The Effectiveness of a Timely Discharge Plan in Older Adults: A Prospective Hospital-Based Cohort Study in Southern Taiwan

Yu-Chun Wang1, Ying-Ping Lu2, Jin-Huei Wang2, Chih-Kuang Liang1,3,4,5, *Ming-Yueh Chou1,3,4, Yu-Te Lin1,7, Fen-Ting Chen6, Miao-Ling Lin6, Su-Hua Lee6, *Joh-Jong Huang7

1Center for Geriatrics and Gerontology, Kaohsiung Veterans General Hospital; Kaohsiung, Taiwan
2Department of Nursing, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan
3Department of Geriatric Medicine, National Yang Ming University School of Medicine, Taipei, Taiwan
4Aging and Health Research Center, National Yang Ming University, Taipei, Taiwan.
5Division of Neurology, Department of Medicine, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan
6Department of Health, Kaohsiung City Government, Kaohsiung, Taiwan
7Bureau of Social Affairs, Tainan City Government, Tainan, Taiwan

ABSTRACT

Background/Purpose: The aim of this study was to explore the effect of a timely discharge plan for community-based long-term care (LTC) in older adults (age 65+ years) admitted to a tertiary teaching hospital.

Methods: Older patients in geriatric wards who needed community-based LTC were enrolled between October 2016 and June 2017. Patients living in Kaohsiung City needing community-based LTC received timely discharge, with LTC assessed and arranged prior to discharge. Patients with the same needs but living in a different administrative area served as the control group and received traditional discharge, with LTC arranged after discharge home. All were assessed by the discharge planning team of nurses, geriatricians, and physical therapists. Rates of 3-day Emergency Department (ED) revisit and 14-day, 30-day, and 180-day readmission after hospitalization were assessed, as was length of hospital stay (LOS) and the time until LTC service delivery.

Results: Of the 84 participants (mean=80.5 years, standard deviation=9.3 years, 33.3% female) recruited, 42 received timely discharge. Compared to the control group, the timely discharge group waited significantly less for LTC service post discharge (3.4±7.1 days versus 36.4±20.7 days, p <0.001), had shorter LOS (21.1±13.0 days versus 24.2±25.9 days, p=0.531), and lower rates of ED revisit (2.4% versus 4.8%), readmission within 14 days (4.8% versus 9.5%), 30 days (11.9% versus 23.8%), and 180 days (35.7% versus 47.6%).

Conclusion: Timely discharge can significantly shorten the wait for community-based LTC for hospitalized older adults. Further studies should seek to reduce LOS, readmissions and ED revisits.

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1. INTRODUCTION

The world is rapidly aging, and Taiwan is no exception. In Taiwan, adults aged 65 years and older account for 14.0% of the population in 2018 and are estimated to reach 35.5% by 2050.\(^1\) The number of older adults in need of long-term care (LTC) is also growing dramatically due to the rapid aging society. In Taiwan, there were 350,000 older adults needing LTC in 2014, a number estimated to increase to 1.2 million in 2031.\(^2\) Furthermore, most older people prefer to live in their homes as long as possible rather than move to LTC facilities, so as to maintain their social networks and have better quality of life.\(^3,5\)

Older people are more likely than younger adults to be hospitalized because of acute illness.\(^6,7\) During hospitalization, older people are at risk of developing new disabilities or declining in their ability to perform activities of daily living (ADLs) due to frailty and poor physical reservation.\(^8,9\) In addition, older adults are at risk for worse hospitalization outcomes compared to young adults, including higher risk of revisiting the Emergency Department (ED), readmission and death; longer hospital length of stay (LOS); and higher risk for functional decline and institutionalization on discharge.\(^8,10\)

Once older adults lose their ability to perform ADLs during hospitalization, LTC is frequently required for them to regain their ADL ability as part of the transition from the hospital to community. An integrated and supportive discharge plan will help the hospitalized older adult to be discharged safely back into the community so as to experience healthy aging and aging in place.\(^11-13\) Discharge plans, a routine service of health care systems in many countries, involve individual assessment to establish an individualized discharge care plan for patients being discharged from an acute hospital into the community.\(^14\) An integrated discharge plan also aims to improve the efficiency and quality of medical and LTC by reducing the delay between hospital stay and subsequent care, and by improving the quality of transition from acute hospitals into the community.\(^15\)

For older adults with reduced functionality after a hospital stay, a discharge plan requires coordination between the hospital and LTC systems.\(^16\) The lack of integration of these two systems will fragment care and reduce the quality of care received. The indicators for optimal transitional care of older adults from the acute hospital to the community include effectiveness, efficiency, timeliness, safety, and person- and family-centered care and experience.\(^15,17-19\) Timely care means that the service are provided without waiting periods for patients and family.\(^17\) Therefore, the aim of this study was to explore the effectiveness and time waiting for service of a timely discharge plan in older adults needing LTC after a stay at a tertiary teaching hospital.

2. METHODS

2.1. Participants

This prospective case-control study was conducted between October 2016 and July 2017 in a tertiary teaching hospital in southern Taiwan. After hospitalization to the geriatric, general and hospitalist wards, older patients aged 65 years and older were enrolled in the study if they lived in Kaohsiung city and met these criteria: 1). lost capacity in at least one ADL during hospitalization; 2). plan to be discharged home; and 3). request community-based LTC. Those with following conditions were excluded: 1). lived in LTC facility before hospitalization; 2). already used community-based LTC before hospitalization; or 3). had a terminal or critical illness with limited life expectancy. There were 11 districts in Kaohsiung city. Participants who met the conditions as above and lived in the 3 districts near the hospital were arranged for timely discharge plan service, and those who lived in other districts were enrolled into the control group and received the traditional discharge plan, described below. The study protocol was approved by the Institutional Review Board of Kaohsiung Veterans General Hospital.

2.2. Traditional Discharge Plan

In Taiwan, the Long-Term Care Service Version 2.0 was launched in 2016, and those who meet the following criteria could apply for community-based LTC if they were: 1). aged 65 and over with impaired ADLs; 2). indigenous people aged 55 years and over with impaired ADLs; 3). aged 65 and over living alone with limited instrumental ADLs; or 4). aged 50 years and over with dementia. Requests for LTC are made to the LTC Service Center of the local government. In the traditional model, the hospitalized older adult is first discharged home, requests LTC, and then the care manager assesses the need and arranges with the LTC providers to provide the services needed. On average, these discharged patients wait over four weeks after their discharge for LTC service.

2.3. Timely Discharge Plan

The timely discharge plan was implemented by the hospital discharge team, which included special discharge nurses, geriatricians, and physical therapists. The discharge planning team will first evaluate the patient’s care needs before discharge. LTC will be arranged and the service providers will communicate with the discharge team before the discharge.

2.4. Comprehensive Geriatric Assessments

Participants’ demographic characteristics and functional status were recorded from the hospital database by special discharge nurses, including age,
gender, education level (years), body mass index (BMI; kg/m²), Charlson’s Comorbidity Index (CCI), ability to perform ADLs, marital status (married or not) and caregivers (spouse, child, other) before admission. Participants’ ADLs were accessed by using the modified Katz Index of ADL, classified into four categories with 0 indicating independent, 1-2 indicating mild disability, 3-4 indicating moderate disability, and 5-6 indicating severe disability. ADLs were assessed at hospital admission and at discharge.

2.5. Outcome Measurements

The waiting time (days) after discharge until delivery of the community-based LTC was recorded as the primary outcome. The hospital LOS was recorded from the discharge medical record and the number of times revisiting the ED and readmission were recorded 1, 3 and 6 months after discharge by follow-up phone call as the secondary outcome.

2.6. Statistical Analysis

In this study, all continuous variables were presented as mean±standard deviation (SD), and categorical data were presented as numbers (percentage) as appropriate. Student’s t-test was used to compare continuous variables between groups and the chi-squared test or Fisher exact test was used to compare variables. For all tests, a two-tailed P-value of <0.05 was considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21 (IBM Corp., Armonk, NY).

3. RESULTS

In total, 84 patients (mean age±SD 80.5±9.3 years and 66.7% male) were recruited for this study. Among them, the 42 patients (50.0%) who received a traditional discharge plan were included into the control group. The basic demographic characteristics did not significantly differ between the timely discharge group and the traditional discharge group, including age (79.1±8.9 versus 81.7±9.7 years, p=0.170), CCI (2.3±1.9 versus 2.2±1.5, p=0.920), education level (p=0.210), marital status (p=0.450), or modified Katz Index on admission (p=0.893) or discharge (p=0.578) (Table 1).

Compared with the control group, those in the timely discharge group had a significantly shorter wait time from discharge to LTC needs assessment (-3.6±3.0 versus 11.8±11.1 days, p <0.001) and a shorter wait time from discharge to receiving community-based LTC (3.4±7.1 versus 36.4±20.7 days, p <0.001) (Table 2). However, there was no significant difference in the rate of ED visits within the first 72 hours (2.4% versus 4.8%) or readmission within 14 days, 30 days, and 180 days (4.8% versus 9.5%, 11.9% versus 23.8%, and 35.7% versus 47.6%, respectively) (Table 2).

4. DISCUSSION

This prospective pilot study was the first project in Taiwan to explore the effectiveness of a timely discharge plan for older adults needing community-based LTC after a stay in a tertiary teaching hospital. Results of this study showed that the timely discharge plan could reduce the wait time to receive an assessment of LTC needs from 11.8±11.1 days after discharge to 3.6±3.0 days before discharge. In addition, the wait time for delivery of LTC after discharge could be reduced significantly, from 36.4±20.7 days to 3.4±7.1 days. However, the reduction in ED revisits and readmission rates within the first six months did not reach statistical significance.

Table 1. The demographic characteristics of participants with the timely discharge plan and with the traditional discharge plan.

| Variable                      | Total (N=84) | Timely Discharge Plan (n=42) | Traditional Discharge Plan (n=42) | p value |
|-------------------------------|--------------|------------------------------|----------------------------------|---------|
| Age (years)                   | 80.5±9.3     | 79.1±8.9                     | 81.7±9.7                         | 0.170   |
| Gender                        |              |                              |                                  | 1.00    |
| Male                          | 56 (66.7)    | 28 (66.7)                    | 28 (66.7)                        |         |
| Female                        | 28 (33.3)    | 14 (33.3)                    | 14 (33.3)                        |         |
| Educational level             |              |                              |                                  | 0.210   |
| Illiterate                    | 14 (16.6)    | 6 (14.3)                     | 8 (19.1)                         |         |
| <6 years                      | 36 (42.9)    | 22 (52.4)                    | 14 (33.3)                        |         |
| >6 years                      | 34 (40.5)    | 14 (33.3)                    | 20 (47.6)                        |         |
| Marital status                |              |                              |                                  | 0.450   |
| Unmarried                     | 21 (25.0)    | 9 (21.4)                     | 12 (28.6)                        |         |
| Married                       | 63 (75.0)    | 33 (78.6)                    | 30 (71.4)                        |         |
| CCI                           | 2.2 (1.7)    | 2.3 (1.9)                    | 2.2 (1.5)                        | 0.920   |
| Modified Katz Index of ADL on admission | |                     |                                  | 0.893   |
| Independent and mild disability | 33 (39.8)  | 17 (40.5)                    | 16 (39.0)                        |         |
| Moderate disability and severe disability | 50 (60.2) | 25 (59.5)                    | 25 (61.0)                        |         |
| Modified Katz Index of ADL at discharge | |                     |                                  | 0.578   |
| Independent and mild disability | 16 (19.0)  | 9 (21.4)                     | 7 (16.7)                         |         |
| Moderate disability and severe disability | 68 (81.0) | 33 (78.6)                    | 35 (83.3)                        |         |

*Mean±standard deviation; †Number (%); ‡Married includes participants who have a spouse or who cohabited, and unmarried includes participants with no spouse, widowed, separated; Range of 0 to 33, with a higher score indicating greater number and more severe comorbidity; Katz Index of ADL ranges from 0 to 6, with a higher score indicating more disabilities (we classified Katz Index into four categories: 0 indicating independent, 1-2 indicating mild disability, 3-4 indicating moderate disability, and 5-6 indicating severe disability). ADL: activities of daily living; CCI: Charlson Comorbidity Index.
In the traditional plan, older adults needing community-based LTC after hospitalization were discharged home first and only then could the care managers from the official LTC center assess their care needs. These older adults would have to wait until discharge to know whether they could apply for LTC. Then, they would have to wait some more before LTC services could begin. Previous studies reported that case managers and geriatricians should be responsible for care transitions. Therefore, in the timely discharge plan, the government authorized and empowered the discharge planning nurses to assess and decide the needs for LTC based on discussion of the interdisciplinary geriatric team. Through this innovative pilot study, LTC could be approved and decided during hospitalization. The discharge planning nurses could communicate with community service providers before discharge, and patients could be sure of receiving supportive LTC upon their return home with no waiting.

Timeliness and equity are two indicators of quality health care recommended by the Institute of Medicine.23,26 A “time gap” between hospital discharge and service delivery usually increases the care burden, causing considerable stress leading to lack of confidence in the caregiver. Our study found that the acute care hospital, competent government authority, and service providers could cooperate to provide integrated, seamless delivery of care from discharge through community-based LTC. Preen et al.26 also showed that timely communication with community service providers could reduce wait time, improve satisfaction with and confidence in discharge procedures, and improve quality of life.

In our study, we found that the timely discharge plan reduced the rates of unplanned readmissions, ED revisits and hospital LOS, but not enough to be statistically significant. Shepperd et al.13 showed that it was “probably” effective to reduce the rehospitalization rate and hospital LOS with transitional care. Previous studies also concluded that suitable transitional care could reduce short (<30 days), intermediate (31-180 days), and long-term (181-365 days) hospital readmission rates.27,28 However, Buurman et al.29 found that a systematic Comprehensive Geriatric Assessment by a community care registered nurse as part of a transitional care bridge program did not significantly reduce readmission rates. Verhaegh et al.30 reported that high-intensity interventions seemed to be effective in reducing short-term readmissions. However, the effectiveness of reducing readmissions and ED revisits were not found in our study. Further high-intensity interventions should be designed to complement the timely discharge project.

Despite our best efforts, this study still had some limitations. First, the number of study participants was too small to explore the effectiveness of the reduction in hospital LOS, readmissions and ED revisits. However, the reductions in time waiting for community-based LTC were significant. Second, the participants in the control group lived in administrative areas away from our hospital, which may have caused unmeasured differences from the intervention group. However, the demographic characteristics between the two groups were not significantly different. Third, the functional assessment was not done after discharge so that we could not show any effect of the timely discharge plan on functional improvement.

5. CONCLUSION

Timely discharge to LTC can significantly shorten the time hospitalized older adults wait for community-based LTC assessment and service. Further studies should be designed to reduce hospital LOS, readmissions, and ED revisits in older adults.

CONFLICTS OF INTEREST

All authors have no conflicts of interest to declare.

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### Table 2. Outcomes for those receiving the timely discharge plan and the traditional discharge plan.

| Variable                                      | Total       | Timely Discharge Plan | Traditional Discharge Plan | p value |
|-----------------------------------------------|-------------|-----------------------|-----------------------------|---------|
| Length of time waiting for service deliverya  | 19.4±22.2   | 3.4±7.1               | 36.4±20.7                   | <0.001  |
| Length of time waiting for service assessmenta| 4.1±11.2    | -3.6±3.0              | 11.8±11.1                   | <0.001  |
| Outcome of admission                          |             |                       |                             |         |
| Length of hospital stayb                      | 22.6±20.4   | 21.1±13.0             | 24.2±25.9                   | 0.531   |
| 3 days’ ED revisitb                           | 3 (3.6)     | 1 (2.4)               | 2 (4.8)                     | 1.00    |
| 14 days’ readmissionb                         | 6 (7.1)     | 2 (4.8)               | 4 (9.5)                     | 0.676   |
| 30 days’ readmissionb                         | 15 (17.9)   | 5 (11.9)              | 10 (23.8)                   | 0.254   |
| 180 days’ readmissionb                        | 35 (41.7)   | 15 (35.7)             | 20 (47.6)                   | 1.00    |

*a*Mean±standard deviation, in days; *b*Number (%). ED: Emergency Department.
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