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Special Feature Article

An Approach on the Correspondence between Moving and the Walking Ability of the Elderly with Dementia, Fall Prevention, and Physical Restriction Reduction

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Abstract

The approach on the correspondence between moving and the walking ability of the elderly with dementia, fall prevention, and physical restriction reduction is summarized as follows.

1. The person's viewpoint

Falls of the elderly with dementia are caused by several risks such as those affecting the cognitive function, and it is necessary to analyze the cause of these falls from the viewpoint of the person who experienced the dangerous action leading to the fall. Accidental falls often result from a person's need for excretion or movement.

2. Care based on the person's uniqueness

Care should involve environmental maintenance or rehabilitation. It was also suggested that the support that satisfied the needs of the elderly with dementia and allowed them to move and walk safely was the original fall prevention measure.

3. Multi-factorial cooperation

It is necessary to examine support care (concerning eating, sleeping, and excreting) and the quality of life (pleasure, etc.) through multi-factorial cooperation based on the person's viewpoint in order to support the independence of the moving activity of elderly people with dementia.

4. Physical restriction reduction

Easy physical inhibition increases fall risks, which leads to needing a care station, and accidental falls. Physical restrictions that include the use of a sensor mat can easily lead to more accidental falls and a greater burden for nurses.

Safety management for preventing the occurrence of falls leads to physical restrictions. Hence, it is necessary to cultivate consciousness for injury prevention associated with falls.

Keywords: elderly with dementia, moving walking ability, fall prevention, physical restriction reduction

Introduction

The Ministry of Health, Labour and Welfare (MHLW) estimates that the number of elderly people with dementia will increase to 7.3 million by 2025, and 8.62 million if mild cognitive impairment (MCI) is included, meaning that one in four elderly people will develop dementia 7). Elderly people with dementia are reportedly eight times more likely to fall than those without dementia 2), and this is not only caused by gait and balance impairments related to cranial nerve damage as dementia progresses, but also psychotropic drug use, behavioral and psychological symptoms of dementia (BPSD), such as agitation and wandering, and a variety of other factors. Furthermore, it is difficult to analyze the underlying causes of falls because the elderly with dementia themselves have impaired memory and judgment. Currently, the Long-Term Care Insurance Law prohibits physical restraints 8) with regard to fall prevention measures for the elderly with dementia in Japan, but physical restraints are still often used in the medical field 14). In the case of elderly people with dementia, physical functions related to the risk of falling are likely to change along with symptoms caused by the cranial nervous system disease and changes in mental and physical functions due to aging. Noticing and responding to changes in mental, physical, and emotional functions, including the risk of falling, will help prevent falls. In this paper, we consider fall prevention and the reduction of physical restraints from the viewpoint of dealing with the mobility and walking ability of the elderly with dementia.

I. Increased Falls Among Elderly People with Dementia in Hospitals

Falls tend to occur when a person loses balance while walking or moving. Motor control of gait occurs at all levels of the brain: cortical, subcortical, spinal tract, and peripheral. In particular, perceptual integration, motor planning, and gait execution occur at the subcortical level, while the basal ganglia, cerebellum, and cortex are involved in planning and executing deliberate movements. Figure 1 shows the relationship between gait and falls in those with dementia 15). Aging-related changes reduce the balance and sensory functions (physical factors), and impairments in attention and perceptual integration related to cognitive factors and executive functions related to motor behavior can lead to gait disturbance, making falls more likely to occur. The incidence of first falls among the elderly with dementia, involving at least one fall during a 12-month follow-up after diagnosis, was 47% for Alzheimer's disease patients, 47% for vascular dementia patients, 77% for dementia patients with Lewy bodies, and 90% for dementia patients with Parkinson's disease, compared with 37% in the control group (no dementia) 2). In particular, dementia with Lewy bodies and dementia with Parkinson's disease are more likely to cause falls due to parkinsonism and autonomic nervous system disorder, and require support for daily activities and environmental maintenance, with attention to diurnal fluctuations. Table 1 lists the specific risks of falls that are likely to occur in clinical practice. Elderly people with dementia are more likely to fall because they do not remember the need for assistance due to memory impairment, they cannot tell the time and place due to disorientation, and they are more active during the night due to day/night reversal. In addition, elderly patients with Alzheimer's disease are prone to visuospatial cognitive impairment, such as stumbling and bumping into things because they cannot locate them, which increases the risk of falls due to various complex factors.

Figure 2 shows trends in the number of accidents involving falls and tumbles at hospitals, which were compiled by the author based on The Japan Council for Quality Health Care (JQ) Medical Accident Reporting Project, the website of the JQ Medical Accident Information Collection, Analysis, and Provision Project, and the content of the accident × degree of the accident (based on the total number of reports from participating registered medical institutions in a given month) 11).

The number of reported falls/falls increased 5.4-fold in 12 years, from 194 in 2005 to 1,046 in 2017, and the ratio of fall reports to all reports increased 1.7-fold, from 15.3 to 25.5%. As described

above, elderly patients with dementia have a very high fall risk due to cognitive dysfunction, and multimorbidity and polypharmacy can cause unsteadiness and delirium, further contributing to the risk of falls 1).

As a part of fall prevention at hospitals, in particular, nurses make a "nursing diagnosis" of the fall risk status using a fall assessment tool and an assessment index, also known as a fall and tumbling assessment score sheet, and implement fall prevention measures, such as environmental modifications to reduce the risk of falls, and assistance and monitoring during walking and transfers (Figures 3, 4). The risk of falls in the elderly is complicated by a number of factors. They often have multiple comorbidities and commonly take multiple medications, which can cause falls and femoral neck fractures as adverse drug events, as well as a decline in the quality of life. In addition to nurses, physicians, physical therapists, occupational therapists, and other professionals work as a team in many hospitals to analyze accidents and develop measures to deal with patients at high risk of falling. One of the challenges of falls in hospitals is the increase in hospitalization of elderly people with dementia who are treated for physical illnesses, and especially the increase in the number of elderly people who develop delirium due to cognitive decline or stroke sequelae, caused by the increase in the number of elderly people in later stages of life. The increased use of multiple medications, especially benzodiazepines and anti-dementia medications, has a significant impact on the gait function due to side effects (such as dizziness and lightheadedness). Therefore, specialized knowledge, including dementia and safety management, is necessary to consider individualized fall prevention measures that address each fall risk. Multidisciplinary intervention with expert knowledge of dementia is needed, but there is currently little sufficient evidence of fall prevention intervention methods for elderly people with dementia 13). Furthermore, it is difficult to completely prevent falls in bipedal organisms. Fall prevention is not just about preventing falls; it is about preventing traumatic injuries caused by falls in order to improve the quality of life of elderly people with dementia. However, due to the excessive awareness of safety management (falls = adverse events) caused by the influence of medical safety awareness and safety management culture in hospitals, patients are currently physically restrained in an attempt to completely prevent falls.

II. Physical Restraints and Falls

Physical restraint is defined as "a restriction of behavior in which a patient's body is temporarily restrained using clothing or a cotton-filled belt to inhibit movement" (Ministry of Health and Welfare Notification No. 129, April 8, 1988) 6). According to a survey published in 2016, 14) the most common cause of physical restraint was "fall and tumbling" (Table 2). The most common cause of physical restraint is "falls" (Table 2). In particular, for those who were at risk of falling or had actually fallen, measures such as "surrounding the bed with fences or walls on all sides," "attaching a Y-shaped restraint belt, waist belt, or wheelchair table," and "using psychotropic drugs in combination with multiple medications" were employed. The survey revealed that almost 90% of hospitals were using physical restraints (even including just one of the 11 items), including 93.1% of general wards (7:1/10:1 nursing staffing), 94.7% of general wards (13:1/15:1), 98.6% of community comprehensive care wards, and 91.5% of recovery-period rehabilitation wards in hospitals with medical insurance coverage. On the other hand, the percentage of patients in long-term care facilities was low, at 30-40%, including 46.6% in long-term care health facilities for the elderly and 33.3% in long-term care welfare facilities for the elderly 14).

Physical restraints have various effects on the physical and mental health of elderly people with dementia. Elderly people are prone to disuse syndrome due to physical restraints, and their ADLs are reduced due to joint contractures and muscle weakness. The elderly with dementia who are restrained in a wheelchair by a belt are prone to gait disturbance related to the decline in ADL, which can lead to accidents such as falls and tumbles. There is a risk of not only injury but also death, such as when an elderly person with dementia who is restrained in a wheelchair by a belt suddenly tries to stand up forcibly. The elderly person's dignity as a human being is violated, and his/her condition worsens further, accompanied by anxiety, anger, and marked emotional distress. Family members are also shocked when they see the patient being subjected to such physical restraints. Medical professionals who use physical restraints also suffer a loss of morale as professionals, and society may develop distrust and prejudice toward hospitals. Once the use of physical restraints has begun, there are no standards for discontinuing their use, so it is currently impossible to make a decision to discontinue using them over the long term. As key points for procedures to remove physical restraints, it is necessary to establish procedures for removing them in advance, including

the establishment of a system for the abolition of physical restraints and the implementation of conferences, but many hospitals have not yet considered the possibility of removing physical restraints.

Although physical restraints to prevent falls are implemented in hospitals, we must reconsider whether it is truly meaningful to live safely to the end of one's life even if physically restrained. Falls are a natural occurrence, but we need to focus on preventing fractures and other injuries. One of the major ethical issues associated with fall prevention in hospitals today is that they want to prevent major trauma and disability caused by falls, but they are trying to prevent the occurrence of falls themselves. They use a sensor mat, assuming that patients with dementia cannot understand anything. Physical restraint by medication, such as giving psychotropic drugs to patients because they move around (wandering), is also seen in clinical practice, but the risk of falling increases due to side effects. It has been reported that new administration of psychotropic drugs significantly decreases life expectancy 3), and over-administration of psychotropic drugs is a major factor in physical restraints.

Tables 3 and 4 show the Database for improvement of Nursing Quality and Labor (DiNQL), a nursing management database 10) constructed by the Japanese Nursing Association. Table 3 shows the "percentage of physically restrained patients" by the calculation status of the additional fee for dementia care. The percentage of physically restrained patients tended to be higher on wards with the additional fee for dementia care-2 than on wards with the additional fee for dementia care-1. On the other hand, the "percentage of physically restrained patients" on wards with highly specialized nurses was lower than that in the group of hospitals without such nurses, on wards with the additional fee for dementia care-2 (Table 4). Based on these results, in the Japanese fiscal year 2020 revision of the medical service fee system, in addition to the existing "score to evaluate efforts by the dementia care team" and "score to evaluate efforts by trained ward nurses, "a new" score to evaluate efforts by full-time physicians or highly specialized nurses" was added to the Dementia Care Addition. The above indicates that the presence of nurses with expertise in dementia and collaboration with a multidisciplinary team are effective to reduce the use of physical restraints.

The author conducted focus group interviews with dementia nursing experts, and found that nurses with marked expertise in dementia care were

more likely to believe that the elderly with dementia are people with their own will, with unique values and lifestyles developed over their lives, are more likely to develop risky behaviors that lead to falls due to cognitive dysfunction, and they are more likely to fall due to lack of attention and judgment. However, the nurses believe that if the values and unique needs of each elderly person with dementia are met and their lives are settled, falls are less likely to occur 12).

Elderly people with dementia act on their own initiative, and supporting them to act safely without restricting their behavior is the key to fall prevention. As shown in Figure 4, health care providers tend to make judgments based on the scene alone because they feel that the patient is likely to fall, but it is necessary to have a perspective on fall prevention that considers the total daily rhythm of life. Falls are more likely to occur when elderly people with dementia move or transfer, so it is necessary to provide care that meets the needs of elderly people with dementia in their daily lives, and to support them to safely do what they want to do and move around. In particular, it is necessary to enhance care for eating, sleeping, excreting, and having fun in daily life. Toileting is a complex activity that involves not only moving and walking, but also integrating various cognitive functions, and elderly people with dementia who have cognitive impairment have a high fall risk. Support for safe activities that meet the needs of elderly people with dementia, including environmental maintenance and rehabilitation to enable safe activities, is the ideal form of fall prevention. As shown in Figure 5, excretion is an independent function that should be maintained until the end of a person's life, and requires meticulous care that respects dignity. In addition, cognitive dysfunctions such as not knowing how to act next (executive dysfunction), not knowing where the toilet is (disorientation), not knowing the location of the toilet bowl (visuospatial dysfunction), and not being able to maintain attention to danger (impaired attention) are important causes of falls in those with dementia. In order to maintain the dignity of the elderly, it is necessary to provide meticulous environmental maintenance and practice care that takes into account the risk of dementia-related falls.

Recently, hospitals and facilities often install sensor mats at the bedside as a fall prevention measure, but we must reconsider whether sensor mats can really prevent falls (Figure 6). The current sensor mats do not prevent accidents involving falls and increase the stress and burden on nurses by

sounding nurse calls 5). In addition, the sensor mat reacts to the call, saying: "Danger!" "Do not get up!" This is a form of physical restraint, and it has been pointed out that a patient's family may feel a sense of restraint. It has been pointed out that the sensor mat is ineffective if used exclusively, that elderly patients are more likely to engage in risky behaviors such as "straddling" or "hiding the mat" because they are aware of its presence, a nurse visiting the room without a reason causes stress for the patient and induces risky behaviors, and nurses may become dependent on the sensor mat and neglect other fall prevention measures 9). It is necessary to fully confirm that the purpose of using the sensor mat is not to restrain, and clarify the criteria for its use, such as the need for assistance to move and transfer and assess the reasons for wanting to move, even if the sensor mat is used.

In order to prevent falls in elderly people with dementia, it is necessary to have expert knowledge about dementia, and multidisciplinary intervention may be effective because various fall-related risk factors are involved. In addition, fall risk assessment, KTY (hazard prediction) training, and multidisciplinary fall prevention teams are expected to play an important role in improving sensitivity to fall risk. These careful efforts to prevent falls will lead to a reduction in the use of physical restraints.

Conclusion

The relationship between visuospatial and attentional impairments related to cognitive dysfunction in the elderly with dementia, as well as the causes of walking around (wandering), a BPSD of dementia, and the risk of falling, need to be clarified. The measures that focus on the needs from the perspective of older adults with dementia that fail to meet potential needs lead to risky behaviors and increase the likelihood of falls, and seeing things from the person's point of view, taking into account the process that causes a fall, is important to prevent falls in older adults with dementia. Furthermore, multidisciplinary intervention is also important to reduce the use of physical restraints.

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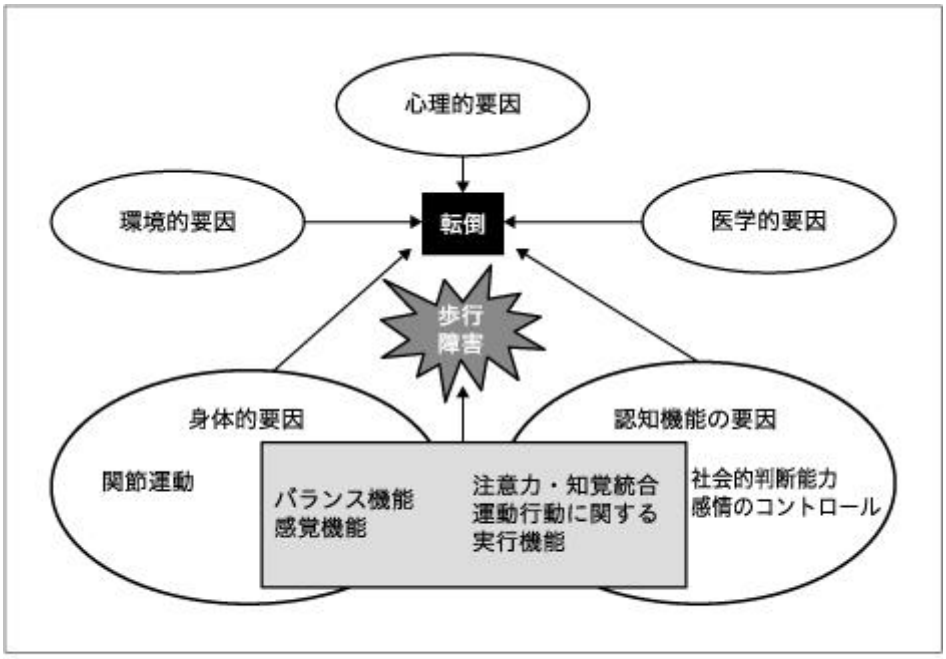

図1　認知症における歩行と転倒の関係
（文献 15 より引用）

Figure 1 Relationship between gait and falls in dementia patients
(Adapted from Ref. 15)

表1　認知機能障害に関連した転倒リスク

認知機能障害	具体的な症状	転倒リスクとの関連
記憶障害	・新しいことを覚えることが難しい	・介助の必要性を覚えていない ・物を置いた場所がわからない・覚えられない
見当識障害	・時間，場所，人などを認識することが難しい	・場所などがわからず（例：トイレ），歩き回って転倒する ・昼夜逆転して見守りの十分でない夜間に活動する
視空間認知障害	・物の位置や距離，方向を認知することが難しい	・物の位置がわからず，つまずく・ぶつかる
失認・失行	・失認：視覚，聴覚で得た情報を正しく認識することが難しい ・失行：物事を順序よく遂行することが難しい	・衣服や履物を正しく着用できないためにバランスを崩して転倒しやすい
注意障害	・注意を向けたり，維持したりすることが難しい	・注意深い行動がとれない ・注意喚起を理解できずに転倒する

Table 1 Risk of Falls Associated with Cognitive Impairment

Cognitive impairment
Memory impairment

Disorientation
Visuospatial cognitive impairment
Loss of cognition and actions
Attention deficit

Specific symptoms
Difficulty remembering new things
Difficulty recognizing time, place, people, etc.
Difficulty recognizing the location, distance, and direction of objects
Loss of cognition: Difficulty correctly recognizing information obtained visually and aurally
Loss of actions: Difficulty performing tasks in order
Difficulty directing and maintaining attention

Associated with fall risk
Difficulty remembering the need for assistance
Difficulty remembering where things are placed
Difficulty recognizing places, etc. (example: bathroom), walking around and falling
Activities during the night when the patient is not adequately monitored, as day and night are reversed
Failure to recognize the location of objects; stumbling and bumping into them
Inability to wear clothes and footwear correctly, resulting in loss of balance and falls
Difficulty in attentive behavior
Failure to understand reminders to pay attention and falls

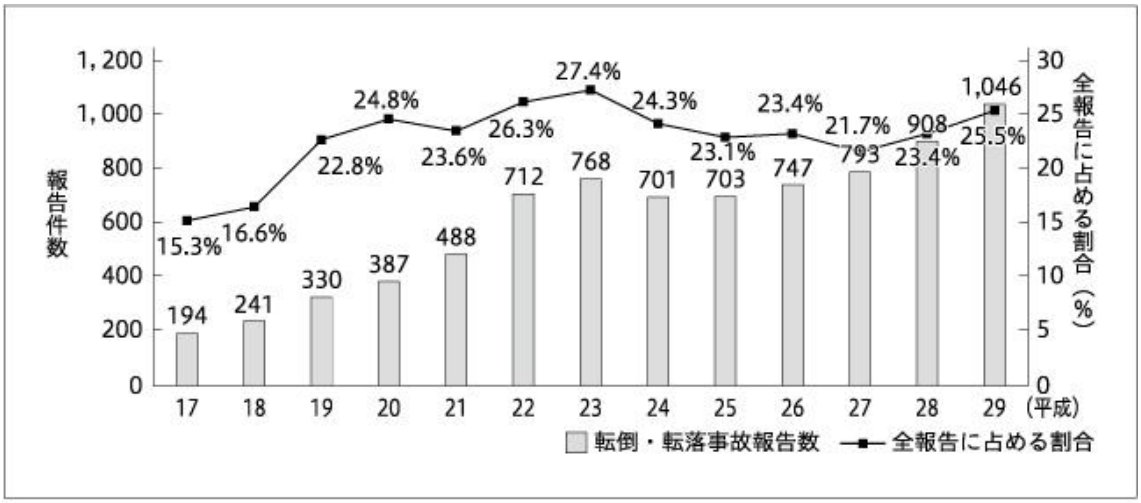

図2　病院転倒・転落アクシデントの推移
（文献 11 を参考に著者作成）

Figure 2 Hospital Falls and Fall-related Accidents
(Prepared by the author based on Reference 11)

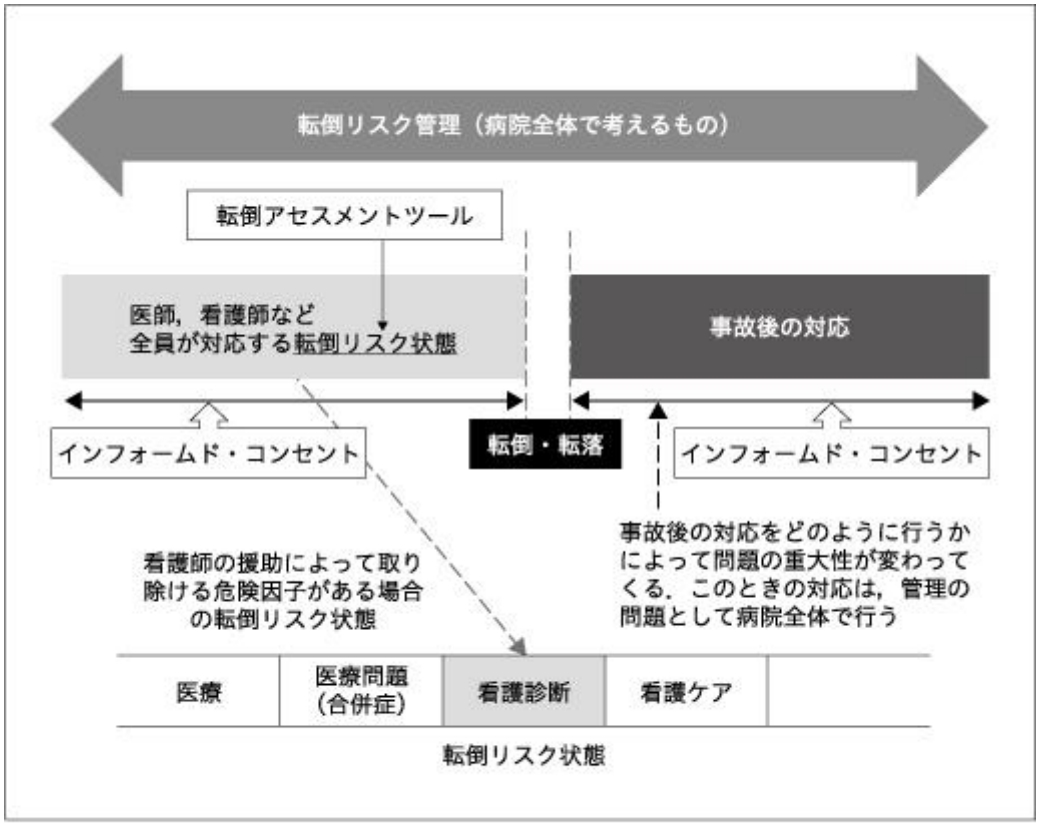

図3　転倒リスク状態の考え方と看護師の役割
（文献 4 より作成）

Figure 3 Concept of fall risk status and the nurse's role
(Prepared from Reference 4)

表 2　身体的拘束の原因となる行動と身体的拘束の種類

身体的拘束の原因となる患者の行動・症状	実施される身体的拘束
転倒・転落 ・転落のおそれがある ・立って歩くと転倒のおそれがある ・実際に転倒・転落したことがある	・ベッドの四方を柵や壁で囲む ・Y 字型拘束帯や腰ベルト，車いすテーブルをつける ・向精神薬の多剤併用
点滴・チューブの自己抜去 ・点滴・チューブ類を抜去しようとする ・実際に点滴・チューブ類を抜去したことがある	・ミトン型の手袋など ・ベッドの四方を柵や壁で囲む
暴力・暴言	・ベッドの四方を柵や壁で囲む ・向精神薬の多剤併用
かきむしり・自傷行為	・ミトン型の手袋など ・ベッドの四方を柵や壁で囲む
弄便・不潔行為	・ベッドの四方を柵や壁で囲む ・ミトン型の手袋など ・Y 字型拘束帯や腰ベルト，車いすテーブルをつける
睡眠障害や不穏症状	・ベッドの四方を柵や壁で囲む ・Y 字型拘束帯や腰ベルト，車いすテーブルをつける ・向精神薬の多剤併用

（文献 14 より引用）

Table 2 Behaviors that lead to use of physical restraints and types of restraints (cited from Ref. 14).

Patient Behaviors and Symptoms Leading to Use of Physical Restraints
Falls and tumbles
Fear of falling
Patient may fall when standing and walking
Patient had an actual fall or tumble
Self-removal of IV/tubes
Attempts to remove IV/tubes
Has actually removed IV/tubes
Violence/abusive language
Scratching and self-injurious behavior
Coprophilia and filthy behavior
Sleep disturbance and restlessness
Physical Restraints Used
Fences or walls on all sides of the bed
With a Y-shaped restraint belt, waist belt, or wheelchair table
Multiple use of psychotropic medications

Mitten-type gloves, etc.
Fences or walls on all sides of the bed
Fences or walls on all sides of the bed
Multiple use of psychotropic medications
Mitten-type gloves, etc.
Fences or walls on all sides of the bed
Fences or walls on all sides of the bed
Mitten-type gloves, etc.
Y-shaped restraint belts, waist belts, or wheelchair tables
Fences or walls around the bed on all sides
Y-shaped restraint belts, waist belts, or wheelchair tables
Use of multiple psychotropic medications

表 3　身体的拘束患者割合

	算定あり		
	加算 1 92 病院 436 病棟		加算 2 76 病院 379 病棟
75%タイル	8.7	<	9.9
50%タイル （中央値）	4.2	<	5.2
25%タイル	1.2	<	2.0

身体的拘束の定義：抑制帯など，患者の身体または衣服に触れる何らかの用具を使用して，一時的に当該患者の身体を拘束し，その運動を抑制する行動の制限を指す
身体的拘束患者割合の計算式：（病棟で身体的拘束を実施した患者数）÷（病棟の入院実患者数）×100
（文献 10 より引用）

Table 3 Percentage of patients physically restrained
Definition of physical restraint: A restriction of behavior that temporarily restrains the patient's body and inhibits his/her movement by some device that touches the patient's body or clothes, such as a restraint belt.
Formula for calculating the percentage of physically restrained patients: (number of patients on the ward who were physically restrained) ÷ (actual number of patients admitted to the ward) × 100

(cited from Ref. 10)

表 4　認知症に関する専門性の高い看護師配置の身体的拘束の効果

	加算 2 の群分け		
	加算 2 で専門看護師・認定看護師*1の配置あり 23 病院 132 病棟*2		加算 2 で配置なし 53 病院 247 病棟*2
75%タイル	8.0	<	11.4
50%タイル（中央値）	4.9	<	5.5
25%タイル	1.8	<	2.1

*1認知症に関する専門性の高い看護師：「老人看護」「精神看護」専門看護師，「認知症看護」認定看護師
*2認知症に関する専門性の高い看護師は病院全体の配置数
（文献 10 より引用）

Table 4 Effects of Physical Restraints on Nurse Staffing with Specialization in Dementia

*1Nurses with expertise in dementia: nurses specializing in "geriatric nursing" and "psychiatric nursing," and nurses certified in "dementia nursing.

*2Hospital-wide number of nurses with expertise in dementia.

(cited from Ref. 10)

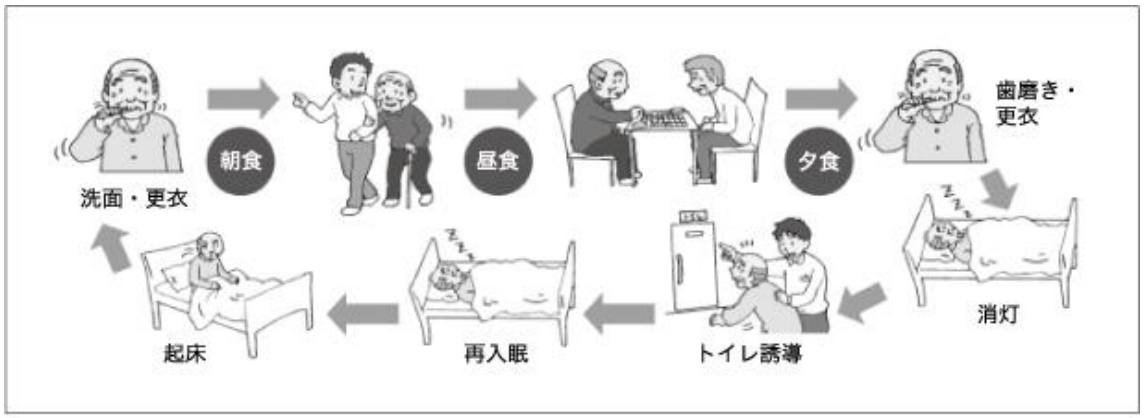

図 4　転倒しそうで危険だからと場面だけで判断するのではなく，
１日をトータルに考えた転倒予防

高齢者がしたいこと（ニーズ）に対応するケア
　ニーズを満たそうと危険な行動をとってしまうのが認知症高齢者の転倒の特徴
　転倒しそうな高齢者に対して「何かお困りですか？」と聞いてみる
　本人がしたいことを安全に対応する手段を考える
　トイレまで「歩きたい」のか？　「排泄したい」のか？
　１日のなかで日光浴やリハビリテーションなど活動の時間を作る
　高齢者が行動したいことを満たす
日常生活の質を高める
　食べる，寝る，排泄する，楽しみなどのケアの充実

Figure 4 Preventing falls by considering the whole day, rather than making decisions based on the scene alone because it looks dangerous.

Care that takes into consideration what the elderly patient wants (needs) to do

A characteristic of falls in the elderly with dementia is that they perform dangerous actions to realize their needs.

Ask the elderly person who is about to fall: "What is the problem?" "Do you need help?"

Think of safe ways to accommodate what he/she wants to do.

Does he/she want to walk to the toilet? Do they want to defecate?

Make time in the day for activities such as sunbathing and rehabilitation.

Facilitate what the elderly person wants to do

Improve the quality of daily life

Improve care for eating, sleeping, toileting, and enjoyment

図 5　転倒リスクが最も高い排泄動作
排泄動作は移動歩行だけでなく，さまざまな認知機能が統合された複雑な動作：認知症高齢者にとって転倒リスクが高い

Figure 5 Excretory movement with the highest fall-related risk
Excretion is a complex movement that integrates not only moving and walking but also various cognitive functions: the risk of falling is high in elderly people with dementia.

図 6　センサーマットで転倒予防できるのか？

Fig. 6 Can sensor mats prevent falls?

Utilized to support independence with the consent of the patient.
Make the bed low.
P-shaped fence for getting-up motion
Lay down a cushioning mat.
The sensor assesses the need for assistance with moving and transfers and the reasons for wanting to move. The purpose of the sensor should be confirmed among nurses, and it should not inhibit a patient's behavior.