

A randomized clinical trial of the effectiveness of a discharge planning intervention in hospitalized elders with hip fracture due to falling

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Aim. The objective of this study was to examine the effectiveness of a discharge plan in hospitalized elderly patients with hip fracture due to falling.

Background. Hip fractures are an important cause of morbidity and mortality among older people. Hip fracture patients require ongoing medical and long-term care services. Discharge plan services can play a very important role for these patients, since the services improved their outcome conditions.

Methods. Hip fracture patients aged 65 years and older ($n = 126$), hospitalized due to falling and discharged from a medical centre in northern Taiwan, were randomly assigned to either a comparison group (the routine care) or experimental group (the discharge planning intervention). The outcomes used to determine the effectiveness of the intervention were: length of hospitalized stay, rate of readmission, repeat falls and survival, and activities of daily living.

Results. The discharge planning intervention decreased length of stay, rate of readmission and rate of survival and improved activities of daily living for intervention group compared with those of control group. Mean total SF-36 scores of patients in the experimental group were higher than for the control group and both groups had improved quality of life.

Conclusion. The discharge planning benefited older people with hip fractures.

Relevance to clinical practice. A discharge planning intervention by a nurse can improve physical outcomes and quality of life in hip fracture patients.

Key words: clinical trial, discharge planning, elders, falling, hip fractures

Introduction

Hip fractures are important causes of morbidity among older people (Cameron *et al.* 2001, Fransen *et al.* 2002). About 90% of hip fractures among older people are reported to be associated with a fall (Norton *et al.* 1997) and several factors have been identified as risks for falls leading to hip fracture (Cummings *et al.* 1995).

Almost all hip fracture patients require hospitalization and surgical repair and an estimated 18–28% of older hip fracture patients die within one year of their fractures (Ahmad *et al.* 1994). Many hip fracture patients (25–75%) do not regain their prefracture functional level by one year after surgery (Koval *et al.* 1995, Young *et al.* 1996). These functional limitations may compound the existing medical conditions and psychosocial problems of older hip fracture

patients (Young *et al.* 1997, Lawrence *et al.* 2002, Archibald 2003). As the number of older people continues to increase and effective strategies for preventing hip fracture are not yet available, the number of hip fracture patients will grow and require ongoing medical and long-term care services. The majority of hip fracture patients do not regain their prefracture functional level. The functional decline can result in loss of independence; therefore, long-term care is needed for them. The payment of National Health Insurance in Taiwan for long-term care only covers home care service (HC). The HC only provides for someone who needs more technical care (i.e. with catheter, tracheotomy, nasogastric feeding, severe wound). This means most older people are functionally limited after hip surgery but do not qualify for the HC service. Moreover, most of public opinion is against institutionalization in Taiwan. The majority of older people with hip fracture who are discharged from hospital are at home without HC. Therefore, an appropriate discharge plan service may contribute to the well-being of these patients.

Discharge planning is a process of assessing hospitalized patients and planning for their leaving the hospital. Discharge planning may include screening, psychosocial assessment, provision of counseling and education, coordination of an interdisciplinary team of providers, activation of community services, follow-up and evaluation (Oktay *et al.* 1992).

The framework of discharge planning process for this study is based on the McKeeham and Coulton's (1985) discharge plan model (structure, process and outcome) and a survey of the literature on successful discharge planning strategies:

- Structure – formalize the discharge plan by providing written information and structured interactions with health care providers (Anderson & Helms 1995, Nixaon *et al.* 1998).
- Process – within 24–48 hours of patients' admission, start to assess their health care needs; visit regularly (every 48 hours at least) during hospitalization to assess, counsel, educate, coordinate and evaluate the health care needs of patients and caregivers; use a multidisciplinary approach; promote communication between health care providing organizations; establish a follow-up programme; and involve patient and family (Jackson 1994, Anderson & Helms 1995, Naylor *et al.* 1994, 1999, Nixaon *et al.* 1998, Rosswurm & Lanham 1998).
- Outcome – an assumption of discharge planning programmes is that they will be cost-effective (by reducing length of hospital stay and decreasing hospital readmissions) and enhance patients' quality of life (QOL) (Jackson 1994). Desirable functional outcomes after hip fracture in older people are reduced mortality and ability to perform activities of daily living (ADLs) (Koval & Zuckerman 1994). More-

over, a history of falls increases an older person's chance of falling again (Richardson & Hurvitz 1995). Consequently, the outcomes in this study of discharge planning were prognosis (length of hospitalized stay, rate of readmission to hospital, rate of repeat falls, number of deaths and ability to perform ADLs) and QOL.

The objective of this study was to examine the effectiveness of a discharge plan for hospitalized elderly patients with hip fracture due to falling. We hypothesized that this intervention would improve the length of hospitalized stay, rate of readmission to hospital, rate of repeat falls, number of deaths, ability to perform ADLs, and QOL of hospitalized older patients with hip fracture.

Methods

Design

The research design used in this study is a two-group randomized intervention design. This design involves randomized assignment of subjects into an experimental group and a comparison group.

Participants

From January to December 2002, patients over 65 years with hip fractures due to falling were recruited from a 3970-bed medical centre in northern Taiwan. Eligible participants for the study were those discharged within the catchment areas of the medical centre (Taipei City and County, and Taoyuan County). Patients who were cognitively impaired or too ill (e.g. with co-morbidities, unable to communicate or needing to stay in the ICU) were excluded. During the study period, 141 patients qualified for this study. Of these, 15 patients (seven experimental and eight control) left the study before discharge (due to refusal of participation or changes in health status). A total of 126 patients completed the study.

Ethical considerations

After obtaining approval of human subjects research from the Institutional Review Board of the medical centre, an experimental design study was conducted. Each participant was assured of confidentiality and the ability to decline participation or withdraw from the study at any time.

Procedures for data collection

A research assistant (RA), blinded to assignment of subjects to study groups, asked eligible patients and their families to give

written informed consent within 24 hours of patient admission. After obtaining informed consent, the RA collected baseline data on both groups. According to a computer generated table, the researcher then randomly assigned patients to either the control group or the intervention group. All subjects were interviewed at the time of discharge, and again two weeks and three months after discharge. At these interviews, the RA evaluated patients regarding the outcomes.

Intervention

Intervention group

The discharge planning intervention extended from hospital admission through three months after discharge. A full-time, master's-prepared gerontological nurse with seven-years experience in hospital and home care of older adults provided the discharge service in the study hospital. The initial nurse visit took place within 48 hours of hospital admission and the nurse visited patients at least every 48 hours during hospitalization. Three to seven days after patient discharge, the nurse made one home visit and was available for patient by telephone seven days per week (8 AM–8 PM); once a week the nurse initiated telephone contacts with patients or caregivers.

The nurse collaborated with the patients, family caregivers and health care team members to design an individualized discharge plan based on the patient's information. The intervention group received two brochures prepared by the researcher. One brochure provided detailed information on self-care for hip-fracture patients, including classification, operative procedure, pre- and postoperative care and self-care at home. The second brochure provided information regarding fall prevention, specifically safety issues regarding medication and environment. The nurse provided direct care, education and confirmation of learning with regard to both medication and environmental safety, as well as the proper employment of assistance devices.

Additionally, the nurse executed the plan by providing the management of needed resources, which include both the setup of home care services and the assessment of rehabilitation facility needs. To express the brochure contents, we used coloured pictures, step by step and with few words, to address the prevalent issue of illiteracy among older adults in Taiwan.

Before discharge, the nurse provided hard copy summaries to patients and caregivers detailing the plans, goal progression and ongoing concerns. Through follow-up, the nurse addressed concerns of patients and caregivers, monitored patients' progress and collaborated with physicians to modify therapies and find needed services.

Comparison group

Patients in the comparison group received routine hospital discharge planning for adult patients, provided by nurses who were primarily diploma- or bachelor's-prepared generalists. No brochures or written discharge summaries were given to patients in this group, nor did they receive any home visit or telephone contact.

Outcome measures

The primary outcomes for this study were: length of hospitalized stay (in days), rate of readmission to hospital, rate of repeat falls (subjects keep a diary), rate of survival, and ADLs. The Barthel Index is designed to rate the level of independent functioning for ten ADLs in individuals with neuromuscular or musculoskeletal disorders or other chronic disorders. Ratings are recorded in the areas of feeding, moving from wheelchair to bed, personal toilet, getting on and off toilet, bathing, walking on level surface, ascending and descending stairs, dressing, controlling bowels and controlling bladder. The higher the score, the more independent the individual. The study by Granger *et al.* (1979) showed the test-retest reliability was 0.89 and inter-rater reliability was 0.95. Additionally, Cronbach's alpha was 0.90 in this study.

The secondary outcome was QOL three months after discharge. The 36-item Medical Outcomes Study Short-Form health status questionnaire (SF-36) (Garratt *et al.* 1993) was used to measure health-related QOL. This instrument has eight subscales that measure physical function, role functioning-physical, pain, general health perception, vitality, social function, role functioning-emotional and mental health. The score on each subscale may range from 0 to 100 points, with higher scores indicating better health status. The SF-36 has undergone extensive validity and reliability testing (McHorney *et al.* 1993, 1994, Tsai 1999).

Data analysis

Statistical analyses were conducted using SPSS 11.0 for windows. Baseline data for the intervention and control groups were compared using Chi-squared tests for categorical variables, *t*-tests for continuous variables. *t*-tests were used to compare length of hospitalized stay between groups. Kaplan-Meier survival analysis was used to compare primary end points of time to readmission, time to repeat fall, and time to death between groups. Repeated measures ANOVA was used to compare ADLs and QOL of control and intervention groups over time.

Results

Comparison of two groups at baseline

The two study groups were similar in all sociodemographic and baseline health characteristics (Table 1). The average patient age in both groups was over 75 years. The majority was female, religiously affiliated, illiterate, widowed, living with their families, see themselves as having more than enough income and report positive family interactions. Baseline health characteristics include the majority of patients in both groups as having had one chronic condition, ADL scores which indicate they can live independently and most having had no history of falls during the previous year (excluding the fall that caused the hip fracture). Of the 126 enrolled patients, four in the control group died within three months of discharge.

Outcomes

Except for the rate of repeat falls, all indicators of outcome were significantly better for patients in the intervention group than those in control group.

The average hospitalized stay for the experimental group patients was significantly less (mean = 8.17, SD = 3.61 days) than for those in the control group (mean = 10.06, SD = 3.07 days) ($t = -3.16$, $P = 0.002$). Patients in the experimental group stayed in the hospital 1.89 fewer days than the control group patients (Table 2).

Comparison group patients were more likely than experimental group patients to be readmitted. The intervention resulted in fewer total hospital readmissions within three months after discharge (four intervention vs. 13 control). Of the 17 readmissions, 11 were related to comorbid conditions (four vs. seven) and six to new health problems (three repeat falls and three infections). No readmissions in the intervention group were related to new health problems (zero vs. six). The average time to readmission for the experimental group was also longer than for those in control group (2.91 vs. 2.67 months after discharge, $P = 0.02$) (Table 3).

At three months after discharge, there were five patients in the experimental group experienced falling: three due to outdoor environmental hazards e.g. walkways with clutter, and without enough light and two due to dizziness. Seven patients in the control group had repeat falls: three due to indoor environmental hazards, two due to inappropriate use

Variables	Experimental (<i>n</i> = 63)	Control (<i>n</i> = 63)	<i>P</i>
Age** [years, mean (SD)]	75.9 (7.6)	78.1 (7.5)	0.14
Gender (Female)*	40 (63.5)	47 (74.6)	0.21
Religious affiliation* (yes)	58 (92.1)	52 (82.5)	0.17
Education (illiterate)*	39 (61.9)	36 (57.1)	0.67
Marital status (widow)*	37 (58.7)	37 (58.7)	1.00
Living status (with family)*	61 (96.8)	54 (85.7)	0.29
Self-rated economic status*			
Enough	27 (42.9)	30 (47.6)	0.72
More than enough	36 (57.1)	33 (52.4)	
Interaction with family* (positive)	51 (80.1)	44 (69.8)	0.45
Chronic condition** [mean (SD)]	1.04 (0.90)	1.09 (1.04)	0.83
None	18 (28.6)	21 (33.3)	
1	31 (49.2)	27 (42.9)	
2	10 (15.9)	8 (12.7)	
≥3	4 (6.3)	7 (11.1)	
ADLs** [mean (SD)]	96.5 (7.6)	96.43 (7.1)	0.91
Falling history previous year* (no)	37 (58.7)	42 (66.7)	0.58
Type of fracture*			
Intracapsular	25 (39.7)	30 (47.6)	0.47
Extracapsular	38 (60.3)	33 (52.4)	
Type of Surgery*			
Open reduction internal fixation	22 (34.9)	34 (53.9)	0.11
Close reduction internal fixation	19 (30.2)	13 (20.6)	
Total hip replacement	22 (34.9)	16 (25.4)	

Table 1 Socio-demographic and health characteristics of elderly patients (*n* = 126)

*Chi-squared test; ***t*-test.

Table 2 Hospitalized stay days for patients in intervention and control groups (df = 125)

Variable	Group				<i>t</i>	<i>P</i>
	Experimental (<i>n</i> = 63)		Control (<i>n</i> = 63)			
	mean	SD	mean	SD		
Hospitalized stay days	8.17	3.61	10.06	3.07	-3.16	0.002**

of walker and two due to dizziness. No significant difference was found in the average time to repeat fall experienced by patients in either group (2.83 vs. 2.79 months after discharge, $P = 0.57$) (Table 3).

No patient in the intervention group died during the three months following discharge, while four patients in the control group died in the same period. The mortality rate of the experimental group was thus zero, while that of the control group was 4.4% (3.00 vs. 2.92 months, $P = 0.04$) (Table 3). The causes of death were heart disease ($n = 3$) and stroke ($n = 1$).

ADL scores improved steadily for both groups over the three months following discharge (Table 4). Mean total scores for patients in the experimental group rose from 47.6 (SD = 10.4) at discharge to 87.2 (SD = 11.6) at three months after discharge, while scores for patients in the control group at the same times rose from 37.5 (SD = 17.9) to 71.02 (SD = 26.1). Repeated measures ANOVA showed that the group by time interaction was significant ($F = 4.43$, $P < 0.05$) and the main effects of group and time were significant ($F = 20.21$ and 399.52 , $P < 0.01$). Thus, the ADLs of both groups showed significant improvement ($P < 0.01$) over the three months following discharge. The mean ADL scores of patients in the experimental group were significantly higher than those of the control group ($P < 0.01$), and the ADLs were higher at three months following discharge in the experimental group compared with those in the comparison group ($P < 0.05$).

Table 3 Outcome measures (Kaplan–Meier survival analysis) for patients in intervention and control groups after discharge

Variables	Group				<i>P</i>
	Experimental (<i>n</i> = 63)		Control (<i>n</i> = 59)		
	<i>n</i> (%)	Mean (SD) (months)	<i>n</i> (%)	Mean (SD) (months)	
Readmission	4 (6.35)	2.91 (0.05)	13 (20.63)	2.67 (0.09)	0.02*
Repeat falls	5 (7.94)	2.83 (0.09)	7 (11.11)	2.79 (0.08)	0.57
Survival	63 (100)	3.00 (0.00)	59 (93.65)	2.92 (0.04)	0.04*

Quality of life, as measured by the total score on the SF-36, improved steadily for both groups over the three months following discharge (Table 5). Mean total scores for patients in the experimental group rose from 42.2 (SD = 9.9) at discharge to 60.8 (SD = 10.5) at three months after discharge, while scores for patients in the control group at the same times rose from 36.2 (SD = 7.8) to 51.3 (SD = 11.6). Repeated measures ANOVA showed that the group by time interaction was significant ($F = 4.06$, $P < 0.05$), but the group and time main effects were significant ($F = 21.77$ and 289.47 , $P < 0.001$). Thus, the QOL of both groups showed significant improvement over the three months following discharge, and the mean scores representing QOL of patients in the experimental group were significantly higher compared with those of the control group (Table 5).

Among the eight aspects of QOL represented by the subscale measures on the SF-36, physical function, role functioning-physical, social function and vitality in the experimental group showed significant improvement at three months following discharge compared with those in the control group. Six QOL aspects showed significant improvement over time in the experimental group as compared with the control group: social function ($P < 0.05$); physical function, bodily pain, vitality and mental health ($P < 0.01$); general health perceptions ($P < 0.001$) (Table 5).

Discussion

Older patients (> 65 years) who had been hospitalized with a hip fracture due to a fall and had received a discharge intervention with follow-up planning spent 1.84 fewer days in the hospital ($P < 0.05$) than those in the control group. The patients and their families in the intervention group had a more positive perception of their readiness for discharge than those in the control group. Several previous studies (Stewart *et al.* 1998, Naylor *et al.* 1999, Brook 2001) have also demonstrated that discharge planning and home follow-up can decrease the length of hospitalization. Other investigators (Naylor 1990, Evans & Hendricks 1993, Naylor *et al.* 1994)

Table 4 ADLs measures for patients in intervention and control groups at discharge, two weeks, and three months after discharge

Experimental (n = 63) [Mean (SD)]	
T1	47.62 (10.39)
T2	73.41 (13.28)
T3	87.22 (11.60)
Control (n = 59) [Mean (SD)]	
T1	37.54 (17.89)
T2	58.73 (21.87)
T3	71.02 (26.09)
F1†	4.43*
F2‡	20.21**
F3§	399.52**

T1, discharge; T2, two weeks after discharge; T3, three weeks after discharge.

†F1, group by time interaction (df = 2, 119); ‡F2, group main effect (df = 1, 120); §F3, time main effect (df = 2, 119).

*P < 0.05. **P < 0.01. by repeated measures ANOVA.

have reported that discharge planning did not significantly reduce the length of hospitalization. The difference in these findings could be attributed to the better health of qualified subjects in this and other concurring studies.

Length of time to readmission in the experimental group was significantly longer than that of the control group. This result is supported by two studies (Stewart *et al.* 1998, Naylor *et al.* 1999). Several studies (Evans & Hendricks

1993, Naylor *et al.* 1994, Rosswurm & Lanham 1998, Parker *et al.* 2000, Nazareth *et al.* 2001). However, disagreed with our findings. A possible explanation for this difference is the variation in medical diagnosis of the target population and longer follow-up period.

Patients in the experimental group experienced a lower rate of repeat falls, with these subsequent falls happening later than in the control group. These results agree with the findings of Abreu *et al.* (1998). Several studies have indicated that the risk factors for falling are health status, inappropriate use of walking accessories, dizziness, poor mobility and environmental hazards (Gaebler 1993, Mahoney *et al.* 1994, Commodore 1995, Abreu *et al.* 1998). The subjects may have limited mobility and not be able to go outside in the first three months after discharge, especially those in the comparison group; therefore no subjects in the comparison group fell due to outdoor environmental hazards. The discharge planning programme for the experimental group only assessed indoor environmental safety and used assisting devices safely; thus, three subjects in the experimental group experienced falling due to outdoor environmental hazards. These outdoor environmental issues should be added for their safety. However, the number of subjects in this study was too small to draw conclusions.

The survival rate of experimental group patients was significantly higher than that of the control group. This

Table 5 Quality of life measures for patients in intervention and control groups at discharge, two weeks, and three months after discharge

SF-36 subscale	Experimental (n = 63) [Mean (SD)]			Control (n = 59) [Mean (SD)]			F1†	F2‡	F3§
	T1	T2	T3	T1	T2	T3			
Physical function	0 (0)	5.16 (8.75)	23.65 (18.86)	0 (0)	2.97 (5.35)	13.72 (19.62)	7.29**	7.44**	101.86***
Role function – physical	0 (0)	4.37 (9.57)	29.76 (19.50)	0.40 (3.15)	7.14 (11.38)	20.76 (20.32)	7.79**	1.50	130.17***
Role function – emotional	52.38 (28.53)	60.85 (29.05)	88.89 (20.74)	43.39 (23.67)	55.03 (30.62)	79.10 (30.89)	0.55	3.61	94.29***
Social function	52.38 (18.76)	51.79 (18.36)	71.63 (22.47)	53.37 (18.94)	44.44 (19.15)	60.17 (23.15)	6.10**	3.96*	49.34***
Pain	62.06 (18.74)	85.29 (13.37)	90.10 (10.51)	52.63 (9.37)	74.90 (16.66)	84.20 (14.11)	3.01	19.07**	297.61***
General health	53.30 (13.10)	55.21 (14.10)	57.62 (15.18)	38.98 (12.17)	40.89 (11.67)	45.59 (13.32)	0.38	34.60***	17.30***
Vitality	56.83 (19.08)	49.84 (17.67)	62.30 (16.94)	49.60 (17.28)	39.29 (10.62)	50.08 (15.41)	3.53*	12.64**	49.26***
Mental health	60.95 (16.33)	55.81 (18.56)	62.16 (19.66)	51.37 (18.25)	43.94 (15.55)	56.34 (15.14)	2.70	7.78**	39.66***
Total	42.24 (9.96)	46.04 (10.50)	60.77 (10.50)	36.22 (7.79)	38.58 (7.90)	51.25 (11.63)	4.06*	21.77***	289.47***

T1, discharge; T2, two weeks after discharge; T3, three weeks after discharge.

†F1, group by time interaction (df = 2, 119); ‡F2, group main effect (df = 1, 120); §F3, time main effect (df = 2, 119).

*P < 0.05, **P < 0.01, ***P < 0.001 by repeated measures ANOVA.

observation is supported by a six-month discharge planning follow-up study, which targeted 97 congestive heart failure patients (Stewart *et al.* 1998); however, another discharge planning study that targeted 362 hospitalized older people (Nazareth *et al.* 2001) disagreed with this finding. In our study, the causes of death were not directly related to hip fracture (three for heart disease and one for stroke); therefore, this finding needs more studies to explore the associations.

One study found that ADL dependency consistently predicted mortality (Mehr *et al.* 1997). The control group subjects in our study were with more ADL dependency when discharged from hospital than those in the experimental group. Poor physical function is central to the problem of frailty and falls in older adults. Functional mobility refers to the individual's ability to perform ADLs (Gladwin 1996). The ADLs were higher at three months following discharge in the experimental group compared with those in the control group ($P < 0.05$). Two previous studies demonstrated that discharge planning could improve the ADLs (Dai *et al.* 1998, Rosswurm & Lanham 1998) of hospitalized older people.

Both groups showed improved QOL over the three months after discharge ($P < 0.001$). This finding is supported by several studies (Tsai 1999, Susanne & Bergbom 1999, Lin 2000). Lin (2000) followed 80 knee and hip replacement patients for one year and used the Arthritis Impact Measurement Scales 2 (AIMS2) to measure QOL. Susanne and Bergbom (1999) used the Sickness Impact Profile (SIP) to assess QOL in 51 total hip replacement patients for six months. Tsai (1999) targeted 56 hip fracture patients for three months, using the SF-36 to measure QOL.

In our study, patients in the experimental group had significantly higher scores on six of the eight subscales of the SF-36, and the total QOL improved over time for subjects in the experimental group compared with those in the control group. This finding supports Jackson's (1994) assumption that discharge planning would enhance QOL. However, as we know, there is no study using QOL as an outcome variable for discharge planning intervention; therefore, no literature could be used to compare with the results of this study. A possible explanation for these differences is that the individualized discharge plans encourage older people with hip fractures to regain specific functions that improve their QOL.

Conclusion

Most of the studies regarding injuries had focused largely on physical health outcomes. More recently, attention has been given to the psychosocial health of patients who have sustained a traumatic injury (McCarthy *et al.* 2003). More attention to psychosocial health as well as physical health of

patients who sustain a hip fracture injury may be needed to ensure an optimal recovery from this injury. The results of this study clearly indicate the benefits of appropriate discharge planning on improving QOL, survival, ability to perform ADLs, while reducing readmission rates and length of stay in hospital for older people with hip fractures. These findings could be used for teaching and clinical practice, in the hope of improving quality of health care for older people.

Implications for practice

In the study hospital, the referral system for discharge planning is initiated from staff nurses and physicians who had very low referral rate for older people with hip fracture to discharge planning services. Hansen *et al.* (1998) and Bowles *et al.* (2003) mentioned that lack of knowledge, experience and ability were all cited as important concerns related to discharge planning effectiveness. Perhaps additional support and education are needed for nurses and physicians who, by nature of their frequent patient contact, are in an ideal position to recognize patients' needs and to initiate a referral. New employee hospital orientation and staff development programme should include content and procedures of the discharge planning.

The positive results found in this study may be caused by protocol design based on successful discharge planning strategies taken from the literature. Implementing a pilot study among 69 hip fracture patients prior to this study could also be the cause. Additionally, this is a nurse-managed programme. However, it was developed in a multidisciplinary way by orthopedists, physical therapists, nurses and discharge planners and the brochure was specifically designed for older adults in Taiwan. The findings could provide a model for hip fracture discharge services and be used for teaching and clinical practice.

Implications for research

Attrition is potential problem in studies where outcome measures are obtained over time. We addressed this challenge by recruiting more participants than needed for the desired statistical analysis. Monetary incentives were used to reduce the likelihood of participant attrition. In addition, it is believed that the attrition rate was reduced by conduction of home visits rather than mailings in the posthospitalization phase.

Limitations

Examining the effectiveness of the discharge plan in hospitalized elderly patients with hip fracture is the objective of this

study. The subjects in the experimental group received more attention than those in the comparison group and this could have affected the outcome.

A challenge in this study was the rotation plan (the moving of an aged parent to different children's residences every few months, especially for disabled older people) is a popular way to manage parental care in Taiwan. More than half of the caregivers were not consistent; therefore, the outcome measurements among caregivers were excluded in this study. As a way to prevent a similar occurrence in further study, using a randomized block design to block on types of caregiver (i.e. consist or not consist).

This study was limited to one hospital in northern Taiwan, a small size, and a three-month follow-up period. A more robust study could include multiple sites, a larger sample and a longer follow-up period. Finally, although precautions were taken to keep the hospital staff and RA blind to group assignment, they may have been aware of group assignment.

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Contributions

Study design: T-TH; data analysis: T-TH; manuscript preparation: T-TH; data collection: S-HL.

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