Journal of The Korea Convergence Society
Vol. 13. No. 2, pp. 313-320, 2022

e-ISSN 2713-6353
DOI : https://doi.org/10.15207/JKCS.2022.13.02.313

Physical Functions in Follow-up Convergency Care by Discharge Locations

Soo-Kyung Bok[1], Youngshin Song[2*]
[1]Professor, Department of Rehabilitation, College of Medicine, Chungnam National University
[2]Professor, Department of Nursing, College of Nursing, Chungnam National University

퇴원장소에 따른 융합적 돌봄을 위한 신체기능연구

복수경[1], 송영신[2*]
[1]충남대학교 의과대학 교수, [2]충남대학교 간호대학 교수

Abstract Discharge plans should be considered during rehabilitation depending on the location specified by the patients. This study aims to compare the demographics and rehabilitation function according to discharge location in people with rehabilitation one month after discharge. Among 300 discharged patients, 146 were discharged to their homes, 154 were transferred to facilities such as nursing homes. The results showed that rehabilitation function that scored using the modified Barthel Index were different according to discharge location. That is, the modified Barthel Index scored greater in home discharged patients than counter group. However, the home discharged patient's physical function and daily activities showed scores that required rehabilitation. Differentiated strategies should be needed for home and facility visit rehabilitation programs for rehabilitated patients.

Key Words : Convergence, Discharge, Physical function, Home, Rehabilitation

요 약 퇴원계획은 환자의 거주지를 고려하여 재활중에 계획되어야한다. 본 연구는 퇴원 1개월 후 재활환자를 대상으로 퇴원장소에 따른 인구통계학적 요인과 재활기능을 비교하는 것을 목적으로 연구가 시행되었다. 대상자는 재활퇴원환자였으며 전체 300명중 146명은 자택으로 154명은 요양원등 시설로 퇴원하였다. 그 결과 수정된 Barthel Index를 이용해 점수화된 재활기능점수가 퇴원장소에 따라 차이가 있는 것으로 나타났다. 즉 자택으로 퇴원한 환자의 재활기능점수가 시설퇴원환자보다 높은 점수를 보였다. 그러나 재택환자의 신체기능과 일상생활 동작이 재활이 필요한 점수를 보였다. 재활환자를 위한 가정 및 시설 방문재활프로그램에 대한 차별화된 전략이 필요하다.

주제어 : 융합, 퇴원, 신체적기능, 재택, 재활

*Corresponding Author : Youngshin Song(yssong87@cnu.ac.kr)

Received November 5, 2021
Revised November 24, 2021
Accepted February 20, 2022
Published February 28, 2022

1. Introduction

The National Disability Survey in South Korea reported that there were more than two million people with disabilities in 2017, with 82.4% of them being taken care of by their families [1]. The Ministry of Health and Welfare has established a regional rehabilitation hospital center to efficiently manage the medical delivery system for rehabilitation patients. Currently, there are six regional rehabilitation medical centers that have a complete management system from hospitalization to discharge and for the transition from hospital to community or their home for rehabilitation patients. Moreover, the Korean government operates a long-term care insurance system, 11.2% of the older adults receive benefits from the long-term care insurance system [2]. Long-term care facilities such as nursing homes are institutions used for rehabilitation of discharged patients.

The ultimate goal of rehabilitation is to return- to-work outcomes and their home regardless of disability types [2,3]. To achieve patients' ultimate goals, patients with disability require rehabilitation programs to enhance their chances of returning to functional independence at home or work environments [4]. Proper evaluation at the time of discharge, which includes checking the patient's independency and health conditions, and provision of follow-up care after discharge, are critical in rehabilitation [5]. This is because patients' impaired functional status at the time of discharge in rehabilitation may result in poor outcomes of recovery and lead to hospital readmissions [6]. Therefore, discharge plans should focus on the level of patient's function and its related factors. However, there is limited evidence regarding how different care strategies influence rehabilitation and discharge [7].

In South Korea, most patients in rehabilitation tend to be transferred to long-term care facilities or their homes according to their status. Several studies on the predictors of discharge location for patients with stroke have reported that the important factors include age, gender, social support, functional status at discharge, and affected site [8-11].

However, the need for further research is emphasized because the results have been inconsistent across previous studies. In South Korea, such studies have been rare, especially regarding the factors affecting discharge location for rehabilitation patients.

Therefore, this study aimed to identify and compare the physical functional abilities of patients who were discharged to home and to facilities.

2. Methods

2.1 Study design

A retrospective descriptive study design was employed to investigate patients' levels of physical function according to discharge locations using electronic medical records (EMRs).

2.2 Participants and procedure

The participants included patients of all ages admitted to the rehabilitation medical center located in a metropolitan city in South Korea, excluding those who died in the hospital. The participants' medical records were examined after allocating them to two groups, depending on whether they were being discharged to home or to facilities such as nursing homes. Those who were transferred to another university hospital or were moved to a hospital level were excluded. Most cases of transfer to hospital were excluded because rehabilitation treatment was prolonged. However, in the case of discharging

at home or to a nursing home, the two groups were compared because they had similar level of home care. Data collection was conducted to retrospectively gather EMR data (N=300) from the Rehabilitation Medical Center of C-University hospital from April to June 2017.

2.3 Measurements

The participants' general characteristics included their age, gender, and medical diagnosis.

The scores for modified Barthel Index (MBI), Functional Independence Measure (FIM), mobility function (independent walk, walk using assistive devices, wheelchair, don't walk), types of diet (regular, tube feeding, soft diet, others), and status of bowel/urinary elimination (catheterization, diaper or komodo, toileting, others) were investigated between the two groups. Data on the nature of social participation (passively engaged, actively engaged, return to work, driving, others) was determined for the home discharged group and post-discharge prognosis (worse, no change, better) were collected from medical records during outpatient visits after discharge.

The MBI measures patients' performance of activities of daily living, assessing their degree of independence in terms of the level of assistance required, and covers the functions of bowel control, bladder control, grooming, toilet use, feeding, transfers, walking, dressing, climbing stairs, and bathing [12]. The total score ranges from 0 to 100, with a higher score indicating a better rehabilitation function. The FIM can measure the level of assistance an individual needs to grade their functional status across a range of total independence to total assistance and explores an individual's physical, psychological, and social functions [13].

The FIM comprised 18 items measured on a 7-point scale (1=total assistance with helper to 7=complete independence with no helper) and the scores ranged from 18 to 126, with a higher score indicating a higher level of independence with no helper.

2.4 Data analysis

Descriptive statistics were computed, including frequency and mean scores. Patients' characteristics in the groups discharged to home and to facilities were compared using chi-square test and t-test. The significance level was set as $p<.05$.

3. Results

3.1 Comparisons of general characteristics between groups

Table 1 presents the participants' general characteristics. Of the 300 participants, 48.7% (n=146) were discharged to their home, while 51.3% (n=154) were transferred to facilities such as nursing home. The distributions of gender and age were not statistically different between the two groups, but medical diagnosis showed statistical differences ($X^2=17.532$, $p=.014$). The number of patients with stroke and traumatic brain injury (TBI) in the facility discharge group was significantly greater than those in the home discharge group. However, the proportion of spinal cord injury, pain/muscle problem, cerebral palsy, cardiogenic disease, and degenerative disease were significantly higher in home discharged group than facility discharged group. The mean age of the patients in facilities was 62.6 years, while it was 59.1 years among those discharged to home.

Table 1. The general characteristics of participants **(N=300)**

Characteristics		Home (n=146) n (%) or Mean (±SD)	Facilities (n=154) n (%) or Mean (±SD)	X^2 or t (*p*)
Gender	Male	75 (51.4)	86 (55.8)	0.60 (.487)
	Female	71 (48.6)	68 (44.2)	
Medical Diagnosis	Stroke	42 (28.8)	56 (36.4)	17.53 (.014)
	Traumatic Brain Injury (TBI)	3 (2.1)	18 (11.7)	
	Cord injury	20 (13.7)	14 (9.1)	
	Pain and muscle problem	40 (27.4)	39 (25.3)	
	Cerebral Palsy	6 (4.1)	2 (1.3)	
	Cardiogenic disease	4 (2.7)	2 (1.3)	
	Cancer	2 (1.4)	2 (1.3)	
	Others: degenerative disease	29 (19.9)	21 (13.6)	
Age	years	59.1 (±21.2)	62.6 (±18.7)	-1.51 (.131)

Table 2. The comparisons of main factors between home and facility discharge groups

Characteristics		Home (n=146) n (%) or Mean (±SD)	Facilities (n=154) n (%) or Mean (±SD)	X^2 or t (*p*)
MBI	Range: 0-100	71.0 (25.9)	39.1 (30.4)	6.76 (<.001)
FIM	Range: 18-126	75.9 (28.9)	54.1 (29.9)	3.24 (.002)
Mobility function	Independent walk	67 (45.9)	21 (13.8)	47.63 (<.001)
	Walk using assistive device	35 (24.0)	33 (21.7)	
	Wheel chair	40 (27.4)	76 (50.0)	
	Bed (don't walk)	4 (2.7)	22 (14.5)	
Diet types	Regular	102 (73.9)	73 (51.4)	37.98 (<.001)
	Tube feeding	2 (1.4)	28 (19.7)	
	Soft diet	3 (2.2)	17 (12.0)	
	Others	31 (22.5)	24 (16.9)	
Bowel/urinary elimination	Catheterization	5 (3.6)	42 (29.8)	38.31 (<.001)
	Diaper or komodo	13 (9.4)	19 (13.5)	
	Toileting	97 (70.3)	66 (46.8)	
	Others	23 (16.7)	14 (9.9)	
Prognosis after discharge	Worse	23 (15.8)	28 (18.2)	8.94 (.011)
	No change	93 (63.7)	113 (73.4)	
	Better	30 (20.5)	13 (8.4)	
Social participation	Passively engaged	57 (41.3)	-	
	Actively engaged	26 (18.8)		
	Return-to-work	8 (5.8)		
	Driving	23 (16.7)		
	Others	24 (17.4)		

MBI: Modified Barthel Index,
FIM: Functional Independence Measure

3.2 Physical function between groups

Table 2 presents the comparison of the main factors between the home and facility discharge groups. In the home discharge group, the MBI mean score was 71.0 (±25.9), whereas it was 39.1 (±30.4) in facility discharge group. The MBI score was significantly greater in the home discharge group than the counter group (t=6.769, p<.001). Similar to the MBI score, the FIM score was also higher in the home discharge group than in the facility discharge group (t= 3.243, p=.002).

Regarding mobility function, 45.9% in the home discharge group can walk independently, while 50% of those discharged to a facility used the wheelchair. In terms of bowel and urinary elimination function, 70.3% in the home discharge group could go to the toilet on their own, while in the facility discharge group, it was 46.8%. It was observed that 20.5% of the group discharged to home had an improved prognosis, while 8.4% of those discharged to a facility showed a better prognosis in terms of their outpatient medical records. In the discharged-to-home group, 41.3% was passively engaged in social participation, while 18.8% actively engaged in social participation in same group.

4. Discussion

This study revealed that physical function and prognosis after discharge was better in home discharge compared to facility discharge.

In South Korea, the proportion of patients who return to their homes and society after proper rehabilitation is not as high as that of advanced countries. In order to improve the outcomes of return-to-home or society, the government has a rehabilitation medical system to minimize physical functional recovery and aftereffects from acute to recovery [1].

During the three months of this investigation, 48.7% of patients were discharged to their home, which was similar to that of patients transferred to nursing facilities. In the facility discharge group, patients with stroke and TBI constituted 48.1% of the sample, whereas it was 30.9% in the home discharge group. Patients with stroke and TBI were found to have high demands for long-term care and rehabilitation. However, the proportion of patients with pain were similar between the two groups, which will require further investigation.

Currently, the number of nursing homes and nursing home residents in South Korea has been rapidly growing due to caring burden. The number of discharge facilities such as nursing homes is expected to increase further. To prepare for this, it is necessary to reinforce the functions of nursing homes. In South Korea, long-term care insurance covers the nursing home care service. It is measured on a five-point scale depending on physical, cognitive, behavioral, and rehabilitation functions [2].

There is a growing demand for adequate nursing provision, but unmet needs about the provision of services due to financial difficulties are increasing. This is because most users are chronically ill, old aged, or need more rehabilitation. In line with these results, the mean age was greater in the facility discharge group than the home discharge group in this study.

Similarly, physical function and the level of independence in those discharged home were better than in the counter group. According to a previous study, home discharge after rehabilitation was related with good functional status such as independence in activities of daily living [14]. On the other hand, demographic and social background factors such as old age, female, living alone, and absence of social support were negatively correlated with home discharge in prior studies [15-18].

However, the study findings showed that there were no statistical differences in gender and age between groups. That is, gender distribution was similar and mean age was slightly lower in the home discharge group than in the facility discharge group. In medical diagnosis, the number of patients with stroke or TBI in the home discharge group were smaller than that in the counter group. In line with this study finding, fewer stroke patients in the Netherlands

are discharged home because they are elderly or are in a multi-morbid state [14].

One of the most important factors in determining discharge in rehabilitation is the functional state of the patient. Physical functional scores measured with MBI and FIM were significantly lower in patients transferred to a facility than those discharged home in this study. According to a review by Vluggen et al. [14], the level of dependence in activities of daily living, cognitive disability, living alone, high age, urinary and bowel incontinence, neglect, absence of social support, loss of consciousness, and severe paralysis were important factors in a home discharge plan. Among them, activities of daily life were most commonly reported as a main factor in previous studies.

Particularly, bowel and urinary elimination were significantly different between the two groups. In the facility discharge group, 51.4% had a urinary catheter or bowel incontinence. This means that professional nursing care is needed, and in this case, there is a high possibility of avoiding discharge to their homes. It seems to be important data on why certain information is insufficient but cannot be discharged to the home. Mobility function was also similar to the results for bowel and urinary elimination. The proportion of patients walking independent was greater among those discharged home compared to those discharged to a facility. Moreover, it is a meaningful finding that the number of individuals consuming a normal diet was low among those transferred to a facility when only dietary types are compared. However, detailed information about diet types should be explored in future studies because dietary types can be associated with swallowing abilities.

Through this study, we were able to specifically identify the differences in general characteristics and functional states between patients who were discharged home and those transferred to a facility. However, this study was limited to examining medical records and investigating specific related factors such as cognitive function, comorbidity, and socio-economic factors. The investigation of predictive factors of discharge location in rehabilitation patients would be beneficial in terms of policy, economy, culture, and public health. Further research should employ a well-planned a prospective study design.

5. Conclusion

Using retrospective descriptive study design, this study empirically analyzed rehabilitation patients' functional states in terms of physical and social aspect at the time of discharge according to the discharge locations. Continuous monitoring by healthcare providers after discharge of rehabilitation functions can be beneficial to encourage their adaptation to daily routine. If the location of discharge is home, appropriate housing is needed to ensure independent, safe, and comfortable environments. If the location of discharge is long-term care facilities such nursing home, appropriate professional care service should be guaranteed to discharged patients who need prolonged rehabilitation care. Moreover, further studies should analyze in detail the activities of daily life, social participation level, and physical function, according to discharge location.

REFERENCES

[1] M. S. Ock, J. H. Ahn, S. J. Yoon & M. W. Jo. (2016). Estimation of disability weights in the general population of South Korea using a paired comparison. *Plos One, 11(9),* e0162478. DOI : 10.1371/journal.pone.0162478

[2] S. J. Chang. (2013). Lived experiences of nursing

home residents in Korea. *Asian Nursing Research, 7(2),* 83-90.
DOI : 10.1016/j.anr.2013.04.003

[3] H. A. Désiron, A. D. Rijk, E. V. Hoof & P. Donceel. (2011). Occupational therapy and return to work: a systematic literature review. *BMC Public Health, 11(1),* 1-14.

[4] K. Bridger, B. Kellezi, D. Kendrick, K. Radford, S. Timmons, M. Rennoldson & ROWTATE Team. (2021). Patient perspectives on key outcomes for vocational rehabilitation interventions following traumatic injury. *International Journal of Environmental Research and Public Health, 18(4),* 2035.
DOI : 10.3390/ijerph18042035

[5] V. Agarwal, M. P. Mcrae, A. Bhardwaj & R. W. Teasell. (2003). A model to aid in the prediction of discharge location for stroke rehabilitation patients. *Archives of Physical Medicine and Rehabilitation, 84(11),* 1703-1709.
DOI : 10.1053/S0003-9993(03)00362-9Get rights and content

[6] P. M. Smith, K. J. Ottenbacher, M. Cranley, S. S. Dittmar, S. B. Illig & C. V. Granger. (2002). Predicting follow-up living setting in patients with stroke. *Archives of Physical Medicine and Rehabilitation, 83(6),* 764-770.
DOI : 10.1053/apmr.2002.32736

[7] B. Hitch, A. B. Parlier, L. Reed, S. L. Galvin, E. B. Fagan & C. G. Wilson. (2016). Evaluation of a team-based, transition-of-care management service on 30-day readmission rates. *North Carolina Medical Journal, 77(2),* 87-92.
DOI : 10.18043/ncm.77.2.87

[8] S. M. Dyer, M. R. Perracini, T. Smith, N. J. Fairhall, I. D. Cameron, C. Sherrington & M. Crotty. (2017). *Rehabilitation following hip fracture.* In: Falaschi P, Marsh D (eds). Orthogeriatrics. Springer, Switzerland, pp 183-222.

[9] L. Tooth, K. McKenna, K. Goh & P. Varghese. (2005). Length of stay, discharge destination, and functional improvement: utility of the Australian National Subacute and Nonacute Patient Casemix Classification. *Stroke, 36(7),* 1519-1525.
DOI : 10.1161/01.STR.0000169923.57038.a8

[10] J. Y. Wee & W. M. Hopman. (2005). Stroke impairment predictors of discharge function, length of stay, and discharge destination in stroke rehabilitation. *American Journal of Physical Medicine & Rehabilitation, 84(8),* 604-612.
DOI : 10.1097/01.phm.0000171005.08744.ab

[11] M. Massucci, L. Perdon, M. Agosti, M. G. Celani, E. Righetti, E. Recupero & M. Franceschini. (2006). Prognostic factors of activity limitation and discharge destination after stroke rehabilitation. *American Journal of Physical Medicine & Rehabilitation, 85(12),* 963-970.
DOI : 10.1097/01.phm.0000242620.44924.1b

[12] K. Cruyssen, L. Vereeck, W. Saeys & R. Remmen. (2015). Prognostic factors for discharge destination after acute stroke: a comprehensive literature review. *Disability and Rehabilitation, 37(14),* 1214-1227.
DOI : 10.3109/09638288.2014.961655

[13] A. A. Küçükdeveci, G. Yavuzer, A. Tennant., N. Süldür, B. Sonel & T. Arasil. (2000). Adaptation of the modified Barthel Index for use in physical medicine and rehabilitation in Turkey. *Scandinavian Journal of rehabilitation medicine, 32(2),* 87-92.

[14] A. W. Heinemann, J. M. Linacre, B. D. Wright., B. B. Hamilton & C. Granger. (1993). Relationships between impairment and physical disability as measured by the functional independence measure. *Archives of physical medicine and rehabilitation, 74(6),* 566-573.
DOI : 10.1016/0003-9993(93)90153-2

[15] T. P. Vluggen, J. C. Haastregt, F. E. Tan, G. I. Kempen, J. M. Schols & J. A. Verbunt. (2020). Factors associated with successful home discharge after inpatient rehabilitation in frail older stroke patients. *BMC geriatrics, 20(1),* 1-8.

[16] M. S. Eijk, S. U. Zuidema, B. I. Buijck, R. T. Koopmans & A. C. Geurts. (2012). Determinants of rehabilitation outcome in geriatric patients admitted to skilled nursing facilities after stroke: a Dutch multi-centre cohort study. *Age and Ageing, 41(6),* 746-752.
DOI : 10.1093/ageing/afs105

[17] H. Mutai, T. Furukawa, K. Araki, K. Misawa & T. Hanihara. (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.
DOI : 10.1111/j.1447-0594.2011.00747.x

[18] K. Lindenberg, J. C. Nitz, A. Rahmann & P. Bew. (2014). Predictors of discharge destination in a geriatric population after undergoing rehabilitation. *Journal of Geriatric Physical Therapy, 37(2),* 92-98.
DOI : 10.1519/JPT.0b013e3182abe79e

복 수 경(Soo-Kyung Bok) [정회원]

· 1993년 2월 : 충남대학교 의학과(학사)
· 1997년 2월 : 충남대학교 재활의학과 (의학석사)
· 2000년 2월 : 충남대학교 재활의학과 (의학박사)
· 2011년 ~ 현재 충남대학교 의과대학 재활의학과 교수

· 관심분야 : 뇌손상재활, 암재활, 족부재활
· E-Mail : skbok111@gmail.com

송 영 신(Youngshin Song) [정회원]

· 1991년 2월 : 충남대학교 간호학과 (간호학사)
· 1997년 2월 : 충남대학교 간호학과 (간호학석사)
· 2002년 2월 : 충남대학교 간호학과 (간호학박사)

· 2013년 ~ 현재 충남대학교 간호학과 교수
· 관심분야 : 만성질환관리, 교육
· E-Mail : yssong87@cnu.ac.kr