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Effectiveness of Using Telephone Follow-Up Intervention on the Unplanned Readmission of Older Adult Patients within 14 Days of Being Discharged from Hospital

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SUMMARY

Background: Not only system but also personal and family factors lead to unexpected readmission after hospital discharge, and how to support old patients staying at home is an important clinical issue. Telephone follow-up interventions are frequently employed to address this problem. This study sought to determine whether telephone follow-up intervention after discharge reduces the unplanned readmission rate of older patients within 14 days and what factors are related to unplanned readmission.

Methods: This study adopted a quasi-experimental design. Participants were patients who were 65 years or older, had been discharged, and had care needs. The intervention group received two times telephone follow-up calls at 3–5 days and at 6–12 days after discharge, whereas the control group received conventional care. Data collections included long-term care service needs, treatment reported during telephone interviews, and whether patients were unexpectedly readmitted within 14 days of discharge.

Results: The unplanned readmission rates of the intervention group ($n = 216$) and control group ($n = 145$) were 5.1% and 2.1%, respectively. No significant difference was observed between the groups (chi-square = 2.1, $p = 0.145$). Patients who lived alone (adjusted odds ratio = 5.2, $p = 0.020$) and did not receive physical care services (adjusted odds ratio = 0.2, $p = 0.035$) had higher risks of readmission.

Discussion: Telephone follow-up intervention alone cannot reduce the risk of readmission; other interventions must also be used. During clinical care, special attention should be paid to the patients who lived alone and had unmet physical care needs.

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1. Introduction

Patients hospitalized due to acute illness are discharged home after completing treatment. Unplanned readmission refers to the situation in which a patient has been discharged but has to be readmitted due to unexpected changes in the same disease or symptoms. A critical indicator of medical care quality is the 14-day unplanned readmission rate.¹ Unplanned readmission indicates that a patient's health conditions has worsened rapidly. Moreover, frequently being admitted to the hospital in a short period of time consumes medical resources such as human resources, equipment, and medicine, putting pressure on the health care system.^{2–5}

Regarding the ratio of unplanned readmission, studies conducted in the United States have showed that the ratio of patients in post-acute care was 22.8% and that of patients with heart failure was 25%.^{5,6} A study in Taiwan reported that the unplanned readmission rate of older adults who were admitted to the hospital for the first time and discharged within 30 days was 14.6%.⁷ A study conducted in the United Kingdom revealed that the readmission rate

of patients with chronic obstructive pulmonary disease who were discharged within 30 days was 22.6%.⁸ Studies in Taiwan have also indicated that the unplanned readmission rate within 30 days and within 14 days was 16.7% and 5.85%, respectively,^{9,10} indicating the importance of this topic in Taiwan. Taiwan National Health Insurance system takes 14 days readmission due to the same disease as a quality indicator of medical care, which mean instability of discharge. Therefore, we used 14 days readmission as the outcome.¹

Personal and family factors would lead to readmission if they could not deal with the problems at home, including those relating to the activities of daily living and their emotions, medication, and diet.¹¹ To avoid such problems, when patients are in the hospital, nurses may provide individualized discharge planning involving health education and medication guidance. After patients are discharged, nurses may also provide services such as telephone interviews, home interviews, telemedicine consultations, and referrals to long-term care service, thereby preventing unplanned readmission.^{6,12,13} The literature suggests that unplanned readmission can be prevented.^{14–16}

Using telephone follow-up after patient discharge to contact patients or their family has the advantages of low cost and easy implementation. Thus, it is an often-adopted intervention. Through

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communication between medical professionals and patients or caregivers, home care suggestions are provided, and suggestions to seek medical support regarding comorbidities are also offered.^{11,17,18} Relevant studies have reported inconsistent results of the usefulness of telephonic follow-up interventions in reducing unplanned readmission. Some studies have demonstrated that after patients admitted to the emergency department were discharged, telephone follow-up could reduce their sense of loneliness and depression while increasing their sense of satisfaction; however, no significant correlation was discovered between this intervention and the readmission rate.^{13,18,19} Moreover, the effectiveness of telephonic follow-up may differ depending on patients' diseases or conditions and the long-term care service they receive. Thus, further investigation is required to clarify this topic.

In 2018, Taiwan became an aged society, with the population of older adults exceeding 14%. The Taiwanese government provides long-term care services to meet the assistance needs of older adults living in communities.²⁰ After older adults are discharged, they are also connected to long-term care services. However, the relationships between unplanned readmission and the usage of long-term care services in older patients were unknown.

According to literature, factors related to unplanned readmission are age, the number of times being admitted, the number of chronic diseases, living alone, an absence of social support, health status, functional disorders, and a history of depression.²¹ Patients who undergo an unplanned readmission are often those receiving post-acute care or those who are advanced in age.^{5–7} Chronic diseases are significantly correlated to readmission rate. Specifically, for patients with cardiovascular disease, chronic respiratory diseases, diabetes, or kidney disease, poor chronic disease management leads to high readmission rates.^{13,21–23} Studies have also indicated that patients who live alone often lack family members' assistance, including providing reminders to take medicine, which results in an increased risk of readmission.²⁴ This study explored the factors related to unplanned readmission.

Previous studies showed some symptoms and needs of care services related to unplanned readmission, and long-term care policy in Taiwan provides various kinds of care services to meet patients' needs at home. Telephone intervention is a convenient and feasible intervention. The telephone intervention and the usage of long-term care services are aimed to support them to stay at home. However, it is unknown about the effects of telephone and the care services related to readmission. Thus, the research aims of this study were to explore (1) whether telephone follow-up after older patients were discharged would reduce the rate of unplanned readmission within 14 days and (2) the factors related to unplanned readmission within 14 days.

2. Methods

2.1. Research participants

Participants of this study were patients who, as determined by nurses during their stay in the hospital, would have care needs after returning home and who received discharge planning. The inclusion criteria were inpatients aged 65 years or older who, before being discharged, scored less than 60 on the Activities of Daily Living scale,²⁵ exhibited Instrumental Activities of Daily Living problems, or whose condition required physical care, tube replacements, wound care, or nourishment care. Depending on the patients' needs, nurses would connect patients with community service resources such as (1) physical care services, (2) professional care services, (3) transportation

services, (4) assistive device services, (5) home respite services, (6) home nursing, and (7) home medical consultation services. Exclusion criteria were not receiving discharge planning while admitted to hospital, or entering an institution or hospital for chronic disease treatment after discharge.

2.2. Research design

This study was conducted in a regional teaching hospital in southern Taiwan. A quasi-experimental design was adopted for this study. The experimental group consisted of inpatients who received discharge planning from September 2019 to February 2020 and received telephone follow-up after their discharge. The control group consisted of patients who received discharge planning from March 2020 to May 2020 but did not receive telephone follow-up after discharge. This study was approved by the institutional review board of Ditmanson Medical Foundation Chia-Yi Christian Hospital (IRB 2020080).

2.3. Intervention

The nurses called the patients two times, one was at 3–5 days and the other at 6–12 days after discharged. The main purpose of the phone call was to assess the physical recovery of the patient after they returned home, with specific attention given to their level of consciousness, activity level, digestion, defecation habit, sleep, wound changes, and overall recovery. The nurses asked whether patients had the specific problems. If the patient's physical conditions had improved or had not changed since discharge, then the nurse would provide guidance and health education. For patients whose condition had worsened, the nurses provided guides or suggestions to manage the problem. When the patients or caregivers could not handle the problems, the nurses would suggest them to go to the emergency department or at an outpatient clinic. The post-discharge telephone interviews were recorded in the discharge planning case management system.

2.4. Measurements

This study collected patients' data from the discharge planning case management system, including demographic information, long-term care resource need and referral statuses, and telephone follow-up records. From the medical history information system, we obtained data regarding whether the patients were readmitted within 14 days after discharge.

Demographic information of interest was sex, age, type(s) of chronic disease, education level, and living status. Long-term care data consisted of the following seven categories: (1) Physical care services: a licensed home care attendant provides a patient with daily life and physical care services, such as showering, going to the hospital, eating, and going out, at the patient's home. (2) Professional care services: professionals (such as nurses, physical therapists, and occupational therapists) visit a patient's home or community to offer professional nursing services and guidance, such as nutrition care, eating and swallowing care, distress care, special care for those who are bedridden or whose long-term activities are limited, home care guidance, and barrier-free space assessments and consultations. (3) Transportation services: this involves providing transportation to patients who need long-term care from their home to the hospital or a community long-term care facility and back. (4) Assistive device service: this involves the purchase or rental of assistive devices. (5) Home respite care service: this involves a licensed

caregiver going to a patient's home when the family caregiver needs to leave home and run errands or needs a short break. (6) Home medical service consultations: for patients with mobility disabilities and cannot go out to seek medical support, doctors or nurses will go to their home to provide professional medical services or consultations. (7) Home nursing: professional nurses will go to the home of a patient with disabilities to provide nursing care, such as changing tubes or offering nursing guidance. After a nurse checked with a patient or their primary caregiver about their care needs, boxes were ticked for "Yes" or "No" if they did or did not have such needs, respectively.

The nurses used telephone to ask about patients' physical conditions, including level of consciousness, level of activity, digestive system condition, defecation habit, sleep condition, wound condition, and overall recovery status. On the basis of the patient's situation at that time, the patient or their primary caregiver would answer with "No changes," "Improved," or "Worsened." Depending on the patient's condition, the nurse would provide nursing health education guidance or referral suggestions. They would tick the boxes "No handling needed," "Provided nursing health education," "Suggested going to outpatient clinic," or "Suggested going to the emergency department immediately."

The last part of the telephonic follow-up was checking whether the patient had been readmitted unexpectedly due to the same or a related illness.

2.5. Statistical analysis

Descriptive statistics were used to present the demographic in-

formation and statuses of the two groups after returning home. The chi-square test was used to compare categorical variables, and the *t*-test was adopted to compare differences in continuous variables between the groups. Logistic regression was performed, with the dependent variable being whether a patient was unexpectedly readmitted within 14 days of their discharge. The predictive variables were sex, age, education level, living alone, total number of chronic diseases, demand for the seven long-term care services, and receiving (or not) the telephone follow-up intervention. Regarding sample size, there were sixteen predictive variables, and each variable needed 20 participants. The total number of the participants was enough for logistic regression. A *p* value < .05 was set as the level of significance. SPSS was used for statistical analysis.

3. Results

From September 2019 to May 2020, this study collected data from 361 patients. The telephone follow-up intervention group consisted of 216 patients and the control group comprised 145 patients. The mean age of the patients was 75.6 ± 12.4 years old. Most of the patients were women (53.2%) and had an elementary school education level (38.0%). The top three long-term care services that were needed were care services (53.7%), long-term professional care services (46.3%), and transportation services (30.5%). The two groups only exhibited significant differences in receiving long-term professional care services (chi-square = 10.5, *p* = 0.001). Detailed demographic information is provided in Table 1.

The rates of unplanned readmission within 14 days for the experimental group and the control group were 5.1% and 2.1%, re-

Table 1
Demographic information.

	All (N = 361)	Experimental group (N = 216)	Control group (N = 145)	Chi-square (χ^2)	<i>p</i> value
Demographic information					
Sex				0.00	0.980
Men	169 (46.8)	101 (46.8)	68 (46.9)		
Women	192 (53.2)	115 (53.2)	77 (53.1)		
Age	75.6 ± 12.4	76.1 ± 11.9	74.8 ± 13.1		0.354
Number of chronic diseases	2.0 ± 1.4	1.9 ± 1.3	2.0 ± 1.4		0.497
Living condition					
Living alone				0.00	0.969
Yes	47 (13.0)	28 (13.0)	19 (13.1)		
No	314 (87.0)	188 (87.0)	126 (86.9)		
Education level				0.90	0.924
Illiterate	111 (30.8)	65 (30.1)	46 (31.7)		
Elementary school	137 (38.0)	84 (38.9)	53 (36.6)		
Junior high school	41 (11.4)	23 (10.7)	18 (12.4)		
Senior high school	47 (13.0)	30 (13.8)	17 (11.7)		
College and above	25 (6.8)	14 (6.5)	11 (7.6)		
Connection to community resource					
Physical care service				0.39	0.529
Yes	194 (53.7)	119 (55.1)	75 (51.7)		
No	167 (46.3)	97 (44.0)	70 (48.3)		
Long-term professional care service				10.54	0.001
Yes	167 (46.3)	115 (53.2)	52 (35.9)		
No	194 (53.7)	101 (46.8)	93 (64.1)		
Transportation service				3.32	0.068
Yes	110 (30.5)	58 (26.9)	52 (35.9)		
No	251 (69.5)	158 (73.2)	93 (64.1)		
Assistive device service				2.65	0.104
Yes	79 (21.9)	41 (19.0)	38 (26.2)		
No	282 (78.1)	175 (81.0)	107 (73.8)		
Home respite care service				3.75	0.053
Yes	74 (20.5)	37 (17.1)	37 (25.5)		
No	287 (79.5)	179 (82.9)	108 (74.5)		
Home medicine				1.11	0.292
Yes	70 (19.4)	38 (17.6)	32 (22.1)		
No	291 (80.6)	178 (82.4)	113 (77.9)		
Home nursing				1.17	0.279
Yes	58 (16.1)	31 (14.4)	27 (18.6)		
No	303 (83.9)	185 (85.6)	118 (81.4)		
Unplanned readmission within 14 days				2.12	0.145
Yes	14 (3.9)	11 (5.1)	3 (2.1)		
No	347 (96.1)	205 (94.9)	142 (97.9)		

spectively; no significant difference was observed (chi-square = 2.1, $p = 0.145$). Regarding patient condition after returning home for 3–5 days, five participants reported worsened activity levels, two had worsened digestive function, two had worsened wound conditions, and four had experienced setbacks in overall recovery. Detailed information is presented in Table 2. Factors that were significantly related to unplanned readmission were living alone (adjusted odds ratio = 5.2, $p = 0.020$) and not receiving physical care services (adjusted odds ratio = 0.2, $p = 0.035$; Table 3).

4. Discussion

This study adopted a longitudinal experimental design to explore the effectiveness of telephone follow-up on unplanned readmission within 14 days of discharge and the related factors with readmission. The results indicated that telephone follow-up did not significantly reduce older patients' unplanned readmission. Factors related to readmission were living alone and needing care services.

The results of this study revealed that telephone follow-up may not reduce the rate of readmission within 14 days; Some possible reasons may account for this finding. First, the unplanned readmission rate in this study was lower than the mean in Taiwan, which is 5.85%.⁹ In addition, before the participants were discharged, discharge planning had been provided by nurses, and the participants had been connected to long-term care resources they might need after returning home. Thus, whether telephone follow-up was provided after discharge did not significantly affect their readmission rate.^{12,13,26,27} Second, during phone interviews, nurses could only become aware of changes in patients' conditions, but were unable to reduce readmission rates.²⁸ In this study, the nurses only gave some suggestions through telephone but could not arrange other further supports. On the other hand, they might suggest the patients to go to the emergency department if they could not handle the problems. Therefore, the telephone intervention did not have a significant effect on reducing readmission. In addition to the telephonic follow-up, a diverse range of other interventions may be needed, such as predischarge health education, rehabilitation, physical therapy, health education and guidance regarding medication and diet after discharge, home visits, and telemedicine consultations, to effectively reduce readmission rates.¹³

This study discovered that living alone and physical care services were significant factors related to readmission. Older patients who lived alone had higher chance in readmission. After older patients returns home, they might need others' care or assistance. If nonofficial caregivers (i.e., untrained and unpaid caregivers, such as family, friends, or neighbors) are available, then they can assist with the recovery of the physical function of the patient under their care. However, older patients who live alone may not have caregivers to assist in supervising their physical condition, providing daily life care, administering them medicine, or arranging subsequent outpatient appointments, and hence, their readmission rate or emergency department visits tend to be higher than those of patients with unofficial caregivers.^{21,29–31}

Patients who received physical care services had lower probability for readmission than those who did not receive physical care services. A previous study revealed significant correlations between daily life functions and readmission.³² A high level of daily life function impairment is correlated with a high rate of falls at home as well as a high rate of being unable to eat by oneself, which leads to malnutrition and subsequently leads to an increased risk of readmission.³³ When older patients received physical care services, and home care attendants came to patients' house and provided various

Table 2

Experimental group receiving telephone follow-up assessment and intervention 3–5 days after they return home (N = 216).

Telephone follow-up item	N (%)
Consciousness assessment	
1. No change	130 (60.2)
2. Improved	84 (38.9)
3. Worsened	2 (0.9)
Suggestion after assessment	
1. No handling needed	213 (98.6)
2. Provide nursing health education	3 (1.4)
3. Suggest going to outpatient clinic	0 (0.0)
4. Suggest going to emergency department immediately	0 (0.0)
Functions of daily living assessment	
1. No change	80 (37.0)
2. Improved	131 (60.7)
3. Worsened	5 (2.3)
Suggestion after assessment	
1. No handling needed	207 (95.8)
2. Provide nursing health education	8 (3.7)
3. Suggest going to outpatient clinic	0 (0.0)
4. Suggest going to emergency department immediately	1 (0.5)
Adverse drug reaction assessment	
1. No change	135 (62.5)
2. Improved	81 (37.5)
3. Worsened	0 (0.0)
Suggestion after assessment	
1. No handling needed	214 (99.1)
2. Provide nursing health education	2 (0.9)
3. Suggest going to outpatient clinic	0 (0.0)
4. Suggest going to emergency department immediately	0 (0.0)
Digestive system assessment	
1. No change	133 (61.6)
2. Improved	81 (37.5)
3. Worsened	2 (0.9)
Suggestion after assessment	
1. No handling needed	210 (97.2)
2. Provide nursing health education	5 (2.3)
3. Suggest going to outpatient clinic	1 (0.5)
4. Suggest going to emergency department immediately	0 (0.0)
Defecation function assessment	
1. No change	130 (60.2)
2. Improved	86 (39.8)
3. Worsened	0 (0.0)
Suggestion after assessment	
1. No handling needed	213 (98.6)
2. Provide nursing health education	3 (1.4)
3. Suggest going to outpatient clinic	0 (0.0)
4. Suggest going to emergency department immediately	0 (0.0)
Sleep condition assessment	
1. No change	128 (59.3)
2. Improved	87 (40.2)
3. Worsened	1 (0.5)
Suggestion after assessment	
1. No handling needed	241 (99.1)
2. Provide nursing health education	2 (0.9)
3. Suggest going to outpatient clinic	0 (0.0)
4. Suggest going to emergency department immediately	0 (0.0)
Wound condition assessment	
1. No change	61 (28.3)
2. Improved	153 (70.8)
3. Worsened	2 (0.9)
Suggestion after assessment	
1. No handling needed	214 (99.0)
2. Provide nursing health education	1 (0.5)
3. Suggest going to outpatient clinic	0 (0.0)
4. Suggest going to emergency department immediately	1 (0.5)
Overall condition assessment	
1. No change	62 (28.7)
2. Improved	150 (69.4)
3. Worsened	4 (1.9)
Suggestion after assessment	
1. No handling needed	213 (98.6)
2. Provide nursing health education	2 (0.9)
3. Suggest going to outpatient clinic	0 (0.0)
4. Suggest going to emergency department immediately	1 (0.5)

Table 3
Factors related to unplanned readmission within 14 days.

	Crude OR (95% CI)	p value	Adjust OR (95% CI)	p value
Sex	1.1 (0.4–3.3)	0.808	2.4 (0.6–9.0)	0.195
Age	1.0 (1.0–1.1)	0.307	1.0 (1.0–1.1)	0.457
Number of chronic diseases	1.1 (0.6–1.8)	0.769	1.0 (0.5–1.7)	0.860
Education level ^a				
Elementary school	1.4 (0.2–11.9)	0.775	3.4 (0.3–40.3)	0.330
Junior high school	0.7 (0.1–6.7)	0.775	1.1 (0.1–12.2)	0.912
High school	1.2 (0.1–14.3)	0.868	1.8 (0.1–26.2)	0.652
College or above	0.5 (0.0–8.7)	0.651	0.7 (0.0–13.4)	0.835
Living alone ^b	4.0 (1.3–12.6)	0.016	5.2 (1.3–21.1)	0.020
Physical care service ^b	0.5 (0.2–1.4)	0.177	0.2 (0.0–0.9)	0.035
Long-term professional care service ^b	1.2 (0.4–3.4)	0.775	0.6 (0.1–2.3)	0.418
Transportation service ^b	0.4 (0.1–1.7)	0.197	0.7 (0.1–3.7)	0.675
Assistive device service ^b	0.3 (0.0–2.1)	0.204	0.3 (0.0–2.9)	0.296
Home respite service ^b	0.0 (0.0–0.0)	0.997	0.0 (0.0–0.0)	0.996
Home medicine ^b	1.1 (0.3–4.2)	0.844	0.4 (0.1–2.4)	0.364
Home nursing ^b	0.4 (0.1–3.1)	0.371	0.1 (0.0–1.2)	0.070
Telephone follow-up intervention ^b	0.4 (0.1–1.4)	0.158	0.3 (0.1–1.4)	0.133

^a The control group for education level was participants who had not received formal education.

^b Control groups for these variables were patients who did not live alone or did not receive the service.

kinds of physical care; and then it could decrease the probability of unplanned readmission.

Regarding clinical application, telephone follow-up alone cannot reduce the likelihood of patients being readmitted after returning home. Other interventions or care must be incorporated into post-discharge care to effectively reduce the readmission rate. Moreover, the discharge service must provide extra assistance to older patients living alone and needing physical care services. Physical care services can be arranged before discharge. Care plans should be devised to incorporate the long-term care resources, such as physical care services, provided to patients. When care service providers conduct home visits, they should provide assistance to primary caregivers to solve care problems to reduce readmission rates.

Although this study adopted a longitudinal research design, it still has the following research limitations. First, this study was a retrospective study of a single institution, and the participants were not randomized to experimental or control groups. Second, the conditions of the patients at home were reported by the patient or their primary caregiver, and hence, their reports might have differed from their actual situations. Third, readmission and the reasons due to the same illness or not were based on patients' self-report, thus, the readmission rate may be underestimated. As for future research directions, telemedicine may be incorporated so that nurses may access the electronic health records provided by the patient or the primary caregiver to understand the care situation of the patient after they go home. In addition, random distribution can be used in patient enrollment, and cooperation with multiple medical institutions may be conducted to effectively explore methods to reduce unplanned readmission.

5. Conclusion

Only telephone follow-up intervention cannot reduce the risk of unplanned readmission in older patients, and other interventions must be used combining telephone intervention. Older patients who lived alone and not receiving physical care services had higher risks of readmission.

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Declarations about Conflicts of Interest

The authors stated there was no conflict of interest in this study.

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