2.4. Signal processing

Signal processing was performed using Matlab Release 2009a (MathWorks, Natick, MA). All acceleration data were low-pass filtered using a dual pass zero-lag Butterworth filter with a cut-off frequency of 20 Hz. Analyses were performed on data from all strides over the central 10 m of the walkway for each trial. Stride time variability (STV) was used as the index of gait variability and calculated using the following equation [18]:

$$\mathrm{STV}(\%) = \frac{\text{standard deviation of stride time}}{\text{mean stride time}} \times 100 \quad (1)$$

We calculated the root-mean-square (RMS) acceleration, which provides information about the average magnitude of acceleration at L3 in the AP and ML directions. Using the RMS of acceleration at L3, we calculated the standardized RMS based on the methodology introduced by van Iersel [19]. The standardized RMS exhibits oscillation at L3 independent of the effect of gait speed and is comparable between different conditions, i.e., single-task gait vs. dual-task gait [20]. The first step to calculating the standardized RMS was the log-transformation of the RMS in the AP and ML directions to obtain a normal distribution and to decrease the influence of outliers. We then constructed a formula based on regression analysis using each RMS and gait speed in the four self-selected gait speed conditions (linear mixed models with the subjects as the random effect and gait speed as the fixed independent effect and the logarithm of the RMS as dependent variable) that described how these data varied with speed in each direction during walking without an additional task (Upper panel in Fig. 1). The logarithmic RMS increased linearly with increasing gait speed. The resulting regression coefficient for gait speed was a_1; a_0 was the constant regression term (ML direction: $a_0 = +1.0466$, $a_1 = +1.0223$, AP direction: $a_0 = -0.8502$, $a_1 = +1.1158$). For each subject, the standardized logarithmic RMS was calculated as follows:

$$\text{Standardized logarithmic RMS} = \text{logarithm of RMS} - a_0 - (a_1 \times \text{gait speed})$$

Because the standardized logarithmic RMS is difficult to interpret, we also calculated the standardized RMS:

$$\text{Standardized RMS} = 100 \exp(\text{standardized logarithmic RMS}) \quad (3)$$

A standardized RMS = 100 means that the oscillation is equal to the median standardized RMS of all subjects (Lower panel in Fig. 1). We used Eq. (3) to calculate the standardized RMS in the cognitive-task gait and manual-task gait conditions for each subject. If an additional task increased the RMS, the median percentage during dual-task gait would be >100%.

2.5. Statistical analyses

One-way repeated measure analysis of variance (ANOVA) was used to evaluate the effects of task conditions. If a significant effect of walking condition was identified, a series of pair-wise comparisons was performed using Bonferroni-adjusted *t*-tests to determine differences between the reference no dual task during the self-selected comfortable walking speed (single-task gait) and cognitive-task gait, and between single-task gait and manual-task gait. To investigate the association between trunk oscillation and age, basic physical performance and gait variability, correlations between standardized RMS in the ML and AP directions, and age, TUG, 5CS and STV were evaluated using Pearson's *r* correlation coefficient. To evaluate the effect of FoF, unpaired *t*-tests adjusted for potential confounders (age, sex and fall history) were performed between subjects with and without FoF for the gait variables of gait speed, STV, and standardized RMS in the ML and AP directions. Analyses were performed for the following conditions: single-task gait, cognitive-task gait, manual-task gait, cognitive-task gait–single-task gait (difference in values between cognitive-task gait and single-task gait) and manual-task gait–single-task gait (difference in values between manual-task gait and single-task gait). A *p* value of <0.05 was considered statistically

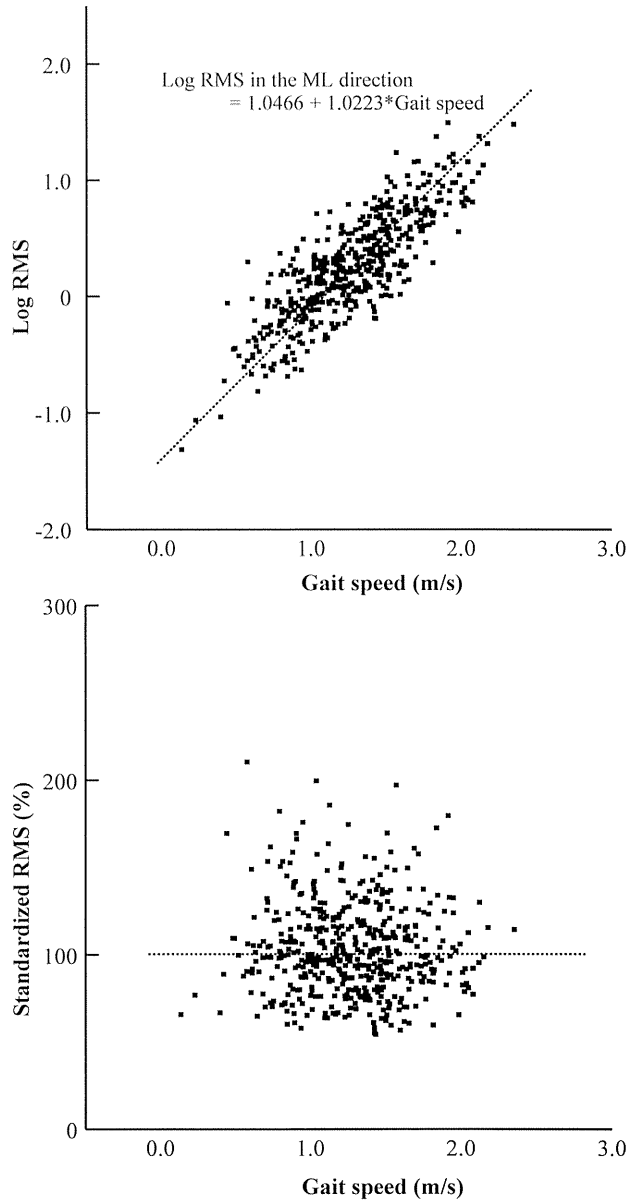

Fig. 1. Upper panel: RMS of lower trunk accelerations in the ML direction. The logarithmic RMS increased linearly with increasing gait speed. The regression line was obtained using a linear mixed model regression. The regression coefficients were $a_0 = +1.0466$ and $a_1 = +1.0223$ for the ML direction (AP direction: $a_0 = -0.8502$, $a_1 = +1.1158$). The distribution of points around the line is approximately normal and the variance is equal over the gait speeds. RMS, root-mean-square; ML, mediolateral; AP, anteroposterior. Lower panel: standardized RMS of lower trunk accelerations in the ML direction. Taking the exponential of the logarithmic RMS and multiplying by 100, we converted the logarithmic value to a percentage. The median value of the RMS at each gait speed was set to 100%. The standardized RMS remained constant over the entire range of gait speed; thus, the influence of gait speed was removed.

significant for one-way repeated measures ANOVA, Pearson's r correlation coefficient, and unpaired t-test. A p value < 0.025 was considered statistically significant for Bonferroni adjusted t-tests because two pair comparisons were conducted (single-task gait and cognitive-task gait, single-task gait and manual-task gait: $p = 0.05/2$). All statistical analyses were performed using JMP 10 software (SAS Institute Japan, Tokyo, Japan).

3. Results

The sum total of numbers enumerated in the central 10 m of the walkway for the cognitive-task gait was 10.6 ± 3.2. In the manual-task gait, all subjects were able to complete the walk without dropping the ball from the tray.

The effects of the different task conditions and the results of the ANOVA are presented in Table 2. Task conditions significantly affected gait speed and STV (gait speed: $F = 44.8$, $p < 0.001$; STV: $F = 18.8$, $p < 0.001$). Subjects walked more slowly and with greater STV in the cognitive-task gait (gait speed: $t = -10.3$, $p < 0.001$; STV: $t = 5.4$, $p < 0.001$) and manual-task gait (gait speed: $t = -7.4$, $p < 0.001$; STV: $t = 4.4$, $p < 0.001$). Task conditions significantly affected RMS in the ML direction ($F = 40.7$, $p < 0.001$) and the AP direction ($F = 82.7$, $p < 0.001$). Both tasks significantly decreased lower trunk oscillations in the ML direction (cognitive-task gait: $t = -4.1$, $p < 0.001$; manual-task gait: $t = -8.6$, $p < 0.001$) and the AP direction (cognitive-task gait: $t = -4.9$, $p < 0.001$; manual-task gait: $t = -12.2$, $p < 0.001$). After standardization of RMS for gait speed, task conditions significantly affected standardized RMS in the ML direction ($F = 47.0$, $p < 0.001$) and the AP direction ($F = 97.9$, $p < 0.001$). However, task effects were not the same between cognitive-task and manual-task gaits. The cognitive task significantly increased lower trunk oscillations in the ML ($t = 4.9$, $p < 0.001$) and AP directions ($t = 6.1$, $p < 0.001$), while the manual task significantly decreased lower trunk oscillations in the ML ($t = -5.9$, $p < 0.001$) and AP directions ($t = -8.3$, $p < 0.001$).

The Pearson's r correlation coefficients are shown in Table 3. The standardized RMS in the ML direction was significantly associated with STV in the cognitive-task gait ($r = 0.382$, $p < 0.01$), and with TUG in the manual-task gait ($r = 0.186$, $p < 0.05$). The standardized RMS in the AP direction was significantly associated with STV in the single-task gait ($r = -0.198$, $p < 0.05$), cognitive-task gait ($r = 0.575$, $p < 0.01$), and manual-task gait ($r = -0.195$, $p < 0.05$).

The results of unpaired t-tests are shown in Table 4. Subjects with FoF walked slower during cognitive-task gait than subjects without FoF ($t = 2.3$, $p < 0.05$) and walked with greater STV during single-task gait than subjects without FoF ($t = 2.5$, $p < 0.05$). Additionally, the difference in trunk oscillations between the cognitive-task and single-task gait in the ML direction was significantly larger in subjects with FoF than in subjects without FoF ($t = 2.6$, $p < 0.01$).

4. Discussion

After standardizing RMS for gait speed, the manual-task significantly decreased standardized RMS in the ML and AP directions, while the cognitive task increased standardized RMS in both directions. Additionally, subjects with FoF exhibited larger changes in trunk movement in the ML direction during the cognitive-task gait, but not during the manual-task gait. This study is the first to demonstrate that a manual task affects lower trunk oscillations in the horizontal plane differently than a more attention-demanding cognitive task, and that the effect of FoF on trunk oscillations varies between cognitive- and manual-task gaits.

The manual-task gait, carrying a ball on a tray, requires subjects to hold the upper arm firmly beside the trunk and to maintain a

Table 2
Effect of task conditions on gait variables. The task conditions of single-task gait and dual-task gait (cognitive-task gait and manual-task gait) were assessed.

Gait variables	Single-task gait	Dual-task gait		F value	p value
		Cognitive-task gait	Manual-task gait		
Gait speed (m/s)	1.40 ± 0.19	1.24 ± 0.25*	1.28 ± 0.24*	44.8	<0.001
STV (%)	2.2 ± 1.1	3.9 ± 3.2*	2.9 ± 1.6*	18.8	<0.001
RMS in the ML direction (m/s^2)	1.53 ± 0.46	1.42 ± 0.42*	1.25 ± 0.44*	40.7	<0.001
RMS in the AP direction (m/s^2)	2.14 ± 0.50	2.00 ± 0.53*	1.69 ± 0.51*	82.7	<0.001
Standardized RMS in the ML direction (%)	102.6 ± 24.5	112.0 ± 26.9*	93.3 ± 21.6*	47.0	<0.001
Standardized RMS in the AP direction (%)	103.5 ± 14.2	114.9 ± 22.7*	91.7 ± 15.3*	97.9	<0.001

Mean ± standard deviation, STV, stride time variability; RMS, root-mean-square; ML, mediolateral; AP, anteroposterior.
Single-task gait: reference no dual task during self-selected comfortable speed of walking.
Cognitive-task gait: walking while counting backward by 1 from 100.
Manual-task gait: walking while carrying a ball on a round tray with raised edge.
* $p < 0.01$, result of comparision to single-task gait.

Table 3
Associations between standardized RMS in the ML and AP directions, and age, TUG, 5CS and STV.

	Task conditions	Age	TUG	5CS	STV
Standartized RMS in the ML direction	Single-task gait	−0.076	0.130	0.024	0.089
	Cognitive-task gait	−0.154	0.124	0.092	0.382**
	Manual-task gait	0.035	0.186*	0.063	−0.086
Standartized RMS in the AP direction	Single-task gait	0.020	−0.003	0.043	−0.198*
	Cognitive-task gait	−0.094	−0.056	0.067	0.575**
	Manual-task gait	0.092	0.029	0.024	−0.195*

RMS, root-mean-square; ML, mediolateral; AP, anteroposterior; TUG, Timed Up & Go test; 5CS, 5 Chair Stand test; STV, stride time variability.
Single-task gait: reference no dual task during self-selected comfortable speed of walking.
Cognitive-task gait: walking while counting backward by 1 from 100.
Manual-task gait: walking while carrying a ball on a round tray with raised edge.
* $p < 0.05$.
** $p < 0.01$.

Table 4
Differences of gait variables between subjects with and without FoF.

Gait variables	Subjects without FoF ($n = 85$)	Subjects with FoF ($n = 32$)
Gait speed (m/s)		
Single-task gait	1.42 ± 0.20	1.35 ± 0.17
Cognitive-task gait	1.27 ± 0.25	1.16 ± 0.24*
Manual-task gait	1.30 ± 0.23	1.26 ± 0.25
Cognitive-task gait–single-task gait	−0.14 ± 0.15	−0.20 ± 0.20
Manual-task gait–single-task gait	−0.12 ± 0.17	−0.13 ± 0.19
Stride time variability (%)		
Single-task gait	2.01 ± 1.09	2.56 ± 1.12*
Cognitive-task gait	3.70 ± 2.57	4.33 ± 4.51
Manual-task gait	2.79 ± 1.51	3.15 ± 1.73
Cognitive-task gait–single-task gait	1.69 ± 2.79	1.77 ± 4.76
Manual-task gait–single-task gait	0.78 ± 1.61	0.59 ± 2.21
Standardized RMS in the ML direction (%)		
Single-task gait	102.7 ± 24.4	102.3 ± 25.2
Cognitive-task gait	109.4 ± 25.6	119.0 ± 29.3
manual-task gait	92.2 ± 19.8	96.3 ± 26.0
Cognitive-task gait–single-task gait	6.7 ± 19.3	16.6 ± 23.0*
Manual-task gait–single-task gait	−10.4 ± 16.0	−6.0 ± 18.7
Standardized RMS in the AP direction (%)		
Single-task gait	103.3 ± 14.2	104.0 ± 14.5
Cognitive-task gait	112.7 ± 20.2	120.7 ± 27.9
Manual-task gait	91.1 ± 14.9	93.4 ± 16.4
Cognitive-task gait–single-task gait	9.4 ± 16.6	16.8 ± 26.7
Manual-task gait–single-task gait	−12.21 ± 10.6	−10.6 ± 13.4

Mean ± standard deviation, RMS, root-mean-square; ML, mediolateral; AP, anteroposterior; FoF, fear of falling.
Single-task gait: reference no dual task during self-selected comfortable speed of walking.
Cognitive-task gait: walking while counting backward by 1 from 100.
Manual-task gait: walking while carrying a ball on a round tray with raised edge.
Cognitive-task gait–single-task gait: difference in value between cognitive-task gait and single-task gait.
Manual-task gait–single-task gait: difference in value between manual-task gait and single-task gait.
* $p < 0.05$.

steady gaze on the ball to avoid dropping it. In the manual-task gait, therefore, subjects are required to enhance their trunk stability to maintain a stable platform for the arm and for vision [21,22]. As a result, trunk oscillations become smaller than those during the single-task gait condition. These observations and our results suggest that conscious attention was allocated to trunk control in the manual-task gait, resulting in smaller trunk oscillations. In contrast, the cognitive task increased trunk oscillations in the horizontal plane, consistent with another study that found that an additional arithmetic task increased upper trunk angular velocity in the horizontal plane [20]. Many reports suggest that insufficient attention allocation affects gait control through fluctuated gait patterns and increased trunk movements [2]. Thus, the increased trunk oscillations may be attributed to an insufficient attention allocation induced by a cognitive task.

Interestingly, trunk oscillation was negatively associated with gait fluctuations in the manual-task gait, and was positively associated with it in the cognitive task gait. These results suggest that the effect of dual task related gait changes on trunk movements differ depending on the nature of the additional task. In the manual-task gait, subjects needed to frequently change their gait patterns to avoid dropping the ball from the tray, i.e., "cautious gait" [23]. In contrast, during the cognitive-task gait, subjects' gait patterns fluctuated because they most likely could not allocate attention to their gait appropriately [2]. These findings suggest that dual task related gait changes induced by the manual task may have diminishing effects on trunk movement, while those induced by the cognitive task have increasing effects on trunk movement.

Another important finding of our study was that FoF was associated with changes in trunk movement in the ML direction during cognitive-task gait, but not during the manual-task gait. Changes in gait movements related to dual tasking (identified as a dual-task cost) can be attributed to competition for limited attentional resources [24]. Therefore, dual-task costs are an index of individual's ability to perform dual tasks. Some reports suggest that FoF can reduce the attentional resources available for trunk control during walking [9]. Additionally, lateral trunk movements are strongly affected by dual-task walking [22,25]. Furthermore, our findings are consistent with and extend upon the prior literature on falling in older adults [26]. Our findings may help explain why older adults with FoF are prone to falls from a postural control perspective. For older adults with FoF, attention-splitting conditions may induce irregular trunk control while walking that predisposes them to falls.

However, another study found no effect of FoF on trunk sway in dual-task gait [12]. One possible explanation could be that the cognitive task used in that study (counting backward by 7) was relatively more difficult than in our study (counting backward by 1). People may give priority to postural control during dual-task gait in the case where the additional task is more complicated and difficult [27]. In such cases, the cognitive load is not constant during walking, and the dual-tasking interference may not be observable. In the manual-task gait, however, no significant changes were observed. In the present study, subjects were required to carry a ball on a tray without dropping it from the tray. Postural stability may have been prioritized and conscious attention allocated more heavily to postural stability. As a result, the effect of FoF on trunk movement may be less significant in manual-task gait.

One limitation of the current study was that spatial gait data, e.g., step length and width, were not measured. Spatial gait data are reportedly affected by the specific attention-demanding task and are associated with trunk movements [28–30]. However, because we did not measure these gait variables, the association between these gait variables and trunk control remains unclear. Another limitation is that we did not assess the effects of any other type of manual task on gait. Our results show only the effects of one type of manual task on gait, and further study is needed to assess trunk control during different types of manual tasks. The other limitation is that FoF was not assessed by a standard FoF assessment method, such as the activities-specific balance confidence (ABC) scale [10]. FoF is often not easily admitted and may be trivialized by an individual. The ABC scale quantifies FoF and classifies subjects according to the level of FoF [10]. Future studies should examine the difference between varying levels of FoF and their influence on dual-task gait.

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Conflict of interest statement

The authors have no conflicts of interest to disclose.

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Perception gaps for recognition behavior between staff nurses and their managers

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ABSTRACT

Nurse managers play a critical role in improving the work environment. Important leadership characteristics for nurse managers include visibility, accessibility, communication, recognition, and support. The nurse manager's recognition behaviors strongly influence the job satisfaction of staff nurses. In our previous study, we investigated how staff nurses perceived the nurse manager's recognition behaviors and revealed that there was a divergence in practical approaches to these behaviors between the nurse manager and the staff. We assume that one factor causing this divergence could be perception gaps between the nurse manager and the staff. The aim of this study, therefore, was to uncover what types of perception gaps exist between the nurse manager and staff nurses and whether the background of staff nurses, such as years of experience or academic background, could affect the staff nurses' perceptions. This quantitative, cross-sectional study involved 10 hospitals in Japan. A total of 1425 nurses completed the questionnaire. The results showed that staff nurses considered "Respect job schedule preferences" to be the most important of the recognition behaviors. In contrast, nurse managers gave "Nurse manager meets with the staff nurses to discuss patient care and unit management" the highest score for importance. Four factors (marriage status, age, years of clinical experience, and training background) affected the professional awareness of recognition behaviors. Our results suggest that nurse managers need to consider these factors when they conduct recognition behaviors.

Keywords: Recognition Behavior; Nurse Manager; Staff Nurses

1. INTRODUCTION

In the face of the current shortage of nurses, it is urgent to procure sufficient human resources by training nurses and preventing them from leaving the profession. The importance of improving staff motivation and work environments and thereby enhancing job satisfaction as a means of preventing turnover and career change has recently been highlighted. One of the factors influencing work environment and job satisfaction is the nurse manager's management ability; in particular, the importance of recognition behavior, which is defined as assessing nurses' performances and accomplishments in a concrete manner, has been reported [1]. Studies on nurse managers' recognition behaviors identified work-related stress, commitment, autonomy, communication with superiors and colleagues, and recognition behavior as factors related to improved job satisfaction among nurses. Moreover, the recognition behavior of nurse managers was defined as their explanations of nurses' performance and ability evaluations, which were presented in a 38-item scale for recognition behavior by nurse managers [2]. Goode & Blegen [3] conducted a survey on the perceptions of staff nurses, focusing on nurse managers' recognition behavior. The researchers reported that performance recognition behaviors, consisting of 27 items, and achievement recognition behaviors, consisting of eight items, improved job satisfaction and prevented nurses from leaving their profession.

In response to the study by Blegen [2], Ozaki [4] translated the scale into Japanese and modified it to correspond to nursing staff scenarios in Japan. A factor analysis showed that five factors (reporting/announcing results, supervising and supporting staff nurses, assigning jobs with responsibility, reporting evaluations from patients, and respect for desired working hours) correlated with job satisfaction.

In our previous study, we investigated how nursing staff perceived the nurse manager's recognition behaviors and revealed that there was a distinction between the nurse managers' and the staff's practical approaches to these behaviors. We assume that one factor causing this distinction

could be possible perception gaps between the nurse manager and the staff. We describe the development of a research-based management intervention to provide recognition and the implementation of the intervention by nurse managers. The aim of this study was to uncover what types of perception gaps exist and which factors, such as years of experience and academic background, could affect these perception gaps.

2. METHODS

2.1. Participants

The study was conducted in 10 hospitals with 100 beds or more in the Kanto, Kansai, and Kyushu regions of Japan. Following the agreement of the involved organizations, a meeting was held so that the researchers could explain the project and procedures to all of the unit nurse managers. Individuals were informed that their answers would be treated anonymously and confidentially.

2.2. Data Collection

We used a descriptive, cross-sectional design. The instrument used for data collection was questionnaire about recognition behavior developed by Blegan [2]. This scale was translated by Ozaki [4] and converted to a revised 35-item Japanese scale. The questionnaires were divided into two parts. Part One consisted of the background information of responders, and Part Two contained 35-items for determining recognition behavior. The following demographic data were collected: age, gender, marital status, overall work experience, position (nurse manager or staff), academic background (associates degree, diploma in nursing, junior college graduate, or university/graduate university), mental health, and physical health. The participants were asked to describe a variety of nurse manager recognition behaviors using a four-point Likert-scale ranging from "fully agree" to "fully disagree".

2.3. Ethical Consideration

The study was approved by the Ethics Committee of Kyoto University Graduate School and the Faculty of Medicine. Additionally, research permission was given by the chief nursing directors of all 10 hospitals. The questionnaires included the researchers' contact details, and the collected information was provided voluntarily and kept anonymous.

2.4. Statistical Analysis

All statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) 20.0J (SPSS Japan Inc., Tokyo, Japan) for Windows. The categorical data were described using frequencies and percentages. Recognition behavior was analyzed using principal factor analysis. The median values and interquartile range (IQR) were used to describe continuous data. The evaluations of the implementation of the three extracted factors were compared using the Mann-Whitney *U*-test. Demographic comparisons based on recognition behavior were analyzed using the Kruskal-Wallis test, and a multiple comparison was performed using a multiple analysis of variance (ANOVA) followed by the Bonferroni test.

3. RESULTS

A total of 1425 nurses participated in this study. The participants were nurse managers (n = 117) and staff nurses (n = 1248). Ninety-four percent of the nurse managers were women, and 63% of them were married. The mean age was 47.7 years (range: 42.2 - 53.2 years). Regarding professional work experience, 14% had 10 - 19 years of nursing experience, and 86% had 4 - 19 years of experience. The nurse managers' academic backgrounds included an associate's degree (25%), a diploma in nursing (57%), junior college graduation (13%), and university or graduate school education (5%). Among the staff nurses, 94% were women, and 66% were single. The mean age was 33.8 years (range: 24.7 - 42.9 years). Regarding professional work experience, 30% had 10 - 19 years of nursing experience, and 28% had 4 - 9 years (range: less than one year-42 years). Their academic backgrounds included an associate's degree (15%), a diploma in nursing (56%), junior college graduation (8%), and university or graduate school education (21%; **Table 1**).

We compared the three items with the highest averages among the 35 questions to determine the differences between nurse managers' and staff nurses' views of recognition behavior (**Table 2**). The staff nurses gave "Respect job schedule preferences" the highest score, indicating that they considered it the most important recognition behavior.

This was followed by "Nurse manager meets with the staff nurses to discuss patient care and unit management" and "Patient evaluations that compliment individual nurses on the unit are posted on the bulletin board." For nurse managers, "Nurse manager meets with the staff nurses to discuss patient care and unit management" had the highest score, followed by "Patient evaluations that compliment individual nurses on the unit are posted on the bulletin board" and "The nurse manager evaluates the staff by their work"; therefore, the top two items were the same as those indicated by the staff nurses.

The three items with the lowest average score were "Release time is given to spend a day with the supervisor

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Table 1. Demographic characteristics of nurses (n = 1425).

	Nurse manager (n = 177)		Staff nurse (n = 1248)	
Demographic variable	n	%	n	%
Gender				
Male	11	6	81	6
Female	166	94	1167	94
Marital status				
Single	66	37	826	66
Married	111	63	422	34
Age range, years, mean (±SD)	47.7 (±5.5)		33.8 (±9.1)	
Under 30	0	0	516	44
30 - 39	14	8	319	27
40 - 49	94	53	260	22
Over 49	69	39	81	7
Overall work experience, years, mean (±SD)	25.1 (±5.6)		11.0 (±8.7)	
Under 3	0	0	288	23
4 - 9	0	0	346	28
10 - 19	24	14	373	30
Over 19	153	86	241	19
Academic background				
Associate degree	45	25	186	15
Diploma in nursing	100	57	703	56
Junior college graduate	23	13	101	8
University or graduate university	9	5	258	21

Table 2. Nurse managers' behaviors that provide recognition for performance and achievement (the highest average).

	Staff nurses (n = 1248)	
	Nurse managers' behaviors	Mean (SD)
I	Respect job schedule preferences	3.15 (0.65)
II	Nurse manager meets with the staff nursee to discuss patient care and unit management.	3.15 (0.62)
III	Patient evaluations that compliment individual nurses on the unit are posted on the bulluten board.	3.08 (0.62)
	Nurse managers (n = 177)	
	Nurse managers' behaviors	Mean (SD)
I	Nurse manager meets with the staff nursee to discuss patient care and unit management.	3.34 (0.59)
II	Patient evaluations that compliment individual nurses on the unit are posted on the bulluten board.	3.33 (0.57)
III	The nurse manager evaluates the staff by their work.	3.29 (0.54)

to experience management functions," "Achievements are announced in the hospital newsletter," and "Release time is given to work on special projects for the unit," suggesting that they had a low level of importance to the staff as recognition behaviors (**Table 3**). For the nurse managers, the lowest three items were "Release time is given to work on special projects for the unit," "Preference for selection of hours is given to the nurse," and "Helps with the staffs' job when busy."

Using the responses to these 35 questions related to recognition behavior, we performed a factor analysis (main factor method: promax rotation) for nurse managers

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Table 3. Nurse manager's behaviors that provide recognition for performance and achievement (the lowest average score).

	Staff nurses (n = 1248)	
	Nurse managers' behaviors	Mean (SD)
I	Release time is given to spend a day with the supervisor to experience management functions.	2.63 (0.69)
II	Achievements are announced in the hospital newsletter.	2.64 (0.71)
III	Release time is given to work on special projects for the unit.	2.67 (0.75)
	Nurse Managers (n = 177)	
	Nurse managers' behaviors	Mean (SD)
I	Release time is given to work on special projects for the unit.	2.75 (0.66)
II	Preference for selection of hours is given to the nurse.	2.75 (0.64)
III	Helps with the staffs' job when busy.	2.77 (0.71)

and staff nurses. We also performed a factor analysis that excluded items that had many plural factors, taking a load of 0.4 as a reference. As a result, five items ("The nurse manager praises the staff individually," "Release time is given to spend a day with the supervisor to experience management functions," "Senior nursing management receives a letter from the nurse manager regarding the staff nurse's performance," "Private verbal feedback is given by the nurse manager," "Using time to serve the staff") were excluded from the 35 items due to low factor loadings (0.4 or less) in both the staff nurses' and nurse managers' responses.

For the staff nurses, an additional six items ("The nurse manager brags about the performance of the unit staff nurse," "The nurse manager encourages the staff nurse to develop expertise in one aspect of care," "Peer review provides an opportunity for the staff nurse to share developed projects/materials," "Release time is given to work on special projects for the unit," "Nurse manager meets with the staff nurse to provide support and assistance towards professional and career goals," "The nurse manager congratulates the nurse in front of peers") were excluded, for a total of 11 excluded items. Eventually, we extracted 24 items, which were classified into three factors. Factor One consisted of eight items related to evaluation, such as "The achievements of nurses are posted on the bulletin board" and "Achievements are announced in the hospital newsletter" and was classified as "Evaluation, presentation, and report." Factor Two consisted of nine items related to job schedule preferences, patient care, and participation in decision-making in wards, such as "Respect job schedule preferences," "Helps with the staffs' job when busy," "The nurse is given preference for the selection of work hours" and was classified as "Individual value and transfer of responsibility." Factor Three consisted of seven items related to participation in training and professional ability activities, such as "Staff nurses are asked to represent the unit at hospital meetings" and "Staff nurses are selected as presenters for new employees" and was labeled "Professional development."

For the nurse managers, an additional eight items (such as "Staff nurses are encouraged to participate in professional activities at the local and national level") were excluded. We classified the 28 remaining items into three factors. Factor One included 14 items related to staff considerations, such as "For consistently working extra hours, a written letter is given to the staff nurse and a copy is placed in the personnel file" and "Respect job schedule preferences" and these items were categorized as "Individual consideration and development." Factor Two consisted of nine items related to the publication of evaluations and reports to the nurse manager, such as "Nurses' achievements are posted on the bulletin board" and "Achievements are announced in the hospital newsletter," and these items were called "Notification and report of achievements." Factor Three was composed of three items related to the nurse manager's behavior in evaluating the staff, such as "The nurse manager congratulates the nurse in front of peers" and "The nurse manager brags about the performance of unit staff nurse," and this factor was labeled "Expression of evaluation."

The internal consistency of each factor in the factor analysis for both nurse managers and staff was 0.50, indicating the reliability of the questionnaire (**Table 4**).

We compared the median score of the lower item total score for factors with staff's attributes. In Factor Three, married nurses obtained a significantly higher score than did single nurses, the 40-year age group obtained higher scores than the 20-year age group did, and those with 10 - 19 years clinical experience obtained higher scores than those with three years' experience or less, indicating the importance of Factor Three as a recognition behavior.

However, in terms of academic background, university

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and college graduates obtained a significantly lower score compared with those with associate degrees and diplomas in nursing, indicating that Factor Three was not considered important in those areas (**Table 5**).

Table 4. Result of exploratory factor analysis on recognition behavior.

	Staff nurses (n = 1248)			
	Factor	Number of items	Cronbach's alpha	Factor loadings
I	Evaluation presentation and report	8	0.869	0.577 - 0.83
II	Individual value and transfer of responsibility	9	0.847	0.48 - 818
III	Professional development	7	0.752	0.532 - 0.816
	Nurse managers (n = 177)			
	Factor	Number of items	Cronbach's alpha	Factor loadings
I	Individual consideration and development	14	0.869	0.489 - 0.858
II	Evaluation presentation and report	9	0.847	0.418 - 0.678
III	Expression of evaluation	4	0.752	0.488 - 0.639

Table 5. Demographic comparison based on recognition behavior analyzed by an exploratory factor (Staff nurses).

	Factor One			Factor Two			Factor Three		
	Median	IQR	p	Median	IQR	p	Median	IQR	p
Gender									
Male	23	20 - 25	0.763[a)]	27	25 - 29	0.992	21	19 - 22	0.876
Female	24	21 - 24		27	25 - 29		21	19 - 22	
Marital status									
Single	23	21 - 24	0.293[a)]	27	25 - 29	0.152	21 *	18 - 21	0.001
Married	23	21 - 25		27	25 - 30		21	19 - 23	
Age range, years									
Under 30	24	21 - 24	0.121	27	25 - 27	0.62	21 *	18 - 21	0.002
30 - 39	23	20 - 24		27	25 - 27		21	19 - 22	
40 - 49	24	21 - 24		27	25 - 27		21	19 - 22	
Over 49	23	21 - 24		27	24 - 27		21	21 - 22	
Overall work experience, years									
Under 4	23	21 - 24	0.513	27	25 - 29	0.46	21 *	18 - 21	0.002
4 - 9	24	20 - 24		27	25 - 29		21	18 - 22	
10 - 19	23	21 - 25		27	25 - 30		21	19 - 23	
Over 19	23	21 - 25		27	24 - 29		21	19 - 23	
Academic background									
Associate degree	24	20 - 25	0.993	27	25 - 30	0.06	21 *	19 - 22	0.001
Diploma in nursing	24	21 - 24		27	25 - 29		21 **	19 - 22	
Junior college graduate	23	21 - 25		27	25 - 29		21	18 - 21	
University or graduate university	23	21 - 24		27	24 - 28		21	18 - 21	

n = 1248, $^{*}p < 0.05$, $^{**}p < 0.001$ [a)]Mann-Whitney test. Kruskal-Wallis test and the multiple comparisons test were performed by a multiple analysis of variance.

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4. DISCUSSION

Compared with the average of the each lower item (35 questions) concerning recognition behavior for staff nurses, the highest scores were obtained for "respect job schedule preferences". This is most likely because of the importance of a good work-life balance. Inadequate work scheduling and long working times have been identified as a major threat to employees' health and well-being. Shift working has been found to cause fatigue, sleep disruptions, impaired concentration, irritability, and somatic symptoms, such as digestive problems [5,6]. However, studies have suggested that the effects of shift work can be reduced not only by adopting appropriate shift rotations [7] but also by increasing the predictability of work schedules [8] and choices over shift patterns [9]. Among the survey respondents, 66% were single; those respondents placed importance on having sufficient individual free time. Further, 71% were younger than 30 years old, at a point in life when they experience many life-changing events, such as marriage and giving birth. It is also possible that younger nurses experience more stress and fatigue because they have greater family responsibilities than older nurses do [10].

In terms of less important items among the recognition behaviors, "Nurse manager meets with the staff nurses to discuss patient care and unit management" was selected by both staff nurses and nurse managers. According to previous research, an important predictor of a staff nurse's job satisfaction is the professional practice model [11-14]. Some characteristics of professional practice are autonomy and shared governance [15]. Nurse managers should not just listen to the thoughts and opinions of staff nurses in a one-sided way; instead, they should convey the intentions of their own actions and let the staff nurses participate in decision-making [16]. This shows that nurse managers are also aware of the importance of this type of communication.

Among the recognition behaviors, the item of which the staff nurses were the least aware was "Release time is given to spend a day with the supervisor to experience management functions". This may be because the daily work demands of a nurse, such as the introduction of sophisticated medical devices and the need for increased care for the elderly, are becoming increasingly complex, and either the nurses have insufficient interest or knowledge of administrative matters or they believe that such matters are the responsibility of the nurse manager. In comparison, there was a tendency for nurse managers not to be aware of the item "Helps with the staff's job when busy". This result suggests that in Japan, staff nurses do not regard the nurse manager as an "administrator", but rather as a staff member who performs nurse duties, as a previous study indicates [4]. Furthermore, most staff nurses recognized the nurse manager as another member of the nursing staff who performs nursing duties rather than someone in a "management position", which suggests that the difference between the nurse management and staff roles may not be clear to staff nurses. Thus, a trend toward insufficient understanding of management was observed among this study's respondents.

A slight difference in the lower items among the factors was observed from the results of the factor analysis; however, a common awareness was noted for two factors, including items relating to consideration to each staff member, notification of achievements and reports.

Two lower items ("The nurse manager congratulates the nurse in front of peers" and "The nurse manager brags about the performance of the unit staff nurse") were excluded from the factor analysis for staff nurses. In contrast, these items were included as "Expression of evaluation" in the factor analysis for nurse managers. These exclusions occurred because staff nurses do not like to be praised in public. In addition, this exclusion may arise from the fact that Japanese people are conservative, believe that "*envy is the companion of honor*", and prefer quieter, emotional approval to receiving approval openly [17]. Furthermore, the lower items in Factor Three for the staff ("Professional development") were included in Factor One ("Consideration and development of individual") for the nurse managers, which indicates their respect for each staff nurse.

Higher scores in the 40-year age group and the group with 10 - 19 years clinical experience relative to the 20-year age group and those with three years' experience or less, respectively, underline the importance of Factor Three as a recognition behavior. Nurses in mid-career were defined as those who had been in practice for 11 and 22 years and those between the ages of 31 and 50. Strong associations were found between retention and control over nursing practice for nurses in mid-career [18]. Thus, staff nurses aged 40 - 49 years have been trained as experts in their profession; they have a strong desire for career advancement as professionals and keenly wish to receive recognition.

In the same way, for Factor Three, there was less awareness of recognition behavior among university and college graduates than among those with associate degrees and diplomas in nursing. This occurred because the lower items are related to participation in hospital conferences, selection as preceptors, and participation in seminars, and graduates most likely desire more academic career advancement [19], which is not included in these activities. This aspect of staff nurses' professional development needs to be considered by including it in future training.

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5. CONCLUSIONS

A Our results indicate that nurse managers assign the maximum respect to such recognition behaviors as "Nurse manager meets with the staff nurses to discuss patient care and unit management" and "Patient evaluations that compliment individual nurses on the unit are posted on the bulletin board"; in this respect, staff members' and nurse managers' responses were concordant. However, staff nurses regarded "respect job schedule preferences" as the most important recognition behavior, indicating that there was different awareness of this behavior between staff and nurse managers. Our results also showed that marriage status, age, years of clinical experience, and training background influenced the awareness of recognition behavior as a "professional job".

We predict that the burnout of staff nurses, which can be caused by increased nursing duties and by difficulties in interpersonal relationships, will increase in the future. We believe that recognition behaviors are an effective way to support nurses' self-realization.

6. RECOMMENDATIONS

A The results of this study indicate what types of recognition behaviors staff nurses expect from nurse managers and what staff nurses consider important. The results can also reflect the difference in awareness between the nurse manager and staff nurses and suggest future directions for the education of nurse managers.

A nurse holds a patient's life in her hands. It is a professional job in which she or he must take care of the patient and show a high degree of flexibility with medical techniques and skills. For this professional job, it has been reported that praise from the superior is more effective than providing information or emotional support for preventing burnout [20]. This fact also indicates that it is desirable for the nurse manager to be aware of the importance of giving her staff and their work praise and approval. Moreover, it has been shown that the leadership of the nurse manager influences staff nurses' job satisfaction. It has been reported that staff nurses do not merely want the nurse manager to manage the ward; rather, they want her or him to play a functional role within the overall infrastructure in which they look to her or him for leadership to ensure their status as independent professionals [21]. In the future, transformational leadership will no doubt be required, including such recognition behavior such as sensitivity toward the staff and providing stimulation and motivation.

7. LIMITATIONS OF THIS STUDY

A Many interlinked factors, such as an individual sense of values, regional characteristics, and job locations, may be important to this study, but they have not been discussed. In addition, regarding the survey items used, changes in the environment surrounding treatment, and changes in nurses' working conditions and training, need to be considered in the future.

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Original Study

Priorities of Health Care Outcomes for the Elderly

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A B S T R A C T

Objectives: Physicians are uncertain about what medical services should be provided to older and/or disabled patients. Better understanding of health outcome prioritization among health care providers and recipients may help the process of decision- and policy-making. For this purpose, surveys were conducted on priorities of health care outcomes for the elderly.
Design: Survey research.
Setting: Four groups of health care providers and four groups of health care recipients.
Participants: A total of 2512 health care providers and 4277 recipients.
Measurements: Questionnaires were sent to more than 8000 health care providers and more than 9000 health care recipients: geriatricians, physicians who commonly see older patients or work in long term care facilities, staff members and participants in adult day care, patients in outpatient geriatric clinics, family members of patients with dementia, and community-dwelling older adults. The questionnaire asked the subjects to rank 12 measures of health care outcomes.
Results: The mean response rate was 49%. All health care provider groups considered "improvement of quality of life" the most important. In contrast, in health care recipient groups, "effective treatment of illness," "improvement of physical function," and "reduction of carer burden" were given high priority, whereas "improvement of quality of life" was perceived as less important. All the groups, including health care providers and recipients, ranked "reduction of mortality" the least important, followed by "avoiding institutional care." Stratification analysis showed that the results did not differ by sex, nursing care level, or the existence of relatives who required nursing care, whereas age slightly influenced the order of high-ranked measures.

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Conclusion: Priorities of health care services and their differences between providers and recipients should be taken into account in the health care of older patients and the design of health care policies and research.
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Japanese society has been rapidly aging owing to long life expectancy and a low birth rate.[1] People older than 65 comprised 23.8% of the population in 2012, which is expected to rise to 31.8% in 2030[2] and will be by far the highest in the world. Japanese physicians have been exposed to a high load of older patients, and management of older patients remains a major challenge. There are several reasons for this difficulty. Evidence is still largely lacking for older patients, especially for those older than 75 years, who account for 11.8% of the Japanese population.[2,3] Older patients are likely to have multimorbidities, or co-occurrence of two or more chronic conditions,[4] but application of disease-specific guidelines to older patients with multimorbidities may result in polypharmacy, an increased risk of adverse drug reactions, and poor outcomes.[5,6] At the same time, however, older patients are at increased risk of underuse of necessary medication, for fear of polypharmacy or complications.[7,8]

In an attempt to help optimize prescribing for older patients, investigators have devised numerous tools to guide clinicians, such as lists of indicated, beneficial medication or medication with high potential for harm.[9,10] Although these tools are helpful in reducing exposure of older patients to inappropriate medication and risk of adverse drug events,[11] they do not provide more general considerations, such as when or how to discontinue potentially inappropriate medications, how to balance risks and benefits of unlisted medication, or how to manage medication in special circumstances, such as palliative and hospice care where symptom control is of higher priority. Therefore, the process of determining the medication regimen is inevitably subjective and individualized, taking into account patients' cognitive, physical, and social function, remaining life expectancy, and the goals of care.

Unfortunately, few studies have examined the priorities of health care perceived by health care providers and recipients in geriatric medicine. One small study conducted in England more than 15 years ago showed that geriatricians and patients similarly gave high priority to reducing disability and improving quality of care, and low priority to reducing mortality.[12] However, the serious question of whether there may be a gap in priorities of health care between health care providers and recipients has been raised.[13,14]

Better understanding of health outcome prioritization among health care providers and recipients in geriatric medicine is necessary to help physicians, older patients, and their family members discuss the goals of care and to assist health policy makers in effectively using resources to address the needs of older patients. In this study, we aimed to obtain a comprehensive picture of the views of groups with an important stake in geriatric health care services (geriatricians, physicians who commonly see older patients or work in long term care facilities, staff members and participants in adult day care, patients in outpatient geriatric clinics, family members of patients with dementia, and community-dwelling older adults) on the relative priorities of different outcome measures that are relevant to geriatric clinical practice and health care policy.

Methods

Between September 2010 and October 2011, surveys were conducted in the following eight groups:

(1) All geriatricians (approximately 1500) board certified by the Japan Geriatrics Society
(2) A total of 5000 physicians randomly selected from the list of board-certified physicians in five subspecialties (two internal medicine subspecialties, two surgical subspecialties, and one other) with high exposure to older patients
(3) Physicians working in 800 long term care facilities that were randomly chosen from the nationwide list of long term care facilities
(4) Staff members working in adult day care at 400 randomly chosen long term care facilities as mentioned previously
(5) Participants in adult day care at the same 400 long term care facilities as mentioned previously
(6) Patients in geriatric outpatient clinics at five university teaching hospitals (the University of Tokyo, Kyorin University, Nagoya University, Kyoto University, and Tohoku University)
(7) Family members of patients with dementia who had been seen in geriatric outpatient clinics at four university teaching hospitals (Tohoku University was excluded because of the Tohoku Earthquake at the time of this survey)
(8) A total of 6000 community-dwelling, functionally independent (ie, not requiring nursing care provided by long term care

Table 1
Survey Methods and Number of Valid Answers in 8 Groups

Groups	Time of Survey	Survey Methods	No. of Questionnaires Sent	No. (%) of Valid Answers*
Health care providers				
Geriatricians	2010, Sep	By post	1500	619 (41)
Physicians in 5 subspecialties	2011, Oct	By post	5000	1305 (26)
Physicians in long term care facilities	2011, Oct	By post	800	384 (48)
Adult day care staff	2010, Sep	By post for each facility	400 facilities (2 per facility)	204†
Health care recipients				
Adult day care participants	2010, Sep	By post for each facility	400 facilities (5–10 per facility)	795†
Patients in geriatric outpatient clinics	2010, Sep	Distributed by physicians and returned by post	950	512 (55)
Family members of patients with dementia	2011, Oct	Distributed by physicians and returned by post	542	333 (61)
Community-dwelling older adults	2010, Sep	By post	6000	2637 (44)

*Responses with missing items or invalid answers were excluded.
†For adult day care staff members and participants, questionnaires were sent to each facility by post, where 2 staff members and 5 to 10 participants were offered the questionnaire; 123 facilities (31%) returned the completed questionnaires.

insurance) older adults randomly drawn from the community registers of two target areas (Kashiwa, Chiba Prefecture, a city close to Tokyo, and Sabae, Fukui Prefecture, a provincial city), from which men and women, 65 to 74 years and older than 75 years, were equally selected

Postal questionnaires were sent to all groups of physicians and community-dwelling old adults. For adult day care staff members and participants, questionnaires were sent to each facility, where two staff members and 5 to 10 participants were offered the questionnaire, to be completed on a voluntary basis. The completed questionnaires were gathered at each facility and then returned to us. Patients and family members of patients with dementia received the questionnaires from their physicians (Table 1).

The questionnaire asked about the relative priorities of 12 health care measures that were derived from a literature review and a previous Internet-based survey conducted by the National Center for Geriatrics and Gerontology in 2009 (in Japanese; http://www.ncgg.go.jp/pdf/itaku/21hokoku/20si-3.pdf). Each item was expressed as several words so as to help health care recipients understand the meaning. The respondents were asked to rank the measures in order of priority from 1 (most importance) to 12 (least important). To facilitate ranking the outcomes in order, they were prompted to choose and rank the three most important outcomes, then the three least important outcomes, and last, the six middle outcomes. Ties, or the same ranks, were not allowed.

To examine whether variation in the question wording could affect the results, we devised another version of the questionnaire with different wording for four items and sent that version to a randomly selected subset of participants; however, the results were almost identical (data not shown). We also tested whether the order of health care measures that appeared in the questionnaire would affect the results in a random subset of participants, but the responses to the reverse order questionnaire were similar to those of the original version (data not shown). Therefore, we analyzed the responses from different versions (wording and order) together.

The following information was also collected using the questionnaire: age and sex for all participants; specialty (internal medicine, surgery, psychiatry, or others) and years of experience for physicians; qualification and years of experience for adult day care staff; nursing care level (level of required nursing care: relatively independent, limited impairment, needing extensive help, or severely dependent) for adult day care participants; nursing care level and the existence of relatives who required nursing care for patients in geriatric outpatient clinics; nursing care level, morbid conditions, and the existence of relatives who required nursing care for community-dwelling older adults.

The study protocol was approved by the Ethics Committee of the Graduate School of Medicine, The University of Tokyo. Ethical approval for the surveys on patients in geriatric outpatient clinics and family members of patients with dementia was also obtained from the participating institutions.

Results

The mean response rate for the eight groups was 49%, which varied from 28% for board-certified physicians to 68% for family members of patients with dementia (Table 1). The analytic sample included a total of 2512 health care providers and 4277 recipients.

Tables 2 and 3 show the relative priorities of 12 measures of health care services from the highest importance to the lowest, with mean and 95% CI, perceived by health care providers and recipients, respectively.

All physician groups considered "improvement of quality of life" the most important, and the low mean value for this item across physician

Table 2
Health Care Providers' Priorities for Health Care Outcome

Rank Order	Geriatricians (n = 619)			Physicians from 5 Relevant Subspecialties (n = 1305)			Physicians in Long Term Care Facilities (n = 384)			Adult Day Care Staff (n = 204)		
	Outcome	Mean	95% CI	Outcome	Mean	95% CI	Outcome	Mean	95% CI	Outcome	Mean	95% CI
1	Improvement of quality of life	2.62	2.45–2.80	Improvement of quality of life	3.09	2.96–3.22	Improvement of quality of life	2.88	2.62–3.14	Improvement of quality of life	4.29	3.88–4.71
2	Patient satisfaction with care	4.37	4.15–4.58	Patient satisfaction with care	4.34	4.19–4.49	Patient satisfaction with care	4.60	4.32–4.88	Maintaining a high level of activity	4.35	3.96–4.73
3	Effective treatment of illness	4.80	4.53–5.07	Maintaining a high level of activity	4.64	4.48–4.80	Improvement of physical function	4.68	4.39–4.97	Reduction of carer burden	4.80	4.42–5.17
4	Maintaining a high level of activity	4.92	4.69–5.15	Improvement of physical function	5.25	5.08–5.42	Maintaining a high level of activity	4.73	4.43–5.03	Resolution of assessed problems	5.15	4.74–5.55
5	Improvement of physical function	4.94	4.71–5.18	Effective treatment of illness	5.32	5.13–5.52	Improvement of mental health	5.50	5.29–5.71	Improvement of mental health	5.26	4.86–5.65
6	Improvement of mental health	6.04	5.87–6.20	Reduction of carer burden	5.93	5.79–6.07	Resolution of assessed problems	5.77	5.51–6.04	Patient satisfaction with care	5.43	5.03–5.83
7	Resolution of assessed problems	6.39	6.17–6.61	Resolution of assessed problems	6.12	5.97–6.27	Reduction of carer burden	6.10	5.84–6.37	Improvement of physical function	5.83	5.42–6.25
8	Reduction of carer burden	6.45	6.27–6.64	Improvement of mental health	6.39	6.26–6.52	Effective treatment of illness	6.22	5.87–6.57	Improvement of social functioning	7.17	6.79–7.55
9	Efficient use of resources	7.83	7.67–8.00	Efficient use of resources	7.50	7.37–7.62	Efficient use of resources	8.15	7.95–8.35	Effective treatment of illness	7.41	6.95–7.87
10	Improvement of social functioning	8.80	8.62–8.98	Improvement of social functioning	8.69	8.56–8.82	Improvement of social functioning	8.20	7.95–8.44	Efficient use of resources	7.43	7.04–7.81
11	Avoiding institutional care	10.28	10.15–10.42	Avoiding institutional care	10.24	10.14–10.34	Avoiding institutional care	10.31	10.13–10.50	Avoiding institutional care	9.97	9.71–10.23
12	Reduction of mortality	10.56	10.37–10.76	Reduction of mortality	10.49	10.36–10.62	Reduction of mortality	10.85	10.67–11.04	Reduction of mortality	10.92	10.66–11.17

CI, confidence interval.

Table 3
Health Care Recipients' Priorities for Health Care Outcome

Rank Order	Community-Dwelling Older Adults (n = 2637)			Family Members of Patients With Dementia (n = 333)			Patients in Geriatric Outpatient Clinics (n = 512)			Adult Day Care Participants (n = 795)		
	Outcome	Mean	95% CI	Outcome	Mean	95%CI	Outcome	Mean	95% CI	Outcome	Mean	95% CI
1	Effective treatment of illness	4.23	4.11–4.36	Effective treatment of illness	3.04	2.76–3.32	Effective treatment of illness	2.79	2.58–3.00	Improvement of physical function	3.64	3.42–3.86
2	Reduction of carer burden	4.56	4.44–4.67	Improvement of physical function	4.49	4.19–4.78	Improvement of physical function	4.06	3.84–4.29	Effective treatment of illness	4.33	4.11–4.55
3	Improvement of physical function	5.24	5.13–5.36	Maintaining high level of activity	5.11	4.76–5.45	Improvement of quality of life	5.46	5.19–5.73	Reduction of carer burden	5.40	5.18–5.63
4	Maintaining high level of activity	5.88	5.76–5.99	Reduction of carer burden	5.29	4.98–5.61	Reduction of carer burden	5.52	5.28–5.77	Improvement of quality of life	6.08	5.86–6.30
5	Resolution of assessed problems	5.91	5.76–6.05	Improvement of mental health	5.53	5.24–5.82	Improvement of mental health	5.81	5.58–6.04	Maintaining high level of activity	6.12	5.88–6.37
6	Improvement of mental health	6.26	6.15–6.36	Improvement of quality of life	5.80	5.48–6.13	Maintaining high level of activity	5.97	5.66–6.28	Improvement of mental health	6.38	6.17–6.58
7	Improvement of quality of life	6.36	6.23–6.49	Resolution of assessed problems	5.98	5.69–6.27	Resolution of assessed problems	6.17	5.93–6.42	Patient satisfaction with care	6.44	6.24–6.64
8	Patient satisfaction with care	6.81	6.70–6.92	Patient satisfaction with care	6.01	5.70–6.31	Patient satisfaction with care	6.72	6.47–6.96	Resolution of assessed problems	6.45	6.26–6.65
9	Efficient use of resources	6.91	6.81–7.02	Efficient use of resources	7.49	7.21–7.76	Efficient use of resources	7.46	7.24–7.69	Efficient use of resources	6.57	6.36–6.77
10	Improvement of social functioning	7.44	7.32–7.56	Improvement of social functioning	9.17	8.90–9.45	Improvement of social functioning	8.42	8.18–8.65	Improvement of social functioning	8.22	8.03–8.42
11	Avoiding institutional care	8.43	8.31–8.56	Avoiding institutional care	9.86	9.60–10.12	Avoiding institutional care	9.39	9.16–9.62	Avoiding institutional care	8.61	8.41–8.81
12	Reduction of mortality	9.98	9.87–10.08	Reduction of mortality	10.23	9.99–10.48	Reduction of mortality	10.22	10.00–10.44	Reduction of mortality	9.75	9.55–9.95

CI, confidence interval.

groups indicated physicians' strong preference for this item. All the physician groups also considered "patient satisfaction," "maintaining a high level of activity," and "improvement of physical function" important after "improvement of quality of life," with some variation in the order of their preferences. Geriatricians ranked "effective treatment of illness" the third most important, in contrast to the other two physician groups that ranked this item lower. Adult day care staff ranked "improvement of quality of life" and "maintaining a high level of activity" first and second, respectively, but placed "reduction of carer burden" the third most important, unlike physicians.

With regard to the receiving side of health care, "effective treatment of illness," "improvement of physical function," and "reduction of carer burden" were given high priority, whereas "improvement of quality of life" tended to be perceived as less important.

All the groups, including both health care providers and recipients, ranked "reduction of mortality" the least important, followed by "avoiding institutional care," "improvement of social functioning," and "efficient use of resources," except for the adult day care staff who ranked "improvement of social functioning" higher than "effective treatment of illness."

Stratification analysis demonstrated that the results from physicians were not influenced by sex (male vs female, data not shown); however, physicians older than 60 years tended to rank "effective treatment of illness" and "improvement of physical function" higher compared with younger physicians, who appeared to prioritize "patient satisfaction" and "maintaining a high level of activity." Physicians with more than 30 years' experience, most of whom were older than 60 years, showed a similar tendency, prioritizing "effective treatment of illness" and "improvement of physical function." The results from adult day care staff were identical across groups stratified by age, years of experience, and qualification (data not shown).

The results from the health care recipients did not differ by nursing care level (relatively independent vs limited impairment or higher, or limited impairment vs needing extensive help or higher) for adult day care participants and patients in geriatric outpatient clinics, the existence of relatives who required nursing care (present vs absent) for patients in geriatric outpatient clinics, study site for patients in geriatric outpatient clinics and community-dwelling older adults, or sex for all health care recipient groups (data not shown). Although stratification by age showed that the three measures given highest priority were the same across the age groups (65 to 74 vs older than 75) in community-dwelling older adults, the younger group ranked "reduction of carer burden" first, whereas the older group ranked "effective treatment of illness" first (data not shown).

Discussion

This study is, to our knowledge, the largest survey ever conducted to describe health outcome prioritization in geriatric medicine. We aimed to obtain a comprehensive picture of the views of those involved in decision-making processes in geriatric medicine and compare views between health care providers and recipients. We chose four groups each from providers and recipients that are considered relevant to our purpose. The mean response rate was close to 50%, which was good for a large-scale postal survey and ensured the representative nature of our respondents.

This survey demonstrated that there may be an important gap in health outcome prioritization between health care providers and recipients in geriatric medicine. All health care provider groups, notably physicians, expressed a strong preference for improvement in quality of life (QOL) as a priority of care, whereas health care recipients gave the highest priority to effective treatment of diseases and tended to put lower importance on QOL. In the context of clinical medicine, QOL is often used as a nonspecific, all-encompassing term to describe

nonmortality outcomes averaged over multiple domains (ie, physical, social, and psychological functioning and well-being). Consideration of QOL is essential for the selection of a treatment option, particularly when conditions are noncurative and chronic.[15] Therefore, it is not surprising that physicians who regularly see older patients with multiple chronic conditions consider QOL the most important health care outcome. On the other hand, the term QOL may not be familiar to many health care recipients, and we cannot exclude the possibility that QOL might be confused with other terms, such as standard of living.

Most health care recipients ranked effective treatment of diseases as the most important, suggesting that patients are concerned about their own particular symptoms rather than nonspecific QOL, arguing for efforts to examine the symptoms most concerning to patients. The high importance of effective treatment of diseases ascribed by health care recipients, but not physicians, also implies the significance of the often-neglected aspect of inappropriate prescribing in older adults: underuse of medication likely to be beneficial to older adults. Increased evidence has suggested that failure to prescribe indicated, beneficial medication is common in older adults,[7,8,16] and recent attempts to provide an explicit list of appropriate, indicated medication for older adults are justified.[10]

Interestingly, views on patient satisfaction were also different. All physician groups ranked patient satisfaction as the second top priority, whereas health care recipients considered this to be less important. This tendency has been demonstrated in a prior small study in England more than 15 years ago.[12] Recently, patient satisfaction has been increasingly used to measure health care qualities and compare health plans or physicians.[17] However, our finding may argue against the value of patient satisfaction as a performance measure in geriatric medicine, especially in light of recent evidence suggesting that higher patient satisfaction is accomplished at the sacrifice of increased use of health care resources and may not be directly associated with technical quality of care or improved outcome.[17,18]

We observed agreement on several items between health care providers and recipients. The importance of physical and mental function, such as maintaining activity or improving physical function, was expressed by both health care providers and recipients. This finding was consistent with prior studies in older adults with multiple chronic conditions[12,19] or terminal conditions,[20,21] suggesting that physical and mental function should be an essential factor to consider as a health care outcome in various care settings for older patients.

Reduction in mortality was given the lowest priority by all the groups in health care providers and recipients alike. This view is similar to that observed in previous studies.[12,19] This finding supports the contention that treatment interventions should be assessed in terms of reduced morbidity and improved QOL in addition to reduced mortality.

In this survey, respondents' characteristics, except age, had limited influence on their views on health outcome prioritization within each group. Geriatricians older than 60 years and community-dwelling adults older than 75 years gave higher priority to effective treatment of diseases compared with their younger counterparts. This suggests that health outcome priorities may not be stable, and can change as respondents age or differ from generation to generation. The cross-sectional design of our survey prevented us from separating the age effect from the secular trend, and further studies will be required to examine the time- or setting-dependent variability of health outcome prioritization.

This study has several limitations. First, although the average response rate was high for a postal survey, it was lower in physician groups than in health care recipient groups (26% to 48% vs 44% to 61%, Table 1). Thus, selection bias cannot be excluded. Second, it was not sure that health care recipients, particularly adult day care participants, correctly understood the study terminology. Third, some of the items used in the survey were not mutually exclusive. Nevertheless, a similar trend in priorities of outcome measures according to either side of health care providers or recipients suggests that the overall results were not significantly affected by these limitations.

Conclusion

We demonstrated that there was significant agreement and disagreement of health outcome prioritization between health care providers and recipients in geriatric medicine. Health care providers and recipients agreed on high priority for function and low priority for reduction in mortality, but there was obvious disagreement in how they perceived QOL, treatment effect, and patient satisfaction as goals of care. Such disagreement necessitates better communication between providers and recipients to reach goals of care that are mutually understandable and tailored to meet patients' specific needs. The low importance of reduction in mortality and patient satisfaction ascribed by health care recipients may question the value of these outcomes as a way to assess treatment interventions and quality of care. We propose that the priorities of health care outcomes and their differences between providers and recipients demonstrated in this study should be taken into account in the health care of older patients and the design of health care policies and research.

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ORIGINAL ARTICLE: EPIDEMIOLOGY, CLINICAL PRACTICE AND HEALTH

Global brain atrophy is associated with physical performance and the risk of falls in older adults with cognitive impairment

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Aim: Falls are common in patients with cognitive disorder. The purpose of this study was to determine whether global brain atrophy is associated with cognitive function, physical performance and fall incidents in older adults with mild cognitive disorder.

Methods: A total of 31 older adults with mild cognitive disorders (mean age 78.9 ± 7.3 years) were studied, and 10 of them had experienced falls and the others had not in the past 1 year. Cognitive function and physical performance were measured in these patients. Global brain atrophy was determined by the Voxel-Based Specific Regional Analysis System for Alzheimer's Disease software.

Results: Fallers showed significantly worse scores than the non-fallers in the Global Brain Atrophy Index, Clock Drawing Test (CDT), Verbal Fluency Test (animal), maximum walking time and Timed Up & Go (TUG) Test. The Global Brain Atrophy Index was correlated with the Verbal Fluency Test (animal; $r = -0.522$), the Verbal Fluency Test with letter (ka; $r = -0.337$), CDT ($r = -0.547$), TUG ($r = 0.276$) and Five Chair Stands Test ($r = 0.303$) by age-adjusted correlation analyses. Stepwise regression analysis showed that the Global Brain Atrophy Index ($\beta = 1.265$, 95% CI 1.022–1.567) was a significant and independent determinant of falls ($R^2 = 0.356$, $P = 0.003$).

Conclusion: Global brain atrophy might be indicated as one of the risk factors for falls in older adults with mild cognitive disorders. **Geriatr Gerontol Int 2013; 13: 437–442.**

Keywords: falls, global brain atrophy, mild cognitive disorder.

Introduction

Falls are a significant cause of injuries, loss of confidence, increased morbidity and mortality in older adults.[1,2] One-third of community-dwelling older adults aged 65 years and older, and up to 50% of those aged 80 years and older experience falls each year.[3,4] It has been noted that older adults with cognitive impairment are more likely to suffer falls.[5] In fact, the fall rate in patients with Alzheimer's disease (AD) was reported to be nearly twofold higher than age-matched controls.[6] Furthermore, older adults with cognitive disorders have impaired balance and gait,[7] as well as impaired executive functions.[8]

Although patients with cognitive disorders have a higher risk of falls, few studies have been reported on the relationship between morphological changes of the brain and fall incidents. White matter lesions, frequently found in magnetic resonance imaging (MRI) of the aging brain,[9] are attributed to cerebral microangiopathic changes.[10] White matter lesions in older adults are also associated with gait and balance impairment,[11,12] cognitive impairment[13] and frequent falling.[14] A previous study suggested that periventricular white matter lesions might be related to falls in patients with a mild to moderate cognitive disorder.[15] Furthermore, white matter lesions can predict the incident of hip fracture in persons younger than 80 years-of-age.[16]

Previous reports showed that measures of cognitive performance in old age, such as scores on tests of intelligence, information processing speed and memory, are predicted by global and local brain atrophy.[17] However, there have been no studies to address the relationship between global brain atrophy and fall incidents. Therefore, the purpose of the present study was to determine whether global brain atrophy is associated with cognitive function, physical performance and fall incidents in older adults with mild cognitive disorders.

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Methods

Participants

Patients with a cognitive disorder who were referred to the memory clinic of the Department of Geriatric Medicine in Kyoto University Hospital, Kyoto, Japan, were enrolled in the present study. All patients underwent brain MRI, as well as a battery of laboratory tests. The diagnosis of AD and mild cognitive impairment (MCI) was made according to the following criteria: AD, Diagnostic and Statistical Manual of Mental Disorders, 4th edition and National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association;[18,19] and MCI, Petersen's criteria.[20] In the present study, we did not set the upper limit of the Mini-Mental State Examination (MMSE) for the diagnosis of MCI. Of the 31 patients with a cognitive disorder, 20 were classified as mild AD and 11 were classified as MCI by the criteria. Those with MMSE scores below 19 were excluded from the present study.[21] Other exclusion criteria used in the present study were vascular dementia, dementia with Lewy bodies, lacunar infarcts, Fazekas grade 3 periventricular hyperintensity (PVH)/deep white-matter hyperintensity (DWMH),[22] severe cardiac, pulmonary or musculoskeletal disorders, and the presence of comorbidities associated with greater risk of falls, such as Parkinson's disease and stroke.

Written informed consent was obtained from each participant or his/her family members for the trial in accordance with the guidelines approved by the Kyoto University Graduate School of Medicine and the Declaration of Human Rights, Helsinki, 1975.

MRI

MRI scans were carried out with a 1.5-T superconductive MRI unit (Magnetom Symphony; Siemens Medical, Erlanger, Germany). Whole-brain volumetric imaging with 3-D gradient refocused echo sequence (magnetization prepared rapid gradient echo, or MPRAGE) was carried out for voxel-based morphometry analysis using the following parameters: field of view (FOV) 22 × 22 cm, matrix 256 × 256, 120 contiguous 1.25-mm thick sagittal slices, TR/TE/TI 1700/3.93/800 ms and FA 15°.

Voxel-based morphometry

The voxel-based analysis system in the present study has been validated.[23] Currently, their software is distributed in Japan under the name, Voxel-Based Specific Regional Analysis System for Alzheimer's Disease (VSRAD). VSRAD automatically calculated the following analysis results, which reflect the severity of gray matter loss in the global brain by comparing the original normal database template. The severity of global brain gray matter loss was estimated with the Global Brain Atrophy Index, which was calculated as a percentage rate of voxels with a Z-score >2 compared with the whole brain.

Fall experience

Fall events in the past 1 year were recorded based on an interview with the family members. A fall was defined as "an event that results in a person coming to rest inadvertently on the ground or other lower level regardless of whether an injury was sustained, and not as a result of a major intrinsic event or overwhelming hazard".[5] The date, number, characteristics (e.g. while rising from a lying or sitting position, while turning in the opposite direction, while tripping over an obstacle) and consequences (e.g. bruise, fracture) of the falls were recorded using a standardized questionnaire.

Cognitive function measures

Cognitive functions were assessed by MMSE, Clock Drawing Test (CDT), Trail Making Test part A (TMT-A), Verbal Fluency Test (animal) and Verbal Fluency Test with letter (ka). MMSE is a short screening test to assess cognitive impairment, which consists of five areas: orientation, registration, attention and calculation, and recall language. The CDT is a sensitive test for executive function and early cognitive impairment. The participant was asked to draw a clock with all the numbers on it and to set the time to 10 min past 11. We used a 10-point scoring system by Rouleau *et al.*[24] The TMT-A assesses working memory capacity. Patients need to connect the numbers in order, beginning with 1 and ending with 25, as fast as possible. Word fluency is a sensitive test to detect early changes in cognitive function. In the Verbal Fluency Task (animal), patients were instructed to name as many animals as possible within 1 min. In the Verbal Fluency Task, the subject was asked to say as many words as possible beginning with the letters "ka" in 1 min.[25]

Physical performance measures

The participants were subjected to five physical function tests that are widely used to identify frail elderly. For each performance task, the participants performed two trials, and the better performance of two trials was used as scores in the analysis. The physical performance assessment, such as 10-m walking time,[26] Timed Up & Go (TUG) Test,[27] Functional Reach (FR),[28] One-Leg Stand (OLS) test[29] and Five Chair Stands (5CS) Test,[30] was carried out as previously described.

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