

RESEARCH PAPER

The impact of additional payments on functional decline among long-term care health facility residents in Japan

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Abstract

Background: Additional payment approach has been one of the most important incentives in long-term care (LTC) systems for the past 20 years in Japan.

Objective: To estimate the effect of additional payments on functional decline in long-term care health facility (LTCHF) residents of Japan.

Design: A 24-month retrospective cohort study.

Setting and subjects: Residents aged ≥ 65 years who were newly admitted to LTCHFs in the 2014 fiscal year.

Methods: National LTC claims data were linked to the survey of institutions and establishments for LTC. Competing risk regression was performed with functional decline as the primary outcome, and additional payments as exposure, controlling for individual and facility characteristics. The level of LTC needs certified in the LTC insurance system was applied as a proxy of functional ability. Death, hospitalisation, discharge to home and transfer to other LTC facilities were treated as competing events. Individual- and facility-level additional payments were presented as binary variables: being reimbursed or not during the follow-up period.

Results: At baseline, 146,311 residents from 3,724 LTCHFs were included. The vast majority of additional payments were associated with a lower risk of functional decline at follow-up. At the individual level, additional payment for pre/post admission instructions had the strongest association with a lower risk of functional decline. Despite this, only 8% of residents were reimbursed for this additional payment. At the facility level, residents in LTCHFs with additional payments for support for home-life resumption and nutritional management were associated with a decreased risk of functional decline.

Conclusions: The results of our study may be of particular interest to policymakers in monitoring and evaluating additional payment approaches and provide insight into improving quality of care.

Keywords: additional payment, financial reimbursement, functional decline, long-term care facilities, older people

Key Points

- This is the first study to investigate the impact of additional payment on functional decline among long-term care facility residents in Japan.

- Additional payment for pre/post admission instructions, support for home-life resumption and nutritional management were associated with a lower risk of residents' functional decline.
- The findings of this study are useful for policy makers to review additional payment approaches when considering health policies for older people and to improve quality of care.

Introduction

A well-designed payment system that provides incentives to health care providers might be linked to policy achievements, such as improving quality of care [1]. Japan, the country with the oldest population globally, has operated a universal long-term care (LTC) insurance system since 2000. One of the purposes of this system was to prevent a decline in functional status by providing services intended to improve individuals' physical strength, nutritional status, oral function and mental health [2]. Citizens aged ≥ 65 years who satisfied the eligibility criteria are available to receive LTC insurance services including home, community and facility-based care services.

Meanwhile, additional payment systems have been implemented to provide better quality care. Generally, LTC providers are reimbursed for their provision of custodial care with a fixed payment. The additional payment approach emphasises the value obtained from case-specific care services and LTC providers' improved management capacities. Using financial incentives as drivers of motivation, LTC providers are encouraged to strive to receive additional payments. In short, additional payments are reimbursed at the provider level when LTC providers implement initiatives to strengthen management systems. Otherwise, additional payments are reimbursed at the individual level when users receive special care according to their needs. The government determines the requirements of additional payments to facilitate quality improvement; however, virtually nothing is known about the impact of additional payment on quality of care in Japan.

Functional status is generally believed to be a critical parameter of quality of care, especially for older persons [3]. Functional status can be assessed in several different ways, usually with a focus on the person's abilities to perform basic activities of daily living (ADL), which include basic self-care such as bathing, feeding and toileting, or instrumental activities of daily living (IADL), which include activities such as cooking, shopping and managing one's affairs [4]. In Japan, an often-used assessment of functional ability is care-need level, as all LTC services users are required to have care-need level certificates. Care-need level is assessed using a nationally standardised questionnaire, which includes questions on current physical and mental status [5]. Recently, a good correlation between the Barthel index (BI) and care-need level was reported [6].

Ageing, gender, chronic conditions, cognitive impairment and malnutrition have been reported as predictors of functional decline in nursing home residents [7, 8]. Additionally, LTC providers' characteristics (e.g. location, facility type and

bed size) are associated with a risk of functional decline [3, 9, 10].

In Japan, there are three types of facility-based care services: LTC welfare facilities (i.e. nursing homes; a living facility for those who are in stable condition), long-term care health facilities (LTCHFs) (i.e. intermediate care facilities) and LTC medical facilities (i.e. medical-based facilities for individuals who need substantial care and long-term treatment).

Among these three types of facilities, LTCHFs are an appropriate option to improve the physical function of older individuals because these facilities provide professional rehabilitation and nursing care. As intermediary facilities between hospitals, homes and nursing homes, LTCHFs' goal is to 'improve the users' function to enable them to go back home' [11]. Therefore, requirements of additional payments for LTCHFs are focused on residents' functional status.

The aim of this study is to evaluate the influence of additional payments on residents' functional status in LTCHFs in Japan, while controlling for both resident- and facility-level characteristics. Our study has important implications for LTC providers' payment and quality of care.

Methods

Data source and participants

In this retrospective cohort study, national LTC claims data were linked to the survey of institutions and establishments for LTC in 2014. These data were provided by the Ministry of Health Labor and Welfare (MHLW) under Article 34 of the Statistics Act as a part of the government project. LTC claims are monthly data that contain information about age, sex, care-need level, service use and cost details (i.e. basic payments and additional payments). The survey of institutions and establishments for LTC contains structural information about LTC providers, including capacity, years in business and staff allocation.

We included people who were aged ≥ 65 years admitted to LTCHFs during the 2014 fiscal year. The residents who had a care-need level of 5 at baseline could not deteriorate further; thus, these residents were excluded to prevent a ceiling effect. (Figure 1).

Outcome

As a proxy of functional ability, we used the care-need level certified in the LTC insurance system. Eligibility for the system is initially assessed by a trained local government

Effect of additional payments on functional decline in LTCHF residents of Japan

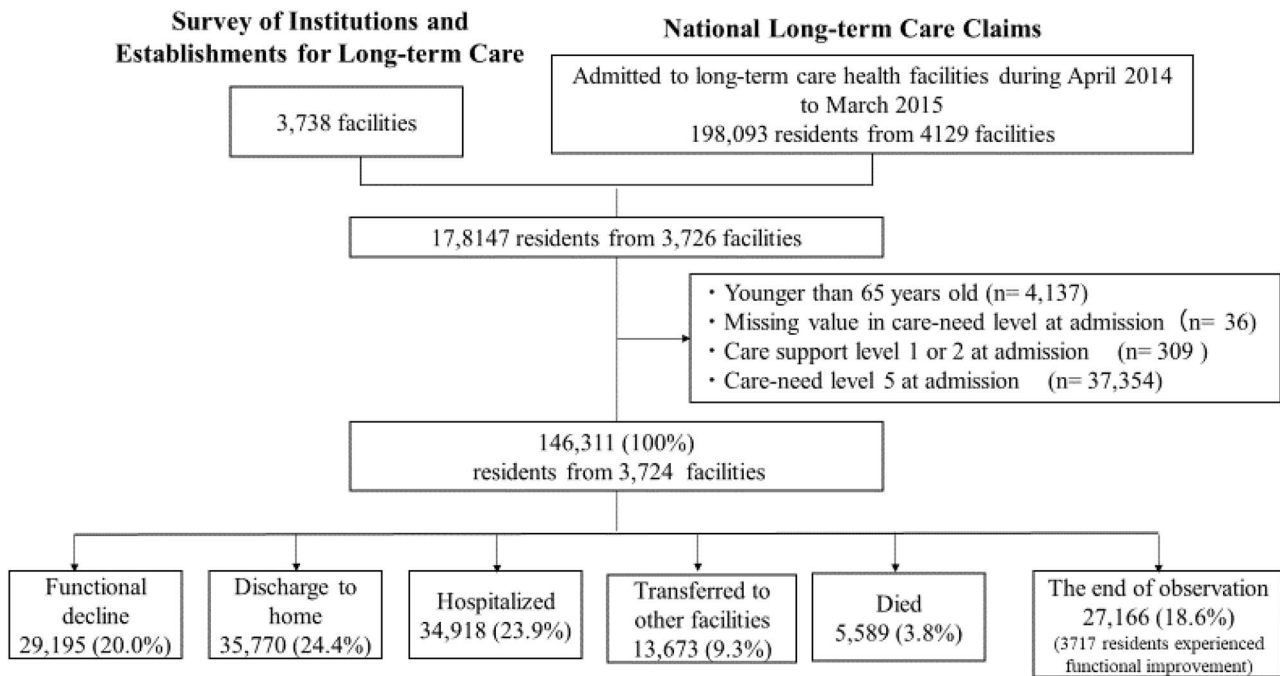


Figure 1. Flow diagram of participant selection.

official using a nationally standardised survey strictly based on the extent of a physical or mental disability. Care-need level certificate consists of seven categories, starting with support level 1 or 2, care-need level 1 (less disabled) to care-need level 5 (most disabled). In brief, LTC certification levels are defined as follows: Support level 1 is defined as 'limited in instrumental activities of daily living but independent in basic activities of daily living (ADLs)'; care level 2 is defined as 'requiring assistance in at least 1 basic ADL task' and care level 5 is defined as 'requiring care in all ADL tasks' [13]. The final decision is made by the Nursing Care Needs Certification Board after considering a statement by the applicant's primary care physician. Only care-need level 1–5 users are allowed to use LTCHF services. According to a previous validation study [6], the median BI score by care-need level was as follows: care-need level 1, 85; care-need level 2, 70; care-need level 3, 60; care-need level 4, 30; and care-need level 5, 20. The certificate is available for a maximum of 2 years for people who renew the certificates, and a maximum of 1 year for new LTCI users. However, users are allowed to reapply for a care-need level certificate whenever they experience functional changes, even across a short time period such as 1 month [10]. Residents were followed up after 24 months from admission, and we defined the first instance of care-need level deterioration as functional decline.

Exposure

Both individual- and facility- level additional payments were the exposure of interest, and the relative requirements [12] of these additional payments are described in Table 1. Since

three of four individual-level additional payments only allow reimbursement once, items of additional payments were presented as binary variables: being reimbursed from admission or not.

Co-variables

Several individual-level and facility-level characteristics were considered as covariates after conducting a literature review. Individual-level adjusted variables included age, sex and care-need level at baseline. Medical conditions (dementia or dysphagia), and medical treatment (implementation of medical treatment and emergency treatment) were detected using additional payments for specific medical conditions. Residents who received LTC services for dementia or dysphagia were defined as having these medical conditions [14]. Emergency treatment included inspection, injections, medical tests, and medication that were only provided to residents who needed emergency medical care. In response to the medical needs of residents, the MHLW of Japan encourages LTCHFs to provide medical treatments (i.e. inspection, injections and medication) for residents with pneumonia, urinary tract infections or herpes zoster at the facility without hospitalisation.

Facility-level characteristics were derived from a survey of institutions and establishments for LTC and included types of care (conventional or unit care), facility size (<60 beds or ≥60 beds), years in business, location (metropolitan or non-metropolitan), specialised employees allocated per 100 users, the proportion of registered nurses (RN) among nurses and the proportion of registered dietitians among all dietitians [10].

Table 1. Items and requirements of additional payments in LTCHFs

Items	Requirements determined by the Ministry of Health, Labour and Welfare
<i>Additional payments for individuals' special care</i>	
Short-term intensive rehabilitation programme	Provide intensive rehabilitation by physical therapists based on a physician's instruction within 3 months of admission.
Intensive rehabilitation programme for dementia	Provide intensive rehabilitation by physical therapists based on a physician's instruction within 3 months of admission for residents with dementia.
Pre/post admission instructions	Home visits and creation of a detailed care plan aiming towards discharge to home, between 30 days before admission and 7 days after admission.
Therapeutic diet	Therapeutic diets are formulated by doctors and provided under dietitians' instruction. Therapeutic diets can supplement treatment for diabetes, kidney disease, liver disease, stomach ulcers, anaemia, pancreatic disease, dyslipidemia and gout.
<i>Additional payment for facility initiatives</i>	
Support for home-life resumption	The following requirements will be calculated using a certain formula: (i) discharge to home rate, (ii) bed turnover rate, (iii) proportion of pre/post admission instructions, etc. (iv) proportion of giving pre/post discharge instructions, etc.
Sufficient night-shift staff	Have night-shift nursing staff or care workers at a resident-to-staff member ratio greater than 20:1.
Oral hygiene management system	Dentists or dental hygienists give technical suggestions to nursing care staff regarding oral cavity care more than once a month. Oral health care plans are created based on dentists' instructions.
Strengthening of the services provision system	The proportion of certified care workers among care workers is more than 50%.
Nutritional management	There is a full-time registered dietitian to create and manage nutrition plans for residents individually.
Improvements in working conditions	The facility implements a wage increase system based on care workers' experience and qualifications.

Source: Perfect guide of payment for long-term care. 2015. Igakutushinsya.

Statistical analysis

Initially, a descriptive analysis was conducted to review the distribution of outcomes and independent variables. We performed competing risk analysis [15] because residents could experience multiple outcomes during follow-up, and the occurrence of functional decline could be precluded by following competing events (discharge to home, transfer to other facilities, hospitalisation and death). A univariate competing risk regression was carried out to identify the variables that are significantly associated with the outcome for inclusion in the multivariate model. The Fine-Gray sub-distribution model was used, which directly models the cumulative incidence function (CIF) with covariates, by treating the CIF curve as a subdistribution function. The proportional hazards assumption was tested using log(time) interactions and goodness of fit by Schoenfeld residuals tests [15]. The robust standard variance estimator was applied to account for residents' clustering within LTC facilities. Subdistribution hazard ratios (SHRs) with 95% confidence intervals (CIs) for functional decline were reported. Analyses were performed using STATA, version 15 software.

Results

The entire cohort included 146,311 residents who were admitted to LTCHFs in the 2014 fiscal year. During the study period, 29,195 (20.0%) residents experienced functional decline, 35,770 (24.4%) were discharged home, 34,918 (23.9%) were hospitalised, 13,673 (9.3%) were transferred to other facilities and 5,589 (3.8%) died (Figure 1). At the end of the observation, 27,166 (18.6%)

residents were continuously residing in LTCHFs, and among them, 3,717 residents experienced functional improvement (Figure 1).

Table 2 and Table 3 present the distribution of additional payments, resident and facility characteristics according to the events. Approximately 83% of the residents were between 75 and 95 years old, 68% were women and 14% had dementia. Most residents (80%) were reimbursed for additional payment for short-term intensive rehabilitation; on the contrary, only 8% of residents are reimbursed for pre/post-admission instructions (Table 2). At the facility level, most facilities were reimbursed for additional payment for nutritional management (94.4%) and sufficient night-shift staff (87.7%) (Table 3). The unadjusted competing risk regression model yielded a significant relationship between functional decline and all considered variables (Supplementary Table S1).

After multivariable adjustment, at the individual level, additional payment for providing special care of short-term intensive rehabilitation, pre/post-admission instructions and therapeutic diet were associated with a lower risk of functional decline. At the facility level, the following additional payment initiatives were associated with a lower risk of functional decline: support for home life resumption, sufficient night-shift staff, nutritional management, oral hygiene management, strengthening service provision and improvements in working conditions (Table 4).

Discussion

This is the first study that examined the effect of additional payments on functional decline among LTCHFs in Japan.

Table 2. Participants' characteristics and additional payments for individuals' special care by outcome status in long-term care health facilities (n = 146,311)

	Total n (%)	Functional decline n (%)	Discharged to home n (%)	Hospitalised n (%)	Died n (%)	Transferred to other facilities n (%)	Reached the end of observation n (%)
Age (years)							
65–74	12,950 (8.9)	2,174 (7.5)	3,829 (10.7)	2,674 (7.7)	240 (4.3)	1,251 (9.2)	2,782 (10.24)
75–84	51,901 (35.5)	9,987 (34.2)	13,599 (38)	12,063 (34.6)	1,417 (25.4)	4,788 (35)	10,047 (36.98)
85–94	71,342 (48.8)	14,680 (50.3)	1,6,495 (46.1)	17,502 (50.1)	3,058 (54.7)	6,732 (49.2)	12,875 (47.39)
≥95	10,118 (6.9)	2,354 (8.1)	1847 (5.2)	2,679 (7.7)	874 (15.6)	902 (6.6)	1,462 (5.38)
Sex							
Male	46,514 (31.8)	8,124 (27.8)	11,435 (32)	13,667 (39.1)	2,310 (41.3)	3,790 (27.7)	7,188 (26.46)
Female	99,797 (68.2)	21,071 (72.2)	24,335 (68)	21,251 (60.9)	3,279 (58.7)	9,883 (72.3)	19,978 (73.54)
Care-need level							
1	22,842 (15.6)	7,911 (27.1)	6,415 (17.9)	3,634 (10.4)	361 (6.5)	645 (4.7)	3,876 (14.27)
2	35,296 (24.1)	9,619 (33)	9,952 (27.8)	7,018 (20.1)	856 (15.3)	1,342 (9.8)	6,509 (23.96)
3	41,969 (28.7)	7,927 (27.2)	9,897 (27.7)	10,319 (29.6)	1,584 (28.3)	4,467 (32.7)	7,775 (28.62)
4	46,204 (31.6)	3,738 (12.8)	9,506 (26.6)	13,947 (39.9)	2,788 (49.9)	7,219 (52.8)	9,006 (33.15)
Medical condition or treatment							
Dementia	21,052 (14.4)	5,623 (19.3)	3,310 (9.3)	5,437 (15.6)	752 (13.5)	2,343 (17.1)	3,587 (13.2)
Dysphagia	12,075 (8.3)	3,880 (13.3)	1,993 (5.6)	3,238 (9.3)	475 (8.5)	792 (5.8)	1,697 (6.25)
Emergency treatment	6,181 (4.2)	1,431 (4.9)	514 (1.4)	2,922 (8.4)	770 (13.8)	154 (1.1)	390 (1.44)
Medical treatment	24,446 (16.7)	7,097 (24.3)	3,322 (9.3)	7,243 (20.7)	1,549 (27.7)	1,441 (10.5)	3,794 (13.97)
Additional payments for individuals' special care							
Short-term intensive rehabilitation	112,568 (76.9)	21,544 (73.8)	30,974 (86.6)	26,236 (75.1)	3,722 (66.6)	9,916 (72.5)	20,176 (74)
Short-term intensive rehabilitation for dementia	34,753 (23.8)	6,601 (22.6)	10,128 (28.3)	7,703 (22.1)	946 (16.9)	3,105 (22.7)	6,270 (23.08)
Pre/post admission instructions	11,671 (8.0)	1,856 (6.4)	5,783 (16.2)	1,898 (5.4)	206 (3.7)	615 (4.5)	1,313 (4.83)
Therapeutic diet	47,207 (32.3)	8,859 (30.3)	11,429 (32)	12,921 (37)	1,647 (29.5)	3,957 (28.9)	8,394 (30.9)

Medical treatment, medical treatment for residents with pneumonia, urinary-tract infection or herpes zoster.

The vast majority of additional payments were significant protectors of functional decline at follow-up.

Residents who received intensive rehabilitation services within 3 months of admission were at lower risk of functional decline. Because LTCHFs are for people with higher medical needs or unstable physical conditions, it is critical to intensify rehabilitation interventions in the early days of residence. Therefore, for new residents, implementing a tightly coordinated rehabilitation service may improve their functional status. A previous study reported that provision of rehabilitation services to LTC residents reduced disability with few adverse events [16, 17].

Residents following a therapeutic diet were less likely to experience functional decline. Moreover, therapeutic diets are associated with a decreased likelihood of malnutrition [18–20]. Our study showed that almost one-third of the residents were on a therapeutic diet to manage medical conditions such as diabetes, anaemia and stomach ulcers. Therefore, a therapeutic diet might play a role in the treatment of these medical conditions. However, due to lack

of information regarding disease, this study was unable to identify if therapeutic dieting has an effect on specific diseases.

Our study showed a significant association between pre/post admission instructions and a lower risk of functional decline. The purpose of pre/post admission instructions is to ensure the quality and continuity of care between the LTC facility and the community. Thus, to ensure residents live independently in the community, care plans are generally more focused on functional improvement. However, few residents (8%) received pre/post admission instructions in Japan. It should be noted that, even though we adjusted for functional status at baseline, our results could be explained by selection bias. Residents with better health statuses are more likely to be chosen for this additional payment, as LTCHFs are aiming to discharge residents to the community. Nonetheless, to the best of our knowledge, the effect of care plans on discharge goals and residents' outcomes has yet to be investigated in an LTCHF setting. In contrast with nursing home settings, the effects of discharge planning from hospital

Table 3. Additional payments for facility initiatives and baseline characteristics of LTCHFs (n = 3,724)

	n	%	
Additional payments for facility initiatives			
Nutrition management	3,514	94.4	
Sufficient night-shift staff	3,266	87.7	
Improvement of working conditions	2,857	76.7	
Strengthening of services provision system	2,427	65.17	
Oral hygiene management system	2,117	56.85	
Support for home-life resumption	1,371	36.82	
Facility characteristics			
Types of care	Conventional unit	3,345	89.82
		379	10.18
Location	Non-metropolitan	2,989	80.26
	Metropolitan	735	19.74
Capacity	<100 beds	1,847	49.6
	≥ 100 beds	1,877	50.4
24-hour nursing care		3,216	86.36
	Mean	14.44	SD
Years in business		14.44	6.86
Staffing level	Doctors per 100 users	1.53	2.25
	Dentists per 100 users	0.02	0.82
	RNs per 100 users	6.79	10.13
	LPNs per 100 users	7.17	12.88
	RNs/(RNs + LPNs) (%)	48.53	24.39
	Caregivers per 100 users	38.73	57.78
	PTs per 100 users	2.36	4.74
	OTs per 100 users	1.71	2.82
	STs per 100 users	0.30	1.08
	Dietitians per 100 users	0.37	1.19
	Registered dietitians per 100 users	1.47	2.62
	Registered dietitians/dietitians (%)	85.68	30.19

RN, registered nurse; LPN, licensed practical nurse; PT, physical therapist; OT, occupational therapist; ST, speech-hearing therapist

Table 4. The effect of additional payment on functional decline in LTCHFs: result of multivariable competing-risk cox proportional hazards regression

	Subdistribution Hazard Ratio	95% confidence interval	P value
Resident level			
Additional payment for individuals' special care			
Short-term intensive rehabilitation	0.93	(0.9–0.95)	<0.001
Short-term intensive rehabilitation for dementia	0.93	(0.9–0.95)	<0.001
Pre/post admission instructions	0.80	(0.76–0.84)	<0.001
Therapeutic meals	0.90	(0.88–0.92)	<0.001
Facility level			
Additional payments for facility initiatives			
Support for home-life resumption	0.86	(0.84–0.88)	<0.001
Sufficient night-shift staff	0.93	(0.9–0.97)	<0.001
Nutritional management	0.88	(0.82–0.95)	0.009
Oral hygiene management system	0.93	(0.9–0.95)	<0.001
Strengthening of services provision system	0.93	(0.91–0.95)	<0.001
Improvements of working conditions	0.97	(0.94–0.996)	0.024

The model was adjusted for individual-level variables of age, sex, and care-need level, dysphagia, dementia, emergency treatment, medical treatment; facility-level variables of years in business, types of care, location, percentage of registered nurses among nursing staff, and number of physical therapists per 100 users, and percentage of registered dietitians among dietitians.

to home on patients' outcomes (e.g. shorter length of stay, lower readmission rate and higher satisfaction) have been well documented [21–23]. As care plans regarding discharge are a critical link between LTC facility care and community care, future studies are needed to clarify this causality to expand the current understanding.

At the facility level, reimbursement for additional payment for home-life resumption support was associated with residents' lower risk of functional decline. Home-life resumption support is an important quality indicator of LTCHF in the Japanese LTC system [24] because it directly reflects the extent to which the goal of discharge to home

has been achieved. Therefore, facilities supporting residents for home-life resumption should emphasise functional improvement. Furthermore, a previous study reported that residents with younger age, a lower care-need level, without dementia [14] and with the availability of a family member [25] were more likely to be discharged to home. Services focusing on functional improvement for these groups may facilitate providers to get reimbursement for these additional payments.

Residents residing in facilities that are equipped with oral hygiene management systems were associated with a decreased risk of functional decline. Poor oral hygiene can lead to cavities, pain, tooth loss and infection [26], all of which can cause chewing problems linked to poor nutrition and low body mass. However, approximately 57% of facilities are reimbursed for this additional payment, which indicates that oral hygiene management is of low priority for residents in LTC.

Further, our study showed that residents had a decreased risk of functional decline when their LTCHF was reimbursed for additional payment for nutritional management and sufficient night staff. The prevalence of malnutrition is increasing in the older population and is associated with functional decline and reduced cognitive function [27]. Therefore, identification of residents at risk—by assessing nutritional status periodically and preemptive management of a nutritional plan—may be effective. In LTCHFs, a minimum of one night shift employee per 20 residents is required according to the MHLW. However, assuming an emergency, sufficient staff would be more beneficial for safe operation of services and positive inspection. In compliance with expectations, the majority of facilities are reimbursed for these two additional expenses.

Lastly, residents who lived in facilities reimbursed for additional payments for strengthening the service provision system (i.e. more than half of care workers are certified care workers) and improvements in working conditions (i.e. wage increases based on work experience and qualifications) were less likely to experience functional decline. Care worker certification is a national qualification in nursing care that can be obtained by passing a national exam after 1,800 hours of training [28]. A number of studies have shown that caregiver training (to improve their skills [29] and self-efficacy [30]) is helpful for decreasing problematic behaviours among older people with dementia. Thus, in response to diversifying care needs, a certified care worker (competent in physical care, dementia care, hospice care and service management) may have a positive effect on residents' outcomes. Since little is known about the effect of certified care workers on residents' outcomes, this is an area that would benefit from future research.

In reviewing the findings, it is necessary to acknowledge the limitations of this study. First, morbidity is rarely considered due to a lack of medical information in LTC claims data, even though it is an important predictor of functional decline [3]. However, since the Japanese government has made a determined effort to link medical

and LTC claims at the national level, and because it will make data available for research in the future, the aforementioned problem could be solved. Second, we used five care-need levels as a proxy of functional status, but the activity of daily living score [7] (e.g. Barthel Index) could provide more comprehensive information regarding functional status. Third, we defined residents who received LTC services for dementia as having dementia (14.4% of total residents received LTC services for dementia), and this could have led to a large underestimation. According to a previous study, approximately 24.8% of residents had dementia as the primary disease in LTCHFs. Fourth, it should be noted that causal relationships cannot be established in our retrospective cohort study. There may be other unmeasured factors that might influence the associations that have been demonstrated. For example, the 'short-term intensive rehabilitation programme' may be recommended for older people who have already been assessed as likely to benefit from this type of support. Finally, future studies that examine the relative importance of the individual- and facility-level additional payments may help to identify the most effective mix on residents' functional decline.

Conclusion and implications

Additional payment has been one of the most important incentives in LTC systems for the past 20 years in Japan. Most additional payments have a significant association with lower risk of functional decline after adjusting for resident and facility characteristics. Despite these effects, the rate of reimbursement for additional payments is very low. The findings of this study are useful for policy makers to review additional payment approaches when considering health policies for older people and to improve quality of care.

Supplementary Data: Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

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