

Original Article



# Comparison Between Comprehensive Nursing Care Ward and Private Care Ward on Functional Recovery in Stroke Patients

OPEN ACCESS

Yang Rok Hur, Woo Sup Song, Kyung Min Kim, Ki Hun Hwang

**Received:** Mar 31, 2022  
**Revised:** Jun 9, 2022  
**Accepted:** Jul 6, 2022  
**Published online:** Aug 14, 2022

**Correspondence to**

**Yang Rok Hur**

Department of Physical Medicine and Rehabilitation, Dong-Eui Hospital, 62, Yangjeong-ro, Busanjin-gu, Busan 47227, Korea.  
Email: roko1919@naver.com

## HIGHLIGHTS

- Nursing care system without caregiver was offered as a solution for financial burden.
- Compared existing system, there is no significant difference in post stroke recovery.
- Comprehensive nursing care wards can be a good alternative against existing wards.

Original Article



# Comparison Between Comprehensive Nursing Care Ward and Private Care Ward on Functional Recovery in Stroke Patients

Yang Rok Hur , Woo Sup Song , Kyung Min Kim , Ki Hun Hwang

Department of Physical Medicine and Rehabilitation, Dong-Eui Hospital, Busan, Korea



**Received:** Mar 31, 2022  
**Revised:** Jun 9, 2022  
**Accepted:** Jul 6, 2022  
**Published online:** Aug 14, 2022

**Correspondence to**

**Yang Rok Hur**  
Department of Physical Medicine and Rehabilitation, Dong-Eui Hospital, 62, Yangjeong-ro, Busanjin-gu, Busan 47227, Korea.  
Email: roko1919@naver.com

Copyright © 2022. Korean Society for Neurorehabilitation

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**ORCID iDs**

Yang Rok Hur   
<https://orcid.org/0000-0002-7281-608X>  
Woo Sup Song   
<https://orcid.org/0000-0002-6083-0511>  
Kyung Min Kim   
<https://orcid.org/0000-0003-4507-4022>  
Ki Hun Hwang   
<https://orcid.org/0000-0002-8041-4363>

**Funding**

None.

**Conflict of Interest**

The authors have no potential conflicts of interest to disclose.

## ABSTRACT

The need for a comprehensive nursing care service ward (CNCW) is emerging, but few studies have investigated its medical validity. This study aimed to assess the effect of hospitalization on functional recovery and fall incidence in poststroke patients. This retrospective study enrolled 354 patients with subacute stroke between July 2017 and April 2020. CNCW provided full caregiving and nursing to the patient. Baseline demographic and hospital data, including fall occurrence, were collected. Functional outcomes, including the Medical Research Council (MRC), Korean version of the Modified Barthel Index (K-MBI), and Korean version of the Mini-Mental State Examination (K-MMSE), were evaluated upon admission and discharge. One hundred seventy-two patients were hospitalized in CNCW among the 354 stroke patients. Initial and final K-MMSE and K-MBI were significantly higher in the CNCW group. The K-MMSE score gain was significantly lower in the CNCW group ( $p < 0.05$ ). The fall occurrence was significantly higher in the CNCW group ( $p < 0.01$ ). Hospitalization in CNCW adversely affected cognitive function after stroke. Falls were detected more frequently and reported in CNCW.

**Keywords:** Nursing Services; Stroke; Hospitals; Rehabilitation

## INTRODUCTION

Care for patients with stroke is important with neurological sequelae. In particular, subacute stroke patients with moderate or high disabilities must rely on others, mainly caregivers, for most of their daily activities [1]. In Korea, patients admitted to hospital wards are mainly cared for by their family members or caregivers. Caregivers' employment incurs a social burden of approximately 2 trillion won per year, and the expenditure on caregiving is emerging as a social problem that goes beyond the economic burden of patients [2]. Korea has a longer hospitalization period than other countries do, and this issue is burdensome [3]. Currently, personal caregiving services are in the form of private contracts between patients and caregivers and are provided separately from the nursing system [4]. However, in Korea, caregivers are not systematically managed. Furthermore, 34.9% of medical institutions manage caregiving companies, and 40.6% evaluate companies indirectly rather than directly [5,6]. In addition, only 53.4% of hospitals have caregiver management departments [6].

Meanwhile, only 37.4% of caregivers receive regular training, and the average training time annually is only 4.5 hours; hence, the education for caregivers is limited [7]. The Korean government previously attempted to establish hospitals without individual guardians to relieve the existing economic burden of nursing care and improve the quality of hospitalization services; based on this effort, it implemented a pilot project for comprehensive nursing care services in 2013 [8]. Comprehensive nursing care services are currently enforced by the government; however, hospital board members' positions and leading intentions are essential until the service is settled. However, previous studies on comprehensive nursing care services were conducted with a focus on the adequacy of human resources, including the satisfaction of nurses and patients and the work stress of nurses; hence, the medical validity of such services has rarely been explored [2,9,10]. In the current study, we aimed to analyze the rehabilitation process of stroke patients admitted to a comprehensive nursing care service ward (CNCW) on the basis of specific indices to confirm the socioeconomic requirements of caregiving services and the validity of their medical aspects.

## MATERIALS AND METHODS

### Participants

This retrospective study targeted patients with subacute stroke who received inpatient rehabilitation treatment between July 2017 and April 2020. Data collection for this study was approved by the Ethics Committee of the Dong-Eui Hospital (No. 2021-04). Consent collection was not necessary because of the retrospective nature of the medical record investigation conducted in this study.

For patients with subacute stroke in this study, the subacute phase refers to a period of 15–90 days until the date of admission to the rehabilitation medicine department [11,12]. The inclusion criteria for the study subjects were as follows: patients diagnosed with cerebral infarction or cerebral hemorrhage for the first time, patients with unilateral stroke, patients with stroke at the subacute stage (15 to 90 days after stroke onset), and patients over 18 years of age. The exclusion criteria were as follows: patients with recurrent stroke, patients with bilateral stroke lesions, patients with other diseases that may affect daily life function, and patients transferred to other wards or hospitals because of worsening conditions. Patients with a hospitalization period of less than 4 weeks were also excluded to evaluate the long-term treatment effect of the CNCW. A total of 354 patients who received rehabilitation treatment within four weeks were included in the study. Patient characteristics were collected based on the information recorded at the time of hospitalization. Data on sex, stroke type, lesion location, morbidity, paralysis side, duration from onset to start of rehabilitation, treatment period, body mass index, and Charlson comorbidity index were collected. The inpatients were subjected to physical and occupational therapy by certified physical and occupational therapists, respectively. Each treatment was performed five times a week, twice daily for 30 min/day. In terms of the cost of the 2 wards, the CNCW calculated the average daily hospitalization cost, and the general ward set the total cost as the sum of the hospitalization cost and personal care cost. Medical expenses were excluded for both groups.

### Differences between the comprehensive nursing care and general wards

The CNCW provides all nursing and caregiving services following patient hospitalization, on the premise of operating a separate ward. The CNCW provides nurses, nursing assistants, and caregiving support staff in charge of meeting the needs of patients, including nursing

assistance, personal hygiene, and meals. Dong-Eui Hospital is a general hospital, and according to the regulations of the Ministry of Health and Welfare, the ratios of nurses, nursing assistants, and support staff to patients in the CNCW are 1:10 or less, 1:25 or less, and 1:4, respectively. The general ward consisted only of nurses without nursing assistants, and the nurse-to-patient ratio was approximately 1:16. In this ward, patients' guardians or private caregivers are in charge of caregiving. In the CNCW, nursing assistants and support staff continuously receive education on the nursing delivery system, patient safety management, and infection control. In this study, patients with cognitive impairment or those facing a high fall risk from hospitalization were excluded from the CNCW patient group prior to the evaluation of the Korean version of the Mini Mental State Examination (K-MMSE) scores, Korean version of the Modified Barthel Index (K-MBI) scores, and other indicators by 4 rehabilitation medicine specialists.

### Functional ability evaluation and slip down rate

This study used the average Medical Research Council (MRC) score to measure the patients' muscle strength. The doctor and physical therapist in charge averaged the muscle strength of the shoulder, elbow, wrist, finger, hip, knee, and ankle joints on the hemiplegic side, with scores ranging from 0 to 5. To evaluate the cognitive function, an occupational therapist performed the K-MMSE. The K-MMSE items consisted of endurance, memory registration and recall for time and space, attention and calculation, and language and space–time composition items. These items were measured with scores in the range of 0–30 points. Patients' functional abilities were evaluated by an occupational therapist using the K-MBI. The K-MBI consists of items pertaining to personal hygiene, bathing, eating, toilet use, undressing, stool and urine control, movement, walking, and wheelchair movement. Each item was scored in the range of 0–100 points. To assess the severity of the stroke, the attending physician used the National Institute of Health Stroke Scale (NIHSS) in the early stages of hospitalization. In terms of identifying neurological disorders, the NIHSS consists of items pertaining to consciousness, gaze, visual field, facial palsy, limb motor, ataxia, sensory, language, dysarthria, and extension and intension. These items were scored in the range of 0–42 points. NIHSS scores less than 6, between 7 and 15, and 16 or higher were classified as mild, moderate, and severe strokes, respectively. Functional evaluation was performed on admission and discharge, and the effectiveness of functional recovery was calculated by dividing the difference between discharge and admission by the initial score. Injuries sustained from falling or slipping needed to be reported, and reports were corroborated by nurses under the guidance of seniors. These reports were ultimately managed by a treatment management team.

### Statistical analysis

SPSS Statistics version 26.0 for Windows (IBM Corp, Armonk, NY, USA) was used for the statistical analysis. The 354 patients with subacute stroke included in the study were assigned to the CNCW group (n = 172) and general ward group (n = 182) to compare and analyze demographic differences. In addition, the functional evaluation scores of the two groups were compared along with the degree of functional recovery to confirm any statistically significant changes. Categorical variables were also compared and analyzed using the  $\chi^2$ -test and Fisher's exact test, whereas continuous variables were compared and analyzed using the independent t-test.

## RESULTS

Data from 354 stroke patients were included in the analysis. Demographic characteristics of each group are presented in **Table 1**. In the CNCW, 51.4% of the patients were male, with an average age of  $67.7 \pm 11.75$  years. In the general ward group, 48.5% of the patients were male, and the average age was  $66.1 \pm 12.13$  years. There were no statistically significant differences in the demographic characteristics, including average sex and age, between the two groups. The average NIHSS scores were  $7.39 \pm 2.58$  for the CNCW patients and  $8.23 \pm 3.2$  for the general ward patients. The average NIHSS value was 0.8 lower in the CNCW group than in the general ward group, and this figure was statistically significant ( $p = 0.007$ ). **Table 2** shows the distribution of stroke severity based on the NIHSS scores. In the CNCW group, 45.6% and 54.5% of the patients were found to have mild and moderate strokes. In the general ward group, 35.5% and 64.5% of the patients had mild and moderate strokes. However, no statistically significant difference was found in the results ( $p = 0.052$ ). The results of the functional evaluation and fall occurrence are presented in **Table 3**. K-MMSE and K-MBI scores in the early and late stages were relatively high in the CNCW group. The effectiveness of the K-MMSE recovery was significantly higher in the general ward group at  $2.32 \pm 2.04$  than in the CNCW group at  $2.78 \pm 2.13$  ( $p = 0.03$ ). Likewise, the effectiveness of K-MMSE recovery was higher in the general ward group at  $0.15 \pm 0.15$  than in the CNCW group at  $0.12 \pm 0.13$  ( $p = 0.03$ ). The incidence of falls was significantly higher in the CNCW group ( $p = 0.002$ ). There were no significant differences between the 2 groups in terms of functional recovery in the other sectors.

**Table 1.** Demographics and clinical characteristics of the study participants

Characteristics	CNCW (n = 182)	GW (n = 172)	p value
Age (yr)	67.7 ± 11.75	67.7 ± 11.75	0.21
Sex			0.77
Male	97 (53.3)	89 (51.7)	
Female	85 (46.7)	83 (48.3)	
Type			0.48
Ischemic	127 (69.8)	114 (66.3)	
Hemorrhagic	55 (30.2)	58 (33.7)	
Side			0.29
Right	96 (52.7)	81 (47.1)	
Left	86 (47.3)	91 (52.9)	
Lesion			0.06
Cortical	40 (22)	35 (20.3)	
Subcortical	121 (66.5)	107 (62.2)	
Brainstem	21 (11.5)	5 (2.9)	
Cerebellum	0 (0)	25 (14.5)	
BMI (kg/m <sup>2</sup> )	23.36 ± 3.19	23.98 ± 3.5	0.08
CCI score	3.77 ± 0.89	3.8 ± 1.09	0.76
Time to admission (day)	34.37 ± 21.81	34.02 ± 21.24	0.88
Length of stay (day)	83.02 ± 26.95	86.77 ± 25.53	0.18
NIHSS score	7.39 ± 2.58	8.23 ± 3.2	0.01*

Values are presented as mean ± standard deviation or number (%).

CNCW, comprehensive nursing care service ward; GW, general ward; BMI, body mass index; CCI, Charlson comorbidity index; NIHSS, National Institute of Health Stroke Scale.

\* $p < 0.05$  was considered statistically significant.

**Table 2.** Distribution of stroke severity on each ward

Wards	Mild	Moderate	Severe	Total	p value
CNCW	83 (45.6)	99 (52.4)	0 (0)	182 (100)	0.052
GW	61 (35.5)	111 (64.5)	0 (0)	172 (100)	

NIHSS scores less than 6, between 7 and 15, and 16 or higher were classified as mild, moderate, and severe strokes, respectively.

CNCW, comprehensive nursing care service ward; GW, general ward; NIHSS, National Institute of Health Stroke Scale.

**Table 3.** Initial and final functional outcome and gain according to previous studies and fall occurrence

Outcomes	CNCW	GW	p value
MRC scale average			
Initial	2.21 ± 0.84	2.1 ± 0.89	0.220
Final	2.78 ± 0.75	2.64 ± 0.78	0.096
Gain	0.57 ± 0.41	0.54 ± 0.31	0.537
Effectiveness*	0.34 ± 0.35	0.34 ± 0.29	0.869
K-MMSE			
Initial	23.95 ± 4.45	22.45 ± 5.17	0.004 <sup>‡</sup>
Final	26.27 ± 3.44	25.24 ± 4.26	0.013 <sup>‡</sup>
Gain	2.32 ± 2.04	2.78 ± 2.13	0.036 <sup>‡</sup>
Effectiveness*	0.12 ± 0.13	0.15 ± 0.15	0.027 <sup>‡</sup>
K-MBI			
Initial	46.92 ± 20.15	41.72 ± 20.79	0.017 <sup>‡</sup>
Final	65.10 ± 18.91	59.32 ± 20.34	0.006 <sup>‡</sup>
Gain	18.36 ± 15.72	17.66 ± 12.11	0.635
Effectiveness*	0.65 ± 1.04	0.67 ± 0.76	0.889
Fall occurrence	0.15 ± 0.41	0.05 ± 0.21	0.002 <sup>‡</sup>

Values are presented as mean ± standard deviation.

CNCW, comprehensive nursing care service ward; GW, general ward; MRC, Medical Research Council; K-MMSE, Korean version of Mini-Mental State Examination; K-MBI, Korean version of the Modified Barthel Index.

\*Effectiveness is calculated as: Effectiveness = (Final Score – Initial Score)/Initial Score.

Statistically significant differences were indicated <sup>†</sup>p < 0.05 and <sup>‡</sup>p < 0.01.

As for the cost, the average daily cost was 176,395 won for the CNCW group and 200,662 won for the general ward group (admission fee of 70,662 won + personal care expenses of 130,000 won). Thus, the CNCW was estimated to be about 88% cheaper than the general ward. In addition, the actual self-burden was estimated to be 42,150 won for the CNCW group and 148,500 won for the general ward group (hospitalization fee of 18,500 won + personal care expenses of 130,000 won). In this case, the CNCW was 28% cheaper than the general ward (national policy grants and public health insurance are applied).

## DISCUSSION

The cost and resource issues involved in nursing care service is expected to be deepen as changing social structure into aging population and one person household. To solve these issues, the Korean government introduced comprehensive nursing care services, but the actual medical effectiveness of the system has not been studied. An important difference between the CNCW and general ward is that care is not taken on a one-on-one basis. Care is an important task that involves not only the continuous evaluation of patients' daily activities and requirements, such as meal assistance, personal hygiene, bathing, and toilet use, but also education and feedback on deficiencies [13]. Based on this institutional and clinical background, we identified the need to evaluate the impact of the CNCW on clinical value. According to the results of this study, hospitalization in the CNCW did not significantly affect the recovery of motor function based on MRC and K-MBI scores ( $p > 0.05$ ). This outcome was possibly due to professionally educated caregivers, even those assigned to multiple patients, being able to contribute to functional recovery by providing sufficient feedback on daily care [14]. Meanwhile, no difference was observed in the rehabilitation facilities where motor function rehabilitation was mainly performed. According to previous studies, CNCWs do not provide emotional support to patients [15]. However, given that patients' recovery of motor function at the time of discharge can be reduced by affective problems [16,17], and that family mediated exercise activities help patients achieve functional recovery [18], CNCWs can be regarded as important facilities. The degree of recovery based on the K-MMSE



score was lower in the CNCW group than that in the general ward group. The recovery of poststroke enhancement can be affected in a combinational environment because of various influencing factors, such as sex, age, education level, patient participation in treatment, and underlying diseases [19]. In this study, the results were considered to be ceiling effects with lower recovery because of the high initial K-MMSE and low NIHSS scores in the CNCW group, which is consistent with previous studies [18]. In addition, cognitive function recovery can be negatively affected by affective problems [20] caused by a lack of emotional support, which is a disadvantage of the aforementioned integrated nursing and caregiving service ward [15]. The incidence of falls in the CNCW group was higher than that in the general ward group, which is consistent with the report by Son et al. [21], who analyzed falls in patients in a CNCW for 4 years. Previously, fall incidences were reported in cases of actual injuries; however, reports of falls not involving physical injuries have gradually increased, given the emphasis on patient safety issues and the conduct of medical institution evaluations. As falls are voluntarily reported by patients and nearby medical personnel, reports may actually be omitted, and the rate of omitted reports may be 25% [22,23]. Most falls occur with no witnesses and nurses around [24-26]. Through longer contact between patients and nurses, patients can receive help quickly, and the possibility of injury is minimized, resulting in higher reporting rates of minor falls [21]. Relative to the general ward, the CNCW in our hospital increased the duration of face-to-face interactions between nurses and patients by reducing the number of patients per nurse by more than 50% and increasing the number of regular nurse rounds. In other words, the higher incidence of falls in the CNCW than in the general ward is attributed to the ward's higher reporting rate of minor falls without injuries, which can be regarded as a positive effect in terms of patient safety [21]. Except for the MMSE, the MRC, MBI, and activities of daily living scores are not related to the type of ward. In terms of cost, admission to a CNCW can be a good economic choice for patients who need motor function recovery as CNCWs appear to be about 88% cheaper than general wards.

This study had several limitations. First, there is little published data that can be used for comparison; therefore, the interpretation of the results is limited. Second, owing to the limitations of the retrospective research method, it was not possible to evaluate the quality of treatment and patients' motivation or participation in treatment. Third, caregivers in the general wards were a mix of family and private caregivers, but they were not distinguished in the study. Fourth, there might be significant differences in the initial evaluation of the K-MMSE and K-MBI scores between the two groups because of the restrictions on CNCW hospitalization for patients with low cognitive function or a high fall risk. These differences might have affected the results pertaining to the degree of functional recovery. Fifth, there was no statistically different distribution of stroke severity between the 2 wards, but there was a significant difference of about 0.8 in the average NIHSS score. This difference might have affected the results for the functional recovery of the CNCW group, which was a relatively mild patient group. Sixth, the possibility that a patient's mood influenced the recovery of cognitive and physical functions was discussed; however, due to the limitations of the retrospective research method, the patients' moods during hospitalization in the study were inferred based on existing research data. Finally, in addition to the affective and ceiling effects, several factors can affect the recovery of patients' cognitive function, but such factors were not considered in the study because of the limitations of the retrospective research approach.

In conclusion, hospitalization in integrated nursing and caregiving service wards not only helps relieve physical fatigue and financial burden on patients and their family members and prevents the spread of infectious diseases [27], but also provides a good treatment option

with positive effects in terms of reducing fall accidents and improving the recovery of motor functions in stroke patients. Compared to the general ward group, the CNCW group in this study exhibited differences in cognitive function recovery. Given that functional recovery is influenced by various factors, such as sex, age, education level, patient participation in treatment, and underlying diseases, systematic research is needed in the future.

## REFERENCES

1. Yoo EK, Jeon S, Yang JE. The effects of a support group intervention on the burden of primary family caregivers of stroke patients. *J Korean Acad Nurs* 2007;37:693-702.  
[PUBMED](#) | [CROSSREF](#)
2. Kim BK, Lee KS, Park YK, Choi YA, Cho SM, Kim SY, Han GY, Shim MJ. A study of nurses' perception of the comprehensive nursing service. *Korean J Fam Pract* 2017;7:99-104.  
[CROSSREF](#)
3. Jung SH, Lee KM, Park SW, Chun MH, Jung HY, Kim IS, Kim SH, Han TR. Inpatient course and length of hospital stay in patients with brain disorders in South Korea: a population-based registry study. *Ann Rehabil Med* 2012;36:609-617.  
[PUBMED](#) | [CROSSREF](#)
4. Choi R, Hwang BD. Care education present condition for caregivers and awareness on legislation on the caregivers system. *Korean J Care Manag* 2014;13:1-19.
5. Korean Institute of Hospital Management. Tasks for the introduction of a hospital with no guardian system for inpatient nursing services. Available at <http://www.kihm.re.kr> [accessed on 20 January 2015].
6. Kwak CY, Kim SJ, Kang KA, Yim ES. A study on the status and problems of formal caregiving system by hospitals in South Korea. *J Korean Data Anal Soc* 2013;15:827-839.
7. Hwang NM. An analysis of the debates on introduction of public caregivers' services in acute medical centers. *Health Welf Policy Forum* 2010;170:60-71.
8. National Health Insurance Service. Guideline of pilot project on comprehensive nursing care service. Available at <http://www.nhis.or.kr> [accessed on 13 September 2015].
9. Lee MK, Jung DY. A study of nursing tasks, nurses' job stress and job satisfaction in hospital with no guardian. *J Korean Acad Nurs Adm* 2015;21:287-296.  
[CROSSREF](#)
10. Yeun YR. Effects of comprehensive nursing service on the nursing performance, job satisfaction and customer orientation among nurses. *J Korea Acad Ind Coop Soc* 2015;16:317-323.  
[CROSSREF](#)
11. Bernhardt J, Dewey H, Thrift A, Donnan G. Inactive and alone: physical activity within the first 14 days of acute stroke unit care. *Stroke* 2004;35:1005-1009.  
[PUBMED](#) | [CROSSREF](#)
12. Lim KB, Lee HJ, Yoo J, Kwon YG. Effect of low frequency rTMS and NMES on subacute unilateral hemispheric stroke with dysphagia. *Ann Rehabil Med* 2014;38:592-602.  
[PUBMED](#) | [CROSSREF](#)
13. Lee SJ, Shin JB, Hong JY, Lee JH, Jun PS, Ha HS. Comparison of activity patterns between rehabilitation stroke unit and mixed rehabilitation ward for stroke patients. *J Korean Acad Rehabil Med* 2007;31:63-69.
14. Lee KW, Choi SJ, Kim SB, Lee JH, Lee SJ. A survey of caregivers' knowledge about caring for stroke patients. *Ann Rehabil Med* 2015;39:800-815.  
[PUBMED](#) | [CROSSREF](#)
15. Kang MG, Kim CH, Park E, Huh JW, Yang WJ, Nam TW, Min YS, Jung TD. Effect of family caregiving on depression in the first 3 months after spinal cord injury. *Ann Rehabil Med* 2018;42:130-136.  
[PUBMED](#) | [CROSSREF](#)
16. Ahn DH, Lee YJ, Jeong JH, Kim YR, Park JB. The effect of post-stroke depression on rehabilitation outcome and the impact of caregiver type as a factor of post-stroke depression. *Ann Rehabil Med* 2015;39:74-80.  
[PUBMED](#) | [CROSSREF](#)
17. Schmid AA, Kroenke K, Hendrie HC, Bakas T, Sutherland JM, Williams LS. Poststroke depression and treatment effects on functional outcomes. *Neurology* 2011;76:1000-1005.  
[PUBMED](#) | [CROSSREF](#)



18. Galvin R, Cusack T, O'Grady E, Murphy TB, Stokes E. Family-mediated exercise intervention (FAME): evaluation of a novel form of exercise delivery after stroke. *Stroke* 2011;42:681-686.  
[PUBMED](#) | [CROSSREF](#)
19. Bour A, Rasquin S, Boreas A, Limburg M, Verhey F. How predictive is the MMSE for cognitive performance after stroke? *J Neurol* 2010;257:630-637.  
[PUBMED](#) | [CROSSREF](#)
20. Yoon TS, Kwon BS, Park JW, Ryu KH, Lee HJ, Park SJ, Kim DH, Park NK. The influence of depressive symptoms on cognitive and functional recovery in chronic stroke patients. *J Korean Acad Rehabil Med* 2010;34:174-178.
21. Son JI, Park BK, Lee CH, Ahn KH, Kim JN, Park MH, Choi EY, Boo EH, Kang MJ, Hong JH. Incidence rate and characteristics of falls in patients using comprehensive nursing care service. *Health Policy Manag* 2019;29:172-183.  
[CROSSREF](#)
22. Toyabe S. Characteristics of inpatient falls not reported in an incident reporting system. *Glob J Health Sci* 2015;8:17-25.  
[PUBMED](#) | [CROSSREF](#)
23. Hill AM, Hoffmann T, Hill K, Oliver D, Beer C, McPhail S, Brauer S, Haines TP. Measuring falls events in acute hospitals-a comparison of three reporting methods to identify missing data in the hospital reporting system. *J Am Geriatr Soc* 2010;58:1347-1352.  
[PUBMED](#) | [CROSSREF](#)
24. Johnson M, George A, Tran DT. Analysis of falls incidents: nurse and patient preventive behaviours. *Int J Nurs Pract* 2011;17:60-66.  
[PUBMED](#) | [CROSSREF](#)
25. Lee JE, Stokic DS. Risk factors for falls during inpatient rehabilitation. *Am J Phys Med Rehabil* 2008;87:341-350.  
[PUBMED](#) | [CROSSREF](#)
26. Vassallo M, Amersey RA, Sharma JC, Allen SC. Falls on integrated medical wards. *Gerontology* 2000;46:158-162.  
[PUBMED](#) | [CROSSREF](#)
27. Jung YA, Sung KM. A comparison of patients' nursing service satisfaction, hospital commitment and revisit intention between general care unit and comprehensive nursing care unit. *J Korean Acad Nurs Adm* 2018;24:30-39.  
[CROSSREF](#)