**Full title of the manuscript and short title**

Full title

Effects of a nurse-occupational therapist meeting on function and motivation in hospitalized elderly patients: A pilot randomized control trial

Short title

Effects of a nurse-occupational therapist meeting

**Authors' names**

**Ken Kondo, Assistance Professor**

Gunma University Graduate School of Health Sciences, Gunma, Japan

**Naoto Noguchi, Assistance Professor**

Gunma University Graduate School of Health Sciences, Gunma, Japan

**Ryoto Teshima, Occupational Therapist**

Division of Rehabilitation Service, Geriatrics Research Institute and Hospital, Gunma, Japan

**Koji Tanaka, Associate Professor**

Gunma University Graduate School of Health Sciences, Gunma, Japan

**Bumsuk Lee, Professor**

Gunma University Graduate School of Health Sciences, Gunma, Japan

**Corresponding author:**

Bumsuk Lee, Gunma University Graduate School of Health Sciences, 3-39-22, Showa, Maebashi, Gunma 371-8514, Japan

E-mail: leebumsuk@gunma-u.ac.jp

## Research ethics

Ethical approval was obtained from the Fujioka General Hospital Ethics Committee (dated 7 September 2016), and the Gunma University Ethical Review Board for Medical Research Involving Human Subjects (dated 22 October 2018). All participants provided written informed consent.

## Declaration of conflicting interests

The authors confirm that there is no conflict of interest.

## Statement of contributorship

KK and BL conceptualized and designed the study. KK, NN and KT prepared and coordinated data analyses and interpretations. KK, NN and RT analysed the data. KK wrote the first draft of the manuscript. BL provided statistical support in addition to the critical feedback of the paper. All authors participated in the critical review and approved the submission of the manuscript.

## Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

**Abstract**

**Introduction:** This pilot randomized controlled trial assessed the effectiveness of a nurse-occupational therapist (OT) meeting on improving motor and social-cognitive functions, as well as motivation, in a subacute hospital setting.

**Methods:** Participants were randomized to a weekly multidisciplinary team meeting group ("control", n = 20) or a nurse-OT meeting group ("intervention", n = 18). Medical care plans in both groups were discussed in the weekly meeting. In addition, the details of daily life problems for the intervention patients were discussed in the nurse-OT meeting. Outcome measures included motor and social-cognitive functions assessed by the Functional Independence Measure (FIM), and motivation assessed by the Vitality Index. Assessment time-points were at admission and discharge.

**Results:** In the intervention group, additional improvements were found in the FIM cognitive ($p$ = .048, $r$ = .32) and the Vitality Index ($p$ = .027, $r$ = .36), whereas the FIM motor was improved in both groups ($p \leq .018$, $r \geq .52$).

**Conclusion:** We found significant improvement in motor function in both groups, and additional improvements in social-cognitive function and motivation in the intervention group. These observations suggest that collaborative practice between nurses and OTs could improve functions underlying independent daily life in hospitalized elderly patients.

**Keywords**

Collaborative practice, social-cognitive function, activities of daily living, hospital, elderly patient, rehabilitation

# Introduction

Elderly patients have a high risk of activities of daily living (ADL) decline during hospitalization. Previous studies indicated 23 to 46% of older people experience a loss of independence in ADL during their hospital stay (Brown et al., 2004; Zisberg et al., 2011). The low level of independent ADL is associated with a higher incidence of delirium (Avelino-Silva et al., 2014), nosocomial infections (Avelino-Silva et al., 2014), and quality of life decline (Bornet et al., 2017). Moreover, the ADL decline is related to a higher proportion of patients being discharged to nursing facilities (Harrison et al., 2017) and an increased mortality after discharge (Lee et al., 2006).

Motor function decline is a major cause of disability in elderly patients (Zisberg et al., 2011). The decline is associated with illness severity, age-related decline in physical function and hospitalization itself (Brown et al., 2009). One study indicated that 16% of elderly patients were found to have low mobility and their risk ratio for ADL decline was 4.1 when compared to high mobility patients (Brown et al., 2004).

Several studies also showed that cognitive impairment negatively influences ADL outcomes in hospitalized elderly patients (Sands et al., 2003; Cornette et al., 2005). Generally, cognitively impaired individuals display poor self-care management and an increased risk of falls (Fogg et al., 2018). However, interestingly, increased risk of ADL dependency is caused not only by cognitive impairment itself, but also by a lack of social-cognitive functional ability such as interpersonal and problem-solving skills (Mutai et al., 2012). For example, poor interpersonal skill can cause a deterioration in relationship quality between patients and healthcare providers, and this deterioration results in inefficient rehabilitation (Gialanella et al., 2012).

In contrast to the numerous studies on motor and cognitive functions, studies on the relationship between ADL performance and motivation are limited. It was only reported that patients with high levels of motivation achieved independent grooming performance (Fujita et al., 2017). On the other hand, low motivation for self-care was more likely to increase the burden of caregivers (Ide-Okochi et al., 2013).

These observations suggest there is a need to develop a common understanding of each patient's function and motivation level among healthcare professionals. In particular, a common understanding is required between nurses and Occupational Therapists (OTs) as both professions play a crucial role in maintaining and recovering patients' ADL. It is recognized that one of the essential roles of occupational therapy is to provide a means to enable individuals to participate in daily life (Cunningham et al., 2012). Similarly, coaching patients about independent self-care is an important role of nursing (Long et al., 2002). The overlapping

roles of nurses and OTs in ADL are generally observed in elderly services internationally (Booth et al., 2000). This overlap increases the importance of collaborative practice (CP) between the two professions.

Although the importance of CP between nurses and OTs is widely recognized, there is limited information about the specific outcomes of such collaboration. To our knowledge, it is only known that small-group activities based on nurse-OT collaboration increased interpersonal communication opportunities in hospitalized elderly patients with dementia (Tsuchiya et al., 2016). To date it has not been adequately discussed whether this type of collaboration contributes to recovering independent daily life in hospitalized elderly patients.

The aim of the present pilot study was to evaluate the effects of a nurse-OT meeting on improving function and motivation. In order to monitor effectiveness, we chose a community-based care ward. The main role of this ward is to facilitate hospital discharge in a timely fashion, so recovery of each patient's ADL performance is the major concern. For this reason, we concluded that this ward was an optimal setting to examine the effectiveness of CP.

## Methods

The study was approved by the ethics committees of the hospital and the university, and written informed consent was obtained from all participants. The research is reported according to the Consolidated Standards Reporting Trials guidelines.

### *Trial design*

This study was a pilot randomized controlled trial (RCT) with blinded outcome assessment.

### *Participants*

Participants were recruited from a community-based care ward in a general hospital. The ward is a new type of hospital unit launched in Japan in 2014, to provide subacute care for elderly patients who need intensive rehabilitation services. The ward in this study was a 40-bed unit that cares for approximately 1,000 patients per year, and most patients were transferred from an acute care ward in the same hospital. Participants received approximately 40 minutes of rehabilitation therapy per day, five days a week. The rehabilitation

sessions included physical, occupational and/or speech-language therapies. Inclusion criteria were patients who received rehabilitation therapy and were aged 65 years or older. Terminal cancer patients or patients who did not give informed consent were excluded. The study coordinator identified eligible patients from the hospital database and contacted the patients and their family members to explain the study. At least one day was given to consider whether to participate.

## *Interventions*

Two types of team meetings were held in the ward: a weekly multidisciplinary team (MDT) meeting and a nurse-OT meeting. All participants were discussed in the weekly MDT meeting and the intervention group participants were additionally discussed in the nurse-OT meeting. Medical care plans for all participants were discussed in the weekly MDT meeting. In addition, the details of daily life problems for only the intervention group participants were discussed in the nurse-OT meeting. In the weekly MDT meeting, assessment data related to each patient's medical condition were shared among healthcare professionals. Nurses reported patients' current health issues, a social worker reported the socioeconomic status and a representative therapist reported the functional capability which was documented by responsible therapists. Based on their reports, a physician decided on a final treatment policy. Approximately five minutes were allocated for each patient.

In the nurse-OT meeting, patients' motor and social-cognitive functions based on the Functional Independence Measure (FIM) were assessed between the two professionals. The nurse-OT meeting was conducted in accordance with the Situation-Background-Assessment-Recommendation (SBAR) technique to identify patient's daily life problems and appropriate solutions (Velji et al., 2008). As necessary, video recording was used to check for problems in patients' ADL performance. Verbal permission was obtained from the patients prior to each recording in order to pay special attention to patients' rights and privacy. The recordings were used only for the meeting. After reaching a mutual understanding of the current state, concrete plans for therapy integration into ADL were discussed. Finally, they provided detailed feedback to other nurses and the responsible therapists. Approximately 15 minutes were allocated for one patient.

## *Outcomes*

Socio-demographic and clinical characteristics for the study included age, sex, living state (in their own home or in a facility), family living together in home living patients (alone or with family), disease classification in the rehabilitation system of the Japanese Ministry of Health, Labour and Welfare, and the Charlson comorbidity index (Charlson et al., 1987). The length of stay in the acute ward was monitored because a longer length of stay could indicate a potential reduction in function and motivation (Heruti et al., 2002). In addition, discharge destination and length of stay were included.

The primary outcomes were motor and social-cognitive functions assessed by the FIM (Tokunaga et al., 2017). The FIM is a widely used assessment in medical rehabilitation. It consists of 13 motor and five cognitive items. The motor section has four subscales: Self-care, Sphincter, Transfer and Locomotion. The cognitive section has two subscales: Communication and Social cognition. The FIM score ranges from 1 (dependence) to 7 (independence) for 18 items with a maximum score of 126 that indicates total functional independence. FIM-related parameters were also used: FIM gain and FIM efficiency (Tokunaga et al., 2017). The FIM gain was defined as each score at discharge minus each score at admission. This reflects functional improvement during hospitalization. In addition, the FIM efficiency was defined as each gain divided by the length of the hospital stay. This reflects the speed of functional improvement.

The secondary outcome was motivation assessed by the Vitality Index (Toba et al., 2002). It consists of five items: Waking pattern, Communication, Feeding, On and off toilet, and Rehabilitation or other activity. The Vitality Index score ranges from 0 (no motivation) to 2 (complete motivation) for five items with a maximum score of 10. The index principally focuses on self-motivation, regardless of the degree of independence. For example, in the subscale of feeding the highest score is selected when a patient expresses a willingness to eat even with total assistance.

The blinded evaluators were OTs who were familiar with using the instruments, and the assessments were performed within 72 hours after admission and no more than 72 hours before discharge.

### *Sample size*

Due to a lack of preliminary data on the effect of nurse-OT collaboration on function and motivation in hospitalized elderly patients, there was no formal power calculation for this pilot study.

### *Randomisation*

Participants were assigned to either a control group or an intervention group using a computer-generated random number. The allotment procedure was blinded to participants, nurses and therapists, but the study coordinator was not blinded. The coordinator was not involved in any coordination processes in the MDT meetings.

### *Statistical methods*

We assessed assumption of normality using the Shapiro-Wilk test, and found the data was not normally distributed. As a result, non-parametric statistics were applied. The chi-square test or the Mann-Whitney U test were used to compare a mix of nominal, ordinal and ratio variables in socio-demographic and clinical characteristics between the two groups. Within-group analyses were performed using the Wilcoxon signed-rank test for the FIM and the Vitality Index scores between different time points. The Mann-Whitney U test was used to compare the FIM and the Vitality Index scores between the two groups.

The effect size *r* for each outcome variable was calculated to indicate the magnitude of performance difference. The effect size *r* is considered to be a large effect at 0.50, a moderate effect at 0.30, and a small effect at 0.10 (Cohen, 1988). Statistical analyses were performed using IBM SPSS for Windows, version 26. Significance was set at $p < .05$.

## Results

Figure 1 shows the recruitment and assignment of participants. Of the 388 patients admitted to the community-based care ward between September 2016 and March 2017, 94 patients did not meet the inclusion criteria. Two hundred fifty-six patients, including patients who did not give informed consent (n =

245) or terminal cancer patients (n = 11) were excluded. The remaining 38 patients consented to participate in the study were allocated to either the control group (n = 20) or the intervention (n = 18) group. A discharge assessment of one patient in the intervention group, who moved back to an acute ward for treatment of another illness, was performed five days after the nurse-OT meeting.

Baseline socio-demographic and clinical characteristics are summarized in Table 1. The median ages of control and intervention participants were 85.0 (IQR 83.0-88.0) years with 9 males and 11 females, and 84.5 (IQR 76.0-89.0) years with 6 males and 12 females, respectively. The median lengths of stay in the acute ward were 18.5 (IQR 16.0-27.0) and 19.5 (IQR 14.0-24.0) days, respectively. Most participants had musculoskeletal disease or disuse syndrome (84.2%). The baseline characteristics between the two groups did not differ significantly.

During the hospital stay, both control and intervention groups received a similar length of rehabilitation therapy per day (median (IQR) of 56.5 (47.5-61.0) vs. 47.0 (40.0-59.0) minutes).

The control group reviewed a weekly MDT meeting approximately three times (median (IQR) of 3.0 (1.5-5.0)). The patients in the intervention group reviewed the nurse-OT meeting once, in addition to a similar number of MDT meetings (median (IQR) of 3.0 (2.0-4.0)). The nurse-OT meeting was held 7.0 days (IQR 5.5-9.0) after admission. No significant differences were detected for either discharge destination or length of stay.

Table 2 shows the results of comparisons within and between the two groups. In the within-group analyses, both groups showed significant improvements in the FIM total, FIM motor, Self-care, Sphincter, Transfer and Locomotion scores with a large effect ($p \leq .018$, $r \geq .52$). In contrast, the FIM cognitive, the FIM Social cognition, the Vitality Index total, Feeding, and On and off toilet in the Vitality Index subscales showed significant improvements only in the intervention group with a moderate to large effect ($p \leq .046$, $r \geq .47$).

Intergroup comparisons showed that the intervention group gained additional improvements in the FIM cognitive, FIM gain cognitive, and FIM efficiency cognitive scores, and the Vitality Index total and Vitality Index Feeding scores with moderate effect size ($p \leq .048$, $r \geq .32$).

## Discussion

We found that there were additional improvements in the FIM cognitive, the FIM gain cognitive and the FIM efficiency cognitive scores, and the Vitality Index total and Vitality Index Feeding scores in the intervention group, whereas the FIM motor scores improved in both groups.

The intervention group gained significant improvements in social-cognitive function and motivation compared to the control group. One obvious reason for this difference is the therapy integration into ADL in the nurse-OT meeting. One limitation of a conventional MDT meeting is a lack of interaction between meeting members. Most of the time is spent on reporting each patient's current state and there is little time to discuss individual problem solving and goal setting (Monaghan et al., 2005). To solve this problem, we first observed the communication behaviours among the team members and found that one barrier to effective interaction was differences in perception of patients' problems. To minimize the efforts needed to reach a consensus on patient's problems and maximize interaction to solve the problems, we adopted the SBAR technique in the nurse-OT meeting. The situations and background information of specific episodes were reported at the beginning of the meeting. At this stage, professional interpretations and judgments were excluded as much as possible. After creating a mutual understanding of the current state, the assessment phase was initiated. Clear separation between facts and value was helpful when discussing concrete plans with limited meeting time. For example, when the nurse-OT meeting identified that a patient's frequent incontinence episodes (Situation and Background) were due to a problem with using a nurse call button to get help to go to the toilet (Assessment), the responsible OT was advised to find a solution to help the patient become familiar with using the button, and the ward nurses were advised to regularly encourage the patient to go to the toilet with a supportive attitude (Recommendation). The usefulness of the SBAR technique observed in the nurse-OT meeting could provide critical information for the design of successful MDT meetings.

The nurse-OT meeting provided a framework for effective communications between nurses and OTs. In elderly care, the two professions have different viewpoints regarding care, although both are engaged in the same activities associated with self-care. For example, OTs focus on maximizing the capacity levels of ADL, whereas nurses mainly support the performance levels of ADL outside rehabilitation therapy (Singh et al., 2018). OTs prefer to use prompting and instructing, whereas nurses use supervision when interacting with

patients (Booth, 2001). Sometimes these different priorities and interaction styles in an overlapping area of work lead to conflict between the two professions. Atwal (2002) identified that the interprofessional relationship between nurses and OTs is often problematic owing to role confusion and competing priorities, and emphasized the importance of effective communication. By using the nurse-OT meeting as a chance to note the similarities and differences in nurse and OT roles, we could develop a framework for enhancing effective team communication.

Contrary to our expectations, an additional improvement was found in social-cognitive function, although the function was not a major issue discussed in the meetings. Many studies reported the effects of CP for hospitalized elderly patients. For example, Steeman et al. (2006) demonstrated that discharge management shared between trained nurses and social workers increased the rate of home discharge. Similarly, Healey et al. (2004) showed that collaboration between nurses and physical therapists to prevent patients' falls contributed to reducing fall incidents. These studies indicate that targeted outcomes are directly influenced by interventional approaches. In line with previous studies, we expected further improvements in ADL performance in intervention patients. However, the additional improvement was found in social-cognitive function. One reason may be behavioural changes in elderly patients caused by the CP between nurses and OTs. Hospitalized elderly patients tend to feel a sense of isolation from their healthy life (Clarke et al., 2018). Moreover, they also tend to feel confused or depressed in a new living environment (Givens et al., 2009). These behavioural restrictions and emotional distress increase a sense of isolation, resulting in a deterioration in relationship quality with others (Jurgens et al., 2012). The essential nature of our therapy integration into ADL was to create consistent and supportive attitudes toward the elderly patients to solve their ADL performance problems. Thus, it is reasonable to assume that the unified approach to care increased the social interaction of patients with healthcare workers, and their behavioural changes were seen in the improvement in social-cognitive function.

The Vitality Index was also improved in the intervention group, suggesting that the unified approach to care could increase not only social interaction, but also self-confidence in living daily life. Of the five items in the Vitality Index, the improved items were Feeding and On and off toilet, which were mainly discussed in the nurse-OT meeting. However, it should be noted that no additional improvement was found in the Self-care or Sphincter items of the FIM motor section. This discrepancy can be explained by a study that reported a time gap between motivation and actual behaviour (Toba et al., 2002). The study examined the

effectiveness of a behavioural intervention program for urinary incontinence, and found that an improvement in ADL performance occurred one or two weeks after increased motivation. Another study found a similar time gap between the motivation and actual behaviour (Sniehotta et al., 2005). Taken together, it is possible to assume that increased motivation is a critical step for independent ADL.

The FIM motor scores were significantly improved in both the control and intervention groups. This result indicates that intensive rehabilitation in a community-based care ward was useful to improve ADL performance, regardless of the intervention. In Japan, medical costs have increased with the growing elderly population, and these socioeconomic changes have caused a paradigm shift in health care from hospital-based to community-based (Arai et al., 2015). Under such circumstances, a community-based care ward system was launched to facilitate short-term intensive rehabilitation aiming at early home discharge (Ministry of Health, Labor and Welfare Japan, 2014). Another type of hospital unit providing rehabilitation services is a convalescent rehabilitation ward (Mutai et al., 2012). Generally, patients needing convalescent rehabilitation such as stroke and hip fracture patients use the ward. In this study, we found that our study patients had a shorter length of stay (median (IQR) of 20.0 (17.0-32.0) days, mean ± SD of 25.2 ± 14.8 days) and higher FIM gain motor (median (IQR) of 10.5 (5.0-19.0), mean ± SD of 14.6 ± 12.9 points) than those in a convalescent rehabilitation ward (mean ± SD of 54.5 ± 37.7 days, 10.1 ± 10.9 points) (Mutai et al., 2012). Although the baseline characteristics between the two studies were not adjusted, it is reasonable to assume that the community-based care ward was useful to facilitate early home discharge and recovering ADL performance.

## Limitations

Several limitations of the present study should be acknowledged. Firstly, this study included selection bias due to the nature of the pilot study. The participants were recruited from a single facility and most participants had musculoskeletal disease or disuse syndrome. This may affect the generalizability of the study findings. Secondly, the sample size was small. Low recruitment rates for pilot RCTs are a common issue (Gailey et al., 2020). In the present study, identifying eligible patients and obtaining informed consent from both patients and their family members by one study coordinator was a considerable challenge. This resulted in a low recruitment rate (9.8%). To increase the sample size, administrative support at the organizational level

will be essential. Another limitation was the risk of treatment contamination. Although the nurses and therapists were blinded in the study, the same staff provided hospital care to both groups. The unified approach to care provided for intervention patients was exposed to all staff members, and therefore it may have been possible that the staff-patient relationships in the ward were radically changed. To more clearly test the effect of the nurse-OT meeting, a cluster-randomized trial design should be considered in future RCTs.

## Conclusion

We found significant improvements in motor function in both the control and intervention groups, and additional improvements in social-cognitive function and motivation in the intervention group compared to the control group. These observations suggest that CP between nurses and OTs could improve fundamental functions underlying independent daily life in hospitalized elderly patients.

## Key findings

A nurse-OT meeting improved patients' social-cognitive function and motivation, as well as motor function. The meeting provides a new model of nurse-OT collaboration for elderly patients in intensive rehabilitation units.

## What the study has added

This study assessed the effectiveness of a nurse-occupational therapist meeting in a subacute hospital setting. The collaborative practice has the potential to improve hospital care services for elderly patients.

**References**

Arai H, Ouchi Y, Toba K, et al. (2015) Japan as the front-runner of super-aged societies: Perspectives from

medicine and medical care in Japan. *Geriatrics & gerontology international* 15(6): 673-687.

Atwal A (2002) A world apart: How occupational therapists, nurses and care managers perceive each other in acute health care. *British Journal of Occupational Therapy* 65(10): 446-452.

Avelino-Silva TJ, Farfel JM, Curiati JA, et al. (2014) Comprehensive geriatric assessment predicts mortality and adverse outcomes in hospitalized older adults. *BMC geriatrics* 14(1): 129.

Booth J, Davidson I, Winstanley J, et al. (2001) Observing washing and dressing of stroke patients: nursing intervention compared with occupational therapists. What is the difference? *Journal of Advanced Nursing* 33(1): 98-105.

Bornet MA, Truchard ER, Rochat E, et al. (2017) Factors associated with quality of life in elderly hospitalised patients undergoing post-acute rehabilitation: a cross-sectional analytical study in Switzerland. *BMJ open* 7(10): e018600.

Brown CJ, Friedkin RJ and Inouye SK (2004) Prevalence and outcomes of low mobility in hospitalized older patients. *Journal of the American Geriatrics Society* 52(8): 1263-1270.

Brown CJ, Redden DT, Flood KL, et al. (2009) The underrecognized epidemic of low mobility during hospitalization of older adults. *Journal of the American Geriatrics Society* 57(9): 1660-1665.

Charlson ME, Pompei P, Ales KL, et al. (1987) A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *Journal of Clinical Epidemiology* 40(5): 373-383.

Clarke C, Stack C and Martin M (2018) Lack of meaningful activity on acute physical hospital wards: Older people's experiences. *British journal of occupational therapy* 81(1): 15-23.

Cohen J (1988) *Statistical power analysis for the behavioral sciences. 2nd ed.* Hillsdale: Lawrence Erlbaum Associates.

Cornette P, Swine C, Malhomme B, et al. (2005) Early evaluation of the risk of functional decline following hospitalization of older patients: development of a predictive tool. *The European Journal of Public Health* 16(2): 203-208.

Cunningham C, Wensley R, Blacker D, et al. (2012) Occupational therapy to facilitate physical activity and enhance quality of life for individuals with complex neurodisability. *British journal of occupational therapy* 75(2): 106-110.

Fogg C, Griffiths P, Meredith P, et al. (2018) Hospital outcomes of older people with cognitive impairment: An integrative review. *International journal of geriatric psychiatry* 33(9): 1177-1197.

Fujita T, Sato A, Tsuchiya K, et al. (2017) Relationship between Grooming Performance and Motor and Cognitive Functions in Stroke Patients with Receiver Operating Characteristic Analysis. *Journal of Stroke and Cerebrovascular Diseases* 26(12): 2828-2833.

Gailey R, Gaunaurd I, Raya M, et al. (2020) Effectiveness of an Evidence-Based Amputee Rehabilitation Program: A Pilot Randomized Controlled Trial. *Physical Therapy* 100(5): 773-787.

Gialanella B, Santoro R and Ferlucci C (2013) Predicting outcome after stroke: the role of basic activities of daily living predicting outcome after stroke. *European journal of physical and rehabilitation medicine* 49(5): 629-637.

Givens JL, Jones RN and Inouye SK (2009) The overlap syndrome of depression and delirium in older hospitalized patients. *Journal of the American Geriatrics Society* 57(8): 1347-1353.

Harrison JK, Walesby KE, Hamilton L, et al. (2017) Predicting discharge to institutional long-term care following acute hospitalisation: a systematic review and meta-analysis. *Age and Ageing* 46(4): 547-558.

Healey F, Monro A, Cockram A, et al. (2004) Using targeted risk factor reduction to prevent falls in older in-patients: a randomised controlled trial. *Age and Ageing* 33(4): 390-395.

Heruti RJ, Lusky A, Dankner R, et al. (2002) Rehabilitation outcome of elderly patients after a first stroke: effect of cognitive status at admission on the functional outcome. *Archives of physical medicine and rehabilitation* 83(6): 742-749.

Ide-Okochi A, Tadaka E and Fujimura K (2013) The meaning of self-care in persons with cervical spinal cord injury in Japan: a qualitative study. *BMC neurology* 13(1): 115.

Jurgens FJ, Clissett P, Gladman JR, et al. (2012) Why are family carers of people with dementia dissatisfied with general hospital care? A qualitative study. *BMC geriatrics* 12(1): 1-10.

Lee SJ, Lindquist K, Segal MR, et al. (2006) Development and validation of a prognostic index for 4-year mortality in older adults. *Journal of the American Medical Association* 295(7): 801-808.

Long AF, Kneafsey R, Ryan J, et al. (2002) The role of the nurse within the multi-professional rehabilitation team. *Journal of advanced nursing* 37(1): 70-78.

Ministry of Health, Labor and Welfare Japan (2014) Image and Requirements of community-based care ward. Available at: www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000039380. pdf (accessed 13 June 2020).

Monaghan J, Channell K, McDowell D, et al. (2005) Improving patient and carer communication,

multidisciplinary team working and goal-setting in stroke rehabilitation. *Clinical rehabilitation* 19(2): 194-199.

Mutai H, Furukawa T, Araki K, et al. (2012) Factors associated with functional recovery and home discharge in stroke patients admitted to a convalescent rehabilitation ward. *Geriatrics & gerontology international* 12(2): 215-222.

Sands LP, Yaffe K, Covinsky K, et al. (2003) Cognitive screening predicts magnitude of functional recovery from admission to 3 months after discharge in hospitalized elders. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 58(1): 37-45.

Singh R, Kuçukdeveci AA, Grabljevec K, et al. (2018) The Role of interdisciplinary teams in physical and rehabilitation medicine. *Journal of rehabilitation medicine* 50(8): 673-678.

Sniehotta FF, Scholz U and Schwarzer R (2005) Bridging the intention–behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology & health* 20(2): 143-160.

Steeman E, Moons P, Milisen K, et al. (2006) Implementation of discharge management for geriatric patients at risk of readmission or institutionalization. *International journal for quality in health care* 18(5): 352-358.

Toba K, Nakai R, Akishita M, et al. (2002) Vitality Index as a useful tool to assess elderly with dementia. *Geriatrics & gerontology international* 2(1): 23-29.

Tokunaga M, Mita S, Tashiro K, et al. (2017) Methods for comparing Functional Independence Measure (FIM) improvement degree for stroke patients between rehabilitation hospitals. *International Journal of Physical Medicine & Rehabilitation* 5(2): 394.

Tsuchiya K, Yamaguchi T, Fujita T, et al. (2016) A quasi-randomized controlled trial of brain-activating rehabilitation in an acute hospital. *American Journal of Alzheimer's Disease & Other Dementias* 31(8): 612-617.

Velji K, Baker GR, Fancott C, et al. (2008) Effectiveness of an adapted SBAR communication tool for a rehabilitation setting. *Healthcare Quarterly* 11(3): 72-79.

Zisberg A, Shadmi E, Sinoff G, et al. (2011) Low mobility during hospitalization and functional decline in older adults. *Journal of the American Geriatrics Society* 59(2): 266-273.

Table 1. Socio-demographic and clinical characteristics of the participants (n = 38)

| | Control (n = 20) | Intervention (n =18) | *p* |
|---|---|---|---|
| Age, year, median (IQR) | 85.0 (83.0-88.0) | 84.5 (76.0-89.0) | .242 |
| Sex, number, male/female | 9/11 | 6/12 | .463 |
| Living state, number, home/facility | 18/2 | 15/3 | .448 |
| Family living together in home living patients, number, alone/with family | 11/7 | 12/3 | .214 |
| Length of stay in acute ward, days, median (IQR) | 18.5 (16.0-27.0) | 19.5 (14.0-24.0) | .510 |
| Disease classification, number (%) | | | |
| Stroke | 1 (5.0) | 1 (5.6) | |
| Musculoskeletal disease | 8 (40.0) | 7 (38.9) | |
| Respiratory disease | 1 (5.0) | 1 (5.6) | |
| Cardiovascular disease | 1 (5.0) | 1 (5.6) | |
| Disuse syndrome | 9 (45.0) | 8 (44.4) | |
| Charlson comorbidity index, median (IQR) | 0.0 (0.0-1.5) | 1.0 (0.0-2.0) | .617 |
| Amount of therapy received, minutes, median (IQR) | 56.5 (47.5-61.0) | 47.0 (40.0-59.0) | .279 |
| Number of weekly meetings, median (IQR) | 3.0 (1.5-5.0) | 3.0 (2.0-4.0) | .491 |
| Number of nurse-OT meetings, median (IQR) | - | 1.0 (1.0-1.0) | |
| Number of days from admission to nurse-OT meeting, median (IQR) | - | 7.0 (5.5-9.0) | |
| Discharge destination, number, home/others | 11/9 | 14/4 | .139 |
| Length of stay, days, median (IQR) | 18.0 (12.0-37.5) | 23.5 (20.0-31.0) | .161 |

OT: Occupational Therapist

Table 2. Summary of outcome measurements at admission and discharge (n = 38)

| | Control (n = 20) | | | | Intervention (n = 18) | | | | Control vs. Intervention | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Admission | Discharge | | | Admission | Discharge | | | Admission | | Discharge | |
| | | | *p* | *r* | | | *p* | *r* | *p* | *r* | *p* | *r* |
| FIM, median (IQR) | | | | | | | | | | | | |
| Total | 73.5 (48.5-86.5) | 87.0 (62.5-99.0) | **< .001** | .79 | 59.5 (42.0-94.0) | 100.0 (62.0-110.0) | **< .001** | .88 | .770 | .05 | .292 | .17 |
| Motor | 44.5 (21.5-57.5) | 57.5 (37.0-72.0) | **< .001** | .81 | 33.5 (24.0-61.0) | 69.5 (33.0-75.0) | **< .001** | .88 | .942 | .01 | .248 | .19 |
| Self-care | 22.0 (14.5-29.5) | 27.5 (23.0-32.5) | **< .001** | .80 | 19.5 (14.0-28.0) | 33.0 (15.0-36.0) | **< .001** | .88 | .918 | .02 | .247 | .19 |
| Sphincter | 9.0 (2.5-12.0) | 12.0 (7.5-14.0) | **.017** | .53 | 7.0 (2.0-12.0) | 10.5 (4.0-14.0) | **.007** | .63 | .474 | .12 | .892 | .02 |
| Transfer | 11.0 (6.5-13.0) | 13.0 (11.0-15.0) | **.001** | .71 | 10.0 (4.0-13.0) | 15.5 (9.0-17.0) | **< .001** | .86 | .255 | .18 | .132 | .24 |
| Locomotion | 3.5 (2.0-8.5) | 8.5 (2.0-10.5) | **.018** | .52 | 2.0 (2.0-7.0) | 7.0 (5.0-10.0) | **.005** | .67 | .403 | .14 | .976 | .00 |
| Cognitive | 25.0 (16.5-29.0) | 26.0 (17.0-28.0) | .558 | .13 | 27.5 (18.0-33.0) | 30.0 (20.0-33.0) | **.004** | .68 | .305 | .17 | **.048** | .32 |
| Communication | 12.5 (10.0-14.0) | 12.0 (10.0-14.0) | .581 | .12 | 12.0 (10.0-14.0) | 14.0 (10.0-14.0) | .140 | .35 | .988 | .00 | .342 | .15 |
| Social cognition | 14.0 (8.5-16.0) | 14.0 (10.5-15.5) | .215 | .27 | 15.5 (8.0-19.0) | 17.5 (10.0-20.0) | **.008** | .63 | .411 | .13 | .106 | .26 |
| FIM gain, median (IQR) | | | | | | | | | | | | |
| Total | 10.0 (3.0-19.0) | | - | - | 14.0 (10.0-30.0) | | - | - | - | - | .070 | .29 |
| Motor | 8.5 (3.0-18.5) | | - | - | 11.5 (8.0-24.0) | | - | - | - | - | .107 | .26 |
| Cognitive | 0.0 (0.0-1.0) | | - | - | 1.0 (0.0-3.0) | | - | - | - | - | **.035** | .34 |
| FIM efficiency, median (IQR) | | | | | | | | | | | | |
| Total | 0.4 (0.1-1.0) | | - | - | 0.6 (0.4-1.4) | | - | - | - | - | .077 | .29 |
| Motor | 0.4 (0.1-0.8) | | - | - | 0.6 (0.3-1.3) | | - | - | - | - | .188 | .21 |
| Cognitive | 0.0 (0.0-0.0) | | - | - | 0.1 (0.0-0.1) | | - | - | - | - | **.042** | .33 |
| Vitality Index, median (IQR) | | | | | | | | | | | | |
| Total | 7.0 (5.0-8.0) | 8.0 (5.0-8.0) | .238 | .26 | 8.0 (5.0-9.0) | 9.0 (8.0-10.0) | **.007** | .64 | .365 | .15 | **.027** | .36 |
| Waking pattern | 1.0 (1.0-2.0) | 1.5 (1.0-2.0) | .317 | .22 | 2.0 (1.0-2.0) | 2.0 (2.0-2.0) | .059 | .45 | .695 | .06 | .105 | .26 |
| Communication | 1.0 (1.0-2.0) | 1.0 (1.0-2.0) | .564 | .13 | 1.0 (1.0-2.0) | 1.5 (1.0-2.0) | .317 | .24 | .807 | .04 | .541 | .10 |
| Feeding | 2.0 (1.0-2.0) | 2.0 (1.0-2.0) | .317 | .22 | 2.0 (2.0-2.0) | 2.0 (2.0-2.0) | **.046** | .47 | .145 | .24 | **.003** | .48 |
| On and off toilet | 1.5 (1.0-2.0) | 2.0 (1.0-2.0) | .157 | .32 | 2.0 (1.0-2.0) | 2.0 (2.0-2.0) | **.034** | .50 | .794 | .04 | .196 | .21 |
| Rehabilitation or other activities | 1.0 (1.0-1.0) | 1.0 (1.0-1.0) | 1.000 | .00 | 1.0 (1.0-2.0) | 1.0 (1.0-2.0) | .317 | .24 | .243 | .19 | .137 | .24 |

Values in bold indicate a significant difference

FIM: Functional Independence Measure

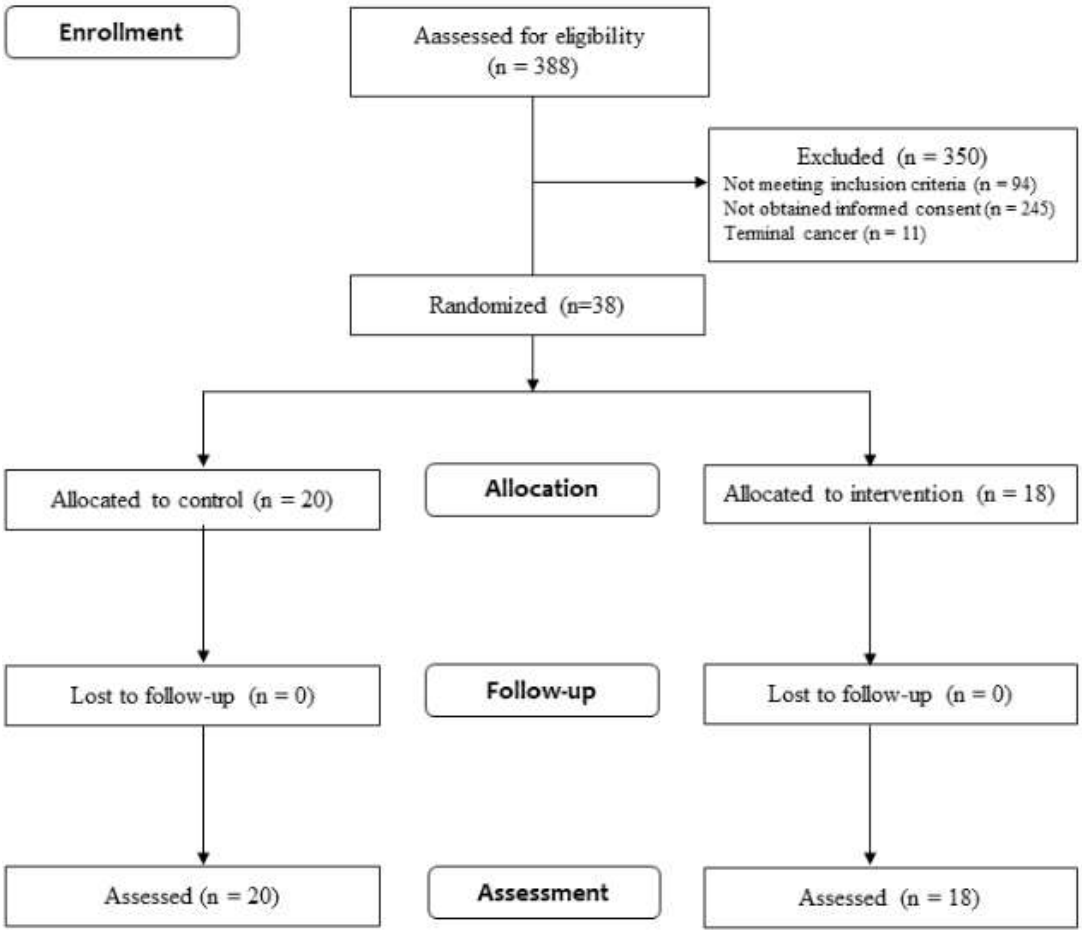


Figure 1. Participant flow throughout the study.