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ORIGINAL ARTICLE: SOCIAL RESEARCH, PLANNING AND PRACTICE

Prevalence of and factors related to pain among elderly Japanese residents in long-term healthcare facilities

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Aim: We aimed to examine the pain prevalence among residents who stayed at healthcare facilities for the elderly requiring long-term care in Japan, and explore factors related to self-reported pain.

Methods: This was a cross-sectional study. All residents in nine healthcare facilities in Japan were asked to participate in the present study, with the exclusion of short-term and temporary residents. Demographic data were collected from participating residents' medical records. The residents were evaluated using the Barthel Index, the Folstein Mini-Mental State Examination and Self-Rated Health measures. After/during patients underwent a body movement protocol, self-reported pain/Abbey Pain Scale scores were obtained. The χ^2-test, *t*-test and logistic regression analyses were carried out to identify factors related to pain.

Results: Data were obtained from 246 residents. The prevalence of pain among the residents was 47.2%. Self-rated health status and history of fracture were significantly associated with self-reported pain. Logistic regression analysis showed that self-rated health status (odds ratio [OR] 0.50, 95% confidence interval (CI) 0.28–0.88), mental health diagnoses (OR 9.18, 95%CI 1.27–66.52) and respiratory diagnoses (OR 0.16; 95%CI 0.03–0.97) were associated with pain experienced by residents.

Conclusions: Nearly half of the residents suffered from pain on movement. The pain of these elderly residents should be managed in order to improve their health status. **Geriatr Gerontol Int 2014; 14: 481–489.**

Keywords: aged care, dementia, pain, prevalence, rehabilitation.

Introduction

Pain is a common and serious problem among older adults. In Japan, 70% of older adults living at home experience pain that keeps them indoors.[1,2] Furthermore, 46.2% of older nursing home residents experience pain.[3] Pain can also lead to depression, reduced physical ability and poor sleep quality.[4–6] Because pain can cause older adults to withdraw from social interaction and physical activities, the condition must be identified accurately and managed appropriately.

Pain is a subjective experience. Healthcare workers should tailor their approach to pain management according to the pain reported by a given individual. However, older adults often hesitate to report pain, because they consider complaining about pain to be inappropriate or believe that pain is a normal part of aging.[7] Older adults often have physical disabilities and/or cognitive impairments; these factors can further impede older adults' abilities and beliefs to report pain on their own behalf.

Wide ranges of pain prevalence (3.7% to 79.5%[8]) and factors related to pain have been reported among older nursing home residents. The variation among these estimates could stem from methodological differences, such as the time frame of pain detection (e.g. "last week"[4] *vs* "at the moment"[9]) or the methods used to quantify pain (e.g. self-reported[7] *vs* proxy assessment[8,10]). Self-reported pain has been considered the gold standard in pain evaluation; however, more than 90% of residents in the aged-care system have cognitive impairment.[11] To maximize the accuracy of pain reports from residents, subjects should be interviewed soon after the painful episode that is the subject of the investigation.[12] Proxy pain assessment could also help to

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obtain pain status for the residents who could not report their pain.

In 2000, Japan established a long-term care insurance system for older adults in order to provide services that would allow these individuals to stay in their homes for as long as possible. The healthcare facilities for the elderly requiring long-term care (HCF: *kaigoroujinhokensisetsu*) established under this system provide rehabilitation and extended-care services to older adults discharged from hospital. Expectations with regard to the roles and services of HCF have increased with time.

Previous studies addressed some concerns regarding pain among HCF residents. A qualitative study reported that residents stated that they avoided walking around by themselves and preferred to use a wheelchair because of fear of pain.[13] Another study reported that nursing ward managers of the HCF estimated lower pain prevalence among the residents (22.3%)[14] than the results of studies carried out in the community.[1,3] However, few studies have examined pain prevalence by self-reports/direct observation of the residents and pain-related problems. These issues must be investigated thoroughly in order to develop adequate and necessary pain management systems, and to facilitate rehabilitation. The present study is the first to examine the prevalence of pain among HCF residents in Japan and to explore factors related to self-reported pain.

Methods

Participants and settings

HCF access was determined by convenience sampling. Data were collected from nine HCF in four prefectures of the Kanto region in Japan. These facilities had the capacity to house 50–165 residents (mean 92.7 residents). No significant differences in age or level of care required were found among samples at the facilities.

Because of the high prevalence of cognitive impairment among aged care residents in Japan,[11] we asked the HCF staff to send letters to family members or guardians of all residents (n = 736) asking for their consent to participate in the study. This process required 1 month; therefore, 98 residents who planned to stay at the facility for less than 1 month or who were discharged before the start of the research study were excluded. Ultimately, 296 family members agreed to participate. Among this group, 50 residents refused to participate, 19 were admitted to the hospital or discharged from the facilities, and 14 residents had health or other concerns that prevented them from participating in the study. The median number of participants at each of the nine facilities was 27 (range 18–48).

Data collection

Residents' characteristics

The demographic data collected from the residents' medical records included age, sex, care requirement levels as specified by Japanese long-term care insurance law, length of stay and the duration for which residents had availed facility services. Researchers obtained each patient's diagnoses from the primary doctors' and nurses' records. The number of diagnoses ascribed to each patient was counted.[10] Diagnoses were classified according to the body system involved. Diagnoses related to cognitive impairment were identified. Diagnoses related to pain, such as a history of fracture, hip prosthesis or open reduction, arthritis, osteoporosis and cancer,[9,15] and conditions such as paralysis[16] and joint contracture[17] were also identified. The medication usage and specific care required by each patient for the 6 h preceding a body movement protocol were identified from residents' medical records, nursing charts and associated medical prescriptions.

The level of activities of daily living (ADL) was measured according to the Barthel Index (BI). The BI score ranges from 0 to 100, with higher scores indicating greater ability.[18] Previous research has shown the reliability and validity of the Japanese version of the BI.[19]

The Japanese version of the Folstein Mini-Mental State Examination (MMSE) was used to characterize each participant's cognitive status. MMSE scores range from 0 to 30, with lower scores indicating inferior cognitive ability.[20] To examine residents who did not cooperate with the MMSE test, and those who were illiterate, blind or hard of hearing, the Global Deterioration Scale was also used to determine the severity of cognitive impairment.[21] This scale is highly reliable.[22–24] Researchers' observations and information gathered from staff interviews were used to supplement these scores.

Depressive status was measured using the 15-item Geriatric Depression Scale (GDS-15). The GDS-15 is a short-form interview used to assess depression among older adults. The associated scores range from 0–15, with a score of $\geq$5 indicating depression.[25] Residents were evaluated using the GDS-15 if their MMSE scores were above 15. This approach maintained the sensitivity (84%) and specificity (91%) of the GDS-15.[26]

The Self-Rated Health (SRH)[5,27] measure was used to quantify self-estimated health status among residents. The SRH is frequently used as a substitute for clinical health status or as a measure of the health-related quality of life.[28] Each resident rated his or her health status on a five-point Likert scale ranging from "bad" (1) to "excellent" (5).

Owing to the established relationship between chronic pain and body mass index (BMI),[29] BMI was also calculated. BMI was calculated as weight in kilograms

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divided by the square of a resident's height in meters. This information was gathered from the weight and height measurements recorded at the facility carried out within the previous 30 days.

Pain assessment

1. Presence of pain
   A simple question "Were you in pain during the movement?" was used to elicit a yes/no answer. If residents had difficulty hearing the question, written text was used to communicate.
2. Pain intensity
   The Verbal Descriptor Scale (VDS) was used to quantify pain intensity. The VDS involves a seven-point scale that ranges from "no pain" (0) to "pain as bad as it could be" (6).[30] This scale was chosen because it is more sensitive and reliable for use with an older population than other self-report scales, such as the visual analog scale.[31] Patients were also asked about the physical localization of their most severe pain.
3. The Japanese Version of the Abbey Pain Scale
   The Japanese version of the Abbey Pain Scale (APS-J) was used to investigate the presence of pain among residents who were not able to verbally report pain. The APS-J has been tested for its reliability and validity, and shows excellent interrater agreement and good association with self-reported pain.[32,33] Pain was rated on a four-point scale (absent = 0, mild = 1, moderate = 2, severe = 3) by observing six types of resident behaviors: vocalization, facial expression, change in body language, behavioral changes, physiological changes and physical changes.[34]

Factors related to pain and reports of pain

Residents were asked their opinions regarding statements about pain. The questions posed were developed based on the van Herk *et al.* study, as follows:[7] "Do you agree that pain is a part of aging?" and "Do you agree that you always tell staff when you suffer from pain?" Residents were also asked "Do you agree that pain should be tolerated?" and "Do you agree that you hesitate to use analgesics due to fears of the associated adverse effects?"[35,36]

Data collection

The MMSE was carried out at the research site. The BI and GDS scores determined by the researchers were confirmed by staff members familiar with a given resident's usual condition. The GDS-15 was also carried out and scored at the site; researchers read a questionnaire for participants and recorded their answers. The study period extended from October 2009 to March 2011.

Pain was evaluated using the APS-J with a body movement protocol that closely mimicked the residents' usual activities: walking in the day room or being transferred from a bed to a wheelchair by staff. The APS-J was used to acquire reliable and unequivocal non-verbal indicators of an underlying chronic pain condition.[32,37] This protocol was also designed to increase interrater agreement, and maximize the study's internal consistency.[37] Residents were asked to stand up and walk anywhere they would like to go. When a resident reached the intended place, he or she was asked to sit down on a chair. If residents were unable to move, staff helped and/or transferred them to a third location. The observation technically began when a staff member touched a resident's body, and stopped when the resident had settled in at the second destination.

The residents were asked if they experienced pain soon after completion of the movement protocol and APS-J tests. When residents could not give a clear response regarding the presence of pain or did not respond even after repeated questioning, the event was recorded as an inability to answer the question. When residents indicated that they experienced pain, they were asked about the physical localization of their pain, as well as its intensity, as measured using the VDS. The VDS questionnaire was printed using large letters for residents with hearing problems.

Data analyses

The prevalence of pain was calculated based on residents' self-reports of pain or results of the APS-J when patients were unable to report pain. The *t*-test and χ^2-test were carried out to explore the differences among residents with and without pain. Variables for the *t*-test were normally distributed or slightly skewed by visual inspection of histograms; for example, length of stay, duration of facility service utilization and Barthel Index scores, therefore we assumed that the *t*-test could be utilized. Fisher's exact test was used when necessary to account for sparse cells. A logistic regression analysis was carried out to evaluate the relationship between residents' pain and factors related to pain. The presence of pain as determined by residents' self-reports was considered as a dependent variable. Factors that could potentially relate to pain were considered as independent variables, after adjusting for confounding variables according to previous studies.[10,38] The factors considered as potential confounding variables included the number of disease diagnoses, conditions that could limit physical activities (e.g. hearing impairments and aphasias) and GDS scores. Sex was not included as a confounding variable, but was included as an independent variable, because sex was often significantly associated with pain.[10,39] Independent variables were selected as follows: factors with a high association with the

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dependent variable in bivariate analyses (e.g. probability value of ≤0.2) and a theoretical relevance to dependent variables, such as duration of utilization of facility services, GDS scores, hearing impairment, respiratory diagnosis, facture, arthritis, number of diagnoses and mental health diagnosis. To determine multicollinearity, associations among variables were calculated using Spearman's rank correlation coefficient. The Hosmer–Lemeshow test was used to check the model's goodness of fit. All data were analyzed using IBM SPSS Statistics19 (IBM, Tokyo, Japan).

Ethical considerations

Informed written consent was obtained from each participant's family member/guardian. The research procedure was reviewed and approved by the ethics committee of Tokyo Medical and Dental University, and the administrators of the participating HCF.

Results

In total, 246 residents participated in the present study (33.4%). The average age (mean ± SD) was 85.9 ± 8.1 years; 76.4% of the participants were female (Table 1). The average length of institutionalization was 14.1 ± 13.3 months. The mean BI, MMSE, GDS, GDS-15, SRH, and BMI scores were 32.7 ± 28.9, 10.6 ± 9.7, 5.2 ± 1.4, 7.0 ± 3.2, 3.1 ± 1.2 and 19.9 ± 3.1, respectively. The mean number of diagnoses was 3.6 ± 1.9.

Pain prevalence

Just 179 residents (72.8%) reported the presence of pain. A total of 57 residents (23.2%) reported pain on movement. The remaining residents were assessed using the APS-J, which revealed pain among an additional 59 residents (24.0%). Overall, the prevalence of pain among residents was 47.2%.

A total of 42 residents were able to characterize the intensity of the pain they experienced using the VDS: 28 residents reported slight to mild pain, five reported moderate pain and nine reported severe pain. A total of 31 residents were able to identify the most painful site: the knee (9 residents), lower extremities (9 residents), lower back (8 residents), upper extremities (2 residents), back and shoulder (2 residents), and chest (1 resident).

Factors related to pain presence

Table 2 compares characteristics of residents with and without self-reported pain. The duration of utilization of facility services, SRH, hearing impairment, respiratory diagnoses and fracture were significantly more common among residents with pain as compared with residents without pain.

A logistic regression analysis was designed to adjust for age, number of diagnoses, hearing impairment, aphasia and GDS scores (Table 3). SRH scores (odds ratio [OR] 0.50; 95% confidence interval [95% CI] 0.28–0.88), mental health (OR 9.18; 95% CI 1.27–66.52) and respiratory diagnoses (OR 0.16; 95% CI 0.03–0.97) were significantly associated with pain. The absence of multicollinearity was confirmed ($r_s < 0.32$). The Hosmer–Lemeshow test showed the model's goodness of fit ($P = 0.146$).

Residents' statements about pain

Most residents (68.5%) agreed that pain should be tolerated (Table 4). A total of 40 residents (51.9%) agreed that pain is a part of the aging process. Just 20 residents (27.4%) consistently reported their pain to a staff member. A total of 44 residents (61.1%) said that they would not hesitate to use analgesics because of fear of the associated adverse effects.

Cognitive and ADL levels in relation to self-reported pain

Cognitive state and ADL were compared between residents who reported pain, and those who did not (Table 5). The mean MMSE, GDS, and BI scores among self-reporters were 14.4 ± 8.8, 4.8 ± 1.4 and 41.3 ± 28.0, respectively. Residents who did not report pain had scores of 0.9 ± 2.6, 6.5 ± 0.5 and 10.0 ± 16.7, respectively.

Discussion

The present study examined the prevalence of pain among HCF residents and the factors related to self-reported pain. As reported in a previous study in Japan,[3] nearly half of the residents experienced pain on movement. The prevalence of self-reported pain in the present study (31.8%) was lower than that reported previously.[3] Furthermore, some residents ($n = 14$) reported moderate or severe pain; however, just 12 residents were administered analgesics or pain care before they moved. The lower prevalence of pain among the study population as compared with nursing home residents or community dwellers can be explained as follows. First, residents were often engaged in rehabilitation after discharge from an acute-care setting; therefore, the pain of these individuals might already have been under control. Alternately, people experiencing pain might have found it difficult to participate in a HCF program. Another possibility is that the pain experienced by these individuals became chronic, allowing them to adapt and find movement patterns that would not cause pain. The time frame used in the present

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Table 1 Characteristics of the residents included in the study

		n	%	Mean	SD
Age (years)		246		85.9	8.1
Sex	Female	188	76.4		
	Male	58	23.6		
Care requirement level specified by Japanese long-term care Insurance law	Care level 1	21	8.5		
	Care level 2	53	21.5		
	Care level 3	56	22.8		
	Care level 4	73	29.7		
	Care level 4	43	17.5		
Length of stay (months)		244		14.1	13.3
Duration of facility service utilization (months)		232		21.4	20.8
ADL	Barthel Index (range 0–100)	246		32.7	28.9
Cognitive status	MMSE (range 0–30)	205		10.6	9.7
	Global Deterioration Scale (range 1–7)	246		5.2	1.4
Depression	GDS-15 (range 0–15)	55		7.0	3.2
Self-reported health status	SRH (range 1–5)	87		3.1	1.2
BMI		215		19.9	3.1
No. diagnoses		237		3.6	1.9
Diagnosis related to body systems (multiple answers)	Neurological system	211	85.8		
	Cardiovascular system	154	62.6		
	Musculoskeletal system	144	58.5		
	Gastrointestinal system	87	35.4		
	Endocrine system	69	28.0		
	Respiratory system	55	22.4		
	Urinary system	42	17.1		
	Mental health	24	9.8		
Diagnosis related to cognitive impairment (multiple answers)	Alzheimer's disease	47	19.1		
	Others (e.g. Lewy body dementia)	12	4.9		
	Vascular dementia	11	4.5		
	Dementia, not specified	77	31.3		
	No diagnosis of dementia	99	40.2		
Diagnosis and conditions related to pain (multiple answers)	History of fracture	92	37.4		
	Limb paralysis	75	30.5		
	Arthritis	69	28.0		
	Hip prosthesis or open reduction	52	21.1		
	Osteoporosis	32	13.0		
	Cancer	28	11.4		
Pain with movement	Self-reported pain	57	23.2		
	Self-reported no pain	122	49.6		
	No self-report and pain assessed by APS-J	59	24.0		
	No self-report and no pain assessed by APS-J	8	3.3		

ADL, activities of daily living; APS-J, Abbey Pain Scale – Japanese version; BMI, body mass index; GDS-15, Geriatric Depression Scale-15; MMSE, Folstein Mini-Mental State Examination; SD, standard deviation; SRH, self-rated health.

study could also have affected the pain prevalence. However, residents who reported moderate to severe pain might not have received adequate pain treatment. Pain detection and appropriate management should be focused in these settings.

The individuals who reported pain tended to report worse health status. This finding was similar to results published previously.[2,5] The experience of pain was also associated with mental illness in the present study. Pain can negatively impact health status through its effects on physical and psychosocial conditions.[40] This phenomenon is often described as being complex, and uses a biopsychosocial model that explains complex interactions between biological, psychological and

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Table 2 Comparison between residents with or without pain by self-reports

	n	No pain		Pain		*P*†
		Mean	SD	Mean	SD	
Age	179	85.9	8.3	86.7	7.1	0.57
Length of stay	168	14.8	13.4	11.8	8.7	0.07
Duration of facility service utilization	168	23.4	22.6	16.8	14.7	0.03
Barthel Index	159	41.8	28.0	40.0	28.0	0.68
MMSE	147	14.1	8.8	15.0	8.8	0.58
Global Deterioration Scale	179	4.8	1.4	4.7	1.3	0.49
GDS-15	55	6.3	2.9	8.1	3.3	0.06
SRH	84	3.2	1.1	2.6	1.3	0.04
BMI	159	20.4	3.0	20.3	3.2	0.80
No. diagnoses	173	3.8	2.0	3.4	1.9	0.25
		n	%	*n*	%	*P*‡
Sex	Female	94	76.4	46	82.1	0.39
	Male	29	23.6	10	17.9	
Hearing impaired	No	95	77.9	32	57.1	0.005
	Yes	27	22.1	24	42.9	
Aphasia	No	116	94.3	50	89.3	0.23§
	Yes	7	5.7	6	10.7	
Diagnosis related to musculoskeletal systems	No	54	43.9	16	28.6	0.05
	Yes	69	56.1	40	71.4	
Diagnosis related to mental health	No	113	91.9	49	87.5	0.36
	Yes	10	8.1	7	12.5	
Diagnosis related to respiratory systems	No	90	73.2	49	87.5	0.03
	Yes	33	26.8	7	12.5	
Diagnosis related to neurological systems	No	21	17.1	10	17.9	0.90
	Yes	102	82.9	46	82.1	
Joint contracture	No	54	44.3	24	42.1	0.79
	Yes	68	55.7	33	57.9	
History of fracture	No	82	67.2	28	49.1	0.02
	Yes	40	32.8	29	50.9	
Limb paralysis	No	91	74.6	40	70.2	0.53
	Yes	31	25.4	17	29.8	
Arthritis	No	91	74.6	37	64.9	0.18
	Yes	31	25.4	20	35.1	
Osteoporosis	No	105	86.1	48	84.2	0.74
	Yes	17	13.9	9	15.8	
Hip prosthesis or open reduction	No	94	76.4	43	76.8	0.96
	Yes	29	23.6	13	23.2	
Cancer	No	106	86.9	52	91.2	0.40
	Yes	16	13.1	5	8.8	
Usage of medications or specific care for pain in the 6 h before the body movement protocol was carried out	No	118	97.5	52	94.5	0.37§
	Yes	3	2.5	3	5.5	

†The *t*-test; ‡χ^2-test; §Fisher's exact test. BMI, body mass index; GDS-15, Geriatric Depression Scale-15; MMSE, Folstein Mini-Mental State Examination; SRH, Self-Rated Health.

sociocultural variables that shape the individual's response to pain.[41] Previous studies also found that pain could trigger depression, and negatively impacts an individual's self-reported health status.[42,43] These findings suggest the presence of an important relationship among pain, health status and psychosocial conditions. Therefore, HCF care providers must carefully consider pain and its effects on residents' health status.

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Table 3 Factors related to self-reported pain

	OR	95% CI Lower	Upper	*P*
SRH	0.50	0.28	0.88	0.016
Diagnosis related to mental health	9.18	1.27	66.52	0.028
Diagnosis related to respiratory systems	0.16	0.03	0.97	0.046

Multiple logistic regression analysis adjusting for age, numbers of diagnoses, hearing-impaired, aphasia and Global Deterioration Scale scores. Self-Rated Health (SRH) was entered as an ordinal variable, "bad" (1) to "excellent" (5). Odd ratio (OR) was calculated by an increment of the SRH level. CI, confidence interval.

Table 4 Statements about pain

	n	Agree		Disagree		Unknown	
		n	%	*n*	%	*n*	%
Pain should be tolerated.	73	50	68.5	12	16.4	11	15.1
Pain is a part of aging.	77	40	51.9	32	41.6	5	6.5
I always told staff when I suffer from pain.	73	20	27.4	42	57.5	11	15.1
I am hesitant to use analgesics because of fear of adverse effects	72	13	18.1	44	61.1	15	20.8

Table 5 Comparison between residents who reported pain and those who did not regarding their cognitive state and ability of daily livings

	Able to answer			Unable to answer			*P*
	n	Mean	SD	*n*	Mean	SD	
Cognitive state							
MMSE	147	14.4	8.8	58	0.9	2.6	<0.001
Global Deterioration Scale	179	4.8	1.4	67	6.5	0.5	<0.001
Ability of daily livings							
Barthel Index	179	41.3	28.0	67	10.0	16.7	<0.001

MMSE, Folstein Mini-Mental State Examination; SD, standard deviation.

Participating residents also reported that they tended to endure pain silently rather than report their pain to HCF staff, as reported previously by studies carried out in the Netherlands.[4,7] Furthermore, the residents who were not able to provide even one correct answer in an MMSE test (average score 0.9) would not have been able to report any experience of pain. The cognitive status of older residents and their beliefs about the connotations of reporting pain might exacerbate their condition. In these situations, care providers need to actively identify pain among residents. The pain management guidelines for aged care staff outline two approaches: active observation of patient behaviors that might indicate the experience of pain, and efforts to obtain reports from the patients themselves.[44] These approaches could help care providers to assess pain among older residents.

The present study had some limitations. Convenience sampling was used in the present study; just 33.4% of all residents participated. Therefore, the results of the present study might have limited generalizability. Residents who were admitted to a hospital and those who had serious health conditions were excluded. These residents were more likely to experience pain, which implies that our measure of prevalence might have been underestimated. The present study focused on pain occurring during body movement and the ability of an

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individual to report this experience of pain. Various other external and/or internal factors could affect an individual's self-reports of pain. Remarkably, 25% of residents were not able to report their pain; nearly 50% were unable to report their health or mental health conditions. Additional studies are required to further characterize this population.

The present study examined pain prevalence among 246 residents in nine HCF. Nearly half of the residents reported pain on movement. Self-rated health status and diagnoses related to mental health were significantly associated with the likelihood that a given resident would report an experience of pain. Residents should be encouraged to express how they are feeling to facilitate appropriate medical attention for pain management and long-term care.

Disclosure statement

No potential conflicts of interest were disclosed.

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