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# Effectiveness of an inpatient daycare for reducing physical restraint time by adjusting the rhythm of daily living among older adults with dementia in a regional comprehensive care ward

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## Abstract

**Aim:** This study aimed to provide inpatient daycare for older adults with cognitive impairment who were physically restrained for fall prevention, and to verify its effects on the reduction of physical restraint time via an adjustment of the rhythm of daily living at a regional comprehensive care ward.

**Methods:** This intervention study was conducted using a control group, where one round lasted two weeks, and six rounds of inpatient daycare were implemented with a change of intervention group participants each round. The program outline included inpatient daycare as a daily routine, burden-free and fun activities for continuous participation and motivation, and the provision of a safe space. An evaluation was conducted by comparing the day before intervention and the day after the final day of inpatient daycare; the evaluation items were the physical restraint time in the wards, physical restraint tool types, sleep hours, scores of the Dementia Behavior Disturbance Scale (DBDS), and scores of the Vitality Index (VI). An analysis was performed using a two-way ANOVA to confirm the presence or absence of interaction and main effects.

**Results:** In total, 18 participants in the intervention group and 21 participants in the control group were analyzed. The total physical restraint time during the daytime was significantly lower in the intervention group compared to those in the control group. In regard to physical restraint tool types, the time using the four-point bed rail as a physical restraint was significantly lower in the intervention group compared to those in the control group. By contrast, no change was observed between the groups for the time spent wearing waistbands while lying on the bed. There was no change in the sleep hours and scores of DBDS; however, the intervention group showed a significant improvement in VI scores.

**Conclusion:** The study indicated that this inpatient daycare may help reduce the four-point bed rail physical restraint period during the daytime.

## KEY WORDS

physical restraint, inpatient daycare, older adults, dementia, regional comprehensive care ward

### Introduction

Despite knowing that physical restraints in hospitals are associated with pain and serious harmful effects

in older adults, patients are still restrained. Physical restraints are defined as physical restraints that intentionally restrict an individual's movement against

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the individual's will by isolation or use of devices or tools<sup>1)</sup>. Harmful effects caused by physical restraints include declined mobility and activities of daily living (ADL), disuse syndrome due to movement restriction<sup>2)</sup>, mental distress because of the infringement on dignity, decline in cognitive function, depression caused by the lack of interaction with the surroundings and decreased stimulation<sup>3)</sup>, and local neurological symptoms, such as physical pain due to compression by belts<sup>4)</sup>. Therefore, the reduction of physical restraints is a pressing issue for preventing such harmful effects and supporting comfort recuperation in older adults.

Physical restraints are generally used to prevent patients from falls. Once a physical restraint is initiated, the restriction tends to be prolonged and is often continued until discharge<sup>5)</sup>. The reasons for which physical restraints cannot be released are because falls can cause fractures and lead to bedridden status in older adults<sup>6)</sup>; further, fall prevention for older adults with dementia is extremely difficult due to their unpredictable behaviors, and nurses who administer the physical restraints tend to fear lawsuits for fall incidents<sup>7)</sup>. Furthermore, restraints have been practiced because of the lack of manpower in facilities<sup>8)</sup>, the incorrect perception of nurses that physical restraints ensure the safety of older adults<sup>9)</sup>, and organizations' traditional constitution to avoid the increase of the incidence of falls by the release of physical restraints<sup>10)</sup>. Older adults with dementia are prone to delirium<sup>11)</sup> and the onset of behavioral and psychological symptoms of dementia (BPSD)<sup>3)</sup> since they are on the deterioration of health status due to aging, experiencing pain or discomfort due to invasive treatments or examination, and the perception of anxiety and stress caused by changes of daily life and environments that they are unfamiliar with. Delirium and BPSD further lead to practice of physical restraints because of increase of fall risks. If adjusting the rhythm of daily life for older adults with dementia by providing comfortable recuperation can be established, they can sleep well during night, and the onset of delirium and BPSD will be reduced all day long, resulting in a reduction in fall risks and in the administration of physical restraints.

In recent years, alternatives for physical restraints for fall prevention have been explored. Previous studies on care for older adults with dementia have

reported on a group care called "inpatient daycare" for the maintenance of rhythm of daily life, physical and cognitive functions, mental stability, and interactions with others during hospitalization<sup>12), 13)</sup>.

Inpatient daycare refers to "activities based on programs combining various nonpharmacological therapies for older adults with dementia"<sup>14)</sup>. It is not subject to additional medical fees, unlike psychiatric daycare and outpatient daycare. The Japanese Nursing Association explains inpatient daycare as "a system that allows for living at a rhythm similar to daily life, even in the hospital, to minimize lifestyle-related impairments associated with treatment and hospitalization. It allows discharge from the hospital in a better state and a smooth transition to home care"<sup>15)</sup>. A cross-sectional nation-wide study in Japan based on random sampling revealed that inpatient daycare has been implemented in 15% of general hospitals, and persons-in-charge of inpatient daycare recognized that they can contribute to the maintenance of physical, cognitive, and social functions; the maintenance of the rhythm of daily life and a reduction of physical restraints for older adults; and the maintenance of mental stability and physical, cognitive, and social functions<sup>16)</sup>. Thus, it is believed that the provision of inpatient daycare can contribute as a tool that stimulates older adults under recuperation and adjusts their rhythm of daily life. If the rhythm of daily life can be adjusted, as in previous studies, by implementing inpatient daycare for restrained older adults with dementia, the behaviors of these adults, such as nocturnal awakening, agitation, and wandering due to BPSD, might be avoided and improved, leading to the release of physical restraints. However, inpatient daycare for the purpose of releasing physical restraints has yet to be developed.

A regional comprehensive care ward is a ward for patients who cannot return home directly because of a decline in their ability to perform ADLs after they have completed the treatment for the acute phase of their condition. It has been shown that, in regional comprehensive care wards, approximately 40% of hospitalized patients show dementia, and 98.6% of these wards in Japan implemented physical restraints for patients, such as for fall prevention<sup>17)</sup>. In short, patients admitted to this care ward show high risks of falls, so they should be supported for improving their

ability to perform ADLs without falls or injuries and physical restraints.

Thus, it is necessary to develop an inpatient daycare and verify its effectiveness in a regional comprehensive care ward for restrained older adults with dementia for the purpose of releasing the physical restraints during recovery time in the wards. We believe that shortening the time of use of physical restraints in the wards will prevent deterioration of the ability to perform ADLs, alleviate physical and mental pain, and prevent the reduction in quality of life and dignity among older adults.

### **Aim**

This study aimed to examine the effectiveness of inpatient daycare for the reduction of physical restraint time through adjusting the rhythm of daily life among older adults with dementia who were physically restrained for fall prevention in a regional comprehensive care ward.

### **Operational definition of terms**

Physical restraints refer to means of purposely limiting a person's free body movement for fall prevention by using devices or tools, indicating "waist-belt attachment on the bed," "four-limb attachment with strings on the bed," "four-bed side rails," and "waist-belt attachment on the wheelchair."

Inpatient daycare involved gathering multiple older adults with dementia who were physical restrained for fall prevention at a certain location in the hospital for program-based activities. Older adults with dementia indicate who were diagnosed with dementia and who showed cognitive impairment were identified by nurses in the ward.

### **Methods**

#### **1. Study design**

An intervention study was performed with two groups in a comprehensive care ward. For the intervention group, inpatient daycare was provided during usual care, whereas for the control group, only usual care was provided in the ward. Usual care at the participating hospital mostly comprises daily life support, such as hygiene care, excretion assistance, and meal assistance as well as talking and efforts to alleviate anxiety

during wound treatment and intravenous injection, and physical restraints are avoided by passing the tube through the collar in intravenous management. A minimum of 14 days is required to improve the rhythm of daily life<sup>18</sup>); since the average hospitalization period of the participating hospital was 18 days, one round of the intervention period was set as 2 weeks, and six rounds were implemented by recruiting different participants.

#### **2. Participants**

The participating regional comprehensive care ward was a 50-bed hospital located in the Kanto area, Japan. The inclusion criteria for participants were older adults aged 65 or above, individuals assessed as having a decline in cognitive function, and individuals who required restraint based on the "falls risk assessment score sheet." The physical restraints were "waist-belt attachment on the bed," "four-limb attachment with strings on the bed," "four-bed side rails," and "waist-belt attachment on the wheelchair," and the subjects were individuals restrained by either one type of the above restraints.

The exclusion criteria comprised individuals who required bed rest for treatments, individuals without a doctor's permission to participate in inpatient daycare, and individuals scheduled to be discharged within the intervention period. A week before the intervention, ward nurses with more than 5 years of experience selected candidates based on the inclusion and exclusion criteria as participants and randomly allocated participants who had provided consent to the intervention group and the control group using the envelope method to avoid selection bias. Both groups were limited to five participants. Figure 1 is a flowchart showing the total number of participants at each stage after the completion of the six rounds.

#### **3. Intervention methods**

##### **1) Overview of inpatient daycare**

Previous studies have shown that the adjustment of the rhythm of daily life prevents nocturnal awakening and reduces restlessness and confusion among older patients<sup>19</sup>. It was believed that the promotion of daytime stimulation and activities could suppress nocturnal awakening and appearance of BPSD, resulting

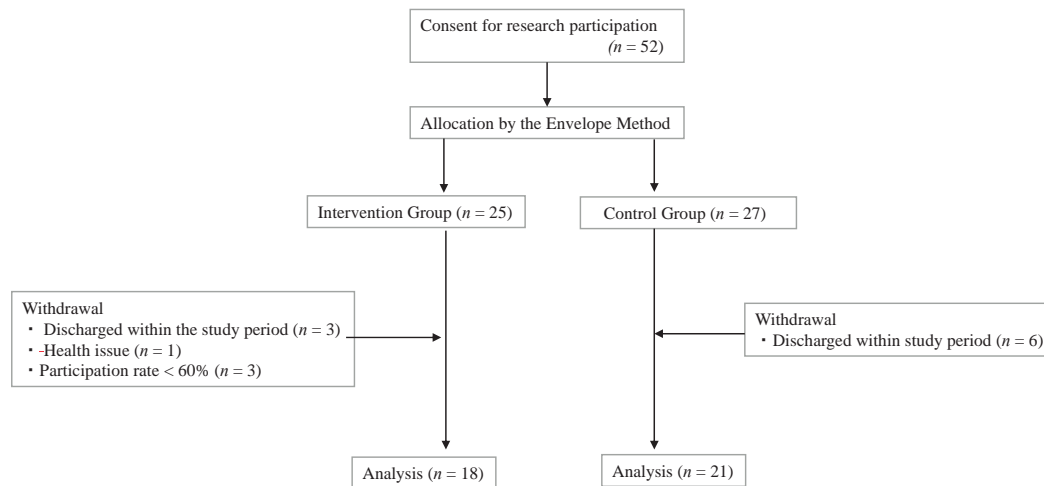


Figure 1: Flowchart showing the participant's allocation and the total number of participants for analysis

in avoidance and reduction of physical restraints. To maintain the rhythm of daily life, the establishment of inpatient daycare and encouragement of continuous participation and motivation among the participants is essential. Therefore, we constructed three frameworks: adjustment of the rhythm of daily life, fun activities for continuous participation and motivation, and staying safely in the inpatient daycare.

#### (1) Adjustment of the rhythm of daily life

The rhythm of daily life is “the rhythm phenomenon repeating the two-tier activities of the activity period and the rest period based on activities at daytime and sleep at nighttime in a daily cycle”<sup>19)</sup>, and it is established from long-time lifestyle habits and life patterns. However, to lead a hospitalized life abiding by treatment, rest, and ward rules, it is necessary to partially modify, adapt, and readjust one’s rhythm of daily life. Moreover, it is difficult for older adults with dementia to adapt to the changes of a new environment<sup>3)</sup>, and they cannot move freely owing to physical restraints; thus, support for readjustment is essential. In the daily life of restrained older adults in the wards before intervention, time apart from rehabilitation was mostly spent lying alone in the hospital room, and the daily schedule and daily tasks<sup>20)</sup> required for readjusting the rhythm of daily life were insufficient.

Accordingly, activities called inpatient daycare were set up as daily tasks and were implemented for 60 minutes at the same time every day. In addition, ward nurses worked on giving participants a sense of time by calling out to them at a fixed time, helping them with

advance preparations in the wards near the starting time, and sending them to and for inpatient daycare at a fixed time. Advance preparation means that the ward nurse did the following before each participation so as to motivate each participation, confirmation of wearing glasses, hearing aids, and dentures to prepare the patient and collect information that allows participants to communicate with others in a small group formed by in-hospital day care. Moreover, as the desire for excretion and wet diapers affects participants’ calmness and is directly linked to hyperactivity and fall risks, nurses provided excretion assistance before the start of inpatient daycare so that the participants felt comfortable in participating and could participate with peace of mind.

#### (2) Fun activities for continuous participation and motivation

For continuous participation in inpatient daycare, it was important for participants to perceive the activities as fun and to feel like participating. Asking participants to use more than their remaining capacity to perform an activity can cause anxiety and confusion, leading to reduced motivation to participate. Therefore, activities that could be carried out in small groups were used to elicit communication and cooperation among the participants. It was important for practitioners to be involved by encouraging the communication among participants, constantly checking participants’ reactions, and substituting for individual shortcomings. We referred to Yamaguchi et al.’s five principles of brain-activating rehabilitation, which are pleasant stimulation, praising one another, bilateral communication, role,

and support to prevent failure<sup>21)</sup>. On the first day of the inpatient daycare, self-introductions were requested, preferred names were confirmed, and name tags were made so that participants could address one another with ease. On the next day, name tags were set up on tables in advance and seats were designated, so that participants who required more assistance than others were managed carefully by seating them next to the practitioner or individuals with relatively retained cognitive function. The activities included simple exercises, singing, handicrafts, collages, and games so that anyone could participate. The activities were selected based on the participants' preferences. For example, participants who "liked tennis when they were young" played a ball rolling game by changing tennis rackets to table tennis rackets and changing the ball sizes to those of table tennis, tennis, and rubber balls, while reminiscing about tennis. These activities focused on ensuring that everyone could have fun by changing the level of difficulty while valuing each participant.

### (3) Spending time safely

The participants were inpatients at risk of frail falls who required treatment, in addition to having unstable health conditions, and the experience of fall could lead to being bedridden and movement restrictions owing to the fear of falling, affecting life afterwards. Thus, it is necessary to implement a program with measures to prevent falls.

Therefore, as the participants were hospitalized older adults, it is essential for the practitioners to be familiar with the treatment process and be able to respond while matching activity programs with the condition of the participants. Accordingly, research members who were nurses were assigned, and a system was established.

Specifically, to ensure that the participants could spend time safely, ward nurses judged every day whether older adults could participate based on their physical and mental health states, state of participation motivation for inpatient daycare, and the conditions of treatment and examination. In addition, the ward nurses provided relevant information to the practitioners of inpatient daycare in the cases of changes in medical treatment and symptoms as well as matters requiring attention. The practitioners monitored the physical and mental states of the participants and safely provided

inpatient daycare based on the information from the ward nurses. In addition, a practitioner set up a support system for cases where behavior that deviated from the activities to be performed in small groups, prepared spare wheelchairs and stretchers, and made arrangements for medical examinations by doctors when necessary.

### 2) Implementation methods of inpatient daycare

Inpatient daycare was implemented for 2 weeks with a 60-min session from 3 PM to 4 PM on weekdays. There were no more than five participants in each session, and one nurse was placed in charge on a daily basis.

## 4. Methods of evaluation

### 1) Evaluation timing

The baseline was the day before intervention, and post-intervention evaluation day was the day after the last day of inpatient daycare.

### 2) Comparison of subject characteristics between intervention group and control group

Participant characteristics included age, sex, primary disease, hospitalization period, physical restraint period before intervention (day), diagnosis of dementia, and the score for falls risk assessment score sheet of the participating hospital. Data were extracted from the medical records by nurses in the ward.

### 3) Evaluation of intervention effects

The primary outcomes included the physical restraint times. Specifically, the total physical restraint period in 24 h, physical restraint period divided into nighttime (9 PM to 6 AM/9 h) and daytime (6 AM to 9 PM/15 h), and the change in the number of hours based on the type of physical restraint. Data were collected by the nurse in charge on the specific day.

Secondary outcomes included total sleep hours, sleep hours at nighttime and daytime, scores of the Dementia Behavior Disturbance Scale (DBDS) and Vitality Index (VI). The DBDS scores 28 behaviors observed in patients with dementia on a five-point scale from zero (not at all) to four (always), and the higher the score, the greater the behavior disturbance. The VI scores the degree of motivation in five categories, "waking

up,” “communication,” “diet,” “excretion,” and “activity,” on a three-point scale, and the higher the score, the higher the motivation. For data collection regarding sleep hours, the nurse in charge on the data collection day visited the participants’ room at least once every hour and recorded the status of sleep at that time. Evaluations using other scales were performed by the same nurse with at least 5 years of experience before and after the intervention.

### Analysis methods

Following the calculation of descriptive statistics, we examined homogeneity between two groups by using Pearson’s Chi-squared test and the Mann–Whitney U test or unpaired t-test under the Shapiro–Wilk test. Next, a two-way ANOVA was used for the evaluation of intervention effects regarding interaction and main effects. The significance level was less than 5%, and SPSS ver. 27 for Windows was used.

### Ethical considerations

This study was approved by the Medical Ethics Review Committee of Tokyo Medical University (T2018-0027). Research participation was based on free will without force. Participants and their family were provided a full written and oral explanation and could refuse and withdraw at any stage. We explained

that the allocation to the “intervention group” that participated in the in-hospital day care and the “control group” that did not participate in the day care was selected by the envelope method, not arbitrarily, and could not be changed after selection. Those who agreed to this were considered to be the subjects of this study. In addition, it was explained that data would be handled carefully, that personal information would be strictly protected, and so on. Then, their consent for research participation was obtained.

### Results

#### 1. Overview of participants

In total, 52 individuals were requested to participate, and all of them agreed to participate in the study. Of the 52 participants, 39 were analyzed (18 in the intervention group, 21 in the control group) (Figure 1). The physical restraint period before intervention was  $13.2 \pm 8.2$  (mean  $\pm$  standard deviation) days for the intervention group and  $12.1 \pm 9.3$  days for the control group, and no significant difference was found in basic attributes between the groups (Table 1).

#### 2. Evaluation of intervention effects

##### 1) Primary outcomes

The total physical restraint period (24 h) showed a significant decrease from  $18.4 \pm 8.2$  h to  $14.7 \pm 10.3$  h

Variables	Mean $\pm$ Standard Deviation/n (%)		p value	
	Intervention Group (n=18)	Control Group (n=21)		
Age	83.9 $\pm$ 8.7	82.5 $\pm$ 9.0	.64 <sup>a</sup>	
Sex	Male	7 ( 38.9)	9 ( 42.9)	.85 <sup>b</sup>
	Female	11 ( 61.1)	12 ( 57.1)	
Primary disease	Orthopedic	3 ( 18.8)	6 ( 28.6)	NA
	Kidney and urological	4 ( 25.0)	3 ( 14.3)	
	Dermatological	2 ( 12.5)	4 ( 19.0)	
	Cranial nerve	2 ( 12.5)	3 ( 14.3)	
	Circulatory	1 ( 6.3)	3 ( 14.3)	
	Respiratory	2 ( 12.5)	1 ( 4.8)	
	Digestive	1 ( 6.3)	0 ( 0.0)	
	Endocrine	1 ( 6.3)	0 ( 0.0)	
Hospitalization period (day)	15.6 $\pm$ 10.5	14.1 $\pm$ 10.8	.74 <sup>a</sup>	
Physical restraint period (day)	13.2 $\pm$ 8.6	12.1 $\pm$ 9.3	.61 <sup>a</sup>	
Dementia diagnosis	Yes	13 ( 72.2)	10 ( 50.0)	.16 <sup>b</sup>
	No	5 ( 27.8)	10 ( 50.0)	
Falls Risk Assessment Score sheet scores <sup>1)</sup>	14.4 $\pm$ 2.1	13.7 $\pm$ 2.5	.37 <sup>c</sup>	

Dementia diagnosis: 1 missing value

NA: Not Applicable

a) Mann–Whitney U test b) Chi-square test c) t test

1) Falls Risk Assessment Score sheet scores: The higher the score, the higher the falls risk

in the intervention group ( $F = 4.6, p < .05$ ) compared with  $22.5 \pm 4.9$  h to  $22.1 \pm 7.4$  h in the control group ( $F = 15.5, p < .001$ ). In 24 h, the physical restraint period at daytime (6 AM to 9 PM/15 h) showed a significant decrease from  $10.2 \pm 6.6$  h to  $8.3 \pm 6.8$  h in the intervention group ( $F = 5.1, p < .05$ ) compared with  $13.6 \pm 4.4$  h to  $12.9 \pm 5.7$  h in the control group ( $F = 7.3, p < .01$ ). However, the intervention did not lead to any change in the physical restraint period at nighttime.

The total usage time of the four-bed side rails showed a significant decrease in the intervention group from  $17.5 \pm 7.9$  h to  $13.1 \pm 9.3$  h ( $F = 7.0, p < .05$ ) compared with  $22.2 \pm 4.9$  h to  $20.5 \pm 7.4$  h in the control group ( $F = 19.9, p < .001$ ). However, the total time of waist-belt attachment on the bed showed a decrease from  $2.9 \pm 5.1$  h to  $0.8 \pm 3.2$  h in the intervention group and from  $2.9 \pm 7.5$  h to  $1.5 \pm 4.1$  h in the control group, and none of the main effects were observed.

## 2) Secondary outcomes

The VI score showed a significant increase from  $6.0 \pm 1.8$  points to  $6.5 \pm 1.7$  points in the intervention group ( $F = 9.7, p < .01$ ) compared with  $4.4 \pm 1.8$  points to  $4.5 \pm 1.9$  in the control group ( $F = 4.8, p < .05$ ). In addition, there was no interaction between evaluation timing (before, after) and presence or absence of intervention (intervention group and control group) for all items.

No harm or ethical issues were noted in this study.

## Discussion

This study introduced inpatient daycare to adjust the rhythm of daily life of older adults with a decline in cognitive function who were restrained for fall prevention at a regional comprehensive care ward and assessed if the physical restraint periods in the ward decreased as primary outcomes. Based on the results, there was no interaction between the presence or absence of intervention and evaluation timing, but the total physical restraint period of 24 h in the intervention group showed a significant decrease by about 4 h, from 18.4 h to 14.7 h. In the control group, it decreased by only 1 h, from 22.5 h to 21.1 h. Similarly, the physical restraint period at daytime decreased by  $<1$  h, from 8.9 h to 8.1 h, in the control group, and by 2 h, from 10.2 h to 8.3 h, in the intervention group. During the

intervention, there were no physical and mental health issues or fall accidents among the participants. The above results suggested that this inpatient daycare might be effective for shortening the physical restraint period for older adults who were restrained for fall prevention in a regional comprehensive care ward. However, in the intervention group, the total usage time of four-bed side rails over 24 h and the usage time at daytime were shortened, but the duration of waist-belt attachment on the bed did not change in the control group. Therefore, this inpatient daycare was found to be effective for a short duration of 2 weeks; however, this was limited to the use of four-bed side rails for older adults with dementia. Specific discussions on effectiveness and issues are as follows.

### 1. Effectiveness in shortening the physical restraint period

All participants in this study were judged by nurses as having a decline in cognitive function, and 72.2% of those in the intervention group were diagnosed with dementia. When individuals with dementia are hospitalized, delirium and BPSD are likely to occur due to confusion associated with environmental changes or changes in daily living as well as pain and anxiety caused by treatment and symptoms<sup>2,3</sup>). In addition, the participants had a 24-h physical restraint period before intervention, with a mean of 18 h for the intervention group, and 22 h for the control group. It was considered difficult for participants to establish a rhythm of daily life due to the pain of not being able to move freely, limited social interaction environment, and limited field of vision regardless of day or night. This inpatient daycare was effective in shortening the physical restraint period as it became a pleasant stimulation for participants, their rhythm of daily life was adjusted through continuous participation, they could aim for mental stability until "patients could live in a calm state"<sup>22</sup>), and their physical restraints implemented to avoid falls were released.

In the inpatient daycare, nurses, as practitioners, while utilizing participants' preferences and residual abilities, monitored participants so that there would be no physical and mental burdens, implemented interventions for participants to move away from the location where they were restrained, and encouraged



Table 2 Intervention of the Effects of Inpatient Day Care

N = 39

Variables	Intervention Group (n=18)		Control Group (n=21)		F value		Interaction	
	At the Start	Two Weeks Later	At the Start	Two Weeks Later	Evaluation Timing <sup>1)</sup>	intervention <sup>2)</sup>		
<b>Primary Outcomes</b>								
Total Physical Restraint Period in 24 hours (h)	18.4 ± 8.2	14.7 ± 10.3	22.5 ± 4.9	21.1 ± 7.4	15.5 ***	4.6 *	ns	
Nighttime (h) <sup>3)</sup>	8.1 ± 2.5	6.4 ± 4.1	8.9 ± 0.7	8.1 ± 2.7	7.0 **	2.6	ns	
Daytime (h) <sup>4)</sup>	10.2 ± 6.6	8.3 ± 6.8	13.6 ± 4.4	12.9 ± 5.7	7.3 **	5.1 *	ns	
<b>Physical restraint period based on the type of physical restraint</b>								
<b>1. waist-belt attachment on the bed</b>								
Total Physical Restraint Period in 24 hours (h)	2.9 ± 5.1	0.8 ± 3.2	2.9 ± 7.5	1.5 ± 4.1	2.5	0.1	ns	
Nighttime (h)	1.7 ± 3.0	0.5 ± 2.1	1.3 ± 3.2	0.7 ± 2.3	2.8	0.0	ns	
Daytime (h)	1.2 ± 2.6	0.3 ± 1.1	1.6 ± 4.4	0.8 ± 2.2	1.8	0.6	ns	
<b>2. four-limb attachment with strings on the bed</b>								
Total Physical Restraint Period in 24 hours (h)	0.0	0.0	0.0	0.0	NA	NA	NA	
Nighttime (h)	0.0	0.0	0.0	0.0	NA	NA	NA	
Daytime (h)	0.0	0.0	0.0	0.0	NA	NA	NA	
<b>3. four-bed side rails</b>								
Total Physical Restraint Period in 24 hours (h)	17.5 ± 7.9	13.1 ± 9.3	22.2 ± 4.9	20.5 ± 7.4	19.9 ***	7.0 *	ns	
Nighttime (h)	8.1 ± 2.5	6.4 ± 4.1	8.9 ± 0.7	8.1 ± 2.7	7.5 **	2.8	ns	
Daytime (h)	9.4 ± 6.4	7.0 ± 6.1	13.4 ± 4.4	12.4 ± 5.0	9.3 **	8.0 **	ns	
<b>4. waist-belt attachment on wheelchair</b>								
Total Physical Restraint Period in 24 hours (h)	1.0 ± 1.3	1.7 ± 2.1	0.2 ± 0.5	0.6 ± 1.4	3.8	6.4 *	ns	
Nighttime (h)	0.0	0.0	0.0	0.0	NA	NA	NA	
Daytime (h)	1.0 ± 1.3	1.7 ± 2.1	0.2 ± 0.5	0.6 ± 1.4	3.8	6.4 *	ns	
<b>Secondary outcomes</b>								
Total sleep hours (h)	9.6 ± 2.1	10.9 ± 1.7	11.3 ± 2.3	11.8 ± 2.5	3.9	6.5 *	ns	
Nighttime (h)	8.2 ± 1.3	8.9 ± 0.6	8.7 ± 1.0	8.9 ± 0.3	4.7 *	0.9	ns	
Daytime (h)	1.4 ± 1.7	1.9 ± 1.6	2.6 ± 2.5	3.0 ± 2.4	1.0	4.2 *	ns	
DBDS Score <sup>5)</sup>	17.6 ± 8.1	16.0 ± 7.6	16.3 ± 5.7	15.5 ± 5.2	15.5 ***	0.2	ns	
VI Score <sup>6)</sup>	6.0 ± 1.8	6.5 ± 1.7	4.4 ± 1.8	4.5 ± 1.9	4.8 *	9.7 **	ns	

Mean ± Standard deviation. Two-way ANOVA. \*p < .05 \*\*p < .01 \*\*\*p < .001

NA: not applicable ns: not significant

1)Evaluation timing: before, after

2)intervention: Control Group, Intervention Group

3)Nighttime (h):9 PM to 6 AM/9 h

4)Daytime (h):6 AM to 9 PM/15 h

5)DBDS: Dementia Behavior Disturbance Scale: The higher the score, the greater the dementia behavior disturbance

6) VI: Vitality Index: The higher the score, the higher the motivation

them to interact in small groups during the activity, which occurred at the same time every day. Reports on the effects of inpatient daycare on mental stability have shown that participants acquire acceptance and a sense of belonging by cooperating with the others in the small group activities<sup>23)</sup>. In this study, nurses could immediately provide the support required while assessing participants' physical condition and participants could spend time actively and freely, while feeling safe, secure, and relaxed<sup>24)</sup>. Inpatient daycare became a pleasant stimulation for the participants. During the intervention period, participants could participate continuously without any request to discontinue participation or withdrawal. Thus, despite reports that the motivation of hospitalized older adults usually decreases significantly from the time of hospitalization<sup>25)</sup>, in this intervention, the VI score of the intervention group improved from 6.0 points to

close to 7.0 points, reaching 6.5 points. In this study, factors that enabled the shortening of the physical restraint period have not yet been analyzed; however, previous studies have shown that improvement in the VI score is positively correlated to the function of living<sup>26)</sup>. As participation in inpatient daycare led to the achievement of a well-organized life during daytime and a calm attitude, ward nurses assessed participants' movement and cognitive abilities as well as their mental state to determine whether the physical restraints could be released and the physical restraint period of the intervention group could be shortened.

## 2. Inpatient daycare issues

Although the physical restraint period for four-bed side rails in the intervention group showed a significant reduction, the duration for waist-belt attachment on the bed remained the same. The effectiveness of

inpatient daycare was thought to be related to the type of physical restraint and the degree of physical and mental burdens. Participants restrained by four-bed side rails are restricted from movement within a limited space; however, they can move their bodies without pain associated with movement. However, waist-belt attachment on the bed caused sorrow and humiliation due to the discomfort and pain caused by local compression due to the direct contact of the physical restraint with the body. In other words, even though the restrained patients received inpatient daycare without bias, the participants' mental states varied depending on the type of physical restraint used, and this could not be resolved within 2 weeks or by the application of other auxiliary interventions. In the future, it will be necessary to clarify patient characteristics based on the type of physical restraint and consider programs and an intervention period according to their health condition. In addition, this study showed no reduction in physical restraint period at nighttime. There is a high possibility that physical restraints were being used as a preventive measure to ensure the safety of older adults who could not protect their own safety amidst a lack of manpower during night shifts. In addition to adjusting the rhythm of daily life of older adults with dementia via inpatient daycare, it is also important to examine the organizational support and system for nurses to limit the use of restraining tools, such as waist belts, with peace of mind, and to reduce the physical restraint period at nighttime.

### **Suggestions for nursing**

In this study, the physical restraint period during daytime was reduced, but the direct reasons or factors for the same were not investigated. Inpatient daycare modifies the ward nursing interventions, and nurses refer to activities in inpatient daycare as part of the care methods in the ward<sup>13)</sup>. Therefore, it was believed that the judgment on the release of physical restraints should be made by ward nurses' considering patients' health and capability. Based on the information shared by practitioners' and participation in inpatient daycare, nurses felt that the use of physical restraints during daytime was unnecessary through the integration of care preferences based on the patients' residual abilities and incorporation of work brought back from

inpatient daycare as tools for communication in their care. This led to patients becoming mentally stable and nurses to actually feel them as responses to their care for patients. It was suggested that inpatient daycare can also be utilized to share awareness for releasing physical restraints in the ward. It has also been reported that the factors of hospitals that do not provide inpatient daycare are due to lack of people and places<sup>16)</sup>. This study showed that inpatient daycare was provided safely every day while taking into account the following these points; program content, how to motivate participation and handle emergencies, and the collaboration between the one nurse who ran the program and the ward nurses. The results suggest that inpatient daycare can be provided even with a small number of operators and a limited number of locations, it was also thought that these findings could be used as a reference when introducing inpatient daycare in regional comprehensive care wards.

### **Research limitations**

In selecting subjects for the present study, the criteria for the study subjects were first shown to nurses with more than 5 years of experience, who would then select candidates; subsequently, the envelope method was used to avoid selection bias. However, it is undeniable that there could be selection bias at the stage of selection. In addition, in judging the release of physical restraints, fall risk conditions were objectively evaluated according to the "falls risk assessment score sheet" used at the participating hospital; then, the presence or absence of physical restraints was judged. However, the evaluating nurses knew the outline of the study, and the blinding of the intervention group and the control group was not possible because the study was conducted in a regional comprehensive care ward. Consequently, the judgment of the release of physical restraints might have been in favor of the study. In addition, the nurses's judgment may have intervened in the fact that the risk of falling decreased as the rhythm of life was adjusted, resulting in a reduction in physical restraint time, we were unable to clarify this point because we did not investigate the nurses' judgment, this is a limitation of this study.

## Conclusion

The results of our study suggest that this inpatient daycare can contribute to adjusting rhythm of daily life and reducing hours of physical restraints among older adults with dementia in a regional comprehensive care ward, although showing limited effectiveness to users of four-bed side rails.

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## 地域包括ケア病棟における認知症高齢患者の身体拘束解除に向けた 生活リズムを整える院内デイケアの有用性

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### 要 旨

**目的:** 転倒予防の目的で身体拘束をされた地域包括ケア病棟の認知機能障害のある高齢患者に, 身体拘束時間低減をねらいとし, 生活リズムを整えるための院内デイケアを提供することでの効果を検証した。

**方法:** 研究デザインは対照群を用いた介入研究であり, 2 週間 1 クールと設定し参加者を変え 6 クール実施した。介入群には院内デイケアの時間を設け, 対照群には病棟で通常ケアのみを提供した。プログラム骨子は, 院内デイケアを日課とし, 継続した参加意欲がもてるように心理的な負担なく楽しい活動とすること, 安全な場の提供とした。評価は, 介入前日と院内デイケア最終日の翌日の比較であり, 評価項目は, 病棟における身体拘束時間, 身体拘束の種類, 睡眠時間, 認知症行動障害尺度 (DBDS) の得点, 意欲の指標 (VI) の得点とした。分析は, 交互作用の有無と主効果を確認するため二元配置分散分析を用いた。

**結果:** 分析対象者は介入群 18 名, 対照群 21 名であった。介入前後において身体拘束の総時間は, 介入群が対照群と比べて有意に減少し, その時間帯は昼間帯であった。身体拘束具の種類毎では四点ベッド柵の使用時間は, 介入群が対照群に比べて有意に減少したのに対し, ベッド上での腰ベルト装着時間では変化を認めなかった。睡眠時間と DBDS の得点においての変化はなく, VI の得点においては介入群が有意な改善を認めた。

**結論:** 本院内デイケアは, 四点ベッド柵の昼間帯の身体拘束時間の低減の一助となる可能性が示唆された。