental health follow-up of maternal women and families with children such as fetal abnormalities and deaths," and similar issues, midwives with 2 years of experience had a low score for "do it yourself." Clearly, young midwives still have items that are difficult to evaluate with confidence. Therefore, midwives have yet to acquire the skills necessary for high-risk cases compared to low-risk cases. We believe that these skills would improve as the midwife gains more experience.

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I. Introduction

Perinatal medicine in Japan faces numerous challenges, including a decline in birthrate, an increase in childbirth age and high-risk pregnancy, a decline in obstetrics and gynecology physicians, and uneven regional distribution. Under these circumstances, midwives are task-shift partners for obstetricians to provide quality medical care to mothers and children[1]. The International Confederation of Midwives (ICM) presents the essential competencies for the Midwifery Practice Framework as a required ability for individuals to begin midwifery practice under the ICM midwifery qualification title[2]. Accordingly, midwives must provide high-and low-risk maternal care. Good quality midwifery care reduces maternal and newborn mortality and morbidity in high, low, and middle-income countries (LMICs)[3]. However, there is considerable variation in the provision of midwifery care and the content, duration, and quality of midwifery education globally. Only 15% of "skilled birth attendants" in LMICs describe themselves as midwives[4].

In 2015, the Japan Midwifery Evaluation Organization launched the clinical ladder level III certification system for improving the ability to practice midwifery, evaluating practical skills, as well as visualizing and objectivizing expertise and skills[5]. In level III, midwives can practice midwifery autonomously. Moreover, those who are responsible for outpatients have the practical ability to be task-shift partners for obstetricians and work as in-hospital midwives are certified[6]. For midwives to reach level III certification, it is necessary to gain the ability to practice midwifery step-by-step. Hospitals are being structured for midwives to gain practical skills, such as the unification of outpatients and wards and a short-and long-term training secondment system. However, it cannot be introduced due to various circumstances of the facility[6].

When the survey on the midwife's practical skills was outlined, numerous items covered the evaluation of the skills acquired through their basic education. Previous studies did not investigate the practical skills acquired by a new midwife after gaining some work experience; only scattered data were collected. The practical skills of midwives from the second to the fourth year after obtaining the license were investigated focusing on the delivery period. The results showed that midwifery practice of a relatively difficult routine, such as care from the hospitalization time to the first delivery stage, was considered "possible" by young midwives. However, several responses regarding high-risk delivery revealed a low confidence level, reflected in answers such as "if there is guidance," "it can be done with exercises," and "it can be understood by knowledge"[7]. The midwives involved in this study worked in various settings, such as perinatal maternal and child medical centers, general hospitals, and clinics. The results concerned only the delivery period. Moreover, a second-year midwife revealed having experienced a gap between their school experience and field practice and between their abilities and those required in the field[8]. These results showed that new midwives were concerned about these gaps.

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Level II refers to midwives with two to four years of experience. Team medicine requires practical skills to handle high-risk delivery[5]. Moreover, 82.1% of midwives with less than three years of experience working in hospitals aim to work as in-hospital midwives[9]. We need to consider helping them build their careers. The study aimed to define midwives in their second to fourth year at the hospital and clarify the relationship between experience of midwifery and that of maternity care (pregnancy, delivery, puerperal period, neonatal period) of young midwives working at the Perinatal Maternal and Child Medical Center in Japan.

II. Methods

1. Study design

The observational study was based on a self-written questionnaire.

2. Study participants and time period

As of April 1, 2017, the survey facilities randomly extracted 102 of the 407 perinatal maternal and child medical centers in Japan. The research collaborators were midwives with two to four years of experience, excluding newcomers who had completed one year at the hospital. The midwifery business of the Perinatal Maternal and Child Medical Center is the care of low-and high-risk maternal and puerperal women and their families[10]. Midwives should be able to handle these cases[11]. Moreover, the mixing of obstetric wards in general hospitals is progressing, and even midwives working in general hospitals may have few opportunities related to maternity care[12]. Therefore, the subjects were midwives working at the Perinatal Maternal and Child Medical Center, who are most likely to be involved in maternity care.

3. Study items and methods

1) Survey duration and method

The survey was conducted from June to July 2017. The request for research cooperation was made to the Director of the Perinatal Maternal and Child Medical Center by the principal investigator by mailing a document. The facility that obtained the cooperation for the research responded to the consent form and the number of midwives who agreed to cooperate and respond. Then, the research cooperation request form, questionnaire, and return envelope of the number of midwives scheduled to cooperate were mailed. It was distributed to the midwives after examination by the ward nurse chief from the nursing director or the person in charge of education. Midwives answered the questionnaire and asked the principal investigator to reply directly using a return envelope.

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2) Measuring tool

The subject's attributes included the number of years of midwife experience, number of delivery assistances, graduate course of midwifery education, and facility form. The item for practical skills of midwifery used the maternity care ability checklist of "new graduate midwife training guide"[13]. The items in this checklist were based on the core competencies[14] and quality assessment criteria of midwifery care[15]. Therefore, they were used to comprehensively confirm the maternity care ability. There were 20 investigation items in ≪diagnosis and care during pregnancy≫, 41 in ≪diagnosis and care during the delivery period and consideration in each stage of delivery≫, and 34 in ≪diagnosis and care in the puerperal stage and diagnosis and care in the neonatal stage≫. Answers included 1) "understand as knowledge," 2) "practice available," 3) "possible with guidance," and 4) "possible in four stages."

4. Analysis

The basic statistics for each variable were calculated. To examine the related factors of the achievement of practical ability of midwives, number of years of midwifery experience, and number of delivery assistances were used as explanatory variables in the delivery period. The χ^2 test or Fisher's direct probability test was performed. The residual analysis was conducted for the item wherein the significance was recognized. Theφcoefficient was determined. SPSS Ver.27 was used for the analysis, and the significance level was set to 5%.

5. Ethical considerations

This study was conducted with the approval of the Ethics Review Committee of Sophia University (approval number 17-12). The facility asked to explain the purpose of the research, the method, safety and voluntary security, privacy, anonymity, and the protection of personal information in writing. The approval request was sent directly to head of the facility who was explained the purpose and method orally and consent form was signed. It was assumed that this was explained to the participating midwives and that consent was obtained when the questionnaire was returned.

III. Results

1. Outcome of survey form collection

The survey sheet was distributed to 242 midwives at 38 facilities. Responses were received from 102 (42.1%) midwives, of which 99 (97.1%) were valid responses.

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2. Participants' attributes

The subjects' attributes are shown in Table 1. Among the midwives, 70 (70.7%) worked at the General Perinatal Maternal and Child Medical Center and 29 (29.3%) at the Regional Perinatal Maternal and Child Medical Center. Regarding experience, 27 (27.3%), 33 (33.3%), and 39 (39.4%) midwives were in their second, third, and fourth years, respectively. Regarding cases, 70 (70.7%) had worked on 1 to 49 cases, 19 (19.2%) in 5 on 0 to 99 cases, and 7 (7.1%) on 100 cases or more.

< Table 1> Target characteristics attribute (n=99)

item	n	%
Years of midwife experience		
Second year	27	27.3
Third year	33	33.3
Fourth year	39	39.4
Number of delivery assistance		
1 –49	70	70.7
50–99	19	19.2
More than 100	7	7.1
No Answer	3	3.0
Midwifery Education Program		
Graduate school	15	15.2
University Major	9	9.1
University department	3	3.0
University	27	27.3
Junior College Major	8	8.1
Senshu School	36	36.4
No answer	1	1.0
Facility from		
Comprehensive Perinatal Maternal and Child Medical Center	70	70.7
Regional Perinatal Maternal and Child Medical Center	29	29.3

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3. Evaluation of the practical skills of midwives in maternity care and the relationship with midwifery experience (number of delivery assistances in years and delivery period)

The survey items are the degree of achievement from the first- to second-year of experience. The analysis of maternity care ability of young midwives with two to four years of midwife experience was indicated in the results as items with a high percentage of answers to "possible."

1) ≪Diagnosis and care during pregnancy≫

Table 2 shows the results for ≪diagnosis and care during pregnancy≫. Among the 20 midwives, 17 answered that they perform it. More than 70% answered that it was possible. However, along with "possible," the highest number of midwives responded to three items, which were "care consultation education based on the care plan of pregnant women," "assistance with examination procedures performed for pregnant," and "mental health follow-up of maternal women and families with children such as fetal abnormalities and deaths."

Items wherein the significant difference was recognized in the relation between ≪ diagnosis and care during pregnancy≫ and the number of years of midwife experience are shown in Table 3. Regarding the number of years of experience, "planning a care plan for pregnant women" ($p<.019$), "care consultation education based on the care plan for pregnant women" ($p<.025$), "care for representative diseases in the perinatal period" ($p<.012$), "maternal transport care" ($p<.009$), and "mental health follow-up of maternal women and families with children such as fetal abnormalities and deaths" ($p<.004$) were "possible" in the second year of midwifery experience. The percentage of respondents who answered was significantly lower.

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< Table 2 > Diagnosis and care during pregnancy (n=99)

	Diagnosis and care during pregnancy	Possible		Possible with guidance		Practice available		Understand as knowledge	
		n	%	n	%	n	%	n	%
1	Understanding vital testing standards for pregnant women	85	85.9	14	14.1	0	0.0	0	0.0
2	Delivery monitoring and judgment	83	83.8	16	16.2	0	0.0	0	0.0
3	Know the birth plan	79	79.8	18	18.2	1	1.0	1	1.0
4	Understanding the needs for breastfeeding	76	76.8	20	20.2	2	2.0	1	1.0
5	Understanding of pathophysiology of perinatal representative diseases	73	73.7	24	24.2	1	1.0	1	1.0
6	Utilization of pregnancy business standard procedures for facilities	72	72.7	24	24.2	0	0.0	3	3.0
7	Planning a care plan for pregnant women	72	72.7	22	22.2	2	2.0	3	3.0
8	Implementation of health checkups for pregnant women	71	71.7	25	25.3	2	2.0	1	1.0
9	Understanding and responding to the facility's maternity care policy	68	68.7	28	28.3	0	0.0	3	3.0
10	Understanding pregnant women's needs	67	67.7	29	29.3	0	0.0	3	3.0
11	Understanding anatomy and physiology associated with pregnant women	63	63.6	34	34.3	1	1.0	1	1.0
12	Evaluation of care provided to pregnant women	59	59.6	37	37.4	1	1.0	2	2.0
13	Implementation of fetal health checkups	58	58.6	38	38.4	2	2.0	1	1.0
14	Coordination and continuation of care	58	58.6	39	39.4	0	0.0	2	2.0
15	Care, education, and consultation related to breastfeeding	48	48.5	46	46.5	2	2.0	3	3.0
16	Care consultation education based on the care plan of pregnant women	37	37.4	53	53.5	5	5.1	4	4.0
17	Care for representative diseases in the perinatal period	65	65.7	32	32.3	2	2.0	0	0.0
18	Maternal transport care	51	51.5	45	45.5	2	2.0	1	1.0
19	Assistance with examination procedures performed for pregnant women	39	39.4	51	51.5	3	3.0	6	6.1
20	Mental health follow-up of maternal women and families with children such as fetal abnormalities and deaths	38	38.4	52	52.5	5	5.1	4	4.0

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< Table 3 > The relationship between pregnancy diagnosis and care and years of midwifery experience (n=99)

Item			Years of midwife experience								Φ	*p-value*
			Sum		Second year		Third year		Fourth year			
			99		27		33		39			
			n	%	n	%	n	%	n	%		
7	Planning a care plan for pregnant women	Possible	72	72.7	14	19.4	24	33.3	34	47.2	.392	.019
		Possible with guidance	22	22.2	9	40.9	9	40.9	4	18.2		
		Practice available	2	2	2	100	0	0	0	0		
		Understand as knowledge	3	3	2	66.7	0	0	1	33.3		
16	Care consultation education based on the care plan of pregnant women	Possible	37	37.4	4	10.8	15	40.5	18	48.6	.382	.025
		Possible with guidance	53	53.5	17	32.1	18	34	18	34		
		Practice available	5	5.1	3	60	0	0	2	40		
		Understand as knowledge	4	4	3	75	0	0	1	25		
17	Care for representative diseases in the perinatal period	Possible	65	65.7	12	18.5	23	35.4	30	46.2	.361	.012
		Possible with guidance	32	32.3	15	46.9	8	25	9	28.1		
		Practice available	2	2	0	0	2	100	0	0		
		Understand as knowledge	0	0	0	0	0	0	0	0		
18	Maternal transport care	Possible	51	51.5	7	13.7	18	35.3	26	51	.416	.009
		Possible with guidance	45	45.5	19	42.2	13	28.9	13	28.9		
		Practice available	2	2	0	0	2	100	0	0		
		Understand as knowledge	1	1	1	100	0	0	0	0		
20	Mental health follow-up of maternal women and families with children such as fetal abnormalities and deaths	Possible	38	38.4	7	18.4	11	28.9	20	52.6	.440	.004
		Possible with guidance	52	52.5	15	28.8	18	34.6	19	36.5		
		Practice available	5	5.1	1	20	4	80	0	0		
		Understand as knowledge	4	4	4	100	0	0	0	0		

χ^2 test. Fisher's direct establishment test for tests containing 5 or fewer cells $p < .05$

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2) ≪Diagnosis and care during delivery≫

Table 4-1 and 4-2 shows the ≪diagnosis and care during delivery≫ period. The highest number of midwives answered "yes" to 36 out of 41 items. More than 70% answered "possible" to 26 items. However, the highest number of midwives answered "possible" to five items. The items were "dealing with flaccid bleeding," "stillbirth care," "understanding primary lifesaving measures in cardiopulmonary arrest in expectant and nursing mothers," "understanding of secondary lifesaving procedures in cardiopulmonary arrest in expectant and nursing mothers," and "calling obstetrics and pediatricians to determine the timing."

< Table 4-1> Diagnosis and care during the delivery period (n=99)

Ability to practice midwifery during labor			Possible		Possible with guidance		Practice available		Understand as knowledge	
			n	%	n	%	n	%	n	%
Diagnosis and care during labor	1	Description and explanation of maternal and child health handbooks	97	98.0	2	2.0	0	0.0	0	0.0
	2	Description of midwifery	94	94.9	5	5.1	0	0.0	0	0.0
	3	Understanding the reference values of maternal vital signs and test values	84	84.8	13	13.1	2	2.0	0	0.0
	4	Description and description of birth certificate	84	84.8	7	7.1	1	1.0	7	7.1
	5	Understanding the needs of maternal women	75	75.8	23	23.2	1	1.0	0	0.0
	6	Predictive consideration of the delivery period's course	75	75.8	23	23.2	1	1.0	0	0.0
	7	Use of facility business procedures	70	70.7	27	27.3	1	1.0	1	1.0
	8	Understanding and responding to facility policies	67	67.7	30	30.3	1	1.0	1	1.0
	9	Cooperation and continuation of care	66	66.7	31	31.3	2	2.0	0	0.0
	10	Understanding anatomy and physiology related to labor	65	65.7	32	32.3	2	2.0	0	0.0
	11	Evaluation of care provided to maternal women	61	61.6	35	35.4	2	2.0	1	1.0
	12	Planning a midwifery care plan	60	60.6	35	35.4	4	4.0	0	0.0
	13	Implementation of delivery assistance	58	58.6	38	38.4	3	3.0	0	0.0
	14	Diagnosis of the labor's course	50	50.5	46	46.5	2	2.0	1	1.0
	15	Dealing with flaccid bleeding	38	38.4	55	55.6	3	3.0	3	3.0
	16	Stillbirth care	27	27.3	55	55.6	5	5.1	12	12.1
	17	Understanding primary lifesaving measures in cardiopulmonary arrest in expectant and nursing mothers	15	15.2	18	18.2	47	47.5	19	19.2
	18	Understanding of secondary lifesaving procedures in cardiopulmonary arrest in expectant and nursing mothers	10	10.1	22	22.2	47	47.5	20	20.2

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< Table 4-2> Diagnosis and care during the delivery period (n=99)

	Ability to practice midwifery during labor	Possible		Possible with guidance		Practice available		Understand as knowledge	
		n	%	n	%	n	%	n	%
Viewpoint of consideration in each stage of labor	19 Self-introduction	97	98.0	1	1.0	1	1.0	0	0.0
	20 Orientation at the time of hospitalization	97	98.0	2	2.0	0	0.0	0	0.0
	21 Explanation and implementation of the procedure to maternal women and their families	89	89.9	8	8.1	2	2.0	0	0.0
	22 Sharing the course of labor with maternal women and their families	88	88.9	10	10.1	1	1.0	0	0.0
	23 Appropriate communication with maternal women and their families	88	88.9	9	9.1	2	2.0	0	0.0
	24 Consideration to ensure women can give birth in an easy position	87	87.9	10	10.1	2	2.0	0	0.0
	25 Explanation of hospital care plan	86	86.9	11	11.1	2	2.0	0	0.0
	26 Have the opportunity to discuss the birth plan	82	82.8	14	14.1	2	2.0	1	1.0
	27 Working with doctors to support labor	73	73.7	24	24.2	2	2.0	0	0.0
	28 Consider anxiety immediately after delivery and do not leave the mother alone	83	83.8	12	12.1	3	3.0	1	1.0
	29 Consideration of support to the husband and the family	81	81.8	15	15.2	2	2.0	1	1.0
	30 Consideration to help women give birth in an easy position	67	67.7	25	25.3	4	4.0	3	3.0
	31 Consideration to the delivery position	64	64.6	25	25.3	5	5.1	5	5.1
	32 Calling obstetrics and pediatricians to determine the timing	42	42.4	53	53.5	2	2.0	2	2.0
	33 Words of reassurance to the mother, husband, and family	93	93.9	5	5.1	1	1.0	0	0.0
	34 Explanation of the same room of mother and child (explaining the postpartum and neonatal rooms)	93	93.9	2	2.0	1	1.0	3	3.0
	35 Environmental adjustments to make your family feel comfortable at an early stage	90	90.9	6	6.1	3	3.0	0	0.0
	36 Have the baby see you as soon as possible after calving.	89	89.9	8	8.1	2	2.0	0	0.0
	37 Breastfeeding directly within 30 minutes after calving	61	61.6	23	23.2	5	5.1	10	10.1
	38 Courteous treatment of maternal women, family members, and other staff members	95	96.0	3	3.0	0	0.0	1	1.0
	39 After using LDR (labor, delivery, recovery) room, the indoor environment is improved and organized.	93	93.9	5	5.1	0	0.0	1	1.0
	40 Care in consideration of privacy and shame	92	92.9	6	6.1	0	0.0	1	1.0
	41 Revision of birth plan according to discussion with the mother and family, and support for satisfactory delivery	71	71.7	24	24.2	2	2.0	2	2.0

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Table 5-1 and 5-2 showed significant differences in the relationship between ≪ diagnosis and care during delivery period≫ and years of midwife experience and number of delivery assistances. Regarding the number of years of midwife experience, the percentage of respondents who answered "possible" in the second year was significantly lower with 11 out of 41 items.

Regarding the number of delivery assistances (Table 6), the proportion of answers to "possible" was low, from 1 to 49 cases of care experience for two out of 41 items. The breakdowns were "implementation of delivery assistance" (p<.043) and "understanding primary lifesaving measures in cardiopulmonary arrest in expectant and nursing mothers" (p<.037).

< Table 5-1 > Relationship between diagnostic care and years of midwifery experience during the delivery period (n=99)

Item			Years of midwife experience								Φ	p-value
			Sum		Second year		Third year		Fourth year			
			99		27		33		39			
			n	%	n	%	n	%	n	%		
6	Predictive consideration of the delivery period's course	Possible	34	34.3	4	11.8	12	35.3	18	52.9	.398	.016
		Possible with guidance	61	61.6	20	32.8	20	32.8	21	34.4		
		Practice available	3	3.0	3	100.0	0	0.0	0	0.0		
		Understand as knowledge	1	1.0	0	0.0	1	100.0	0	0.0		
9	Cooperation and continuation of care	Possible	66	66.7	13	19.7	23	34.8	30	45.5	.313	.045
		Possible with guidance	31	31.3	12	38.7	10	32.3	9	29.0		
		Practice available	2	2.0	2	100.0	0	0.0	0	0.0		
		Understand as knowledge	0	0.0	0	0.0	0	0.0	0	0.0		
10	Understanding anatomy and physiology related to labor	Possible	65	65.7	11	16.9	25	38.5	29	44.6	.366	.010
		Possible with guidance	32	32.3	14	43.8	8	25.0	10	31.3		
		Practice available	2	2.0	2	100.0	0	0.0	0	0.0		
		Understand as knowledge	0	0.0	0	0.0	0	0.0		0.0		
12	Planning a midwifery care plan	Possible	60	60.6	10	16.7	21	35.0	29	48.3	.411	.002
		Possible with guidance	35	35.4	13	37.1	12	34.3	10	28.6		
		Practice available	4	4.0	4	100.0	0	0.0	0	0.0		
		Understand as knowledge	0	0.0	0	0.0	0	0.0	0	0.0		
14	Diagnosis of the course of labor	Possible	50	50.5	7	14.0	20	40.0	23	46.0	.391	.019
		Possible with guidance	46	46.5	18	39.1	12	26.1	16	34.8		
		Practice available	2	2.0	2	100.0	0	0.0	0	0.0		
		Understand as knowledge	1	1.0	0	0.0	1	100.0	0	0.0		

χ^2 test. Fisher's direct establishment test for tests containing 5 or fewer cells $p < .05$

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< Table 5-2 > Relationship between diagnostic care and years of midwifery experience during the delivery period (n=99)

	Item		Years of midwife experience								Φ	p-value
			Sum		Second year		Third year		Fourth year			
			99		27		33		39			
			n	%	n	%	n	%	n	%		
16	Stillbirth care	Possible	27	27.3	3	11.1	9	33.3	15	55.6	.477	.001
		Possible with guidance	55	55.6	12	21.8	20	36.4	23	41.8		
		Practice available	5	5.1	4	80.0	1	20.0	0	0.0		
		Understand as knowledge	12	12.1	8	66.7	3	25.0	1	8.3		
17	Understanding primary lifesaving measures in cardiopulmonary arrest in expectant and nursing mothers	Possible	15	15.2	0	0.0	4	26.7	11	73.3	.378	.028
		Possible with guidance	18	18.2	5	27.8	8	44.4	5	27.8		
		Practice available	47	47.5	17	36.2	12	25.5	18	38.3		
		Understand as knowledge	19	19.2	5	26.3	9	47.4	5	26.3		
23	Appropriate communication with maternal women and their families	Possible	88	88.9	20	22.7	30	22.7	38	43.2	.312	.047
		Possible with guidance	9	9.1	6	66.7	2	66.7	1	11.1		
		Practice available	2	2.0	1	50.0	1	50.0	0	0.0		
		Understand as knowledge	0	0.0	0	0.0	0	0.0	0	0.0		
29	Consideration of support to the husband and the family	Possible	81	81.8	16	19.8	28	34.6	37	45.7	.462	.002
		Possible with guidance	15	15.2	10	66.7	3	20.0	2	13.3		
		Practice available	2	2.0	0	0.0	2	100.0	0	0.0		
		Understand as knowledge	1	1.0	1	100.0	0	0.0	0	0.0		
32	Calling obstetrics and pediatricians to determine the timing	Possible	42	42.4	5	11.9	15	35.7	22	52.4	.388	.021
		Possible with guidance	53	53.5	21	39.6	15	28.3	17	32.1		
		Practice available	2	2.0	0	0.0	2	100.0	0	0.0		
		Understand as knowledge	2	2.0	1	50.0	1	50.0	0	0.0		
34	Explanation of the same room of mother and child (explaining the postpartum and neonatal rooms)	Possible	89	89.9	20	22.5	30	33.7	39	43.8	.356	.014
		Possible with guidance	8	8.1	6	75.0	2	25.0	0	0.0		
		Practice available	2	2.0	1	50.0	1	50.0	0	0.0		
		Understand as knowledge	0	0.0	0	0.0	0	0.0	0	0.0		

χ^2 test. Fisher's direct establishment test for tests containing 5 or fewer cells $p < .05$

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< Table 6 > Relationship between diagnostic care and number of delivery assistances during the delivery period (n=96)

Item			Number of delivery assistance								Φ	*p-value*
			Sum		1 - 49		50 - 99		more than 100			
			96		70		19		7			
			n	%	n	%	n	%	n	%		
13	Implementation of delivery assistance	Possible	58	60.4	37	63.8	15	25.9	6	10.3	.256	.043
		Possible with guidance	38	39.6	33	86.8	4	10.5	1	2.6		
		Practice available	0	0.0	0	0.0	0	0.0	0	0.0		
		Understand as knowledge	0	0.0	0	0.0	0	0.0	0	0.0		
17	Understanding primary lifesaving measures in cardiopulmonary arrest in expectant and nursing mothers	Possible	15	15.6	7	46.7	4	26.7	4	26.7	.374	.037
		Possible with guidance	17	17.7	15	88.2	2	11.8	0	0.0		
		Practice available	47	49.0	34	72.3	10	21.3	3	6.4		
		Understand as knowledge	17	17.7	14	82.4	3	17.6	0	0.0		

χ^2 test. Fisher's direct establishment test for tests containing 5 or fewer cells $p < .05$

3) ≪Diagnosis and care during the puerperal and neonatal periods≫

Table 7-1 and 7-2 shows the ≪diagnosis and care during the puerperal and neonatal periods≫. Among 34 items, most midwives answered "possible" to 31 out of 34 items. Of those, more than 70% midwives answered "possible" in 23 categories.

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< Table 7-1 > Diagnosis and care during puerperal periods and diagnosis and care in the neonatal stage (n=99)

Diagnosis and care during puerperal and neonatal periods			Possible		Possible with guidance		Practice available		Understand as knowledge	
			n	%	n	%	n	%	n	%
Diagnosis and care during the puerperal period	1	Understanding the reference values of vital signs and test values of postpartum women	94	94.9	4	4.0	1	1.0	0	0.0
	2	Understanding the needs of postpartum women	81	81.8	17	17.2	1	1.0	0	0.0
	3	Understanding of anatomical physiology related to maternal	81	81.8	17	17.2	1	1.0	0	0.0
	4	Use of facility business procedures	79	79.8	18	18.2	2	2.0	0	0.0
	5	Evaluation of care provided to postpartum women	79	79.8	19	19.2	1	1.0	0	0.0
	6	Understand and respond to facility policies	78	78.8	19	19.2	2	2.0	0	0.0
	7	Planning of care plan for postpartum women	77	77.8	20	20.2	2	2.0	0	0.0
	8	Implementation of health checkups for postpartum women	71	71.7	27	27.3	1	1.0	0	0.0
	9	Care, health education, and consultation based on the care plan of postpartum women	71	71.7	27	27.3	1	1.0%	0	0.0
	10	Continue care in cooperation with facilities and communities	61	61.6	36	36.	2	2.0	0	0.0
	11	Diagnosis and care of uterine recovery	78	78.8	20	20.2	1	1.0	0	0.0
	12	Assessing and addressing high-risk factors for maternal and child attachment formation and child abuse	49	49.5	45	45.5	4	4.0	1	1.0
	13	Diagnosis and response to breast troubles	46	46.5	52	52.5	1	1.0	0	0.0
	14	Early detection and support for maternity blues	44	44.4	49	49.5	3	3.0	3	3.0

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< Table 7-2 > Diagnosis and care during puerperal periods and diagnosis and care in the neonatal stage (n=99)

		Diagnosis and care during puerperal and neonatal periods	Possible		Possible with guidance		Practice available		Understand as knowledge	
			n	%	n	%	n	%	n	%
Diagnosis and care in the neonatal period	15	Check immediately after birth along with checkpoints	85	85.9	13	13.1	1	1.0	0	0.0
	16	Routine care immediately after birth near the mother	85	85.9	12	12.1	1	1.0	1	1.0
	17	Appropriate explanations and words for mothers and families	78	78.8	18	18.2	3	3.0	0	0.0
	18	Understanding the need for oxygenation	76	76.8	20	20.2	1	1.0	2	2.0
	19	Report to doctors and other midwives when a checkpoint immediately after birth is recognized	75	75.8	22	22.2	1	1.0	1	1.0
	20	Initial treatment of neonatal resuscitation when a checkpoint immediately after birth is observed	68	68.7	26	26.3	4	4.0	1	1.0
	21	Understanding the problems of high concentration oxygen administration	63	63.6	25	25.3	7	7.1	4	4.0
	22	Understanding the need for artificial respiration and sternum compression	57	57.6	20	20.2	16	16.2	6	6.1
	23	Artificial respiration and sternum compression in line with neonatal resuscitation algorithms when needed	20	20.2	41	41.4	32	32.3	6	6.1
	24	Neonatal health checkups	84	84.8	13	13.1	2	2.0	0	0.0
	25	Understanding the reference values of vital signs and test values in newborns	84	84.8	14	14.1	1	1.0	0	0.0
	26	Assessment of maternal life adaptation in newborns	77	77.8	19	19.2	3	3.0	0	0.0
	27	Utilization of business standards and procedures related to the neonatal period	76	76.8	21	21.2	2	2.0	0	0.0
	28	Providing care to newborns	76	76.8	21	21.2	1	1.0	1	1.0
	29	Planning of care plans based on neonatal health checkups	75	75.8	21	21.2	3	3.0	0	0.0
	30	Understanding the test contents required for newborns	74	74.7	19	19.2	4	4.0	2	2.0
	31	Evaluation of care provided to newborns	73	73.7	24	24.2	2	2.0	0	0.0
	32	Understanding anatomy and physiology related to newborns	67	67.7	28	28.3	3	3.0	1	1.0
	33	Continuous care in cooperation with facilities and communities	64	64.6	30	30.3	2	2.0	3	3.0
	34	Coping with emergencies and abnormalities in newborns and providing support to mothers and families	50	50.5	42	42.4	5	5.1	2	2.0

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Table 8 shows items wherein significant differences were observed between ≪diagnosis and care during the puerperal and neonatal periods≫ and the number of years of midwife experience. Regarding the number of years of midwife experience, the proportion of respondents who answered "possible" in the items of "understanding the needs of postpartum women" (p<.026), "continue care in cooperation with facilities and communities" (p<.047), and "understanding the problems of high concentration oxygen administration" (p<.032) was significantly lower.

< Table 8 > Relationship between diagnosis and care and midwifery experience in puerperal and neonatal periods (n=99)

		Item		Years of midwife experience								*Φ*	*p-value*
				Sum		Second year		Third year		Fourth year			
				99		27		33		39			
				n	%	n	%	n	%	n	%		
Puerperium period	2	Understanding the needs of postpartum women	Possible	81	81.8	18	22.2	26	32.1	37	45.7	.334	.026
			Possible with guidance	17	17.2	9	52.9	6	35.3	2	11.8		
			Practice available	1	1.0	0	0.0	1	100.0	0	0.0		
			Understand as knowledge	0	0	0	0	0	0	0	0		
	10	Continue care in cooperation with facilities and communities	Possible	61	61.6	12	19.7	22	36.1	27	44.3	.312	.047
			Possible with guidance	36	36.4	15	41.7	9	25.0	12	33.3		
			Practice available	2	2.0	0	0.0	2	100.0	0	0.0		
			Understand as knowledge	0	0	0	0	0	0	0	0		
Neonatal period	22	Understanding the problems of high concentration oxygen administration	Possible	63	63.6	13	20.6	19	30.2	31	49.2	.373	.032
			Possible with guidance	25	25.3	7	28.0	12	48.0	6	24.0		
			Practice available	7	7.1	5	71.4	1	14.3	1	14.3		
			Understand as knowledge	4	4.0	2	50.0	1	25.0	1	25.0		

χ^2 test. Fisher's direct establishment test for tests containing 5 or fewer cells $p < .05$

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IV. Discussion

1. ≪Diagnosis and care during pregnancy≫

Among the 20 items, 17 were answered with "possible" for the items ≪diagnosis and care during pregnancy≫, but some were less than 60%. Moreover, regarding consultation and education based on the care plan for pregnant women as well as responses and assistance to high-risk pregnant women, answers other than "possible" exceeded "possible." Among young midwives, the items regarding the practical skills of midwives during pregnancy can be evaluated as "possible." However, after graduating from midwifery education, there were items that could not be confidently evaluated as "possible" even after four years. The health guidance's goal for pregnant women is that level I provides general guidance to those in the normal delivery range, and level II provides general guidance at each pregnancy stage while considering their individuality[5]. The midwives surveyed were those working at the General and Regional Perinatal Maternal and Child Care Center, which attends to several high-risk expectant and nursing mothers. Therefore, it is inferred that there were few opportunities to be involved in general health guidelines for pregnant women in the normal birth range. Generally, the process of acquiring the practical skills for midwives is to first gain those regarding diagnosis and care within the normal range and then handle high-risk cases and obtain assistance. Regarding the number of years of midwife experience, it was confirmed that the achievement of the items of "maternal transport care" and "mental health follow-up of maternal women and families with children such as fetal abnormalities and deaths" was "possible" in the third- and fourth-year compared to the second-year of experience. Hence, it was confirmed that the degree of achievement increased by gaining experience.

2. ≪Diagnosis and care during delivery≫

Level III refers to the fifth to the seventh year of midwife experience[5]. The certification requirement is more than 100 cases of delivery assistances[5]. As a need for midwives, 82.1% with less than three years of experience working in hospitals aim to be midwives who can engage as in-hospital midwives[9]. Those surveyed were between the second and fourth year of experience, but only 26 (26.3%) had assisted in more than 50 deliveries. When a young midwife aims for level III, she may not reach more than 100 cases with certification requirements. The number of deliveries decreases due to the declining birthrate. Moreover, with the increase in cesarean sections due to the increase in high-risk expectant and nursing mothers, it is difficult for young midwives to gain experience regarding delivery.

Considering the number of deliveries over the past three years, 23.5% of the General Perinatal Maternal and Child Medical Center and 26.5% of regional perinatal medical centers stated that the number of deliveries was decreasing[12]. Therefore, the opportunity to experience delivery assistance is limited. Midwives not receiving the opportunity to

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gain midwifery experience would be an impediment to their careers. Currently, about 40% of perinatal maternal and child medical centers have in-hospital midwifery[12]. For young midwives to establish careers and move toward achieving their goals, we will use a further midwife secondment support system[15]. It is necessary to consider the introduction of in-hospital midwifery, which is conducted by midwives for low-risk delivery by adopting a method and system wherein they provide independent care.

In the diagnosis and care during the delivery period, the young midwives generally evaluate the ability to practice midwifery for low-risk cases in the delivery period as "possible." However, less than 60% were assigned with the course of delivery and assistance. A total of 70 surveyed midwives (70.7%) had assisted in fewer than 50 deliveries.

The delivery assistance experience is necessary for the midwives to evaluate the execution of the delivery assistance and the diagnosis of the delivery progress as "possible." Regarding the number of years of midwife experience, there was a significant difference in 11 items. Delivery assistance technology reached higher by accumulating the number of service cases[16]. In this study, the ratio of "possible" was significantly lower when the number of delivery assistances was below 50 cases.

Among the diagnosis and care in the delivery stage, items related to high-risk delivery response were high in items other than "possible." Midwives at level I experience fear and anxiety regarding the care of high-risk maternal and puerperal women[17]. The items that they feel that they cannot respond to using their ability were for high-risk delivery, implementation of neonatal resuscitation technology, and assistance[17]. In this study, the response of high-risk delivery was lower than that of a low-risk one. The correspondence in the high-risk delivery is accompanied by urgency. Therefore, gaining experience through practice is undeniably difficult for young midwives.

Instead of dealing with high-and low-risk maternal women, midwives are involved in all high-risk maternal diagnoses; the medical team, comprising obstetricians, provides care according to the needs and conditions of expectant and nursing mothers[18]. To improve the practical skills of young midwives, it is necessary to reconstruct knowledge and skills as a team with the support of senior midwives and doctors. Several studies have also evaluated incumbent training programs focused on emergency maternity. The training, to varying degrees, has resulted in improved knowledge and skills and changes in clinical practice for healthcare professionals[19-21]. Along with on-site practice, it is necessary to improve clinical reasoning through lectures, exercises, role plays, simulations, case studies, and so on, to improve midwives' skills[12,22]. Among the facilities, 41.2% have clinical ladders specializing in midwives, and 23% are currently creating clinical ladders, and training and participation specializing in midwives have been conducted[12]. We believe that midwives can improve their practical skills through various educational methods.

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3. ≪Diagnosis and care during the puerperal and neonatal periods≫

Among the diagnosis and care items of young midwives during the puerperal and neonatal periods, more than 80% answered "possible" for care items with relatively low difficulty. However, the answers other than "possible" were high for the items related to dealing with high risk and aid.

Regarding the number of years of midwife experience, the average score of practical ability on coping with high risk and aid increased from the second to the third and fourth years of experience. In this study, young midwives working at the Perinatal Maternal and Child Medical Center and the proportion of high-risk maternal and puerperal women is high in midwifery care subjects. At present, the number of facilities that change to mixed wards due to the declining birthrate is increasing in the obstetric ward, where the experience of midwifery practice is increasing[12]. Therefore, there is confusion regarding unfamiliar work with other departments [23]. As patients in other departments are cared for in parallel, they cannot concentrate on midwifery work, and there are few opportunities to experience midwifery practice[24]. While confirming these trends, it is necessary to develop an educational system to enable young midwives to continue their careers.

The subjects were 99 young midwives with two to four years of experience, excluding midwife experience after entering the Perinatal Maternal and Child Medical Center for one year; the sample size is thus limited. Moreover, it is considered that the attainment level of the practical skills of young midwives varies depending on the hospital. Career support measures for all young midwives should be considered. Moreover, it is necessary to focus on the practical midwifery skills of young midwives working in general hospitals and clinics regarding maternity care.

V. Conclusions

Generally, young midwives evaluated the diagnosis and care for cases requiring low-risk midwifery practical skills related to maternity care as "possible," but some items were difficult to confidently evaluate as "possible." The recognition of the achievement of midwifery practical ability was not reached with high-risk cases compared to low-risk ones. Therefore, we believe that their skills would improve as each midwife gains more experience.

There is no conflict of interest in this study.

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ORIGINAL ARTICLE

Effects of “Parental Involvement” on Infants Delay in Eating and Speaking Functions

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ABSTRACT

Kataoka points out changes in the circumstances surrounding young children, particularly the time spent the media, such as television and smartphones, may negatively affect infants' speaking functions. In this study, it was investigated the effects of "Involvement of the parents" and "Time spent watched the media" on infants "Have or haven’t delay in eating function" and "Have or haven’t delay in talking function". In addition, this study aimed to clarify whether there is a relationship between "Delay in eating function" and "Delay in speaking function" in infants.

Twenty-three children (13 boys and 10 girls, mean age 30 ± 9.1 months) attending a nursery school (Yamaguchi prefecture) were studied. The results showed that "The time spent watched the media" was significantly longer in the group have delay speak than in the group haven’t delay. The score of "Talking" in parent’s involvement was significantly lower in the group have delay language comprehension than in the group haven’t delay language comprehension. the results of logistic regression analysis suggested that the time spent watched the media had an impact on delay in speaking function. In conclusion, he responsive relation with the person who is close rather than the one-way information through the electronic device is important for "Speaking function".

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I. Introduction

In present, language is delayed in many of the issues pointed out in the 3-year-old children's health examinations conducted in municipalities for children between the ages of 3 and 4 years.[1)] Oral dysfunction is defined a condition in which eating function, speaking function, or other functions are not well developed or these functions are not stereotypically acquired.[2)] In the field of dentistry, the eating function such as feeding and swallowing exercises has been actively checked. The speaking function has been checked only for some dysarthria, only limited efforts have been made at present. Evaluation of oral function in infancy and toddlerhood has great interindividual variability in the process of development and acquisition. It is not easy to accurately identify which stage each child is in.

According to the Child Welfare Act in Japan, toddlers refer to the period from 1 year of age to primary school, early childhood is the period of language gain in addition to the period of weaning food completion. It has been reported that communicating with the mother and child during the infant's prelinguistic period is the basis for the infant to speak words, [3)] and it has been pointed out that the function of the oral cavity, including the speaking function, in children is crucial in terms of the growth and development of mind and body. Hoshiyama (2011) pointed out that gesture plays a key role in the development of speaking function, and situation in which gesture can be expressed, that is, an environment that involves others (such as parents) is essential.[4)] The "Speaking function" of infants is very important in interacting with others and acquiring sociality. In addition, the reading to infants is very important in interacting with others and acquiring sociality. Kawai, Takahashi and Furuhashi (2008) regard to point out that reading to children may lead to development.[5)] Furthermore, it has also been reported that reading aloud to young children develops rhythm and tempo, and that this influences later "Speaking functions".[6)] Kataoka(2005; 2020) points out changes in the circumstances surrounding young children, particularly the time spent the media, such as television and smartphones, may negatively affect infants' speaking functions.[7)8)] Then, such a word delay as a "new type of word delay" and alarms that it is increasing in recent years.[7)] Mizuno and Tokuda (2020a; 2020b) investigated the impact of smartphone use on young children's language development and noted that the ability of younger children to communicate unforeseen events in language may not be fostered by excessive reliance on visual information about smartphones.[9)10)] Sato(2018) points out that media contact may deprive the time required for growth and development, as longer time spent watched the media is negatively correlated with the time for pictorial, musical, and toy play and the time involved with parents and siblings.[11)]

Considering the indications of these previous studies, in this study, it was investigated the effects of "Involvement of the parents" and "Time spent watched the media" on infants "Have or haven't delay in eating function" and "Have or haven't delay in talking function". In addition, this study aimed to clarify whether there is a relationship between "Delay in eating function" and "Delay in speaking function" in infants.

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II. Methods

1. Subjects of survey

It was explained to the guardian of the 1~3-year-old infants who enrolled in the company-led nursery school in Yamaguchi prefecture, and 23 cases of infants was obtained (13 boys and 10 girls mean age of 30 ± 9.1 months).

2. Questionnaire and process

Questionnaire was carried out for the parents of the subject. A total of 8 items were asked about parents: two items related to "the daily condition" of infants, one item related to "the hours of use of televisions" and five items related "Parents involvement" (Table 1).

< Table 1 > Question items about parent involvement

Items related to daily conditions (1 point: not at all, 2 points: occasional, and 3 points: constant)
1. Has your child often unevenness of eating or not eating?
2. Has your child spent a lot of time mumbling?
Items related to the involvement with parents (1 point which is seldom applicable, 2 points which may be applicable, and 3 points which are applicable).
1. Have daily reading with your child?
2. Have daily eating with your child?
3. Have daily talking when your child doing something?
4. Have daily singing with your child?
5. Have daily playing music with your child?
6. How many hours a day your child watch TV, DVDs and smartphones?

It was conducted using "Speak" and "Language comprehension" from the Enjoji method (2009) infant analytical development test chart, in order to evaluate a "Speaking function" of the subject in the nursery school.[12)] And questionnaire was conducted in writing to the childcare professionals on the observable items in the childcare school by referring to the thought on oral dysfunction development disease by the Japanese Dental Association (Table 2). [2)]

< Table 2 > Children's Interview Questionnaire 2 for childcare professional
(Checklist for Oral Dysfunction by the Japanese Dental Association)

Eating (Before starting baby food.)	Check
1. The child has taken breastfeed too long time.	□
2. The child is variation in the amount and frequency of feeding.	□
3. The child can't hold up its own head.	□
4. The child pushes spoon out with tongue.	□
Speaking (Before starting baby food.)	Check
1. The child does not close his mouth when resting.	□

Eating (After starting baby food)	Check
1. The child has taken chewing time too long or too short.	□
2. The child chews only on the right/left side of a mouth.	□
3. The child is sticking out tongue.	□
4. The child is variation in the amount and frequency of eating.	□
Speaking (After starting baby food)	Check
1. The child does not close his mouth when resting.	□

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3. Evaluation Criteria

1) "Delay in Speaking function"

"Speaking function" was evaluated using two items of "Speak" and "Language comprehension" in the Enjoji method infant analytical development test chart (2009).[12] The achievement of the children to be examined was compared with the developmental items of the same age listed on the standard of examination. A case where the attainment item reached one stage below the developmental item was defined as "Haven't delay in speaking function". If the achievement item had reached only two stages below the developmental item, it was defined as "Have delay in speaking function". The same criteria were judged as "Have or haven't delay in language comprehension".

The Enjoji method infant analytical development test chart is originally used to screen infants and toddlers for developmental levels and is not diagnostic. Although this study should not be the purpose of making the diagnosis, and precisely it should be described as "possible delay" or "tending to be delayed," a definitive expression was used for convenience as "Have or haven't delay in", to avoid the complexity in the notation.

2) "Delay in Eating function"

It was defined as "there is a problem with the function of eating", if it was checked three points (frequently) for any of the following two items: "Question items to parents" or "Eating" in the Children's Interview Questionnaire two for the childcare professionals. Other cases were defined as "no problem in eating function".

4. Statistical analysis

The Easy R (EZR) was used for all statistical analyses. EZR is a statistical software that extends the functions of the R and R commanders. Group comparisons were performed using Mann-Whitney U test for the relationship between "Time spent watched the media", "Speaking function" and "Eating function". The subjects were divided into three pairs: "Have or haven't delay in speaking function", "Have or haven't delay in language comprehension", and "Have or haven't delay in eating function". The time spent watched the media was analyzed as twenty-one participants because there were two cases of missing data.

It was analyzed the relationship between "Parental involvement" and "Speaking function" and "Eating function". A comparative test was performed using Mann-Whitney U test between the two groups "Have or haven't delay in speaking function" regarding the scores for each item of "Involvement of parents". Comparisons between the two groups were similarly performed using Mann-Whitney U test for "Have or haven't delay in language comprehension" and "Have or haven't delay in eating function". A logistic regression analysis was conducted on the relationship of the influencing factors on delay in speaking function, using the dependent variables as six items: "Have or haven't delay in speaking function", "Have or haven't delay in eating function", "The time spent watched the media", "Singing (Involvement of parents)", "Reading (Involvement of parents)" and

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"Talking (Involvement of parents)".

The independent variables were determined by considering the likelihood ratio and multicollinearity. Fisher's exact test was used to determine whether or not there is a significant association between have and haven't delay in speaking function, and have and haven't eating function. And also, it was performed for the two groups "Have or haven't delay in language comprehension" and the two groups "Have or haven't delay in eating function".

5. Ethics

Based on the Declaration of Helsinki, this study was carried out by preparing a protocol describing appropriate academic and ethical considerations and obtaining the approval of the Ethical Review Board of the University (No.1108-06).

III. Results

1. Subject characteristics

The subjects were twenty-three children (13 boys and 10 girls, mean age 30 ± 9.1 months) (Table 3). The average age was five subjects (3 boys and 2 girls) for one-year-old children, ten subjects (4 boys and 6 girls) for two-year-old children, and eight subjects (6 boys and 2 girls) for three-year-old children.

It was ten subjects (43.5%) in "Have delay in speaking function" group and thirteen (56.5%) in the "Haven't delay in speaking function" group. There were three subjects (13.0%) in the "Have delay in language comprehension" group and twenty (87.0%) in the "Haven't delay in language comprehension" group. There were 10 subjects (43.5%) in the group with "Have delay in eating function" and thirteen subjects (56.5%) in the group with "Haven't delay in eating function". "The time spent watched the media" on weekdays averaged 1.77±0.98 hours/day.

< Table 3 > Characteristics of the participants

Total, n		23
Number, n(%)	1-year-old (12 to 23 months)	5 (21.7)
	2-year-old (24 to 35 months)	10 (43.5)
	3-year-old (36 to 47 months)	8 (34.8)
Age± SD		2 years 6 months ± 9.1
Delay in speaking function, n(%)	have	10 (43.5)
	haven't	13 (56.5)
Delay in language comprehension, n(%)	have	3 (13.0)
	haven't	20 (87.0)
Delay in eating function, n(%)	have	10 (43.5)
	haven't	13 (56.5)
The time spent watched the media, hours/day, mean± SD		1.77±0.98

SD; Standard Deviation

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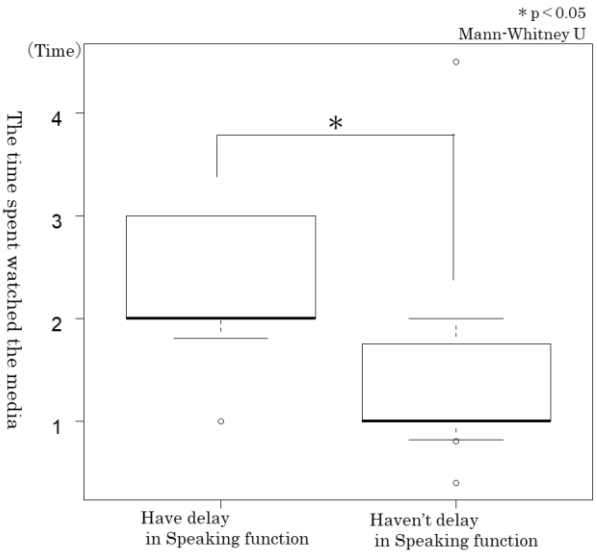
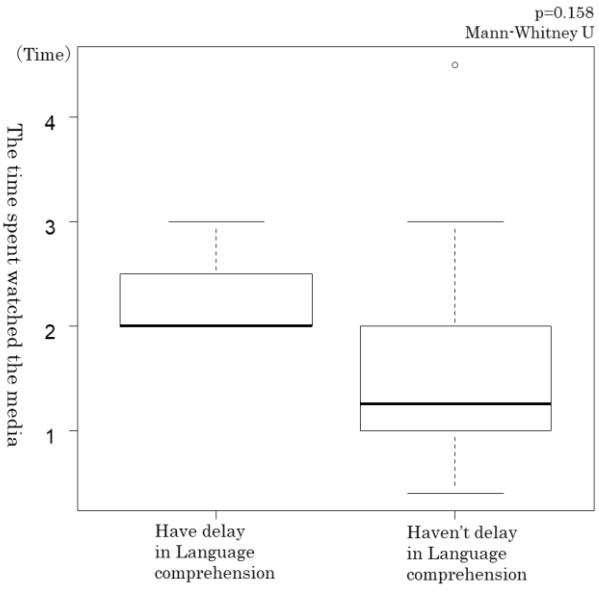
2. Relationship between "The time spent watched the media" and each group

Figure 1 shows the results "The time spent watched the media" between two groups have and haven't delay of speaking function. "Time spent watched the media" was significantly ($p<0.05$) longer in the "Have delay of speaking" group than in the "Haven't speaking delay" group (Figure 1).

Figure 2 shows the results "The time spent watched the media" between two groups have and haven't delay in language comprehension. The results showed that there was no significant difference between the two groups "Have or haven't delay in language comprehension" (Figure 2).



< Figure 1 > "Have or haven't delay of speaking function" and "the time spent watched the media"



< Figure 2> "Have or haven't delay in language comprehension" and "the time spent watched the media"

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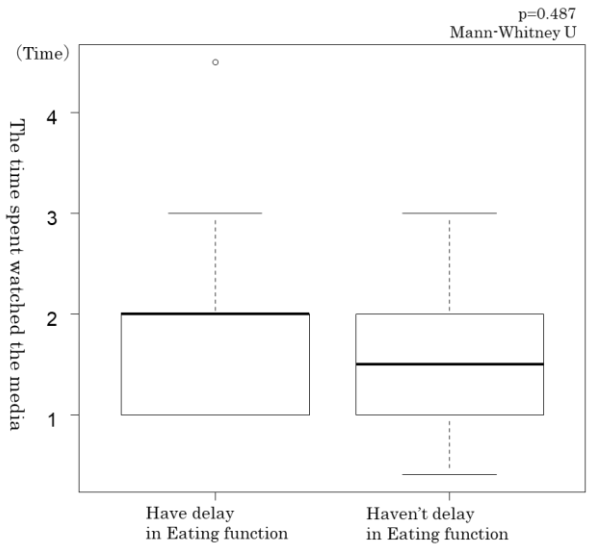
3. Results for "The time spent watched the media" and "Have or haven't delay in eating function"

Figure 3 shows the results "The time spent watched the media" between two groups have and haven't delay of eating function. The results showed that there were no significant differences between the two groups (Figure 3).



< Figure 3 > "Have or haven't delay in eating function" and "the time spent watched the media"

4. Results of "Involvement of parents", "Have or haven't delay in speaking function" and "Have or haven't delay in speaking eating function"

Table 4 shows the results " Involvement of parents " between two groups have and haven't delay of speaking function. A comparison (Mann-Whitney U) between the two groups "Have or haven't delay in speaking function" on the five items related to "the involvement of parents" revealed no significant differences in any of the items (Table 4).

The results showed that about "Talking", the group "Have delay in language comprehension" was significantly lower than the group "Haven't delay in language comprehension" ($p<0.01$). There was no significant difference between the two groups in other items (Table 5).

A comparison (Mann-Whitney U) between the two groups were made for "Have or haven't delay in eating function" on the five items related to "the involvement of parents" revealed no significant differences in any of the items (Table 6).

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< Table 4 > Relationship with "Involvement of parents" and "Have or haven't delay in speaking function"

		Delay in speaking function	Min	25%	Med	75%	Max	p value
Involvement of parents	Reading	have	1.00	2.00	2.00	3.00	3.00	0.20
		haven't	2.00	2.00	3.00	3.00	3.00	
	Singing	have	1.00	2.25	3.00	3.00	3.00	0.75
		haven't	1.00	3.00	3.00	3.00	3.00	
	Talking	have	2.00	3.00	3.00	3.00	3.00	0.49
		haven't	1.00	3.00	3.00	3.00	3.00	
	Finishing polish	have	1.00	3.00	3.00	3.00	3.00	0.90
		haven't	1.00	3.00	3.00	3.00	3.00	
	Eating with parents	have	1.00	3.00	3.00	3.00	3.00	0.89
		haven't	1.00	3.00	3.00	3.00	3.00	

Mann-Whitney U test

< Table 5 > Relationship with "Involvement of parents" and "Have or haven't delay in language comprehension "

		Delay in language comprehension	Min	25%	Med	75%	Max	p value
Involvement of parents	Reading	have	2.00	2.00	2.00	2.50	3.00	0.68
		haven't	1.00	2.00	2.00	3.00	3.00	
	Singing	have	1.00	1.50	2.00	2.50	3.00	0.09
		haven't	1.00	3.00	3.00	3.00	3.00	
	Talking	have	2.00	2.00	2.00	2.50	3.00	0.01**
		haven't	1.00	3.00	3.00	3.00	3.00	
	Finishing polish	have	3.00	3.00	3.00	3.00	3.00	0.64
		haven't	1.00	3.00	3.00	3.00	3.00	
	Eating with parents	have	2.00	2.50	3.00	3.00	3.00	0.63
		haven't	1.00	3.00	3.00	3.00	3.00	

**p<0.01, Mann-Whitney U test

< Table 6 > Relationship with "Involvement of parents" and "Have or haven't delay in eating function "

		Delay in eating function	Min	25%	Med	75%	Max	p value
Involvement of parents	Reading	have	1.00	2.00	2.00	2.75	3.00	0.10
		haven't	1.00	2.00	3.00	3.00	3.00	
	Singing	have	1.00	3.00	3.00	3.00	3.00	0.68
		haven't	1.00	2.00	3.00	3.00	3.00	
	Talking	have	2.00	3.00	3.00	3.00	3.00	0.64
		haven't	1.00	3.00	3.00	3.00	3.00	
	Finishing polish	have	1.00	3.00	3.00	3.00	3.00	0.90
		haven't	1.00	3.00	3.00	3.00	3.00	
	Eating with parents	have	1.00	3.00	3.00	3.00	3.00	0.89
		haven't	1.00	3.00	3.00	3.00	3.00	

Mann-Whitney U test

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5. Results of influencing factors on delayed speak

In this study, there was ten subjects confirmed "the delay in speaking function". Logistic regression analysis was conducted using "Have or haven't delay in speaking function" as the dependent variable. Five of the items related to "Reading (Involvement of parents)", "Singing (Involvement of parents) ", "Talking (Involvement of parents)", "Have or haven't delay in eating function" and "The time spent watched the media" as independent variables. The results showed that "The time spent watched the media" resulted in an odds ratio of 7.87 (p=0.049), suggesting the possibility of affecting "Have delay in speaking function" (Table 7).

< Table 7 > Influencing factors for "Have or haven't delay in speaking function"

	Have or haven't delay in speaking function (Dependent variable)	Odds ratio	Lower 95% CI	Upper 95% CI	p value
Involvement of parents (Independent variable)	Reading	0.017	0.000	2.170	0.100
	Singing	1.310	0.102	16.800	0.836
	Talking	1.400	0.080	24.600	0.818
	Have or haven't delay in eating function	0.077	0.002	2.440	0.146
	The time spent watched the media	7.870	1.010	61.200	0.049

Mann-Whitney U test

6. Relationship between "Delay in speaking function" and "Delay in eating function"

As a result, there was no significant difference between "Delay in speaking function" and "Delay in eating function"(Table 8).

< Table 8 > Tests between "Delay in speaking function" and "Delay in eating function"

(n=23)

		Delay in speaking function	
		Have	haven't
Delay in eating functions	have	6(26.0%)	4(17.3%)
	haven't	6(26.0%)	7(30.4%)

p = 1.00, Fisher's exact test

7. Relationship between "Delay in language comprehension" and "Delay in eating function"

As a result, there was no significant difference between "Eating function" and "Language comprehension"(Table 9).

< Table 9 > Tests between "Delay in language comprehension" and "Delay in eating function"

(n=23)

		Delay in language comprehension	
		Have	haven't
Delay in eating functions	have	2(8.7%)	8(34.8%)
	haven't	1(4.3%)	12(52.2%)

p = 0.56, Fisher's exact test

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IV. Discussion

In Japan, many parents are concerned about delays in children's language and consult nurseries in the preschool area. Hayashi and Yamamoto(2015) reported that, after interviewing seven parents with a semi-structured interview method, they were noted to have a delay in their words in the one-year-old screening and three-year-old screening, and they remembered their anxiety.[13] Kataoka(2005; 2020) regard to the possibility that prolonged viewing of electronic media, such as smartphones and television, may affect infants speak abilities, particularly speak.[7][8] In speaking delay associated with autism spectrum disease, both speaking, language comprehension and sociality are delayed, and in speak delay associated with hearing impairment, there is a delay in speaking function and language comprehension. However, Kataoka(2005) said that the most common language delays in recent years are "Delay of speaking" in many cases, and that they represent "Delays in new types of words" due to the time spent watched the media.[7] In the results of this study, ten out of twenty-three infants tended to be delayed in speaking. And language comprehension was investigated, and it was found that there was a tendency of delay in language comprehension among the three individuals. In addition, the questionnaire was carried out on the watching hour of the media such as television and DVD including the smartphone, and the relevance to "Delay in speaking function" was investigated. In this study, "Have delay in speaking function" group compared to the "Haven't delay in speaking function" group had longer time spent watched the media.

Moreover, no significant difference in "the time spent watched the media" was found between two groups have and haven't the delay in language comprehension. Regarding "language comprehension", it is considered that the influence of children's personality is larger than that of environmental factors around them. This resulted in agreement with the new type of language delay reported by Kataoka(2005).[7] The use of electronic devices such as smartphones is expected to expand increasingly in the child care setting for infants, but it is necessary for persons involved in childcare to fully understand not only their benefits but also their negative effects and provide information to their parents.

In order to investigate whether "the involvement of parents" has any effect on the function of "Have or haven't delay in speaking function", items obtained by questionnaire to parents were assessed by one to three points. In this study, there was no item which recognized the significance especially between two groups have and haven't the delay in speaking function". Since many parents check three points to all items, it is likely that there was no difference between have and haven't delay in speaking function groups. In the future, it is necessary to set the evaluation standard, which is easy to grasp the actual condition more easily on the questionnaire of the parents. Analysis of differences between the two groups have and haven't the delay in language comprehension were similarly performed on five items related to "the involvement of parents". The results suggested that the group "Have delay in language comprehension" had fewer talking involvement of

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parents than the group "Haven't delay language comprehension". Morooka (2005) regard that the lack of mother's speech rarely causes language delay in children, with the exception of special cases.[14] It was speculated that small number of "Talking" may have resulted from poor children's responses to their parents' daily talking, rather than delaying "Language comprehension" due to the small number of "Talking" to children. but the interpretation of the results seemed to require further investigation. Logistic regression analysis was carried out with "The involvement of parents", as independent variables in addition to "The time spent watched the media". Independent variables were five of the items related to "Reading (Involvement of parents)", "Singing (Involvement of parents) ", "Talking (Involvement of parents)", "Have or haven't delay in eating function" and "The time spent watched the media" as independent variables. The choice of independent variables was determined by considering the likelihood ratio and multicollinearity. The results showed that "The time spent watched the media" had an odds ratio of 7.87, suggesting that it was an influencing factor for "Have delay in speaking function". The nursery school childcare guidelines in Japan also mention the importance of responsive relation and speaking with the person who is close.[15] For infants and toddlers, this result also showed that the responsive relation with the person who is close rather than the one-way information through the electronic device is important for "Speaking function". Regarding "Have or haven't delay in eating function", no significant difference was observed between the two groups in terms of "The time spent watched the media" and five items related to "the involvement of parents". Generally, "Eating function" can be analyzed objectively by measuring lip closing force, oral diadochokinetic, tongue pressure, and masticatory function. Sakamoto, Moriwaki and Yamakawa et al.(2020) investigated the frequency of pronunciation, tongue muscle strength, lip closing ability, and eating quantity in order to analyze the relation between articulation function and eating function of young children.[16] However, because the children surveyed this time were one-to-three year-old infants, it was difficult to investigate by direct interventional measurement methods, so only the results from questionnaires to parents and childcare workers could be obtained. Indeed, it has been difficult to rigorously assess whether there are any functional tasks regarding the eating functioning of participants. In the case of infants, it is likely that the investigative actions themselves will affect the results, so it is often to take the method of observation, but what indicators are more objective and appropriate is a challenge in the future. "Speaking function" and "Eating function" also share the oral organ. Functioning itself is quite different, but peripheral nerves and muscles are often shared. In infancy, the sucking reflex is shifted to the masticatory movement by the start of the weaning diet. At this time, it was hypothesized that nerves and muscles around the oral cavity, such as lips, tongue, and orbicularis oris muscle, would develop, allowing more fine movements, which might play a role as preparatory movements for "Speaking". Then, the analysis between "Speaking function" and "Eating function" was also carried out in this investigation. "Have and haven't delay in speaking

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function" groups and "Have and haven't delay in eating function" groups were performed using fisher's exact test, and no significant differences were found. Similarly, fisher's exact test was also used in the two groups "Have or haven't delay in language comprehension" and the two groups "Have or haven't delay in eating function", but no significant differences were found. In this study, it was not possible to recognize the relation between "Speaking function" and "Eating function". As mentioned above, it is speculated that "Eating function" of infants may be due in part to difficulties in assessing and accurately grasping. Language comprehension has profound effects not only on its significance as a communication with others, but also on thoughts inside the self. In the future, it seems to be necessary to investigate longitudinally using the scale which can objectively grasp the developmental stage of an infant, and to analyze the change over time in order to analyze the process and influencing factor of "the language ability acquisition.

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ORIGINAL ARTICLE

Factors Related to Preparatory Behaviors for the Death of Older Women who Lost Their Husbands before Old Age

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ABSTRACT

The purpose of this study was to clarify the factors related to preparatory behaviors for death of older women who lost their husbands before old age and are now in old age.

Five older women who lost their husbands before old age were interviewed. Data were analyzed using Steps for Coding and Theorization (SCAT), which is a qualitative data analysis method using four-step coding.

Factors related to preparatory behaviors for death were generated in three categories, such as behaviors that help in adapting to life without a spouse, behaviors that aim at seeking to live better, and behaviors that prepare for the final stages of life. Behaviors that help in adapting to life without a spouse included time factors, living factors, financial factors, health factors, and family factors related to the opportunity and room to think about their death. In behaviors that aim at seeking to live better, it was the action factors with a view to enjoyment and death, such as goal factors, internal factors, acceptance factors for aging, and acceptance factors towards death. Behaviors that prepare for the final stages of life included recognition of preparatory behaviors, expectations for preparatory behaviors, actual preparatory behaviors, and the matter that revealed in preparatory behaviors. These were not behaviors of a particular order, but occur naturally as part of a spouseless life.

< Key-words >
Older women, spousal bereavement, preparatory behaviors, end-of-life, death

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I. Introduction

The old-age stage is a time when people feel close to death, actively face it, and feel the need to prepare for it. In recent years, many Japanese people have participated in courses and experiences, such as "Shūkatsu" (end-of-life planning), "Oi-jitaku kōza" (the course to prepare for the future), and "Ending seminar" among others. They engage in preparatory behaviors such as making ending notes, making decisions regarding adult guardianship and asset management, funeral methods and grave management, and long-term care and end-of-life care. In this way, there is a wide variety of movements in preparation for one's own death, and interest in death is increasing[1].

On the other hand, older adults recognize that they need to prepare for death[2], but there is a regional perception that the culture and traditions of the local community in which older adults have lived influence their end-of-life behaviors[3]. Additionally, the diversity of hopes regarding expression of intention and proxy decisions during life has also been clarified[4]. As a result, older adults are more likely to be confused about preparing for their own death and tend to procrastinate such preparation[5].

The purpose of death preparatory education is to acquire a positive attitude to prepare for the death of oneself and others[6]. For older adults, a spouse is "emotional supporter "[7], and older couples can work together to support each other, face each other's death, and prepare ahead of the death as a couple. However, it has also been shown that older women are more evasive to death and face more difficulty in accepting death compared with older men[8].

In this way, the characteristics and tendencies of how to perceive death and how to reach the desired death in older adults have been clarified. Based on the individuality and regional characteristics of older adults, it is suggested that support should be provided in consideration of their regional and social aspects, such as lifestyle and rituals. The correlation between life after spouse's bereavement and mental health[9], and the relationship between preparatory behavior for the end of life and life satisfaction in the older adults living alone have been examined in previous studies[10]. The average life expectancy of females is over 6 years longer than that of males[11], and the number of females aged 65 and above who are living alone in the population is higher than that of males[12]. Older women who lose their husbands before old age are expected to face their own death in old age. Therefore, research on preparatory behaviors for death in older women after the bereavement of their husbands is considered to provide novel perspectives that allow them to shift to support toward the end of life without interruption.

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II. Purpose of the Research

We aim to clarify the factors related to preparatory behaviors for death of older women who lost their husbands before old age and are now in old age.

III. Research Method

1. Research Design

The subject was described as it is, followed by exploring the process of the phenomenon existing in it. Hence, a qualitative inductive and factor-searching research design was adopted.

2 . Participants

The participants of this study were five older women who lived in Aomori prefecture and continued to live at home even after their husbands died before old age. Aomori Prefecture is located at the northernmost tip of the main island of Japan; here, population decline, aging, and shortening of life have become important issues. The aging rate in Aomori prefecture is 33.7%, which is 5.1 points higher than the national average of 28.6%[13]. The aging rate here is also the seventh highest in 47 prefectures, and the ranking has been increasing since 2015 (12th) [13]. In terms of the percentage of single-person households, women were the highest in the age group of 75-84 (24.5%). In local communities, the older adults tend to be isolated due to the decline of local culture and weakening of local exchanges [14]. Therefore, we considered that it would be possible to understand the target population, including the characteristics of the area, by focusing on older adults living in Aomori prefecture.

There was no declaration of the faith they believed in. They were in good health no depression or chronic illness affecting the interview.

3 . Methods of Data Collection

In the selection of participants for this study, it was adopted the snowball sampling of obtaining the introduction from of acquaintances who was carrying out volunteer activities in the local community, in order to target a specific survey subject, older women who lost their husbands before old age. The snowball sampling is a method of making a sample of people who have some kind of connection with the person conducting the survey[15], and it is used in many surveys as the sampling in human services[16)-19)].

It was conducted semi-structured interviews on older women whose spouses died before old age and who lived in prefecture A from October 2020 to October 2021. Interviews were conducted based on an interview guide in a private room to ensure privacy. The interview contents were recorded using an IC recorder with the consent of the research participants, and a verbatim transcript was created.

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4 . Interview contents

1) Basic attributes

・Age at marriage, age at the time of bereavement, current age, time elapsed since bereavement

2) Presence or absence of awareness and anxiety about one's death

・Changes in thoughts from spousal bereavement to the present

3) Interest in and practice of preparatory behaviors for death

・Interest only, already done, plan to do it from now on
・Impact of spousal bereavement experience on future preparatory behaviors for death
・Preparatory behaviors for death related to life and rituals (such as listing, organizing before life, organizing property, inheritance contents, messages to close friends, funeral contents and graves)
・Preparatory behaviors for death related to medical care and long-term care (such as decision-making regarding medical care and long-term care, decision-making regarding medical condition notification and life-prolonging and measures)
・Hope of a place to die
・People to talk to, places to talk in, tools to talk with
・Support for families and communities

5. Definition of Terms

1) Shūkatsu

"Shūkatsu" in Japanese, refers to preparatory behaviors for the end of life without disturbing others[3], and includes the act of choosing and leaving what older adults can do rather than leaving diverse hopes[20].

2) Preparatory behaviors for death

In this study, "preparatory behaviors for death" of older women who lost their husbands before old age was defined as recognizing the process leading to their death and after death, and concretely preparing what should be prepared and what should be solved.

6. Data Analysis Method

1) Reasons for choosing an analysis method

The verbatim transcripts created from the interviews were analyzed using Steps for Coding and Theorization (SCAT), a method for analyzing qualitative data developed by Otani et al.[21] In SCAT, valid analysis results can be obtained by repeatedly confirming and modifying one's own analysis. It involves visualization of the analysis process, and is suitable for joint analysis with explicit and step-by-step analysis procedures. It is also applicable to relatively small-scale data[22]. Therefore, we considered that we could use

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SCAT to analyze the factors surrounding preparatory behaviors for death of older women after spousal bereavement before old age.

2) Analysis procedures

(1) The text data obtained from the verbatim transcripts were sectioned for each group of contexts.

(2) The sectioned pieces were coded according to the following four steps. <1> Extraction to clarify a noteworthy phrase in the text, <2> the extracted phrase was paraphrased into a general phrase, <3> phrases were demarcated into background, result, cause etc. and explanation, and <4> themes were summarized into concepts after considering the context before and after.

(3) A storyline was created based on the themes and constructs obtained by coding. The theme and construct of <4>, extracted as preparatory behaviors for death of older women who lost their husbands before old age, were spun into a story line.

(4) While summarizing the contents of the storyline, the theoretical description was created in a short sentence. The contents coded were then compared and corrected between co-authors.

Analysts took care to include rich contextual information in the analysis process, by clearly describing the analysis process and source texts through which interpretations were made. Through this, certainty was also ensured. The analysis by SCAT was mainly conducted by the first author, and the validity of the analysis was examined by the co-authors, based on the SCAT table created from the analysis.

The above procedure was performed for each participant. To grasp the overall picture, the similarities and differences of the texts and themes/constructs were compared. Finally, each content of the construct was subcategorized, and the subcategory was further categorized.

7. Ethical Considerations

Arbitrariness was ensured by soliciting research cooperation and contacting the participants whose consent was obtained through a request form. A sufficient explanation was given to these participants through the instruction manual, such as about the purpose and significance of the research, research method, freedom to suspend research participation, avoiding disadvantages, the confidentiality of personal information, burdens for research participants, and expected results. Participants agreed to participate after reading them. This study was conducted with the approval of the Ethics Review Committee of Hiroaki University of Health and Welfare (approval number 2020-4).

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IV. Results

1 . Overview of the participants

In this study, five people were included in the analysis. Table1 shows the basic attributes of the participants. There were no communication problems, and there were no interruptions or cancellations of the interviews due to changes in physical condition. Interview duration ranged from 21 to 93 minutes, averaging at 58.1 minutes. The interview time varied, but the contents of data were covered based on the interview guide.

< Table 1 > List of participants

Participant's number	Current age (Years)	At the time of bereavement		Additional years since bereavement (Years)	Family structure	Interview time (Minutes)
		Wife's age (Years)	Husband's age (Years)			
1	77	54	61	23	Living alone (No child)	93
2	73	48	47	25	Living with her mother (Three children)	67
3	74	69	73	5	Living alone (Two children)	48
4	73	63	69	10	Living alone (One child)	30
5	60	52	55	8	Living with mother-in-law (Two children)	21

2 . Result of Analysis

1) Storyline

From the stories of older women who lost their husbands before old age, the SCAT analysis was focused on the contents related to preparatory behaviors for death and generated constructs. An example is shown in Table 2.

Next, contextualized words that reflected the themes and concepts in the story (<4> code) were grouped together in the SCAT table, with the storyline as the underlying context. A storyline in the SCAT analysis is a description of the latent meanings in the events described in the data. These mainly comprise the thematic concepts described in <4>[21]. We also used the words and phrases described in the themes and concepts of <4> in the SCAT table for the storyline and underlined them to indicate that the findings were derived from the analysis results.

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< Table 2 > Interview analysis by SCAT (excerpt)

Segmentation → Coding → Storyline → Theoretical description

Text	Step＜1＞	Step＜2＞	Step＜3＞	Step＜4＞	Step＜5＞
Raw interview data	Noteworthy words or phrases from the text	Paraphrasing of words and phrases in Step <1>	Words or phrases to describe the text in Step <2>	Themes and construct, with consideration of the context	Questions and Issues
Is it finally impossible? I thought I had to enter the facility, so I decided to sell my house.	Finally, impossible / Enter the facility / Sell the house	Difficult to live at home	Decided to sell the house (result)	Sale of the house due to health concerns	What happened if she had children, even if she were worried about her health?
I changed the name of the house to my daughter's. I thought it would be difficult to get a seal certificate. If I don't do that, I'll be in trouble later.	Home, Seal, Certificate, Registration / Difficult to be alone / Trouble later	I completed the procedure early to avoid trouble later	Troublesome procedure (reason)	Complete procedures that tend to be postponed	Is the perception that it is difficult influenced by the spouse's bereavement experience?
Gradually, I want to think about each one and dispose of it. I can't do everything suddenly.	Gradually / One by one / Want to dispose / Cannot be done suddenly	Stagnation disposal	Hope to plan for the end of life (background)	Step-by-step organization and disposal of property	
After 60, I disposed of everything around me. Disposed of clothes and wedding tools.	60 years old / Personal arrangement / Clothes and wedding tools	Personal arrangement	Contents of preparation for death (background)	Dispose of mine without hesitation	What influences the timing of 60 years old?
Please take me out of the house when I die. Put the incense at the entrance and just put your hands together	When I died / Burning incense at the entrance / I want you to join hands	What to hope for when I die	Funeral content I want (influence)	Telling her family, the funeral she wants	

2) Categorical classification of death-preparatory behaviors

From the stories of older women who lost husbands before old age, 122 <4> themes / constructs, excluding duplicates, were generated regarding factors and backgrounds related to preparatory behaviors for death. Further, 37 subcategories and 13 categories were generated from the contents. The categories were categorized into behaviors that help in adapting to life without a spouse, behaviors that aim at seeking to live better, and behaviors that prepare for the final stages of life.

In showing the results, the generated category is shown in【 】, the sub-category in [ ], the concept in < >, and the specific example in "*italics* ."

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(1) Behaviors that help in adapting to life without a spouse

After spousal bereavement, maintaining a living was the top priority. Therefore, some behaviors were found to help in adapting to a life without a spouse. Factors related to spouse recollection and life maintenance have been confirmed, and 13 subcategories and 5 categories were obtained from 43 themes and constructs. They are shown in Table 3.

< Table 3 > Behaviors that help in adapting to life without a spouse

Category	Subcategory	Theme / construct
Time factors (11)	Sense of time	Speed of time after spousal bereavement
	Sense of loss	A certain period in which strong loneliness was felt
		The moment that they re-recognized being alone
		Feeling of loneliness
		Recalling the anguish of spousal bereavement
	Adapt to life	Planning the life after spousal bereavement
		Disgust for the words without consideration of surroundings
		Roles assigned after spousal bereavement
		Moving forward without being swept away by inconsiderate surroundings
		Living without being conscious that there is no spouse
		Living while accepting spousal bereavement
Living Factors (8)	Reassurance	Living environment that fosters happiness
		gratitude for being able to live a peaceful life
	Satisfaction	living environment with comfort even by oneself
		Living environment that did not feel inconvenient
		Whereabouts of the hometown that was unexpectedly found
		Possibility of involvement with the community
	Independence	Living with the help of children
		Living without relying on the power of others
Financial factors (5)	Financial anxiety	Financial anxiety after spousal bereavement
	Financial security	Relief to manage life
		Margin to manage life
	Behavior with a view to old age	Savings for a long life
		Savings oriented toward future even before spousal bereavement
Health Factors (9)	Promote health	Maintaining good health for a long life
		Expectations for maintaining own health
		Expectations for maintaining family's health
		Living a healthy life
		Living a well-balanced daily life
		Significance of being alive
		Acceptance of health and illness interpreted in one's own way
	Anxious related to health	Hope to enter the facility urgently because of health concerns
		Difficulty in end-of-life behaviors due to health anxiety
Family factors (10)	Existence of children	Relief brought by existence of children
		Existence of reliable children in case of emergency
	Changes in family relationships	A state of mind that cannot seek positivity in life with a mother-in-law
		A sense of comfort in being able to take a positive view of parents-in-law
		Eliminating the hassle of living with parents-in-law
		Seeking to rebuild the family that could not be achieved with a spouse
	Concern about the burden on the family	Seeking to avoid burdening the family about the end
		The worry that longevity would be a burden on the family
		Avoiding bothering the children
		Avoiding the burden on children

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In 【time factors】, participants talked about the speed of [sense of time] after spousal bereavement and the passage of time in [adapting to life] while feeling a [sense of loss] at a moment's notice. For instance, *"It's early, it's early to think about it. If he were alive now, he would be about 84 years old", "I thought it would make me so lonely because there was nothing when I came home"* and *"I'm lonely, I'm happy, I don't have that feeling, I just go on."*

【Living factors】 discussed [reassurance] for <living environment that fosters happiness>, [satisfaction] for <living environment with comfort even by oneself>, and [independence] such as <living with the help of children> while <living without relying on the power of others>. Participants said, *"Thanks to my dad, I can now live like this", "I didn't feel like coming back here, but I could see Mt. ○○, and when I saw it, my heart was soothed. I was able to act toward what I was thinking"* and *"For now, I have managed to become independent without relying on the government."*

In 【financial factors】, [financial security] and [behaviors with a view to old age] provide <relief to manage life> and <margin to manage life> in living without a spouse. [Financial anxiety] was high for participants without savings, and good financial holding was a prerequisite for living. Participants said, *"For now, I don't have any financial problems, I don't have any problems, I think this is the best", "I have the greatest financial anxiety"* and *"I was saving money thinking that I would live for 80 years."*

Under 【health factors】 in trying to [promote health], while being aware of the need to <maintaining good health for a long life>, participants were aware of the inconveniences and [anxieties related to health] . They stated "*I want to live longer. I don't want to die yet. So, I want to be careful about my health, so I go out and listen to people"* and *"Because my body collapses after I had spinal canal stenosis, it hurts and takes time. No matter what, I do stretch."*

In terms of 【family factors】, [existence of children] was significant, and while children were regarded as <existence of reliable children in case of emergency>, there was also [concern about the burden on the family] and <avoiding bothering the children>. The hassles of living with someone other than the spouse also affected [changes in family relationships].

Participants felt *"It's amazing to be with your child. I feel good"* and "*I can't bother my child*." They also said "*I don't want to bother the children too much in the first place*." Regarding families other than children, they said *"I cannot even look back because my grandpa and grandma are noisy. My daily life was full*" and *"When they died, I felt like I was feeling relaxed, and I was able to relax."*

(2) Behaviors that aim at seeking to live better

As the life after spousal bereavement became established, behaviors aimed toward pursuing a better life were established. There are factors related to the current ways of living life and the way of thinking about death in the face of inevitable aging; 11

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subcategories and 4 categories were obtained from 30 themes and constructs. They are presented in Table 4.

< Table 4 > Behaviors that aim at seeking to live better

Category	Subcategory	Theme / construct
Goal factors (10)	Role continuation	Prioritizing role condition over thinking about one's death
		Existence of work and children have influenced psychological aspects
		How to spend the day to fulfill roles
		Maintaining opportunities for interaction before and after bereavement
	Role acquisition	Acquisition of roles in the community
		Acquisition of things that can be positive
		the goal to make life enjoyable
	Life fulfillment	A sense of fulfillment in life brought by maintaining role
		A sense of fulfillment in life brought by hobbies
		A sense of fulfillment in life brought by relationships with people
Internal factors (7)	Self-solving	Self-reliance before or after bereavement
		Self-solving before and after bereavement
		Deciding for oneself
		Deciding and acting by oneself
	Way of thinking about things	Some positive and some negative
		Do not think about other's assumption
	Understanding the other person	Ability to understand others' feelings
Acceptance factors for aging (5)	realizing	Real feeling one's own decline
		Concerns about being unable to do many things due to aging
	rejecting	Turning away from aging
	accepting	Accepting further aging in the future
		To entrust life and beyond to someone trustworthy
Acceptance factors to death (8)	opportunity to think	Way to think about death by getting older
		Opportunity to face own death
		Chance to think about one's own death
		Margin to think about one's own death
		When to start thinking about afterlife
	the reality	Unrealistic death
		Death felt closer by getting older
		Acceptance of the coming death

【Goal factors】 were [role continuation] such as <how to spend the day to fulfill roles> , and new [role acquisition] such as <acquisition of roles in the community> and <acquisition of things that can be positive>. These contributed to [life fulfillment] such as <a sense of fulfillment in life brought by continuing roles>, <a sense of fulfillment in life brought by hobbies> and <a sense of fulfillment in life brought by relationships with people>. Participants said the following: *"If I go, get ready for breakfast in the morning, finish it, and go shopping early. I can plan, if I have a place to go", "Because I started going to the pool after my dad died"* and *"It feels like being in contact with the children is what makes me want to live. If needed, I'll go again."*

【 Internal factors 】 were [self-solving] , [way of thinking about things] , and [understanding the other person] such as <deciding and acting by oneself>. A participant said *"No matter what I do, I have to do everything myself. I have to do everything myself."*

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【Acceptance factors for aging】 included [realizing] that <concerns about being unable to do many things by aging>. After [rejecting] such as <turning away from aging>, participant [accepting] <accepting further aging in the future>. Participants stated the following: *"How long can I stay healthy?", "Is it meaningful to live like this? I feel sad when I think about what will happen in the future"* or *"I spend my days accepting old age and bereavement."*

In 【acceptance factors to death】, the [opportunity to think] about death and [the reality] of <acceptance the coming death> were present. Participants stated the following: *"It doesn't matter what my husband's death was. I'm old. I'm the only person"*, *"I especially felt it when I was 70"*,*"It looks like it's completely blown out now. I feel like I'm thinking about me dying"* and *"We were talking about not taking life-prolonging measures."*

(3) Behaviors that prepare for the final stages of life

These included the intentions of preparatory behaviors for death and factors related to it; 12 subcategories and 4 categories were obtained from 49 themes / constructs. They are shown in Table 5.

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< Table 5 > Behaviors that prepare for the final stages of life

Category	Subcategory	Theme / construct
Recognition of preparatory behaviors (14)	Positive recognition	Positive thoughts about the funeral
		No resistance in thinking about the funeral
		Interest in using ending note
		Death preparation by utilizing spousal bereavement experience
		Death preparation at the right time
	Negative recognition	Death preparation wherein one knows but cannot act
		Death preparation unresolved
		Vague end of life
		Vague decluttering
	Fluid recognition	Recognizing that one's intention was not universal
		Fluid feelings about place to want to reach at the end
		Comparing preparatory behaviors of others with oneself
	Crisis recognition	Confirmation of actions that should be assumed in an emergency
		When started to feel the need to prepare for a sudden situation
Expectations for preparatory behaviors (9)	Hoping	Hope to proceed with disposal of property with a sense of speed
		Conditions for selecting the final place
		The end of life that wanted from the end of familiar persons
		Hope to exchange a lot of words at the end
		Hope to entrust funeral to children
		Specific funeral contents
	Anxiety	Concerns about new procedures
		Concerns about procedures that will be sudden
		Hesitation to ask for problem to be solved
Actual preparatory behaviors (11)	Specific contents	Selling the house because of health concerns
		Starting preparations for a husband's grave from an early stage
		Seeking the final home
		Completement of procedures that tend to be postponed
		Step-by-step arrangement and disposal of property
		Arrangement of property from an early stage
		Disposing of possessions without hesitation
	Communicative content	Telling the children about the funeral contents that reduces the burden
		Declaring hope for the end, funerals, temples, etc.
		Telling the family about the end that one hoped for>
		Presentation of the number of legal affairs that do not impose a burden
The matter that revealed in preparatory behaviors (15)	Reflection	The decision to choose the grave for ease of access
		Procedures completed unexpectedly smoothly
		The spousal funeral experience that was a good experience
		A sense of security after completing complicated property-related procedures
		A sense of security that the complicated procedure was completed with the help of children
		Regret the missed opportunity for cleanup
	Memories	Difficulty arrangement of husband's relics
		Hesitation to throw away articles with memories
	Clean up	Arrangement and disposal of property not started yet
		The only thing is to clean up now
		Arrangement and disposal of property was the highest priority
		Clean up that must continue
	Comprise	Arrangement and disposal of property that were limited by oneself
		Arrangement and disposal of property that does not depend on health anxiety
		Funeral hopes differ between own and family

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【Recognition of preparatory behaviors】included [positive recognition] such as < death preparation by utilizing spousal bereavement experience>, [negative recognition] such as < death preparation wherein one knows but cannot act>, [fluid recognition] such as <recognizing that one's intention was not universal> and [crisis recognition] such as <confirmation of actions that should be assumed in an emergency>. Participants stated *"I think I have to experience the bereavement of my husband and do it. Ending note ...","I'll be put off. I'm still busy"*, *"I don't really think about it. People always change with wills"* and *"Suddenly, I imagine that my heart is bad or that I'm crushed by an earthquake and can't move."*

【Expectations for preparatory behaviors】included [hoping] such as <conditions for selecting the final place>, there was also a mixture of [anxiety] such as <concerns about new procedures>. Participants stated: *"I'm not sure which hospital I want to go to. I don't like hospitals that are too stubborn or fearful"* and *"I'm that old, and I have to give my son the name of the house."*

【Actual preparatory behaviors】included [specific contents] such as <selling the house because of health concerns>, <starting preparations for husband's grave from an early stage>, and <step-by-step arrangement and disposing of property>. Participants were working on solving problems for their own death. It included [communicative content] such as <telling the children about the funeral contents that reduces the burden> and <presentation of the number of legal affairs that do not impose a burden>. Participants stated: *"Finally, I thought I had to enter the facility, so I decided to sell my house." "I changed the name of my house to my daughter's. I thought it would be difficult to get a seal certificate. If I don't do that, I'll be in trouble later"* and *"I'm talking to my daughter. My hope is to have a funeral at home. It's just hard because it costs money to make the funeral bigger."*

【The matters revealed in preparatory behaviors】 included <the decision to choose the grave for ease of access>, <procedures were completed unexpectedly smoothly>, <a sense of security after completing complicated property-related procedure> and <a sense of security that the complicated procedure was completed with the help of children>. There were many [reflection] such as a sense of security that the procedure was completed. On the other hand, they also talked about <regret regarding the missed opportunity for cleanup>. Regarding [memories] with spouses, participants experienced <hesitation to throw away memories> and <difficulty in arrangement of husband's relics>. [Cleaning up] is the current situation where <arrangement and disposal of property was the highest priority> but <arrangement and disposal of property of upstarted property> needs the most preparation. It was positioned as an action. Therefore, since <arrangement and disposal of property were limited by oneself> and < arrangement and disposal of property that did not depend on health anxiety>, it has been an issue to act with [compromise]. Participants stated: *"Everything went smoothly. It was okay." "I couldn't throw away the memorable things"*, *"There is no choice but to cut them off. For now, cut them off"* and *"I*

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talked to my daughter. When I died, I secretly want a funeral at home. But my daughter asks the funeral director."

V. Discussion

In this study, we investigated factors related to preparatory behaviors for death of older women who lost their husbands before old age. In previous study, it was reported that people with a coping pattern that did not try to deal with life after the death of a spouse have poor mental health[9], and that the value of life satisfaction among the group living alone and not-working on SHU-KATSU was significantly low[10]. However, in this study, older women who lost their husbands before old age, in anticipation of their own death, identified issues to be resolved and prepared for their own death at an earlier stage than older couples. We consider from three perspectives such as behaviors that help in adapting to life without a spouse, behaviors that aim at seeking to live better, and behaviors that prepare for the final stages of life.

1 . Behaviors that adapt to life without a spouse

Older women who lost their husbands before old age were required to adapt to a new life without a spouse. 【Financial factors】necessary for living such as pensions, savings, severance pay and life insurance were essential. [Financial security] influenced 【living factors】of [reassurance] and [satisfaction] . In addition, the elimination of 【health factors】such as [anxieties related to health] also influenced【living factors】. Older women who have lost their husbands are said to be highly satisfied with their lives if they have emotional support from family and friends[23]. However, in older women who lost their husbands before old age,【financial factors】were also related to life satisfaction.

On the other hand, in the 【time factors】as spousal bereavement to the present, even if they were able to adapt to their life, the spouse was often remembered, regardless of the number of years since the bereavement. A [sense of loss] was natural to develop over time, and it can be said that it is a story of the process of steadily accumulating grief work.

【Family factors】 had an effect on adapting to a life without a spouse. While participants felt grateful for the [existence of reliable children in case of emergency], especially for help in emergencies, they also felt [concern about burden on the family], highlighting relationships that are not dependent or supportive.

2. Behaviors that aim at seeking to live better

It is said that there are few older adults living alone due to spousal bereavement[24]; on the other hand, mentally healthy adults and those who have a purpose to live have less anxiety about aging [25]. Even in the current study's participants, 【health factors】,【goal factors】and 【acceptance factors for aging】were interrelated. It was believed that

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eliminating the anxieties and issues of life after the spousal bereavement and creating an objective environment can contribute to independence of daily life and social activities. These promoted toward [accepting] while doing [realizing] and [rejecting] in the process of aging and provided an [opportunity to think] about death ahead of aging.

3. Behaviors that help in preparing for the final stages of life

In the process of universalization and affirmation of a life without a spouse, a wide range of 【recognition of preparatory behaviors】 such as [positive recognition] , [passive recognition] , [fluid recognition] and [crisis recognition] are followed by preparations. It was acting on the behavior.

For older adults, "death-preparation behaviors" is said to encourage sorting out the current situation and solving problems[20]. Even for older women who lost their husbands before old age, it was a【the matter that was revealed in preparatory behaviors】 to [clean up] while making [compromise] .

Participants talked about everyday things that are easy to work in, such as cleaning up things and organizing property. On the other hand, they may be <hesitation to throw away memories> and may remember that there is no spouse. If there are people whom they can rely on, such as their children and other house residents, they can expect to smoothly proceed with <arrangement and disposal of property that were limited by oneself>. Therefore, it is possible that the timing of starting this clean-up may deviate and participants might <regret the missed the opportunity for clean-up>. Additionally, children's help is needed in various situations; 【family factors】 of older women living alone without children affects 【recognition of preparatory behaviors】 and specific 【actual preparatory behaviors】. Therefore, based on [crisis recognition], there might be a tendency to perform preparatory behaviors for death at an early stage.

When there were [anxieties related to health], participants were keenly aware of the [reality] of the coming death, and the timing and content of the preparatory behaviors were concrete. In the absence of [anxieties related to health], there was a tendency for <vague end of life> and <vague decluttering> under [positive recognition].

They regarded organization and disposal of property and handling of important property-related documents as a problem for preparatory behaviors. In addition, the actual experience of the troublesome post-mortem procedures such as registration and handling of monetary savings at the time of spousal bereavement influenced the concrete understanding of problems that need to be resolved toward one's own death. It made intentions and preparations for the final stage clearer, in the final way they want to go, the place they want to reach the end, the funeral contents they want, the place of the grave they want. After spousal bereavement before old age, maintaining life was an urgent matter. The spouse's end was compared with their own end. Afterwards, it was the process of preparing for future intentions and goals regarding one's own aging and death.

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VI. Research limits and future challenges

In this study, since the life after spousal bereavement was understood through participants who were relatively stable physically, psychologically, and socially, their own preparatory behaviors for death were positively regarded as a part of their life. Because of this, there may be limits to adapting the results to understand needs of other older women after spousal bereavement. It was also focused on regional characteristics but found no process factors related to them. Future studies are required to clarify the processes underlying preparatory behaviors for death that affect the health and community of older women, and to obtain suggestions for nursing support.

VII. Conclusion

This study found that maintaining a stable life is a major premise in the death-preparatory behaviors of older women who lost their husbands before old age. In addition, while the acquisition and continuation of roles and positive thinking are related to a stable life, health anxiety and the presence or absence of children also had an effect. These findings suggest providing support for things that cannot be solved by oneself.

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ORIGINAL ARTICLE

Experiences of the Recovery Process and Support for Patients with Schizophrenia in Japanese Psychiatric Hospitals

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ABSTRACT

Background: Psychiatric treatment in Japan is shifting from hospital to community-based care. However, many patients require re-hospitalization in the short term, indicating that recovery support is insufficient and does not correspond to the needs of patients.

Aim: In this study, nine community-dwelling patients with schizophrenia were interviewed regarding their experiences from hospital admission to discharge and their return to community life.

Method: Data from interviews were transcribed and analyzed using qualitative descriptive methods.

Results: The participants described encountering the unknown and tried self-coping, but were still being hospitalized in crisis. In the hospital, they experienced distress in the closed environment; however, they also received support that ensured security and motivation, and were able to confront their distress, transform themselves, and leave the hospital. They described their experiences of having symptoms and regarding community life concerns, but were still able to accept things as they were and obtain support, which gave them hope. Finally, they described realizing recovery from illness and seeking a way of life with goals.

Conclusions: This study demonstrated the recovery process (patients learning to help themselves and increase their resilience), as well as the protection of patients' human rights (listening to their subjective and informed experiences).

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I. Introduction

Schizophrenia is a complex, chronic mental health disorder characterized by an array of symptoms, including delusions, hallucinations, disorganized speech or behavior, and impaired cognitive ability.[1-2] The goals in treating schizophrenia include targeting symptoms, preventing relapse, and increasing adaptive functioning so that the patient can be integrated back into the community. While pharmacotherapy is the mainstay of schizophrenia management, nonpharmacological treatments, such psychosocial therapy, are also important.[3]

In recent years, recovery has become a guiding concept for practice in global mental health services.[4-7] Recovery, in this context, refers to personal recovery. It is the deeply personal and unique process of changing one's attitudes, values, feelings, goals, skills, and/or roles. It is a way of living a satisfying and hopeful life where one feels they are making a contribution, even with the limitations caused by an illness. This involves the development of new meaning and purpose in life as one grows beyond the catastrophic effects of mental illness.[8-12] Personal recovery can occur with or without remission of symptoms. In contrast, clinical recovery is identified by the remediation of symptoms, the return to work or education, and independent living.[13]

When discussing personal recovery, it is also important to consider how this process fits within the mental healthcare system of a particular country.[14] In this regard, several studies have discussed cultural differences in the conceptualization of personal recovery [7,15,16]; however, there is a paucity of Japan-specific research, indicating the need to develop a recovery model tailored to the country.

Following the lead of other countries, in 2004, Japan released "The Vision for Reform of Mental Health and Welfare" to promote the transition from hospital to community-based care.[17] Further, the importance of mental health services based on the concept of recovery was emphasized[18-20]; however, as of 2017, the average length of stay in psychiatric hospitals in Japan was 265 days[21], much longer than in other parts of the world.

Globally, psychiatric inpatients have reported poor experiences of mental healthcare that are not conducive to recovery. Concerns include coercion by staff, fear of assault from other patients, lack of therapeutic opportunities, and limited support.[22] This is likely caused in part by the focus within psychiatric mental health services on the biomedical model, as well as the organizational focus on maintaining safety and clinical treatment, over person-centered, recovery-oriented practice.[23] For example, schizophrenia treatment in Japanese psychiatric hospitals does not involve recovery support that is responsive to patients' needs. Within this context, it is important to explore the lived experiences of patients with schizophrenia who were admitted to and discharged from psychiatric hospitals in Japan.

Therefore, in this study, community-dwelling people with schizophrenia in Japan were interviewed about their experiences from admission to a psychiatric hospital to discharge

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and their return to community life. The findings from these interviews will have implications for recovery support for patients with schizophrenia in Japanese psychiatric hospitals.

II. Objectives

In this study, nine community-dwelling patients with schizophrenia were interviewed regarding their experiences from hospital admission to discharge and their return to community life.

III. Methods

1. Study Design

The current study is qualitative in design. The qualitative descriptive approach used in this study lies within the naturalistic approach in which the researcher understands phenomena through the meanings participants ascribe to them.[24] Qualitative description aims to produce a clear account and comprehensive summary of a targeted phenomenon using participants' language, staying close to the data.[25]

2. Study Period

From April to September 2013

3. Participants

This study was carried out in Aichi prefecture, Japan, where treatment for community-dwelling people with schizophrenia is primarily outpatient or psychiatric daycare. Psychiatric daycare is typically offered to individuals who have just been discharged from inpatient care or as a more intense treatment for people who have failed to respond to outpatient care. Participants for the current study were recruited from psychiatric daycare and were required to meet the following inclusion criteria:

(1) be diagnosed with schizophrenia
(2) have previously been hospitalized for schizophrenia
(3) have attended psychiatric daycare in the past four years
(4) have the ability to talk about their own recovery
(5) consent to participate in the study

4. Data collection

Semi-structured interviews covering the following three topics were conducted:

(1) background prior to psychiatric hospitalization

(2) experiences during psychiatric hospital stay until discharge

(3) community life using psychiatric daycare

Nine participants were interviewed individually in a private room at the day care after their programs or during free time while on programs. Each interview took about 60 minutes to complete. Interviews were recorded with each participant's consent.

5. Data analysis

Transcribed data from the interviews were analyzed using qualitative description. All transcripts were read repeatedly and relevant text was extracted and labeled using short sentences as first codes. Then, the first codes were categorized based on similarity and named based on their common meaning as second codes. This cycle of categorization was repeated until the final codes were generated. The final codes were labeled "categories" and the codes that made up the categories were labelled "subcategories". The relationships among categories were examined with consideration for how they influenced one another.

The nine participants checked the results of the analysis to ensure credibility. Three nurse researchers specialized in psychiatric nursing and with experience in qualitative research verified the validity of the results through comparison with their prior practice and knowledge.

6. Ethical considerations

The study was approved by the ethics committee at Aichi Medical University College of Nursing (No. 51). Each participant received an explanation of the study and was informed that participation was voluntary and that their anonymity would be protected. Written informed consent was obtained from all participants.

IV. Results

1. Basic attributes (Table 1)

Nine participants with schizophrenia were individually interviewed (see Table 1). Their average age was 41.4 years, and they had been attending psychiatric day care for an average of 1 year and 11 months. Eight of them lived with their families and one lived alone. The average interview duration was 67 minutes.

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＜Table 1＞ Basic attributes

Characteristics		N
Gender	Men	5
	Women	4
Age	30's	5
	40's	3
	70's	1
Number of hospitalizations	Once	2
	Twice	3
	4 times or more	3
	Unknown	1
Years of psychiatric day care use	Less than 1 year	3
	Less than 1 to 2 years	3
	Less than 2 to 3 years	0
	Less than 3 to 4 years	3
Living with family	Not together	1
	Together	8
Total		9

2. Recovery and support as described by study participants

Seven categories were extracted from the analysis of the narratives of the nine participants. Each category is described below, with subcategories indicated by the use of [brackets] and supplements in (brackets)

1) Category 1: Encountering the unknown, self-coping, but still being hospitalized in crisis

The participants had the experience of being [surprised by suddenly encountering voices and radio waves] at work and home.

> When I was at home, I suddenly heard a voice saying, "I'm going to strangle you," and I got scared.
>
> It was strange. I don't know what it was. I thought I was hearing radio waves coming into my head, communicating over the airwaves.

They experienced physical fatigue and [pain caused by physical reactions] while working, which disrupted their daily lives.

> I had this thing about my muscles not feeling right, but I was working through the pain.
>
> I worked two shifts and my body clock went crazy. It became too irregular to do anything.

To alleviate this feeling, the participants described [destroying oneself in order to cope].

I was so scared that all of a sudden, I ran out of the house like crazy.

I killed my feelings because I couldn't trust people anymore.

I've self-harmed and tried to kill myself.

Immediately prior to their hospitalization, the participants described experiencing a state of confusion and [crisis in which they were unable to control themselves].

I got into an argument with my mother and kicked the door down.

I got into a fight with my sister, and I couldn't stop myself from getting upset, so I hit her.

I lost my temper and stuck a kitchen knife through the bran.

I was yelling at him and got upset. I rode my bike on the sidewalk, and the cops grabbed me.

They were hospitalized voluntarily or by family members after they or their family [gave up on continuing community life].

My parents told the doctor that they couldn't take care of me, so I had to be admitted.

I thought it wasn't good, and the doctor told me "It was bad." I was immediately admitted to the hospital.

My mother's helper called it in and I was forcefully hospitalized.

2) Category 2: Distress in a closed hospital environment

All participants were admitted to closed wards, and some were admitted to isolation rooms. They [endured the suffering of not being able to get out] while in these closed wards and isolation rooms.

I couldn't stand the pain (in the isolation room); I was going round and round in circles all day.

I asked nurse and the doctor to let me out but they wouldn't, so I broke down crying.

The participants also felt distrustful and fearful of the other patients and medical staff they encountered in the wards and were [endured the suffering of not being able to get out].

There were so many broken people (other patients), it was shocking to watch.

I saw other patients screaming and I wondered when they would take me too; I was scared.

When I asked him (the doctor) why I couldn't go outside, he said it was because I might not get along with everyone. That's when I lost faith in him.

The nurses said to me, "Please come in, just for a look in the ward." The moment I did, they closed the door. When I asked to see my family, I was told that they had already left, which shocked me.

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3) Category 3: Support that ensured security and motivation

The participants described [healthcare providers who understood the distress of hospitalization] in a closed hospital environment.

> The nurse asked the doctor to help me get out (of the protection room). I'm glad I had someone who understood me.

The participants also stated that there were [other patients aiming to be discharged together] in the closed wards.

> A patient in the hospital said, "Eat your food and you'll be checked out. If you don't eat, they won't let you leave the hospital."
>
> We made friends and tried to escape together.

One participant was moved by the fact that family members came to visit them and [treated them like a member of the family].

> I didn't think she would come. When she came, my heart, which had been quiet and still, lit up like a flower. She made me forget the distress I was going through.
>
> It saved (my) heart. I realized that what I wanted most was to see my family.

4) Category 4: Confront distress, change yourself, and leave the hospital

The participants went from struggling in a closed hospital environment with the people they met there to [confronting their distress and feeling signs of recovery] on their own, with the support of medical staff, other patients, and family members.

> I was mentally down and went to get an abortive to calm me. The nurses praised me and made me feel like I could do it myself.
>
> Occupational therapy was very hard for me. But by working hard at it, I heard scary voices less and less.

They were beginning to experience signs of recovery, in contrast to the post-discharge life they had envisioned. They described being [discharged from the hospital in accordance with the conditions of discharge and making concessions for those around them], that is, their families and medical staff.

> My mother told me, "You won't be able to stay at home forever after you leave the hospital." The nurse also told me, "If you can't go to daycare, you won't get a good job." I wanted to get out of the hospital, so I decided to go (to psychiatric daycare).

5) Category 5: Symptoms and community life concerns

The participants encountered [persistent psychiatric and physical symptoms] while living in the community and using psychiatric daycare.

> When I have auditory hallucinations and I panic in the morning, I can't get on the subway.
>
> Sometimes, I wanted to die because my muscles caused so much pain.

They also had [worries about the disease itself and community life].

> It was hard for me to accept the reality of my schizophrenia when I saw my friends

at the reunion getting married and raising kids.

I had no money because I couldn't get through the living expenses process. It was the scariest thing.

I didn't know anyone (in the area), so I was living a lonely life on my own.

6) Category 6: Accepting things as they are and support for hope

In contrast to Category 5, participants reported that their [encouraging family] supported them.

My aunt encouraged me, saying, "It's hard that you're sick, but you have to stay cheerful." She encouraged me to start from where I could.

Further, one participant reported that they had met other [daycare members who shared their concerns].

When I told my friend at daycare about my concerns, she was with me and made me feel safe.

Furthermore, as they had access to [professional staff to attend to their concerns], they were able to achieve mental stability and resolve their problems.

I'm glad my doctor is almost like a friend who understands that late night shows are funny and gives me input on my English studies.

I found a psychotherapist who was there for me when I needed to be listened to, and who was very approachable.

I went to a psychiatric social worker for advice and was able to get some money to live on. I rely on my worker to help me with anything I don't understand.

7) Category 7: Realizing recovery from illness and seeking a new way of life with goals

Several participants described having some worries about their mental illness immediately after discharge, but that by using psychiatric daycare, they felt that they had [recovered from mental illness].

I have a better rhythm in life now that I'm in psychiatric daycare. I have a foundation for my life.

Strangely enough, I don't hear scary voices anymore.

No more schizophrenia derailing my thoughts.

I can talk about my feelings now.

I got to see fireworks, which I haven't seen in 10 years.

It's easier to get out.

In addition, several participants spoke of [having a goal in life].

My goal is to learn to talk about myself successfully in daycare so that I can live in society without a counselor.

Right now, my goal is to work at a continuous employment support facility.

It's about staying healthy.

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The participants also described still [searching for the way to live from now on], even though they were making an effort to get closer to their goals.

I don't know what to do, and I don't know what the future holds.

I knew that if I didn't work, I wouldn't have enough money to buy anything. That's why I went to the lunch box work experience. But I thought it wasn't for me.

I need to find a job, but I'm not sure I can do it.

I want to have friendships, but it's hard for me. I'm not good at making friends on my own.

3. Relationships among categories

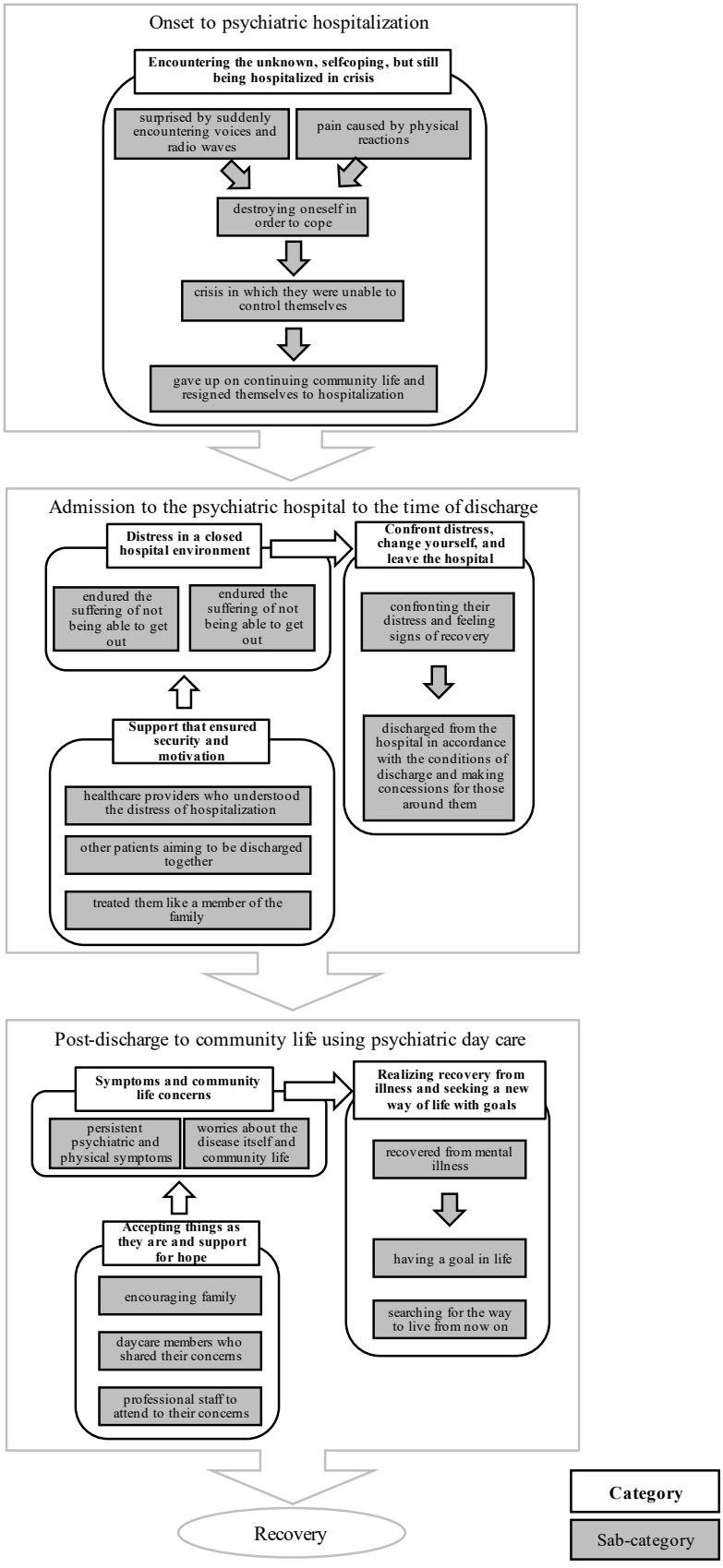
There were also relationships among the aforementioned categories. Specifically, (Category 1) encountering the unknown and self-coping, but still being hospitalized in crisis, describes when they encountered the disease, and their experience of being [surprised by suddenly encountering voices and radio waves] and experiencing [pain caused by physical reactions]. They were [destroying oneself in order to cope] but were in a state of [crisis in which they were unable to control themselves] and were forced to [give up on continuing community life and resigned themselves to hospitalization].

When they entered a closed psychiatric hospital or isolation room, they experienced (Category 2) distress in a closed hospital environment, such as [enduring the suffering of not being able to get out] and being [hurt by the words and actions of other patients and medical staff]. However, with (Category 3) support that ensured security and motivation, they were able to overcome this distress. With [healthcare providers who understood the distress of hospitalization], [other patients aiming to be discharged together], and family members who [treated them like a member of the family] they were able to alleviate their distress.

They described gradually [confronting their distress and feeling signs of recovery]. However, different from the life they had envisioned, they were [discharged from the hospital in accordance with the conditions of discharge and making concessions for those around them]. This experience was named (Category 4), confront distress, change yourself, and leave the hospital.

They returned to community life, but they still had (Category 5) symptoms and community life concerns such as [persistent psychiatric and physical symptoms] and [worries about the disease itself and community life]. However, they also described (Category 6) accepting things as they are and support for hope with the help of [encouraging family], [daycare members who shared their concerns], and [professional staff to attend to their concerns]. They [recovered from their mental illness] and described [having a goal in life], while [searching for the way to live from now on], together described as (Category 7), realizing recovery from illness and seeking a new way of life with goals.

Thus, Categories 1–7 can be used to describe the recovery process as a time series (see Figure 1).



<Figure 1> Recovery Process and Support

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V. Discussion

1. The process from psychiatric admission to living in the community involves learning to help yourself and building resilience

Prior to admission, the participants experienced the unknown (i.e., positive and negative symptoms of schizophrenia). They attempted to self-manage their symptoms but were unsuccessful, leading to a crisis state and eventually hospitalization. During the period from their first encounter with the illness to hospitalization, they became helpless.

Upon admission, they participated in a variety of programs, including the use of antipsychotic medications to alleviate psychiatric symptoms and allow them to be discharged from the hospital. The experience of being in a closed environment and being forced to participate in treatment and rehabilitation was distressing. However, this was an opportunity for them to learn coping skills, such as asking someone for help and actively engaging in occupational therapy.

At the time of discharge, participants described how their wishes were rejected and the conditions for their discharge were proposed by family members and healthcare providers. They coped with this obstacle by giving in to the opinions of those around them in order to achieve their own goal of discharge. In this respect, the self-coping skills they acquired during their hospitalization were applied to their community life at psychiatric daycare.

Thus, experiencing schizophrenia was clearly a learning process in which patients actively attempted to overcome the illness, rather than one in which the illness dominated them.[26] They were very positive about their discharge and this process of learning and practicing appropriate self-coping strategies in the face of hardship can be seen as "resilience" building, enabling them to overcome traumatic and stressful events.[27] This enhanced resilience facilitated recovery.

2. The meaning of support: A human rights advocacy stance that listens to individuals' subjective experiences

The participants described being distressed by their admission to psychiatric hospitals. However, they were supported by medical care providers who understood them, other patients who had the same goal of discharge, and their families. Even if they had problems in their community life after discharge, they were supported by psychiatric daycare members who spent time with them and family members who encouraged them.

What these supporters had in common was their ability to listen to their subjective experiences and defend their human rights, allowing them to engage as people, not simply ill people. By examining the meaning of each person's unique illness, supporters are able to break the vicious cycle that amplifies suffering and instead provides more effective care.[28] Therefore, healthcare providers' respect for patients' freedom, their recognition of patients as human beings and experience-informed individuals will lead to increased resilience.[29] This is relevant not only for healthcare providers but also for family and peer supporters.

3. Issue in supporting patients with schizophrenia in Japan: recovery orientation

The participants had experiences in psychiatric hospitals that were not in accordance with their wishes, including forced inpatient treatment, problems with medical staff, rehabilitation that they did not want, and unfavorable conditions at discharge. This is i partly due to common psychiatry practices in Japan, including forced treatment, involuntary hospitalization, and restraint[30], which infringe on patient autonomy and respect.

They experienced the loss of their individuality by being hospitalized, where they were treated as part of a group and had to follow the unspoken rules of inpatient life.[31] Furthermore, they were discharged from the hospital to fulfill their obligation to recover and to cooperate with the healthcare professionals, concentrating on medical treatment and playing the expected patient role in order to be able to carry out their original social role again.[32]

The reason for this phenomenon is that there is a significant difference between the perspectives of patients and medical staff.[33] In treating patients with schizophrenia, attention to the client's subjective views is fundamental to recovery-oriented care, and cultural sensitivity and the ability to imagine the experience from the client's perspective are also important.[34] In this respect, patient experience is a vital source of evidence that can drive the provision of high-quality healthcare services. [35-36]

Japan has a longer average length of hospital stay than many other countries.[37-38] As a result, there are more medical staff working in psychiatric hospitals than daycare staff. To promote the recovery of people with schizophrenia in Japan, it is necessary for medical staff working in psychiatric hospitals to recognize that patients are individuals who will recover, and to provide recovery-oriented education that focuses on the subjective opinions of patients and supports them according to their needs.

VI. Conclusion

We identified seven categories and their relationships with the process from hospitalization to community life as described by Japanese patients with schizophrenia. The results demonstrated the recovery process (patients learning to help themselves and increase their resilience), as well as the protection of patients' human rights (listening to their subjective and informed experiences). Despite this, the treatment process in Japanese psychiatric hospitals still cannot be said to be recovery-oriented. In the future, it is necessary to foster recovery-oriented practices in medical staff working in psychiatric hospitals in Japan.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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ORIGINAL ARTICLE

Lower-limb Aerobic Exercises Improve Physical Function in Frail Older Adults:
A Randomized Controlled Pilot Trial

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ABSTRACT

It is still unclear whether the effects of lower-limb aerobic exercise (Kohzuki Exercise Program; KEP) are effective in improving physical function as an exercise program for frail older adults. The aim of this study was to determine the effect of the 6-month structured KEP on physical function in frail older adults. The KEP group participants engaged in a total of 72 sessions, 3 times a week for 6 months. The KEP consisted of 5 minutes of warm-up and stretching, 30 minutes of lower-limb aerobic exercise, and 5 minutes of cool-down and relaxation. The control group (CON group) participants were asked to maintain their normal behavior over the same 6-month period.

Physical function as an outcome was measured using the Short Physical Performance Battery (SPPB). A total of 23 participants (KEP group: n=12; CON group: n=11) who participated in this study. The analysis of outcomes was performed by Friedman test and Wilcoxon signed rank post-hoc test with Bonferroni correction for the comparison between the time; baseline, 3 months and 6 months. There was a significant changed in physical function over the baseline, 3 and 6-month in the KEP group for SPPB total score ($p<0.01$), balance time ($p<0.05$), gait speed time ($p<0.01$), and chair stand time ($p<0.01$) at 6-month.

In summary, the 6-month KEP intervention targeting physical function is an effective, long-term, and sustainable program for frail older adults.

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I. Introduction

Frailty is a physiological syndrome that is different from normal aging or disability [1,2]. Unlike normal aging, frailty has vulnerabilities that easily lead to various diseases and disorders, even under the same stressor event [3-5]. According to previous studies, the risks of falls, fractures, and death were 1.38 times, 1.4 times, and 1.82 times higher, respectively, among the frail elderly than healthy older adults[6]. In recent years, several studies have been made to measure the state of frailty more objectively[7,8]. However, the specific indicators for measuring frailty still vary between countries and researchers[8]. Of the various frailty measurements[9-11], the most widely and commonly used diagnostic criteria in worldwide is the Cardiovascular Health Study (CHS) Index[12]. The CHS frailty phenotype diagnoses people as pre-frail if they meet specified cut-offs for 1 or 2 of 5 criteria, and as frail if they meet specified cut-offs for 3 or more of the five criteria: slow gait speed, weak grip strength, exhaustion, low energy expenditure, and weight loss[4,5].

Evidence indicates that exercise is the most effective preventive strategy for counteracting the decline in age-related muscle mass, muscle strength, fat mass, cardiopulmonary function, and immune function[13,14]. Aerobic exercise is one of the most effective exercises to improve and maintain the physical activity of older adults[15]. Clinical studies have shown that individuals aged over 65 years can benefit from aerobic exercise (40 minute, 2 times per week for 12 weeks) to increase mobility in older adults[16].

We have demonstrated that the Kohzuki Exercise Program (KEP). The KEP is a lower-limb aerobic exercise program designed to fit the age and physical functions of older people, using the Terasuerugo® (Showadenki Co., Ltd., Osaka, Japan). Terasuerugo® is a newly developed cycle ergometer, has a quantitative 7-step pedal power modulation dial of 10 to 75 watt, it is designed to be used without swaying even when lying down or sitting, and it is portable, and it is easy to handle. Existing ergometers are large in size, heavy in weight, and require a lot of space. However, the Terasuerugo® used in this study is small in size and so does not require much space for exercise. According to previous studies on KEP, is reported that improve physical function in older people over 65 years[17], and can improve cognitive function in Alzheimer's patients over 65 years[18].

As an additional study, we need to investigate whether KEP is suitable as an exercise program for frail older people and whether it is effective in improving physical function in frail older people. Also, we need to investigate whether KEP is applicable.

Therefore, the aim of this study was to determine the effect of a 6-month structured KEP on physical function in frail older adults. The hypothesis was that the KEP would improve physical function in frail older adults.

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II. Methods

1. Study Design and Ethical approval

This study was designed a prospective, a randomized controlled trial (RCT) using the KEP was conducted among 53 frail older adults. Ethical approval was obtained from the Ethics Committees of Tohoku University Graduate School of Medicine and the "Smairu" facility(UMIN-CTR; UMIN000023909).

2. Randomization

Following a baseline assessment, research staff randomized participants into the KEP group (KEP group) or control group (CON group) by identification number, which were assigned on the basis of order of enrollment. A sequence of computer-generated random numbers from 1 to 40 was used. Those who received an odd number were assigned to the exercise group, and those who received and even number were assigned to the control group. Forty participants were randomized to participate in the KEP group(n=20) and CON group(n=20).

3. Participants

Participants were recruited through an advertisement and poster in the "Smairu" facility in Mie city, Japan. The eligibility criteria for inclusion were (i) 65 years or older; (ii) According to Fried et al.(2001), frail (meeting the specified cut-off for three or more of the CHS frailty criteria: slow gait, weak grip, exhaustion, low energy expenditure, and weight loss) ; (iii) Mini-Mental State Examination score >21; and (iv) absence of participation in aerobic exercise and strength training. The exclusion criteria for the participants were (i) any acute cardiorespiratory episode within 1 year before the study; (ii) neurological or neuromuscular disease that could interfere with the proper performance of assessment and/or exercise protocol; and (iii) dementia or psychiatric disorders. All participants were informed of the risks and benefits of the study and agreed to participate by signing a consent form.

Of the 20 participants in the KEP group, 4 dropped out due by declining to be interviewed and 4 dropped out due to loss of motivation. Of the 20 participants in the CON group, 6 participants dropped out by declining to be interviewed, 2 dropped out due to loss of motivation, and 1 dropped out due to relocation. Twenty-three participants were analyzed at the 6-month post-intervention assessment: in the KEP group(n=12) and CON group(n=11).

4. Intervention

The KEP group participants engaged in a total of 72 sessions, 3 times a week for 6 months. All sessions began with 5 minutes of warm-up and stretching, followed by 30 minutes of lower-limb aerobic exercise using a Terasuerugo® (Showadenki Co., Ltd.,

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Osaka, Japan), and 5 minutes of cool-down and relaxation (72 sessions in all). CON group participants were asked to maintain their normal behavior over the same 6-month period. The intensity of training was targeted at a heart rate of 40–60% of maximum. In addition, using Borg's scale[19], participants were asked to exercise at an intensity of 11 (i.e., 60% effort, "fairly light") to 13 (i.e., 70% effort, "somewhat hard") [17,18].

5. Physical Function Outcome Measures

Participants were assessed at baseline, 3 months, and 6 months by the research staff.

Physical function was measured using the Short Physical Performance Battery (SPPB)[20], which was specifically developed for older adults. The SPPB assesses the ability to stand (for 10 seconds) with the feet together in side-by-side, semi-tandem, and tandem positions; time to walk 4 meters; and time to stand from a chair and return to the seated position five times. Each of the three tests have scores ranging from 0 to 4. The SPPB total score (0–12; 0 is poor performance, 12 is excellent performance) is calculated by adding the three test scores[20].

6. Statistical Analysis

All analyses were conducted using Statistical Package for the Social Science (SPSS) version 28 (IBM Corp., Chicago, IL, USA). Descriptive statistics calculated the means and standard deviations (SD). The Shapiro–Wilk test was used to check normality. The baseline characteristics of the participants in the two groups (KEP and CON group) were compared using Mann-Whitney U-test for continuous variables and the chi-square test for categorical variables. The analysis of outcomes concerned within-subject effects group the significance of the Comparison between the time using Friedman test. The significance level was set at $p<0.05$.

III. Results

1. Baseline Characteristics

The total number of 23 participants (KEP group=12, CON group=11) were analyzed at the 6-month post-intervention assessment. There was no statistically significant difference between the KEP and CON group including age, sex, height, weight, body mass index(BMI), medical history, and physical function (Table 1).

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<Table 1> Baseline Characteristics of participant

Variable	KEP Group (n=12)	CON Group (n=11)	p-value
Characteristics			
Age (years)	83.5(7.1)	81.9(7.4)	n.s
Female, n(%)	9(75.0)	9(81.8)	n.s
Height (cm)	154.3(5.2)	154.2(7.9)	n.s
Weight (kg)	56.3(8.4)	55.4(7.9)	n.s
BMI (kg/m^2)	23.7(3.8)	23.3(2.7)	n.s
Smoking History, n(%)	0(0)	1(0)	
Drinking History, n(%)	3(25.0)	4(36.3)	n.s
Hypertension, n(%)	6(50.0)	3(27.3)	n.s
Diabetes, n(%)	1(8.3)	0(0)	
Dyslipidemia, n(%)	4(33.3)	4(27.3)	n.s
MMSE Score (0-30)[a]	26.9(1.8)	27.4(0.9)	n.s
Physical Function			
SPPB (0-12)[a]	6.3(1.2)	5.8(1.3)	n.s
Balance Score (0-4)[a]	2.4(0.5)	2.4(0.7)	n.s
Gait Speed Score (0-4)[a]	2.1(0.5)	1.9(0.3)	n.s
Chair Stand Score (0-4)[a]	1.8(0.6)	1.6(0.7)	n.s
Balance Time (sec) [a]	25.8(3.9)	26.3(4.5)	n.s
Gait Speed Time (sec) [b]	7.4(0.8)	7.7(0.7)	n.s
Chair Stand Time (sec) [b]	15.7(1.6)	14.8(5.1)	n.s

Note: BMI, Body Mass Index; MMSE, Mini-Mental Status Examination; SPPB, Short Physical Performance Battery; n.s., no significant.

Data are expressed as mean (SD) or n(%).

[a] Higher score indicates better functioning.

[b] Lower score indicates better functioning.

[c] Mann-Whitney U-test; p-value.

2. Physical Function Outcome Measures

The results of the SPPB for physical function are shown in Table 2,3. Table 2 shows changed physical function in the KEP group over the baseline, 3 and 6-month. SPPB total score ($p<0.01$), balance time ($p<0.05$), gait speed time ($p<0.01$), and chair stand time ($p<0.01$) were significantly difference at 6 months. Table 3 shows a comparison of the baseline and 6-month physical function levels between the KEP and the CON groups. The

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SPPB total score (<0.01), balance time (<0.001), gait speed time (p<0.001), and chair stand time (p<0.001) had significantly different between the KEP group and the CON group.

<Table2> Baseline scores and changes in KEP group physical function

Physical Function (n=12)	Baseline	3-month	6-month	p-value[c]
SPPB Total Score (0-12)[a]	6.3±1.2	6.6±1.1	7.1±1.1	<0.01
Balance Score (0-4) [a]	2.4±0.5	2.6±0.5	2.8±0.5	n.s
Gait Speed Score (0-4) [a]	2.1±0.5	2.2±0.4	2.3±0.5	n.s
Chair Stand Score (0-4) [a]	1.8±0.6	1.8±0.6	2±0.6	n.s
Balance Time (sec)[a]	25.8±3.9	26±3.7	26.5±3.5	<0.05
	7.4±0.8	7.1±0.9	6.8±0.9	<0.01
Chair Stand Time (sec)[b]	15.7±1.6	15.1±1.4	14.8±1.4	<0.01

Note: n.s., no significant. Data are expressed as mean ± SD.

[a] Higher score indicates better functioning.

[b] Lower score indicates better functioning.

[c] Friedman Test; p-value.

<Table 3> Comparison between groups in the change of physical function

Physical function	Group	Baseline	6-month	Mean difference	p-value[c]
SPPB Total Score (0-12)[a]	KEP group	6.3±1.2	7.1±1.1	0.8±0.8	<0.01
	CON group	5.8±1.3	5.6±1.4	-0.2±0.4	
Balance Score (0-4) [a]	KEP group	2.4±0.5	2.8±0.5	0.3±0.5	n.s
	CON group	2.4±0.7	2.3±0.8	-0.1±0.3	
Gait Speed Score (0-4) [a]	KEP group	2.1±0.5	2.3±0.5	0.3±0.5	n.s
	CON group	1.9±0.3	1.9±0.3	0	
Chair Stand Score (0-4) [a]	KEP group	1.8±0.6	2±0.6	0.3±0.5	n.s
	CON group	1.5±0.7	1.5±0.7	-0.1±0.3	
Balance Time (sec)[a]	KEP group	25.8±3.9	26.5±3.5	0.8±0.9	<0.001
	CON group	26.3±4.5	25.5±4.2	-0.8±0.6	
Gait speed Time (sec)[b]	KEP group	7.4±0.8	6.8±0.9	-0.6±0.4	<0.001
	CON group	7.7±0.7	7.9±0.6	0.2±0.4	
Chair Stand Time (sec)[b]	KEP group	15.7±1.6	14.8±1.4	-0.8±0.5	<0.001
	CON group	14.8±5.1	15.2±5.1	0.4±0.5	

Note: n.s., no significant. Data are expressed as mean ± SD.

[a] Higher score indicates better functioning.

[b] Lower score indicates better functioning.

[c] Mann-Whitney U-test used to estimate mean difference (p) between groups.

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IV. Discussion

To the best of our knowledge, this is the first study to evaluate the effect of KEP intervention targeting frailty in physical function in older adults defined as frail using a validated measure of frailty. The hypothesis was that the 6-month KEP would improve physical function in frail older adults. The present RCT confirmed that a 6-month KEP that involves lower-limb aerobic exercise is effective in significantly improving physical function, based on the SPPB total score, balance time, gait speed time, and chair stand time in the KEP group.

Exercise has a physiological effect on skeletal muscle, physical function, and maintenance of independence [21,22]. The results of previous studies on the physical function improvement programs proposed for frail older adults have varied widely, as have the types of exercise, duration, frequency, and intensity used[23,24].

Our findings are consistent with previous studies that investigated the effects of aerobic exercise. Harber et al. (2009) showed significant improvements in muscle hypertrophy in older adults after 12 weeks of aerobic exercise intervention[14]. In addition, 12 weeks of aerobic exercise; 40 minutes, 2 times per week have been reported to increase mobility in older adults[15]. Our results showed that the KEP's lower-limb aerobic exercise may also be tolerated by frail older adults and may improve their physical function. However, unlike the present study, which was the result of long-term intervention, the results of previous studies are from short-term interventions[14,15], so it is likely that the exercise method used in this study will be more appropriate with regard to sustainability and safety. Moreover, during our study period, no participants experienced joint or muscle pain or injury from performing the KEP. Which means that the KEP has been shown to be a safe exercise program for frail older adults.

Previous studies of exercise for older people were often performed using community-dwelling people living in institution such as nursing homes[24,25]. These studies reported that exercise can improve physical function in terms of gait speed, muscle strength, or mobility [24,25]. Their results are consistent with our study, which showed that the KEP improved physical function in frail older people. It also showed that the KEP is an effective and sustainable exercise that can be used by community-dwelling people and in all types of care facility.

The strengths of our study were the use of a validated definition of frailty; the demonstration that KEP is an effective and safe exercise for frail older people, as well as for healthy older people[17] and older people with dementia [18]. However, several limitations of our study need to be mentioned. First, this study was not blinded, thus it is possible that the benefits reported from the KEP intervention were due to participant bias. Second, the study was limited to a single center. Further studies using randomized controlled multicenter trials are needed. Finally, the sample size was too small. Further studies with a larger sample size are needed.

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In conclusion, for frail older adults, the 6-month KEP intervention targeting physical function is a long-term, effective, and sustainable program for participants. The KEP intervention improved lower-limb function in balance, gait speed, and chair stand tests. It is recommended that future studies in frail older adults use randomized controlled multicenter trials, a longer period, and a larger sample size.

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5. The original shall use one-byte alphanumeric characters. For the figures in the manuscript, the numerals for calculation shall be used mainly.

6. If an abbreviation is used, full text should be included at the beginning.

7. The quantities shall be in MKS (CGS) units and shall be in millimeters, centimeters, m, ml, l, g, kg, cm2, etc.

8. When specifying the name of a specific device or chemical in the body, the following provisions shall be followed.

- Apparatus name: Generic name (company name, product name).
  e.g.) MRI (Siemens, Magnetom)

- The name of the drug is generic name (trade name ®).
  e.g.) Hydrochloric acid eperison (Myonal®)

9. The mention of reference in text shall be subject to the following provisions.

- At the end of the quoted sentence, the appropriate number of the bibliographic list is given in "Upper half-brackets". When multiple documents are cited, the references cited should be numbered separated by "(comma)". If the numbers of the cited documents are consecutive, they are linked by "-(hyphen)" and the first and last numbers are given.
  e.g.) This sentence was written by editor of Asian Journal of Human Services.[1)] This sentence was written by editor of Asian Journal of Human Services.[1,3,7)] This sentence was written by editor of Asian Journal of Human Services.[1-3)]

- When referring to a particular author's report, the year should not be filled in, but only the family name of the first author should be filled in, and "et al." should be added.
  e.g.) 1 person: Smith reported that further research is needed. [1)]
  2 or more: Smith et al. reported that further research is needed. [1)]

10. The reference should be followed below provisions. Parentheses, commas, periods, spaces, and hyphens used in the literature list are unified in half-width.

① Yamauchi M & Hirakawa M. Issues in spousal bereavement support for elderly men in Japan. *Asian J Human Services.* 2020, 1, 1-19. DOI: 10.14391/ajhs.18.33

② Park LT & Zarate CA Jr. Depression in the primary care setting. *N Engl J Med.* 2019, 380, 559-568. DOI: 10.1056/NEJMcp1712493

③ Yano N, Han CW & Kohzuki M. Construction Concept of Quality of Life Scale for Evaluation of Educational Outcomes. Abstract Journal, 2018 Asian Society of Human Services Congress in KYOTO, 2018, 28.

④ American Psychiatric Association. *Diagnostic & Statistical Manual of Mental Disorders,5th edition. (DSM-5).* 2013, American Psychiatric Association Publishing,Washington DC.

⑤ Cabinet Office (2016) Annual Report on the Aging Society. February 2016.

⑥ Cabinet Office (2011) Public opinion poll on nursing care insurance system.
URL: http://survey.gov-online.go.jp/h22/h22-kaigohoken/(14, December 2017).

⑦ The order of reference articles should be in the order of citation in the main text and should be numbered consecutively in single parentheses.

- If the editor and the author are the same, the first name and last name should be followed by a "(edit)". If the editor and author are different, enter the name and name of the editor (edit) after the title.
  e.g.) Lemke T. Foucault, politics and failure. In Jakob Nilsson & Sven-Olov Wallenstein (Eds.), Foucault, biopolitics and governmentality. 2013, Sodertorn University. 35-52.

- In the case of a translation, it must be defined original document (original author name, title, year, publisher). Then the translator name, translated year, translated page should be clearly defined.

- Reference: Indication of the person name should conform to the original reference. In the case of co-authorship, up to six persons should be listed.

  1) Up to 6 authors: Separate with "," and "&".
     e.g.) Plavnick BJ, Tiffany K, & MacFarland CM. Effects of a School-Based Social Skills Training Program for Adolescents with Autism Spectrum Disorder and Intellectual Disability. *J Autism Dev Disord*, 2015, 45(9), 2674-2690. DOI: 10.1007/s10803-015-2434-5

  2) More than seven authors: After separating them with "," and add "et al."
     e.g.) Zhi Z, Zachary W, Amy W, Qiang F, Huan Z, Amy S et al. Brief Report: Evaluation of an Intelligent Learning Environment for Young Children with Autism Spectrum Disorder. *J Autism Dev Disord*, 2016, 46(11), 3615-3621. DOI: 10.1007/s10803-016-2896-0

- If different documents are cited and Author's name and year of publication are the same, distinguish them with alphabets after the year of publication. It should be combined with the notation in the text.
  e.g.) Japan Association of Geriatric Health Services Facilities. White Paper on Care in FY2016 -From the Standpoint of Geriatric Health Services Facilities-. 2016a, 78, Office TM Co., Ltd.
  e.g.) Japan Association of Geriatric Health Services Facilities. White Paper on Care in FY2016 -From the Standpoint of Geriatric Health Services Facilities-. 2016b, 10-13, Office TM Co., Ltd.

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