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Interprofessional Collaboration for the Prevention of HAD in Elderly Patients with Dementia

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Abstract

Purpose: In acute care hospitals in Japan, a super-aging society, caring for older patients with dementia, who are at high risk for hospitalization-associated disability (HAD), is crucial. Thus, this study aimed to determine the type of interprofessional collaboration required to prevent HAD in older adults with dementia. Methods: Semi-structured interviews were conducted with 23 staff members, and responses were qualitatively analyzed using a descriptive approach. Results: The analysis yielded the following three categories: (1) "Interprofessional collaboration for effective HAD prevention"; (2) "Interprofessional collaboration to adjust the medical care for older adults with dementia"; (3) "Interprofessional collaboration to ensure safety without physical restraints". Conclusion: Broader interprofessional collaboration, including hospital and home care staff, is required along with interprofessional efforts to ensure safety while eliminating physical restraints, which can contribute to muscle weakness and helplessness.

Keywords

DCT (Dementia Care Team), HAD (Hospitalization-Associated Dysfunction), *IPW* (Interprofessional Work), Older Adults with Dementia

1. Introduction

In Japan, a super-aging society, the number of elderly patients admitted to acute care hospitals is increasing. Advanced age is a risk factor for hospitalization-associated disability (HAD), an umbrella term referring to the loss of functional ability, such as decreased activities of daily living (ADL), caused by low activity (e.g., bed rest) during hospitalization [1]. For example, ADL decline may include re-

duced mobility and difficulties with toileting. HAD occurs in over 40% of all hospitalized patients [2] [3], leading to longer hospital stays and lower discharge rates. Furthermore, only 30% patients with HAD regain their original level of daily functioning within 1 year after discharge [4], making HAD a significant factor in reducing quality of life.

To prevent HAD, early rehabilitation intervention (hereafter referred to as rehabilitation) and nutritional management are essential [5]. However, elderly patients with dementia—a high-risk group for HAD [6]—often face challenges in care interventions due to dementia-related symptoms such as memory impairment and poor comprehension [7]. These difficulties can hinder rehabilitation and dietary support, both considered underlying high-risk factors for HAD. However, interprofessional team-based care is regarded as a useful approach for clinical management elderly patients with dementia [8]. Moreover, in 2016, the "Dementia Care Add-on Fee" was incorporated into the medical fee schedule. The goal was to prevent the worsening of symptoms in hospitalized dementia patients and ensure they can smoothly receive treatment for physical illnesses through appropriate responses from a multidisciplinary team. This is an evaluation of a multidisciplinary team intervention for dementia care [9]. Therefore, interprofessional intervention is expected to be effective in preventing HAD in elderly patients with dementia. Dementia Care Team (DCT) has already been introduced in many acute hospitals and has been reported to reduce physical restraints such as inhibitory clothing, wheelchair belts, and wrist suppression bands [10]. However, the specific type of interprofessional collaboration necessary for HAD prevention remains unclear.

Therefore, in the present study, semi-structured interviews were conducted with interprofessional staff from DCTs in acute care hospitals to elucidate the type of interprofessional collaboration necessary for preventing HAD in elderly patients with dementia.

2. Research Methods

2.1. Se Study Design

Qualitative descriptive research design.

2.2. Data Collection Period

September 2021-November 2021.

2.3. Methods for Selecting Research Participants

The study participants were DCTs in acute care hospitals. For DCT selection, the network sampling method was used because the network of certified nurses in dementia nursing, who are essential members, can be used to select DCTs with strong team skills. Using convenience sampling, and to avoid bias, we considered the number of beds, the range of participating occupations, and regional characteristics such as urban and rural settings. As the number of cases of HAD was expected to be small due to factors, such as the length of hospital stay, acute care

hospitals with single departments of orthopedics or neurology were excluded. Through the network, we requested research cooperation from four teams that met our criteria, and all of them agreed. The participants participated voluntarily, not based on the instructions of their managers.

2.4. Research Methods and Survey Content

2.4.1. Focus Group Interview (FGI)

Interviews were conducted with groups of 5 - 7 individuals at each of the four acute care hospitals.

Time required for the FGI was 75 - 90 min. The interview method involved one team conducting interviews in person and three teams conducting interviews via video. As for the number of interview facilities, we were able to obtain interviews from various professionals necessary for the care of elderly people with dementia. And similar keywords often appear during data collection, and it was deemed that sufficient data was obtained among the collaborators, and it was judged that the number of data collected this time was the saturation of the data.

2.4.2. Survey Content

Semi-structured interviews were conducted based on the interview guide.

Content of the interviews focused on the interprofessional collaboration required for the prevention of HAD in elderly patients with dementia and was based on the following four themes: 1) Rehabilitation; 2) Dietary support; 3) Information sharing; 4) Collaboration with nurses.

2.5. Analysis Method

Using verbatim transcripts, key content related to "interprofessional collaboration needed to prevent HAD in elderly patients with dementia" was extracted. Responses were grouped based on semantic similarities, summarized, and coded, with additional information supplemented as needed. The codes were then categorized and further abstracted into subcategories with similar semantic content. These subcategories were subsequently organized into a system with a higher level of abstraction to create overarching categories. During the process of coding, subcategorization, and categorization, verbatim data were repeatedly reviewed to examine the contextual flow and interrelationships. Analysis was systematically reviewed step-wise by three co-researchers who are experts in this field. In the event of any objections, the research objectives were checked each time and revised until everyone agreed.

"To ensure the reliability of the analysis results, we held three 60-min meetings to discuss and refine the findings until all three collaborating researchers reached a consensus. Additionally, final adjustments were coordinated via email, with a total of five exchanges." The translation was performed by an expert, and the content of the translation was checked by a collaborator.

2.6. Ethical Considerations

Before participation, the study participants were sent a document describing the

study's purpose, methodology, personal information protection measures, voluntary nature of participation, and their right to withdraw at any time without any disadvantages, even after enrolling in the study. Subsequently, participants' contact information was collected and written informed consent was obtained. The interview schedule was arranged based on each participant's work commitments and availability. This study was conducted with the approval of the Ethics Committee for Human Subject Research at Bukkyo University (approval number: 2021-22-A).

2.7. Definition of Term

Behavioral and psychological symptoms of dementia (BPSD).

BPSD symptoms of disturbed perception, thought content, mood, or behavior that frequently occur in patients with dementia [11].

3. Study Results

FGIs were conducted with 23 DCT members at four acute care hospitals, with each interview lasting 75 - 95 min.

3.1. Participant Attributes

The attributes of the DCTs in the four hospitals included in the study are as follows (Table 1), Hospital 1G had 160 sickbeds, Hospital 2 G had 318 sickbeds, Hospital 3 G had 461 sickbeds, and Hospital 4 G had 992 sickbeds. The number of participants in each team ranged from 5 to 7, with the following occupations represented: 2 physicians, 5 certified nurses in dementia nursing (nurses with specialist knowledge of dementia), 3 nurses, 3 registered dietitians, 2 physical therapists, 1 occupational therapist, 1 speech therapist, 3 pharmacists, 1 clinical psychologist, 1 social worker, and 1 psychosocial worker, resulting in a total of 23 participants.

Table 1. Attributes of each of the four hospital focus groups (n = 23).

Group	No. of hospital beds	No. of individuals	Occupation	No. of individuals
Group 1	160	5	Certified nurse in dementia nursing	1
			Nurse	1
			Registered dietitian	1
			Physiotherapist	1
			Pharmacist	1
Group 2	318	7	Physician	1
			Certified nurse in dementia nursing	1
			Registered dietitian	1
			Occupational therapist	1
			Pharmacist	1
			Clinical psychologist	1
			Social worker	1

Continued

Group 3	461	6	Certified nurse in dementia nursing	1
			Nurse	2
			Registered dietitian	1
			Speech therapist	1
			Pharmacist	1
Group 4	992	5	Physician	1
			Certified nurse in dementia nursing	2
			Physiotherapist	1
			Psychiatrist	1

3.2. FGIs Analysis and Categorization of Content and Revising Line

The results of the analysis are summarized in Table 2.

Table 2. interprofessional collaboration for the prevention of HAD in elderly patients with dementia.

Category	Subcategory	Code
Interprofessional collaboration for effective HAD prevention intervention	Collaboration between therapists and other professionals for early and effective rehabilitation	Time adjustment of painkiller use between therapists and nurses
		Selection of treatment methods that minimize administration routes
		Compensate for lack of rehabilitation by nurses
		Proposal of rehabilitation prescriptions by nurses
		Request from a registered dietician for amino acid (BCAA) intake during rehabilitation
	Collaboration between registered dietitians and other professionals to prevent the risk of malnutrition	Nutritional monitoring through cooperation between nurses and registered dieticians
		Information tailored to specific conditions and treatments provided by nutritionists
		Nurses and registered dieticians share information on patients at risk of malnutrition
		Therapist-led rehabilitation intervention tailored to weekend lifestyle rehabilitation
	Collaboration between ward staff and other professionals for daily living rehabilitation with appropriate assistance,	Timely provision of information from therapists to nurses
		Consultation with therapists and WOC specialists regarding seating methods for bed exit
		"Certified nurses in dementia nursing" provides information on therapist techniques to nurses
		Increased opportunities for nursing assistants in bed exit
	Broader interprofessional collaboration to address BPSDs	Pharmacists, therapists, and nurses consider approaches to medication refusal
		Therapists and nurses work together to deal with rehabilitation refusal

Continued

		Certified nurses in dementia nursing work together to stimulate the five senses towards decreased motivation
		Decision on consultation with a psychiatrist via DCT
		Multidisciplinary teams deal with anorexia
		Correcting polypharmacy by sharing information with home-based staff
		Intervention by a psychologist in response to refusal
		Detailed documentation by nurses for evaluation of delirium and insomnia medications
Interprofessional collaboration to improve the care of elderly patients with dementia	Interprofessional collaboration to share patient-specific intervention methods	Sharing patient-specific care approaches across multidisciplinary teams
		Sharing toilet signs for toilet excretion
		Share advice from DCT among nurses
		Difficult cases include certified nurses in dementia nursing and care guidance from therapists to nurses
	Collaboration to establish a daily life rhythm	Adjustment of rehabilitation time with the therapist
		Conference of therapists and nurses in difficult cases of bed exit
		Adjustment of sitting time between nurses to balance rest
		Adjustment of medications that cause daytime sleepiness by therapists, nurses, and pharmacists
	Interprofessional collaboration for seamless care	Sharing lifestyle information before hospitalization with home-based staff
		Sharing information on rehabilitation and care methods for hospitalized patients with home-based staff
		Sharing information on discharge timing and goals
Interprofessional collaboration to ensure safety without physical restraints	Collaboration to minimize physical restraints	Create a climate in which people can consult about physical restraint relief
		Interdisciplinary discussion among physicians, therapists, and nurses for minimizing physical restraints
		Information sharing among nurses to eliminate unnecessary inhibitions
	Collaboration to minimize the risk of falls	Coordination of benzodiazepine drugs in collaboration with medical safety and DCT
		Information provided by pharmacists to nurses on fall risk medications
		Information sharing among nurses on fall-risk medications

3.2.1. Interprofessional Collaboration for Effective HAD Prevention Intervention

This category was derived from four subcategories: "*collaboration between therapists and other professionals for early and effective rehabilitation*", "*collaboration*

between registered dietitians and other professionals to prevent the risk of malnutrition", "*collaboration between ward staff and other professionals for daily living rehabilitation with appropriate assistance*", and "*broader interprofessional collaboration to address behavioral and psychological symptoms of dementia (BPSDs)*". Daily living rehabilitation refers to rehabilitation usually takes place by nurses not a therapist, using everyday situations such as assistance with eating and toileting as opportunities for rehabilitation.

"*Collaboration between therapists and other professionals for early and effective rehabilitation*" was derived from four codes, including nurses' insights (observations) lead to early rehabilitation prescription through consultations with doctors and therapists, physicians removing unnecessary routes as early as possible to facilitate interprofessional intervention, and therapists and nurses always coordinate the timing of analgesic use such that rehabilitation can be performed without pain. Here, a nurse stated, "We constantly communicate with therapists to ensure that start rehabilitation need to after pain is controlled," while a physician remarked, "I believe it is the doctor's role to eliminate unnecessary procedures and remove the risk of delirium so that staff can work more efficiently." "*Collaboration between registered dietitians and other professionals to prevent the risk of malnutrition*" includes if a patient is at risk of malnutrition, the registered dietitian informs the nurse and takes measures to prepare food in advance or modify the meal to be easier to eat, if a patient is on a difficult-to-swallow diet and is at risk of malnutrition, the nurse consults a registered dietitian, and to efficiently enhance muscle strength, the nutritionist requests that the therapist administer branched chain amino acid (BCAA) immediately after rehabilitation. "*Collaboration between ward staff and other professionals for daily living rehabilitation with appropriate assistance*" was derived from five codes, including therapists provide timely guidance to nurses and nursing assistants on assistance methods, ensuring that patients receive support suited to their abilities and certified nurse in dementia nursing observe rehabilitation sessions and provide nurses with guidance on how to assist patients effectively. "*Broader interprofessional collaboration to address BPSDs*" was derived from 8codes, such as if anorexia is present, a interprofessional team—including certified nurses in dementia nursing, nutritional support teams (NSTs), and psychologists—collaborates to analyze the issue and find a solution and if the certified nurses in dementia nursing determines that the patient is depressed, a psychiatrist is consulted.

3.2.2. Interprofessional Collaboration to Improve the Care of Elderly Patients with Dementia

This category was derived from three subcategories: "*Interprofessional collaboration to improve the care of elderly patients with dementia*." "*Interprofessional collaboration to share patient-specific intervention methods*" was derived from four codes, *patient-specific care methods were shared among multiple professions*, *DCT*, *etc.*, "*Collaboration to establish a daily life rhythm*" *was bas*ed on four codes, such as *interprofessional collaboration to request therapists to ad-*

just rehabilitation times to help establish a consistent daily routine and *interprofessional collaboration to share information on patients' sleeping and eating habits before hospitalization to support the establishment of a life rhythm.* A life rhythm refers to a regular pace of eating, sleeping, and activity. Here, a nurse stated, "We consult with the therapists about rehabilitation times and ask them to structure the schedule in a way that helps patients establish a daily routine," while a therapist remarked, "I make sure to report to the nurses each time, explaining how to assist with toileting in this specific way." "*Interprofessional collaboration for seamless care*" was derived from three codes, including *confirming information on patients' pre-hospital life and diet with home staff and family members to identify potential solutions for dietary and rehabilitation challenges* and *consulting and sharing information with home staff to ensure the continuation of rehabilitation and care at home*. Seamless care refers to a system that ensures patients have uninterrupted and continuous access to necessary services and information during transitions from hospital treatment to home life after discharge, or during transitions between acute, recovery, and chronic phases of care.

3.2.3. Interprofessional Collaboration to Ensure Safety without Physical Restraints

This category was derived from two subcategories, including *collaboration to minimize physical restraints* and *collaboration to minimize the risk of falls*. "*Collaboration to minimize physical restraints*" was derived from three codes, such as the creation of a culture wherein multiple professionals feel free to discuss alternatives to lifting physical restraints, whereas "*collaboration to minimize the risk of falls*" was derived from three codes, such as pharmacists sharing information with nurses and alerting them to medications that may cause unsteadiness to help prevent falls. Here, a nurse stated, "We are working with the therapist and the attending physician to consider removing physical restraints, starting with short periods during the day."

4. Discussion

4.1. Sharing Information on a Daily Basis Contributes to HAD Risk Management

In case of elderly patients with dementia, it is difficult to assess symptoms of illness and daily living functions due to impaired communication skills. Therefore, nurses should gather information broadly from those familiar with the patients' pre-hospitalization condition, such as family members. It is important to collaborate with the attending physician and physical therapist to enable the physician to discontinue unnecessary medications early and promote interprofessional intervention. Furthermore, physical therapists and nurses should coordinate the timing of analgesic administration to achieve pain-free rehabilitation, such as constant adjustment of painkiller timing by therapists and nurses to facilitate pain-free rehabilitation, constitutes "collaboration for early and effective rehabilitation". Furthermore, collaboration and information sharing between registered di-

etitians and nurses are essential for nutritional management [12], such as (1) if there is a risk of malnutrition, the registered dietitian should inform the nurse, and predacious food should be added to the diet beforehand or an easy-to-eat form should be developed; (2) nurses and registered dietitians should consult with each other daily to discuss dietary support in a timely and preventive manner. As malnutrition in hospitalized elderly patients can lead to decreased immunity, infection, delayed wound healing, and reduced ADL [13] this type of support is necessary for effective HAD prevention. Moreover, even in cases of low nutritional status, collaboration such as requesting the intake of amino acids (BCAAs) immediately after rehabilitation—wherein the nutritionist requests the therapist to facilitate muscle strength enhancement—can lead to early improvement of nutritional status. Therefore, "collaboration between registered dietitians and other professionals to prevent the risk of malnutrition" is considered necessary for effective HAD prevention.

In acute care hospitals, rehabilitation by therapists is limited owing to scarcity of personnel and time. Therefore, incorporating daily living rehabilitation—focusing on activities such as eating, toileting, and washing—is also essential for preventing HAD. However, hospitalized elderly patients with dementia often experience significant fluctuations in cognitive and motor functions due to physical symptoms and relocation stress. Additionally, nurses work in shifts to provide patient care, making it increasingly difficult to monitor these changes as hospital stays continue to shorten.

Considering these circumstances, providing daily living rehabilitation with the ap propriate level of assistance tailored to the functional abilities of elderly patients with dementia is challenging. Therefore, it is crucial for therapists and certified nurses in dementia nursing to share information and, when necessary, collaborate with nurses and nursing assistants to ensure proper patient support. This includes measures such as timely provision of assistance methods from therapists to nurses and nursing assistants to enable support based on patients' abilities as well as certified nurses in dementia nursing providing nurses with information on assistance methods after observing the rehabilitation process. Such collaboration is essential for the effective prevention of HAD, emphasizing the importance of collaboration between ward staff and other professionals for daily living rehabilitation with appropriate assistance.

Furthermore, BPSDs are one of the most challenging aspects of intervention for elderly patients with dementia. Among these symptoms, motivation significantly declines with hospitalization [14] and is also a factor that reduces the level of care required [15]. As decreased motivation lead to refusal of rehabilitation and reduced food intake, addressing BPSD is essential for HAD prevention. This requires a multifaceted analysis of the physical, psychological, and environmental factors contributing to BPSD. The removal of these focus, and of these factors; and treatment based on non-drug therapies, sometimes supplemented with psychotropic medications [16]. Therefore, effective HAD prevention requires broader interprofessional collaboration to address BPSD. This includes approaches such

as "when anorexia is present, multiple professionals and teams, including certified nurses in dementia nursing, NSTs, and psychologists, should collaborate to analyze the cause and find a solution", and "if the certified nurses in dementia nursing determine that the patient is depressed, they should consult a psychiatrist". Such collaboration is essential for the effective HAD prevention.

4.2. Interprofessional Collaboration Leads to Seamless Care Tailored to Elderly Patients with Dementia

"Interprofessional collaboration to improve the care of elderly patients with dementia" was derived from three subcategories: "*interprofessional collaboration to share patient-specific intervention methods*", "*interprofessional collaboration to establish a rhythm in daily life*", and "*interprofessional collaboration for seamless care*".

When supporting elderly patients with dementia in their medical care, it is essential to understand their unique patterns of function impairment [17]; ease their confusion about unfamiliar environments, people, procedures, and care upon admission to an acute care hospital; and regulate their daily rhythm to reduce anxiety and agitation [18]. This suggests the necessity for "*collaboration to share the patient's unique intervention methods*" and "*collaboration to establish a rhythm of daily life*". However, it has been noted that nursing staff have limited opportunities to learn from one another about the unique patterns of elderly patients with dementia [17]. Therefore, sharing care methods becomes more effective when certified nurses in dementia nursing act as intermediary nurses and other professionals. For example, certified nurses in dementia nursing can conduct rehabilitation sessions and provide nurses with guidance on caring for elderly patients. Furthermore more, maintaining a balance between activity and rest is crucial for establishing a stable daily routine in elderly patients with dementia. Activities such as bathing, rehabilitation, eating, and medical examinations can cause fatigue, which may in turn affect the ability to perform subsequent activities. Fatigue can make rehabilitation and eating particularly difficult. Therefore, collaboration with therapists is necessary to adjust rehabilitation timing, and sharing information on sleeping and eating habits before hospitalization among healthcare professionals is essential for establishing a consistent daily rhythm.

Seamless care is essential in the impairment care of In the care of elderly individuals with dementia, and ultimately prepare them for their future living [19]. Therefore, promoting information sharing between home and hospital setting at an admission and discharge. This includes actions such as "confirming information on life and diet before hospitalization from home staff and family members to gain insights for addressing dietary and rehabilitation issues" and "holding conferences and sharing information with home staff to ensure continuity of rehabilitation and care at home". We believe that "interprofessional collaboration for seamless care" is necessary to prevent HAD in elderly patients with dementia by promoting information sharing and problem-solving throughout the transition between hospital and home.

4.3. Interprofessional Collaboration between Hospitals and Home Care Providers Leads to Safer Care

"Interprofessional collaboration to ensure safety without physical restraints" was derived from two subcategories: "*interprofessional collaboration to minimize physical restraints*" and "*collaboration between pharmacists and other professionals to minimize the risk of falls*".

Over 90% of elderly patients with dementia in acute care hospitals are physically restrained under the pretext of safety management and treatment performance, such as preventing the removal of IVs and drains or reducing fall risks [20]. However, physical restraints are generally considered a violation of human rights and have several adverse effects, including muscle weakness, skin disorders, acute pulmonary thromboembolism, humiliation, and helplessness [21]. Therefore, fostering a culture where professionals can freely discuss alternatives to physical restraint and promoting multidisciplinary collaboration for HAD prevention is essential. Furthermore, in cases where restraints are used for fall prevention, pharmacists can contribute to minimizing fall risk by sharing information about medications that may cause instability and alerting nurses. Previous research has not identified literature specifically focused on HAD prevention or multidisciplinary collaboration in dementia. However, multifactorial approaches to HAD prevention interventions, such as physical activity and nutritional support, are considered effective [22]. This study involved collaboration among a broad range of multidisciplinary specialists, including dementia experts. Consequently, it addressed not only rehabilitation and nutritional management but also activities of ADL rehabilitation, fall risk, and BPSD. In other words, interprofessional collaboration may lead to multifactorial interventions for elderly individuals with dementia, suggesting potential for preventing dementia-associated depression HAD.

In the UK, which serves as a model for dementia care in Japan, the National Health Service provides services through DCTs and dementia specialist nurses [23]. However, previous studies comparing the structure of dementia care in European countries show that, although there are differences between countries and regions, most of them are regional and outpatient, and services specific to dementia, such as hospitalized DCT, are not yet fully developed [24]. Although the number of DCTs in Japan is not accurately known, an increase in DCT is expected as the dementia care has been added to the medical fee schedule. From this point of view, the results of this study are also significant.

6. Conclusions

This study identified three categories of interprofessional collaboration essential for HAD prevention in elderly patients with dementia: (1) "Interprofessional collaboration for effective HAD prevention intervention"; (2) "Interprofessional collaboration for organizing the daily care of elderly patients with dementia"; (3) "Interprofessional collaboration to ensure safety without physical restraints".

The analysis of these categories emphasizes the importance of interprofessional

recognition of rehabilitation and lifestyle rehabilitation interventions as well as the need to promote early-stage interventions that lead to effective rehabilitation. Additionally, the findings emphasize the necessity of interprofessional collaboration, including daily information exchange and occasional joint interventions, to anticipate each other's roles in addressing risks such as malnutrition and BPSDs. Considering the characteristics of dementia, the seamless provision of dementia-specific care can help regulate daily life routines and resolve BPSD-related issues.

Furthermore, the study suggested that broader interprofessional collaboration—involving staff from both hospitals and home care settings—is essential to ensure patient safety while phasing out physical restraints, which can lead to muscle weakness and a sense of helplessness.

However, since this study was based solely on interviews with hospital staff, caution is warranted when generalizing the findings. The results of this study indicate that the type of multidisciplinary collaboration described here is being implemented in the context of HAD prevention. Furthermore, the findings suggest that multidisciplinary collaboration is important for HAD prevention.

In the future, if this type of interprofessional collaboration is widely implemented in acute care hospitals and HAD in elderly patients with dementia is prevented, it may lead to an improvement in the quality of life of elderly patients with dementia and a reduction in the burden of care. This study also holds social significance, as it is believed that the cost of medical and nursing care can be reduced through a reduction in the cost of care for elderly patients with dementia.

Limitations

The study participants were biased toward certain occupations. It is possible that the study results do not entirely reflect collaboration with occupations that were not considered in this study, and there are limitations to generalizing the results.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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