Functional Outcomes among Geriatric Fragility Hip Fracture Patients in a Developing Country: A Comparative Study between Complete and Incomplete Post-operative Rehabilitation

Maria Antonia Rosanna G. Peña, MD, MBA,[1] Irewin A. Tabu, MD[1] and Dorothy Dy Ching Bing-Agsaoay, MD[2]

[1]*Department of Orthopedics, Philippine General Hospital, University of the Philippines Manila*
[2]*Department of Rehabilitation Medicine, College of Medicine and Philippine General Hospital, University of the Philippines Manila*

ABSTRACT

Objective. The study compared functional outcomes among post-operative geriatric fragility hip fracture patients who received complete and incomplete rehabilitation.

Methods. This is an ambispective cohort study of 50 acute fragility hip fractures over a 40-month period (October 2017 to November 2020) treated with either arthroplasty or internal fixation under the UP-PGH Orthogeriatric Fracture Liaison Service (FLS). Patients were contacted and interviewed through Telemedicine. They were asked to answer two questionnaires – the Modified Harris Hip Score (MHHS) and the EuroQol-5D-5L (EQ-5D-5L). The scores were tallied and used to describe and compare the post-operative functional outcomes between the two rehabilitation pathways.

Results. Among the 50 patients included in this study, twenty-three (46%) patients underwent complete rehabilitation, while 27 (54%) underwent incomplete rehabilitation. The average corrected MHHS was at 82.5 suggesting good outcomes among all patients, with a higher-than-average outcome of 83.6 among patients who underwent complete rehabilitation, and an outcome of 75.9 among patients who underwent incomplete rehabilitation. Results to the EQ-5D—5L survey showed that a majority of patients who underwent complete rehabilitation reported having 'no problems' in terms of self-care, and anxiety or depression. However, the same group had more patients reporting 'any problems' in terms of mobility. On the other hand, a bigger proportion of patients from the incomplete rehabilitation group presented with 'any problems' in terms of usual activities. Proportions were similar for both groups in terms of pain or discomfort, with neither group having patients who reported extreme pain or discomfort.

Conclusion. In spite of the heterogenous nature of the hip fracture population, functional outcome measures show generally good outcomes of patients under the UP-PGH Orthogeriatric FLS, with no significant difference among patients who receive complete rehabilitation from those who undergo incomplete rehabilitation. Continuing this study may better describe and differentiate the functional outcomes in order to pave the way for evidence-based protocols dedicated to providing the highest quality of care for acute fragility fracture patients.

Key Words: hip fracture, Modified Harris Hip Score, orthogeriatrics, rehabilitation

INTRODUCTION

Burden of Illness

Hip fractures among geriatric patients remain to be a leading cause of morbidity and mortality despite the continuous improvement in surgical techniques.[1] Latest studies show that the prevalence of hip fractures among Filipino patients 70 years and above was estimated to be 160 out of every 10,000 Filipinos. A local study by Mendoza et al. reported a rate as high as 32.1% of fragility hip, spine, or

Corresponding author:
Maria Antonia Rosanna G. Peña, MD, MBA
Department of Orthopedics
Philippine General Hospital
University of the Philippines Manila
Taft Avenue, Ermita, Manila 1000, Philippines
Email: anyapena92@gmail.com

forearm fractures in osteoporotic Filipino men.[2] Based on this prevalence rate, it is estimated that there were about 34,000 hip fractures in 2005 and the numbers are expected to have reached 65,000 in 2020, and almost 175,000 by the year 2050. In spite of the significant impact, it poses on the patient's quality of life, only about 10% are able to regain former levels of mobility and activity. Possible contributing factors to such a poor outcome that have been identified in our setting include: limited capacity of our Out Patient Department to cater to the number of patients for rehabilitation; a high physical therapist to patient ratio; logistical difficulties with respect to following up in PGH especially for patients who live in far-flung provinces. The profile of mortality, morbidity, loss of independence and resulting clinical and financial impact on health form hip fractures alone is daunting and emphasizes the need for care based on the best available evidence.

Although a variety of post-operative rehabilitation programs are available, there is a very limited amount of published data on the effects of the type or provider of rehabilitation treatments on hip fracture outcomes, nor is there a consensus on what rehabilitation strategy is most effective.[3] In addition to these, there is no established criteria or standardized method of measuring functional progression. Monitoring these outcomes through objective assessment methods is essential for determining the prognosis and healing of patients after hip surgeries as these affect the clinical decision-making processes and post-operative management that will best cater to the patient's needs. One important principle stands: when the highest quality of care is provided to a patient with a fragility fracture, not only does the patient benefit, but cost savings result.[4] An improvement in patient outcomes that simultaneously decreases costs of care creates high value for patients and health care systems.[5] As such, it is critical to identify opportunities to decrease the cost of rendering and receiving health care for the elderly while preserving or improving the quality of care.

Theoretical Framework

Many factors are involved in the perioperative care of the fragility fracture patient. In general, care is best delivered by a protocol-driven, patient-centered approach.[3] Studies show that close collaboration among orthopedic surgeons, geriatricians and physical therapists can improve outcomes among hip fracture patients. One study by Wong et al. in 2018 showed improvements in the 12-month mortality rate of patients taking full-course rehabilitation in the Geriatric Day Hospital collaboration.[6] Even more studies continue to emphasize the need for more active implementation of orthogeriatric management and multidisciplinary geriatric rehabilitation in order to improve outcomes among geriatric fracture patients. It was for this reason that the UP-PGH Orthogeriatric Fracture Liaison Service (FLS) was established in October 2017.

The UP-PGH Orthogeriatric FLS is a multidisciplinary team composed of Rehabilitation, Geriatrics, Endocrinology, Internal Medicine, Family Medicine and Orthopedic Surgery services that uses a comprehensive, standardized approach to each geriatric patient presenting with a fracture upon admission to the hospital. More commonly known as the "Secondary Fracture Prevention Program" internationally, the Orthogeriatric FLS is a system that ensures fracture risk assessment and treatment where appropriate, is delivered to all individuals with fragility fractures. Early surgery and pre- and post-operative rehabilitation are key principles to encourage early mobilization. Being the pioneering national hospital in the country that has implemented the Orthogeriatric FLS model, PGH is the ideal venue that will allow us to further streamline this multidisciplinary team approach in order to maximize patient functional outcomes.

Review of Related Literature

Fragility hip fractures are one of the more common reasons for surgical management among the geriatric population. More often than not, the usual preoperative complaints among patients who opt to undergo surgery are pain and loss of mobility. As such, the most commonly reported outcomes of these surgeries relate to pain relief and restoration of mobility.[7] After all, the primary goal of rehabilitation after fracture is to restore the patient to the preinjury activity status.[5]

A retrospective descriptive study by Kondo et al. in 2010 found that more pain control and continuous rehabilitation at the hospital performing the surgery were necessary in overcoming the post-operative difficulties among patients with hip fractures.[8] These difficulties encountered by most patients were categorized into four: "difficulties in ADL", "physical symptoms", "reduced social activities" and "anxiety." Some patients for instance, had difficulties in finding rehabilitation facilities, while others wanted support when transferring to another hospital. As such, it was found that both patients and families wanted continuous care from the same hospital even after discharge. Although some hospitals discuss after-care protocols during hospitalization, these services are not always available especially among community-based hospitals. This is a problem because patients that do not have the opportunity for rehabilitation to maximize recovery of strength, range of motion, and balance, run the potential risk of a sub-optimal recovery.

In another study by Su et al. in 2018, it was confirmed that patients had better outcomes when mobilized early whether they were mobilized by physical therapists (PTs) or by non-PTs.[9] Analyses showed that patients mobilized by non-PTs were less immobile at 30 days, but showed no difference with patients mobilized by PTs at 30 days post-surgery. Another study by Kroll et al. in 1994 however, reported that patient self-perception is what ultimately determines whether a patient will perform functional activities assisted or unassisted outside a physical therapy session.[10] These findings may suggest that rehabilitation pathways have no impact on the long-term patients' functional status.

Implementation of effective care pathways and finding the best possible match between healthcare settings, rehabilitation services, and outcomes are still debated.[11]

Primary Outcome Measures

The use of telephone interviews instead of direct interviews for routine follow-up has been shown useful for patients who have undergone hip surgery. Some possible factors for such were that patients are more relaxed at home, helping them better explain their progress and difficulties, with less influence from the surgeon's expectations while answering the questions. Although the average time for completing questionnaires over the phone is longer than in person, this saves the patient the inconvenience and expenses of traveling to the hospital and waiting in line for his or her turn.[12]

The Modified Harris Hip Score (MHHS) was designed to eliminate physical examination findings in times when face-to-face assessment is not possible. It is an 8-item patient or clinician report of pain (44 points) and functional domains (47 points). This makes a total of 91 points, with lower scores indicating greater disability. A total score of less than 70 would suggest a poor outcome; 70-79, a fair outcome; 80-89, a good outcome; and 90 and above, an excellent outcome. This has been widely used and has been shown to have acceptable reliability and construct validity.[13]

The EuroQol-5D (EQ-5D-5L) is an instrument which evaluates the generic quality of life. Although initially developed in Europe, its use has been validated to measure patient-reported outcomes in many countries, on the premise that it is possible to generate a single index value for each health state by some investigatory method. [14,15] It is a descriptive, preference-based health-related quality of life (HRQL) instrument comprising a visual analog scale (VAS) measuring self-rated health and a health status instrument consisting of one question for each of the five dimensions related to daily activities: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.[16,17] In some cases, the results may be dichotomized into 'no problems' (level 1) and 'any problems' (levels 2, 3, 4 and 5) thereby modifying the profile into frequencies of reported problems. EQ-5D-5L was designed to be sufficiently short for the intention of being used in large-scale surveys as a self-completed questionnaire and therefore, has been shown to have good test-retest reliability, is simple for patients to use, and gives a single preference-based index value for health status that can also be used for cost-effectiveness comparative purposes. Moreover, the scores can reasonably be collected from proxies such as relatives and caregivers.

OBJECTIVES

There exists a need to improve recovery after hip fractures, particularly among frail elderly people. Because synthesized data are lacking regarding proper management after hip fracture surgeries, this study seeks to provide evidence to develop recommendations for more effective methods of achieving better functional outcomes among the geriatric population.

General Objectives

The primary objective of this study is to compare the functional outcomes among post-operative geriatric fragility hip fracture patients who receive complete physiotherapist-administered rehabilitation with patients who undergo incomplete post-operative rehabilitation independently or with the guidance of a non-physiotherapist licensed caretaker. This study also doubles as an avenue to promote awareness on secondary prevention and improve outcomes and efficiency of care after hip fractures by delivering professional standards in accordance with established performance and quality measures, and by empowering caregivers in our local community.

Specific Objectives

The secondary objectives of this study are to: (1) measure functional outcomes among all post-operative geriatric fragility hip fracture patients under the UP-PGH Orthogeriatric FLS; and (2) determine whether there is a difference in functional outcomes (pain, function, mobility) among patients who undergo complete and incomplete rehabilitation.

METHODS

Design

This is an ambispective cohort study of all geriatric patients managed under the UP-PGH Orthogeriatric FLS as a case of acute fragility hip fractures who underwent surgery for hip replacement or internal fixation.

Operational Definitions

Complete Rehabilitation – This includes patients who completed at least four (4) sessions of the prescribed post-operative rehabilitation in Philippine General Hospital (PGH) or any other health center under the supervision of a licensed Physical Therapist

Incomplete Rehabilitation – This includes patients who failed to complete the prescribed four (4) sessions of the post-operative rehabilitation regimen and/or patients who had undergone rehabilitation at home under the guidance of their primary or secondary caregiver only, and not a licensed Physical Therapist

Acute fragility hip fracture – a fracture of the proximal femur occurring anywhere from the femoral neck to the subtrochanteric region 5cm distal to the lesser trochanter occurring within 30 days from diagnosis as a result of low-energy trauma

Study Population

This study includes all patients under the UP-PGH Orthogeriatric FLS who had been clinically diagnosed with acute unilateral fragility hip fractures and are at least 120 days post-surgery for hip replacement or internal fixation. On the other hand, the exclusion criteria of this study are patients who: 1) were unable to walk with or without assistance prior to sustaining the hip fracture; 2) had fractures attributable to pathologic causes; 3) had more than one fracture at the same time; 4) died during the course of the hospitalization or follow-up period; 5) are suspected to have or have been diagnosed with mental illnesses that may compromise compliance to instructions; and 6) are less than 120 days post-surgery.

Data Gathering

After approval from the UP-PGH Ethics Review Board was obtained, research data was extracted from the UP-PGH Orthogeriatric FLS database by the Primary Investigator and Research Assistant. Information collected included: patient demographics, contact details, diagnosis and surgical management. There was a total of 140 patients whose records were identified and reviewed for analysis. Each patient was contacted through Telemedicine by the Research Assistant to discuss the background, objectives, all benefits, risks, responsibilities of all parties involved, and subsequent tasks should the patient agree to join this study. Patients who gave their consent to participate, were sent a soft copy of the consent form and questionnaires via either e-mail or electronic messaging. They were given a day to go over and review the documents and to answer the questionnaires, either on their own or with the assistance of their caregiver. Once the questionnaires had been completed, each patient was called and interviewed regarding the post-operative rehabilitation regimen they went through. After which, their answers to the 2 questionnaires – MHHS and the EQ-5D-5L were collected. All interviews were accomplished and recorded by a single Research Assistant and the Principal Investigator according to the Patient Data Sheet (Appendix A). Patients were grouped into two: Group A were patients who underwent complete postoperative rehabilitation with a licensed PT, while Group B are patients who underwent incomplete postoperative rehabilitation. At any point in the study, the patient was given the liberty to withdraw his or her consent from participation if he or she wished.

Statistical Methods

No sample size calculation and sampling procedure was done because total enumeration was employed. All patient demographic and clinical characteristics were summarized using means and standard deviation for normally distributed quantitative data, median and interquartile range for non-normal quantitative data, and frequencies and proportions for qualitative data. Shapiro-Wilk test was used to check for normality of quantitative data. Comparison of outcomes between formal and informal rehabilitation was analyzed using independent t-test for normally distributed quantitative outcomes and chi-square test for qualitative outcomes. Wilcoxon rank sum test was used to test the difference if the quantitative data does not fit normality, while Fisher's exact test was employed if the assumptions of Chi-square test were not met. The relationship of demographic and clinical characteristics with the measured functional outcomes were recorded and described accordingly.

Ethical Considerations

This study was performed in accordance with the relevant guidelines of the Declaration of Helsinki, 1964 as amended in Tokyo, 1975; Venice, 1983; Hong Kong, 1989; and Somerset West, 1996.[18] All participants were asked to give their consent prior to being enrolled in this study. In the event that the participant was incapable of giving or has diminished capacity to give his or her informed consent, a legally authorized representative was allowed to give his or her consent instead. All patient information was coded anonymously, with only the study team having access to the original data. The study results may be disseminated in peer-review publications and conference presentations should the opportunity arise.

RESULTS

Since its official launch in 2017, the UP-PGH Orthogeriatric FLS has had a total of 140 patients diagnosed with acute fragility fractures of the hip. Out of these patients, only 50 (35.7%) were included in this study as 21 (15%) patients had expired, 67 (47.86%) patients were lost to follow-up (either no response to at least 3 telephone calls), and 2 (1.4%) did not undergo surgery. Majority of the study population were female (n=46, 90.38%), with a median age of 73.71 years (range 59-87 years). Of these patients, 30 (60%) underwent arthroplasty, while 20 (40%) underwent internal fixation (Table 1). There was no trend found within the group of patients who were lost to follow-up regarding age, type of procedure performed or type of rehabilitation the patient underwent.

Twenty-three (46%) patients underwent complete rehabilitation, while 27 (54%) underwent incomplete rehabilitation. Among those who underwent complete rehabilitation, 24 patients (48%) completed their rehabilitation in a hospital, either in PGH or another local hospital, 21 patients (42%) received rehabilitation in private rehabilitation facilities, and 5 patients (10%) received rehabilitation with a private physical therapist at home (Table 2). Of those who underwent incomplete rehabilitation, reasons for not having completed the prescribed rehabilitation sessions were mostly attributed to difficulty of traveling due to the lockdown (n=10, 37.04%) or due to living in far-flung areas (n=3, 11.11%), financial constraints (n=3, 11.11%), and

Table 1. Characteristics of post-operative patients under the UP-PGH Orthogeriatric FLS, 2017-2020 (N=50)

Variable	Number of Patients
***Age,** in years (mean, SD)*	73.71 (± 7.83)
	n (%)
Sex	
Female	46 (92)
Male	4 (8)
Hip fracture diagnosis	
Subcapital	4 (8)
Basicervical	4 (8)
Transcervical	26 (52)
Intertrochanteric	13 (26)
Subtrochanteric	2 (4)
Periprosthetic	1 (2)
Type of surgery	
Arthroplasty	30 (60)
Internal fixation	20 (40)

Table 2. Details on rehabilitation of post-operative patients under the UP-PGH Orthogeriatric FLS, 2017-2020 (N=50)

Variable	n (%)
Type of rehabilitation	
Complete	23 (46)
Incomplete	27 (54)
Place of Rehabilitation	
Hospital	24 48)
Private physical therapist	5 (10)
Rehabilitation facility	21 (42)
Reasons for Incomplete Sessions*	
Distance	3 (11.11)
Financial	3 (11.11)
Lockdown	10 (37.04)
Unidentified	13 (48.1)

**Among those who have incomplete sessions.*

Table 3. Functional outcomes of post-operative under the UP-PGH Orthogeriatric FLS, 2017-2020 (N=50)

Variable	Number of Patients
Harris Score	
Harris score *(median, IQR)*	82.5 (25)
Harris score *(mean, SD)*	75.49 (± 19.19)
	n (%)
EQ-5D-5L dimensions	
Mobility	
No problems	16 (32)
Slight problems	16 (32)
Moderate problems	12 (24)
Severe problems	2 (4)
Unable to walk about	4 (8)
Self-care	
No problems	28 (56)
Slight problems	13 (26)
Moderate problems	6 (12)
Severe problems	1 (2)
Unable to wash or dress	2 (4)
Usual activities	
No problems	20 (40)
Slight problems	13 (26)
Moderate problems	10 (20)
Severe problems	2 (4)
Unable to do usual activities	5 (10)
Pain/discomfort	
No pain/discomfort	8 (16)
Slight pain/discomfort	25 (50)
Moderate pain/discomfort	12 (24)
Severe pain/discomfort	5 (10)
Extreme pain/discomfort	0
Anxiety/depression	
Not anxious/depressed	29 (58)
Slightly anxious/depressed	12 (24)
Moderately anxious/depressed	6 (12)
Severely anxious/depressed	3 (6)
Extremely anxious/depressed	0
***EQ-5D-5L VAS score** (median, IQR)*	77.5 (15)
***EQ-5D-5L VAS score** (mean, SD)*	76.06 (±16.03)
EQ-5D-5L VAS Index Value (median, IQR)*	0.747 (0.211)
EQ-5D-5L VAS Index Value (mean, SD)*	0.718 (0.213)

***Calculated using the tool "EQ-5D-5L Crosswalk Index Value Calculator". Available from: https://euroqol.org/eq-5d-instruments/eq-5d-5l-about/valuation-standard-value-sets/crosswalk-index-value-calculator/*

other reasons such as poor compliance and no available caregiver (n=13, 48.1%) (Table 3).

The mean corrected MHHS was at 82.5, signifying generally good outcomes among all post-operative patients of the UP-PGH FLS (Table 4). However, when comparing the two groups of patients, those who underwent complete rehabilitation had better-than-average outcomes with a mean score of 83.6, while those who received incomplete rehabilitation had fair outcomes with a mean score of 75.9 (Table 4). The difference between the two groups was not significant (*P*= .426).

Results to the EQ-5D-5L survey showed majority of patients having either 'no problems' or 'slight problems' with no significant difference in distribution of responses between the two groups across all 5 dimensions (Table 3). Tables 5 and 6 show the functional outcomes and their corresponding proportions for both complete and incomplete rehabilitation groups, respectively. Majority of patients reported having 'no problems' as opposed to having 'any problems' in the dimensions of self-care and anxiety or depression. However, this corresponded to a bigger proportion in the complete rehabilitation group (n=14, 60.87%) compared to the incomplete rehabilitation group (n=14, 51.85%). Furthermore, some patients in the incomplete rehabilitation group (n=3, 14.8%) reported having 'severe problems' or being 'unable to wash or dress' themselves, while there were

Table 4. Comparison of functional outcomes between complete and incomplete rehabilitation among post-operative patients under the UP-PGH Orthogeriatric FLS (N=50)

Patient Functional Outcome Scores	Complete (n=23)	Incomplete (n=27)	p-value
***Age** (in years)*	73 (± 8.26)	74.37 (±7.50)	0.5335[a]
Sex			0.5380[b]
Female	22 (47.8%)	24 (52.17%)	
Male	1 (25%)	3 (75%)	
***Harris score** (median, iqr)*	83.6 (19)	75.9 (33)	0.4259[c]
	n (%)	**n (%)**	
EQ-5D-5L Dimensions			
Mobility			0.172
No problems	6 (37.5)	10 (62.5)	
Slight problems	9 (56.25)	7 (43.75)	
Moderate problems	7 (58.33)	5 (41.67)	
Severe problems	1 (50)	1 (50)	
Unable to walk about	0	4 (100)	
Self-care			0.713
No problems	14 (50)	14 (50)	
Slight problems	6 (46.15)	7 (53.85)	
Moderate problems	3 (50)	3 (50)	
Severe problems	0	1 (100)	
Unable to wash or dress	0	2 (100)	
Usual activities			0.287
No problems	10 (50)	10 (50)	
Slight problems	8 (66.67)	5 (33.33)	
Moderate problems	2 (27.27)	8 (72.73)	
Severe problems	1 (50)	1 (50)	
Unable to do usual activities	2 (25)	3 (75)	
Pain/discomfort			0.411
No pain/discomfort	3 (37.5)	5 (62.5)	
Slight pain/discomfort	14 (53.85)	12 (46.15)	
Moderate pain/discomfort	3 (27.27)	8 (72.73)	
Severe pain/discomfort	3 (60)	2 (40)	
Extreme pain/discomfort	0	0	
Anxiety/depression			0.682
Not anxious/depressed	14 (50)	14 (50)	
Slightly anxious/depressed	4 (36.36)	7 (63.63)	
Moderately anxious/depressed	2 (28.57)	5 (71.43)	
Severely anxious/depressed	2 (66.67)	1 (33.33)	
Extremely anxious/depressed	0	0	
***EQ-5D-5L VAS score** (median, IQR)*	80 (15)	75 (17)	0.6569
***EQ-5D-5L VAS Index Value** (median, IQR)*	0.771 (0.163)	0.729 (0.231)	0.6327

[a] t-test, [b] Fisher's exact test, [c] Wilcoxon rank-sum

none from the complete rehabilitation group. On the other hand, a bigger proportion in the complete rehabilitation group (n=14, 60.87%) compared to the incomplete rehabilitation group (n=14, 51.85%) reported having 'no problems' in the anxiety or depression dimension. No patients presented with 'extreme anxiety or depression' from either of the rehabilitation groups.

Majority of patients reported having 'any problems' in the dimensions of mobility, usual activities, and pain or discomfort in both rehabilitation groups. In terms of mobility, 17 patients reported having 'any problems', corresponding to a bigger proportion of 73.84% in the complete rehabilitation compared to 62.9% in the incomplete rehabilitation group. In the dimension of usual activities, 62.9% presented with 'any problems' in the incomplete rehabilitation group (n=17), while only 56.6% (n=13) in the complete rehabilitation group. In terms of pain or discomfort, both complete and incomplete rehabilitation groups presented with a similar proportion of patients reporting 'any problems' at 86.9% (n=20) and 81.4% (n=22), respectively. Neither of the rehabilitation groups presented with extreme pain or discomfort.

Table 5. Functional outcomes among post-operative patients under the UP-PGH Orthogeriatric FLS who underwent complete rehabilitation (n=23)

Patient Functional Outcome Scores	Complete (n=27)
***Age** (in years)*	73 (± 8.26)
Sex	
Female	22 (95.65)
Male	1 (4.35)
***Harris score** (median, IQR)*	83.6 (19)
	n (%)
EQ-5D-5L Dimensions	
Mobility	
No problems	6 (26.1)
Slight problems	9 (39.1)
Moderate problems	7 (30.4)
Severe problems	1 (4.34)
Unable to walk about	0
Self-care	
No problems	14 (60.9)
Slight problems	6 (26.1)
Moderate problems	3 (13.04)
Severe problems	0
Unable to wash or dress	0
Usual activities	
No problems	10 (43.5)
Slight problems	8 (34.8)
Moderate problems	2 (8.7)
Severe problems	1 (4.4)
Unable to do usual activities	2 (8.7)
Pain/discomfort	
No pain/discomfort	3 (13)
Slight pain/discomfort	14 (60.9)
Moderate pain/discomfort	3 (13)
Severe pain/discomfort	3 (13)
Extreme pain/discomfort	0
Anxiety/depression	
Not anxious/depressed	14 (60.9)
Slightly anxious/depressed	4 (17.4)
Moderately anxious/depressed	2 (8.7)
Severely anxious/depressed	2 (8.7)
Extremely anxious/depressed	0
***EQ-5D-5L VAS score** (median, IQR)*	80 (15)
***EQ-5D-5L VAS Index Value** (median, IQR)*	0.771 (0.163)

Table 6. Functional outcomes among post-operative patients under the UP-PGH Orthogeriatric FLS who underwent incomplete rehabilitation (n=27)

Patient Functional Outcome Scores	Incomplete (n=27)
***Age** (in years)*	74.37 (±7.50)
Sex	
Female	24 (52.17)
Male	3 (75)
***Harris score** (median, IQR)*	75.9 (33)
	n (%)
EQ-5D-5L Dimensions	
Mobility	
No problems	10 (37)
Slight problems	7 (25.9)
Moderate problems	5 (18.5)
Severe problems	1 (3.7)
Unable to walk about	4 (14.8)
Self-care	
No problems	14 (51.9)
Slight problems	7 (25.9)
Moderate problems	3 (11.1)
Severe problems	1 (3.7)
Unable to wash or dress	2 (7.4)
Usual activities	
No problems	10 (37)
Slight problems	5 (18.5)
Moderate problems	8 (29.6)
Severe problems	1 (3.7)
Unable to do usual activities	3 (11.1)
Pain/discomfort	
No pain/discomfort	5 (18.5)
Slight pain/discomfort	12 (44.4)
Moderate pain/discomfort	8 (29.6)
Severe pain/discomfort	2 (7.4)
Extreme pain/discomfort	0
Anxiety/depression	
Not anxious/depressed	14 (51.9)
Slightly anxious/depressed	7 (25.9)
Moderately anxious/depressed	5 (18.5)
Severely anxious/depressed	1 (3.7)
Extremely anxious/depressed	0
***EQ-5D-5L VAS score** (median, IQR)*	75 (17)
***EQ-5D-5L VAS Index Value** (median, IQR)*	0.729 (0.231)

The mean EQ_VAS was higher among the patients from the complete rehabilitation group with a score of 80, compared to a mean of 75 among the patients in the incomplete rehabilitation group (Table 5). This was not statistically significant (P= .6569).

DISCUSSION

Fragility fractures of the hip is one of the biggest healthcare challenges of the twenty-first century. With an ageing population, the morbidity, mortality and socio-economic costs of hip fracture have increased substantially.[17] Yet most current models of care are still inadequate and fail to coordinate the key elements of early identification of those at risk, fall prevention, fracture surgery and rehabilitation. The result therefore is sub-optimal patient care – disjointed, broadly ineffective and unnecessarily costly. Better-coordinated, more effective surgery protocols and perioperative rehabilitation services would deliver prompt, high quality care at lower cost, thereby reducing disease burden and containing its costs.

Although there is little consensus on the most appropriate patient related outcome measure (PROM) for this group of patients, it has been increasingly recognized that healthcare evaluations should routinely include health domains that are important to patients in order to assess their overall perception about their condition and treatment.[19,20] This study compared the measurement properties of two types of patient-reported outcome measures in patients with a fragility fracture of the hip, using the MHHS and the EQ-5D-5L.

Studies have shown that the pre-fracture functional level is closely related to the post-fracture outcome after rehabilitation and is associated with lower risk of mortality, provided that immediate rehabilitation is initiated within the index hospital.[11,21] Furthermore, longitudinal studies have shown a decline in the functional status of patients with hip fractures following reductions in rehabilitation services.[21] This study shows that more than half of patients discharged undergo incomplete rehabilitation and are incapable of completing the prescribed rehabilitation program, either due to financial constraints or difficulties in traveling to and from their provinces. In spite of this, functional outcomes among all patients regardless of the rehabilitation pathway undertaken are similar across all dimensions of health-related quality of life. Moreover, there was no significant difference found in the MHHS and EQ-Visual Analog Scale.

In the setting of a developing country such as ours, where patients are required to travel long distances from far-flung provinces only to make it to the mainland, extending hospital rehabilitation services to all may not be feasible because of costs and lack of resources.[22] This study recognizes that organizational efforts are needed in order to provide timely rehabilitation in adequate settings to increase the number of patients receiving high-quality rehabilitation.

The Institute of Medicine and medical societies have noted that it is during transitions and interfaces between care environments that fragmentation of care most occur. This emphasizes the need for medical reconciliation and communication with the primary care providers at each transition as a way of minimizing these risks.[4] Early discharge could include immediate referral to a community rehabilitation facility to be executed by the FLS in order to ensure continuity of care while cutting down on the costs and time entailed for following up in UP-PGH. This includes providing documentation specifying details on the patient's surgery and course during the hospital stay, along with individualized plans for rehabilitation and treatment goals.

Other recommendations include providing community rehabilitation facilities with standardized protocols or implementing a large-scale program of intermediate care focused on rehabilitation services.[23,24] Furthermore, a multi-disciplinary rehabilitation approach, with an integrated use of medical, social, educational and vocational measures for training or retraining the individual to the highest possible level of function, rather than a highly specific but uncombined physical rehabilitation protocol is recommended.[21] It is recommended that combined Occupational Therapy training with task-specific and functionally based exercises may be a sensible way of retraining leg strength, balance and gait ability in this group of patients.

The results of this study should be interpreted in light of several limitations. First, the study design does not allow to interpret associations between rehabilitation pathways and patient outcomes as causal relationships. Functional outcomes were not recorded upon admission of each patient, giving us no preoperative comparator. Measuring these outcomes at particular time intervals – prior to surgery, 3 weeks, 3-, 6-, and 12-months, and 2 years post-op would be more appropriate so as to better reflect the changes in quality of life of patients over time. Second, a significant percentage of patients in the database were lost to follow-up, thereby adding to the limited number of patients included in this study. More efforts to track these patients through the care pathways are needed.

CONCLUSION

In spite of the heterogenous nature of the hip fracture population, functional outcome measures show generally good outcomes of patients under the UP-PGH Orthogeriatric FLS, with no significant difference among patients who receive complete rehabilitation from those who undergo incomplete rehabilitation. As shown in this study, validated measures such as the MHHS and EQ-5D-5L ensure a good response rate that minimizes clinical time and cost of follow-up. Because hip fractures affect many different aspects of quality of life, physical and emotional, all these aspects should also be taken into account with a multi-dimensional rehabilitation and recovery pathway, rather than focusing on the disease or joint specific outcomes. This study paves the way for possibly shorter hospital stays with less required physical therapy sessions during the admission, coupled with the assurance of continuing the proper prescribed rehabilitation regimen at home. Continuing this ambispective study to accommodate more patients may better describe and differentiate the functional outcomes between the two rehabilitation pathways. Furthermore, routinely administering the EQ-5D-5L as the standard core outcome set in this patient population will pave the way for more evidence-based protocols dedicated to providing the highest quality of care.

Statement of Authorship

All authors contributed in the conception of work, acquisition of data and analysis, drafting and revising and approved the final version submitted.

Author Disclosure

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REFERENCES

1. Wallace S, Ellington BJ. Factors Affecting Postsurgery Hip Fracture Recovery. J Orthop Trauma Rehabilitation. 2013 Aug; 18:54-8.
2. Mendoza S, Lopez AA, Valdez VU, Mercado-Asis LB. Osteoporosis and prevalent fractures among adult Filipino men screened for bone mineral density in a tertiary hospital. Endocrinol Metab. 2016 Sep; 31(3):433-8.
3. Cochrane Database System Review, Multidisciplinary rehabilitation for older people with hip fractures [Internet]. 2004 [cited 2009 Oct]. Available from: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD007125.pub2/full.
4. Bukata SV, DiGiovanni BF, Friedman SM, Hoyen H, Kates A, Kates SL, et al. A guide to improving the care of patients with fragility fractures. Geriatr Orthop Surg Rehabilitation. 2011 Jan; 2(1):5-37.
5. Kates SL, Blake D, Bingham KW, Kates OS, Mendelson DA, Friedman SM. Comparison of an organized geriatric fracture program to United States government data. Geriatr Orthop Surg Rehabilitation. 2010 Sep; 1(1):15-21.
6. Wong TM, Leung FKL, Lau TW, Fang C, Chan FHW, Wu J. Effectiveness of a Day Rehabilitation Program in Improving Functional Outcome and Reducing Mortality and Readmission of Elderly Patients with Fragility Hip Fractures. Geriatr Orthop Surg Rehabilitation. 2018 May; 4(9):1-8.
7. Trudelle-Jackson E, Emerson R, Smith S. Outcomes of total hip arthroplasty: a study of patients one-year postsurgery. J Orthop Sports Phys Ther. 2002 Jun; 32(6):260-7.
8. Kondo A, Sada K, Ito Yayoi, Yamaguchi C, Horii N, Adachi H, et al. Difficulties in life after hip fracture and expected hospital supports for patients and their families. Int J Orthop Trauma Nurs. 2014 Nov; 18(4):191-204.
9. Su B, Newson R, Soljak H, Soljak M. Associations between post-operative rehabilitation of hip fracture and outcomes: national database analysis. BMC Musculoskelet Disord. 2018 Jul; 19:211.
10. Kroll MS, Ganz S, Backus S, Benick R, MacKenzie C, Harris L. A tool for measuring functional outcomes after total hip arthroplasty. Arthritis Care Res. 1994 Jun; 7(2):78-84.
11. Tedesco D, Gibertoni D, Rucci P, Hernandez-Boussard T, Rosa S, Bianciardi L, et al. Impact of rehabilitation on mortality and readmissions after surgery for hip fracture. BMC Health Services Research. 2018 Sep; 18(1):701.
12. Sharma S, Shah R, Draviraj KP, Bhamra MS. Use of telephone interviews to follow up patients after total hip replacement. J TelemedTelecare. 2005; 11(4):211-4.
13. McLean JM, Cappelletto J, Clarnette J, Hill CL, Gill T, Mandziak D, et al. Normal population reference values for the Oxford and Harris hip scores – electronic data collection and its implications for clinical practice. Hip Int. 2017 Jul; 27(4):389-396.
14. Operations Research, A health status index and is application to health services outcomes [Internet]. 1970 [cited 1970 Nov]. Available from https://pubsonline.informs.org/doi/abs/10.1287/opre.18.6.1021.
15. Torrance GW. Measurement of health state utilities for economic appraisal. J Health Econ. 1986 Mar; 5(1):1-30.
16. Balestroni G, Bertolotti G. EuroQol-5D (EQ-5D): an instrument for measuring quality of life. Monaldi Arch Chest Dis. 2012 Sep; 78(3):155-9.
17. Parsons N, Griffin XL, Achten J, Costa ML. Outcome assessment after hip fracture: Is EQ-5D the answer? Bone Joint Res. 2014 Mar; 3(3):69-75.
18. Dale O, Salo M. The Helsinki declaration, research guidelines and regulations: present and future editorial aspects. Acta Anaesthesiol Scand. 1996 Aug; 40(7):771-2.
19. Appleby J. Patient reported outcome measures: how are we feeling today? BMJ. 2011 Jan; 343:1-4.
20. Performance Measurement for Health System Improvement, Patient-Reported Outcomes in Performance Measurement [Internet]. 2009. Retrieved October 20, 2020 from: https://www.euro.who.int/__data/assets/pdf_file/0007/135970/E94887_Part_I.pdf.
21. Luciani D, Cadossi M, Mazzotti A, Chiarello E, Giannini S. The importance of rehabilitation after lower limb fractures in elderly osteoporotic patients. Aging Clin Exp Res. 2013 Oct; 25:113-5.
22. Ireland AW, Kelly PJ, Cumming RG. Associations between hospital-based rehabilitation for hip fracture and two-year outcomes for mortality and independent living: an Australian database study of 1,724 elderly community-dwelling patients. J Rehabilitation Med. 2016 Jul; 48(7):625-31.
23. Gosch M, Hoffmann-Weltin Y, Roth T, Blauth M, Nicholas JA, Kammerlander C. Orthogeriatric co-management improves the outcome of long-term care residents with fragility fractures. Arch Orthop Trauma Surg. 2016 Oct; 136(1):1403–9.
24. Zeltzer J, Mitchell RJ, Toson B, Harris IA, Ahmad L, Close J. Orthogeriatric services associated with lower 30-day mortality for older patients who undergo surgery for hip fracture. Med J Aust. 2014 Oct; 201(7):409–11.

APPENDIX

Appendix A. Patient Data Sheet

Telemedicine Follow-Up Form					
Patient Code		Age/Sex		Birthday	
Diagnosis					
Surgical Procedure				Date of Surgery	
Name of Contact			Relationship		
Contact Number					
1st Call		2nd Call		3rd Call	
Modified Harris Hip Score				**Total Score**	
Pain					
Distance Walked					
Sitting					
Limp					
Stairs					
Public Transport					
Support					
Shoes and Socks					
EQ-5D—5L					
Mobility					
Self-care					
Usual Activities					
Pain/Discomfort					
Anxiety/Depression					
Health Scale					