Factors Influencing Postoperative Functional Ability of People with Simple Lower Extremity Fractures

Yin Mar Han, Suparb Aree- Ue, Pisamai Orathai, Paphon Sa- ngasoongsong*

Abstract: Early restoration of functional ability of people with lower extremity fracture is essential for a speedy return to life activities, including work. Simple lower extremity fractures of working-age adults are surgically treated to regain postoperative functional ability as early as possible. Even with successful orthopedic surgery, postoperative functional improvement varies widely due to many factors. This predictive correlational study examined the predictability of educational status, psychological distress, hospital setting, quality of discharge teaching, pain with activity, and satisfaction with care on functional ability at postoperative six-week in working-age adults with simple lower extremity fractures. In three orthopedic care settings in Myanmar, 178 participants completed the Patient Data Record Form, Impact of Event Scale-Revised, Quality of Discharge Teaching Scale, Numeric Rating Scale-Pain, Patient Satisfaction with Nursing Care Quality Questionnaire, and Lower Extremity Measure. Data were analyzed by using descriptive statistics, Spearman's rank correlation coefficient and hierarchical regression analysis.

Results showed that psychological distress, hospital setting, quality of discharge teaching, and pain with activity were significant predictors of postoperative functional ability of people with lower extremity fractures. The significant predictors jointly explained 39.4% of the variance in postoperative functional ability. However, educational status and satisfaction with care were insignificant predictors. These findings may help nurses and other health professionals to develop programs for psychological intervention, discharge teaching, and postoperative pain control in line with the characteristics of various hospital settings. These may improve quality of nursing care and enhance clinical outcomes that help people with simple lower extremity fractures to regain independent lower extremity function and resume work as early as possible.

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Introduction

Injuries are threats to the health of people in every single country around the world, especially in low and middle-income countries. Injuries contribute 10.1% of the global burden disease, and are major causes of disabilities in adults aged 15-49 years.[1] In

Myanmar, injuries stand as the third leading cause of hospitalization around the country with a high magnitude of road traffic injuries followed by farm injuries.[2,3] Therefore, lower extremity fractures (LEF) are in the top ten injury-related morbidities in Myanmar.[3]

Traumatic LEF puts physical, psychological, and socioeconomic impacts on people and families and causes burdens on families, healthcare settings, and the country. Physically, people with traumatic LEF experience ambulatory limitations at acute post-injury, after surgery, and following discharge. Even with minor injury, the people with LEF suffer significantly lower ability to perform intermediate activities of daily living (ADL) for a certain period and work-related activities until 12 months post-injury.[4] Psychological distresses such as anxiety, depression, and posttraumatic stress symptoms are common among them and influence people's functional ability.[5] In the aspect of socioeconomic impact, the people with LEF experience at least a loss of a productive year of work and decreased income particularly among active working adults. Furthermore, LEF-related lifestyle alters the lifestyle of families and caregivers. The people's functional limitations waste much of their time, energy, and income and of the families as well.[6] Also, LEF poses an enormous socioeconomic burden on countries especially in lower socio-economic countries with limited health care resources.[7]

With the aim of early restoration of pre-injury functional ability, simple LEF of working-age adults are surgically reconstructed. The earlier the restoration of the functional ability, the more likely the people regain independent and productive daily lives which can help them return to work earlier and gain the best possible quality of life.[8] Therefore, ensuring optimal regaining of people's functional ability after technically successful surgery is the critical component for health and well-being of people with LEF undergoing surgery. Even with the overwhelming success of orthopedic procedures, postoperative functional improvement varies widely due to many factors.[9] Understanding factors contributing to functional ability among people with LEF undergoing surgery is also necessary to design care interventions to help the people to regain their previous levels of functioning as early as possible. Numerous international studies have highlighted this issue and documented the influencing factors on postoperative functional ability (POFA) of people with LEF [5,10,11,12,13,14] including patient's educational status[10] psychological distress,[5] hospital setting,[11] quality of discharge teaching,[12] pain,[13] and satisfaction with care.[14] Examining these factors would articulate the characteristics of the people with LEF, the care process, and outcomes of orthopedic care settings in Myanmar since until recently, there has been a paucity of literature documenting influencing factors on POFA of such people in the country and where there are substantial numbers of people with LEF in orthopedic care settings. Therefore, this study aimed to identify influencing factors on the POFA of Myanmar with simple LEF.

Conceptual Framework and Review of Literature

For justifying quality care performance in orthopedics, POFA has frequently been considered as an outcome indicator in people with LEF. Donabedian model's[15] guided this study in assessing the quality of care performance on people with simple LEF. According to this model, information about care service and care quality can be identified from three associated domains which are postulated as good structure (e.g., hospital setting) should promote good process (e.g., discharge teaching), and good process should in turn promote good outcomes (e.g., POFA).[15,16] The Donabedian model is a valuable framework for assessing surgical and trauma care quality.[17] By adding an individual's personal characteristics as an antecedent of care, the model provides better understanding of POFA among people undergoing orthopedic surgery (e.g., joint arthroplasty).[18] Moreover, the model is useful to

identify the influence of structure, process, and immediate outcome factors on targeted outcomes because the improvement of immediate outcomes in the hospital settings are reflected in improvement in positive patient outcomes.[17,19]

Patient characteristics and educational status play important roles in functional consequences of people undergoing orthopedic surgery.[10] For instance, people with low educational status and may be illiterate may have decreased knowledge and understandings of health instructions and discharge teaching. Contrarily, highly-educated people acquire better cognitive skills in processing and remembering information provided during educational interventions, which leads to adherence with health advice and changed health-related behaviors.[20] They are likely to have greater access to discretionary procedures, have lower pain and have better function after orthopedic surgery.[10] Therefore, higher educational status contributes to higher physical function.

People with psychological distress undergoing orthopedic surgery are at risk of less functional improvement because of lack of motivation and trouble sticking to full engagement in rehabilitation or discharge teaching programs.[5,9,21] They have an increased level of inflammatory mediators and proinflammatory cytokines, leading to a decreased pain threshold and increased postoperative pain.[22] They mention the entire care receiving experience in a more negative light and have decreased satisfaction with care.[23] Also, psychological distress contributes to other health conditions which might trigger anxiety and negative thinking that prevents people from participating in physical activities.[21] Therefore, psychological distress controls POFA.

Regarding organizational characteristics, hospital setting, various characteristics of hospital settings have been documented as influencing care processes and outcomes. Larger hospitals may have issues such as not providing help to patients on time, and getting less satisfaction with care.[24] The more specialized the hospital, the more specific category of patients is focused and the more predominant use of evidence-based procedures.[25] Likewise, resources of care delivery in a hospital setting can promote health care outcomes. People receiving care in hospitals with high nurse-to-patient ratio experience better nursing care including adequate discharge teaching and satisfied with care.[26] All these facts together highlight that the hospital setting is an important organizational characteristic expected to influence the care process and outcomes of people undergoing surgery for LEF.

In terms of process of care, discharge teaching can improve the functional ability of people undergoing orthopedic surgery, and their improved health knowledge, high compliance and decreasing long-term health care utilization. Also, discharge teaching helps people to identify problems early, promote self-care, increase the chances for intervention, and improve outcomes. Patients who are well-informed by discharge teaching trust the healthcare system and are more satisfied with the care provided.[12,27] In orthopedics, nurse-led, patient-oriented discharge education emphasizes biophysiological and functional needs.[28] Therefore, discharge teaching contributes to the improvement of POFA of the people undergoing orthopedic surgery.

In relation to an immediate outcome, pain with activity, higher pain is associated with lower physical functioning.[13] Due to postoperative pain, people undergoing orthopedic surgery experience pain-related distress such as frustration, anger, and depression. Such pain reduces early ambulation and activities, interrupts sleeping, induces lethargy and fatigue, and a lack of cooperation with treatment and a delay in the initiation of walking during postoperative rehabilitation.[29] Thus, pain controls POFA. Another immediate outcome, satisfaction with care, confers clinical benefits and is associated with higher physical functioning. People who are satisfied with care are more likely to adhere to treatment regimens and advice from health care providers and to continue to use medical care services and improve health outcomes.[14] Therefore, satisfaction with care contributes POFA in orthopedics. Based on

empirical evidence consistent with the Donabedian model, and because of a lack of research on the topic in Myanmar, this study was undertaken to fulfill the following aim.

Study Aim: To identify predictability of patient characteristics (educational status, psychological distress), organizational characteristics (hospital setting), process of care (quality of discharge teaching), and immediate outcomes (pain with activity, satisfaction with care) on POFA of working-age adults with simple LEF in three orthopedic care settings in Myanmar

Methods

Design: A predictive correlational study.

Sample and Setting: This study consecutively enrolled people with LEF scheduled for surgery at three orthopedic care settings in Myanmar. Inclusion criteria were: aged between 18 and 59 years, having unilateral, isolated LEF (femur or tibia, or both tibia and fibula), first experience of LEF and undergone one-step surgical fixation, able to perform ADL independently before injury, and able to communicate with Myanmar language. Exclusion criteria were those: with history of psychological illness before the injury, pregnant, having LEF with intra-articular involvement, multiple trauma or head injury or spinal cord injury, and severe medical conditions that affect functional ability (myocardial infarction, tuberculosis, AIDS, and arthritis). Sample size was calculated by using the G*Power program. To determine a suitable sample size for multiple regression analysis, an effect size of .10, a power of .80, an alpha of .05, and 6 predictors were used. The minimum sample needed was 143 individuals. Being a prospective correlational study, a dropout rate of 25% was added, so the required samples were 178 individuals.

In Myanmar, the selected settings were Hospital A (2000-bed general hospital), Hospital B (500-bed orthopedic hospital), and Hospital C (300-bed orthopedic hospital) which were major orthopedic referral centers with well-equipped theaters staffed by senior and expert orthopedic surgeons and nurses. Hospital A and C were located in Yangon, and B in Mandalay.

Ethical Considerations: After obtaining approval from the Ethical Committee, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand (ID 11-60-84), and the Ethics Review Committee, Department of Medical Research, Ministry of Health and Sports, Myanmar (Ethics/DMR/2018/005), the principal investigator (PI) and well-trained research assistants (RAs) approached potential participants. Study objectives and procedures and the right to refuse to participate or withdraw at any time without detriment to the care and treatment were informed to the participants. No harmful or life-threatening risks to the participants were identified. All the participants' identities were kept confidential. A consent form was distributed to each participant and written agreement was obtained before administering the questionnaires.

Instruments: Six instruments were used. The PI sought permission from the owners of five instruments, and the original English version of these were translated into Myanmar by using the WHO instrument translation and adaptation process[30] and expert panels. Cognitive interviewing, validity, and reliability were acceptable prior to administer in this study.

Patient Data Record Form (PDRF): This was designed to assess participants' personal characteristics and included 14 items: hospital name, age, gender, height, weight, marital status, completed year of formal education, income per month, occupation, type of injury, fracture location, type of fracture, type of surgery, and length of hospital stay (LOS).

Impact of Event Scale- Revised (IES-R): This was developed by Weiss and Marmar[31] and measures psychological distress. It includes 22 items (e.g., I tried not to mention about that event) with three subscales: avoidance, intrusion, and hyperarousal. Each item is rated on 5-point scale to measure

symptom severity (0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit and 4 = extremely). The IES-R provides an overall raw score range 0 to 88. The lower the scores, the lower difficulties the patient faces by psychological distress posed by the event. A previous study determined a Cronbach's α of .95.[32] In this study, the content validity (CVI) of the scale was .90, and the Cronbach's α was .85.

Quality of Discharge Teaching Scale (QDTS): The scale developed by Weiss et al.[33] and used for assessing quality of discharge teaching. It includes 24 items (e.g., 'Did nurses help you to feel confidence in your ability in caring yourself at home?') with a 0-10 point response format, "0" = none or not at all and "10" = always or a great deal. The three subscales are content need (6 items), content received (6 items), and the delivery subscale (12 items). The total score range is 0-180; only the scores of content received and delivery subscales were calculated. A higher total score indicates more information is transferred for patients' discharge by nurses. The scale was first tested among adult medical and surgical patients, and the Cronbach's α was .92. In this study, the CVI was .87 and the Cronbach's α was .84.

Numeric Rating Scale-Pain (NRS-P): The NRS-P was used for assessing patients' pain with activity. The scoring system comprises a horizontal line divided into 11 segments (0-10); '0' indicates no pain and '10' represents the worst pain imaginable that the patient had. The score ranges from 0 to 10. The higher the score, the more pain the patients suffer. The scale demonstrated a high test-retest reliability of .96 among patients who were literate and .94 among those who were illiterate.[34] In this study, the CVI was 1.0. Test-retest reliability on 30 pilot samples was .97.

Patient Satisfaction with Nursing Care Quality Questionnaire (PSNCQQ): This was developed by Laschinger et al.[35] and is used for assessing patient satisfaction with nursing care. The questionnaire includes 19 items (e.g., 'Easily accessible information': 'Nurses' willingness to answer your questions'). It has a 5-point Likert-type scale with description of magnitude: 1= poor, 2 = satisfactory, 3 = good, 4 = very good and 5 = excellent. Total score range is 19-95. The higher the score, the more satisfied patients are. Cronbach's α firstly tested among medical surgical patients was .97. In this study, the CVI was .98 and the Cronbach's α was .90.

Lower Extremity Measure (LEM): The LEM developed by Jaglal et al.[36] was used for assessing patients' functional ability 6 weeks after surgery. It consists of 29 items (e.g., 'Walking up and down the slopes'). Each activity is graded from 1 (impossible), 2 (extremely difficult) to 5 (not at all difficult), including a "not applicable" option. The summary score is calculated by the formula, [(total raw score - lowest possible total raw score) /raw score range] * 100. The higher the score, the higher the level of POFA. Cronbach's α was .94 when LEM was first tested on patients with hip fractures. In this study, the CVI was .92 and Cronbach's α was .92.

Data Collection: To avoid invalid information due to participant writing issues, an interview method and data extraction from medical record were employed for data collection. An interview was conducted when the person with LEF consenting (PDRF and IES-R), then at discharge (QDTS, NRS-P, and PSNCQQ) in trauma and orthopedic wards and six weeks after surgery (LEM) at outpatient departments of the selected settings. Functional ability was assessed at six weeks postoperatively because LEF healing might occur within six to 20 weeks; according to the Arbeitsgemeinschaft für Osteosynthesefragen (Association for the study of internal fixation) the AO principle, partial and full weight-bearing for people undergone operative fixation of LEF are allowed within 3-10 weeks (especially, femur or tibia shaft fractures).[37] By assessing POFA of people with LEF at six weeks, health care providers could identify the magnitude of the functional limitation and adjust rehabilitation services early.

Data Analysis: Data were analyzed by using SPSS for Windows version 18 (Software License

Download @ Mahidol). Descriptive analysis was performed for all study variables. A Kolmogorov-Smirnov test was performed to test normal distribution of study variables, and found that only two variables, quality of discharge teaching and satisfaction with care were normally distributed. Thus, Spearman's correlation was employed to examine the strength and associated direction between the study variables. Assumptions of normality, linearity, multicollinearity, and autocorrelation were tested for regression analysis. Based on the guided theoretical framework, hierarchical regression analysis was used to examine predictability of the set of variables on POFA.

Among six independent variables, the hospital setting was coded into dummy variables to represent three groups of people with simple LEF from the three hospitals in a single regression equation, and to be meaningfully interpreted its prediction on POFA. Hospital C was set as reference category because the lowest number of people with acute traumatic LEF was admitted there and it mainly focused on people with cold and degenerative orthopedic conditions.

$Hospital_A$ = 1 if admitted to Hospital A, 0 otherwise

$Hospital_B$ = 1 if admitted to Hospital B, 0 otherwise

Results

Characteristics of the Participants

A total of 178 adults with simple LEF (67 from Hospital A, 48 from Hospital B, and 63 from Hospital C) was the final sample. The mean age of the participants was 33.24 years (SD =12.63 years). Majority (85.4%) were male, 53.9% were married, and 86.0% possessed normal body mass index (BMI = 18.5-24.9 kg/m^2). Workers, laborers, and farmers were 20.2%, 20.2% and 20.8 %, respectively; and 55.6% earned 200,000 - 300,000 Kyats (USD140-$210) per month. The injury of 65.2% of the participants was caused by a motorcycle accident. Most experienced both tibia and fibula fractures (60.7%) and a closed fracture (51.1%), 88.8% were surgically treated with intramedullary nails, and 40% of them had a length of hospital stay (LOS) of 14 - 21 days. (**Table 1**).

Table 1 Demographic and Clinical Characteristics of Study Participants (N = 178)

	Hospital A (N = 67)		Hospital B (N = 48)		Hospital C (N = 63)		Total (N = 178)	
	n	(%)	n	(%)	n	(%)	n	(%)
Age (Years)								
18-29	32	(17.9)	22	(12.4)	29	(16.3)	83	(46.6)
30-45	24	(13.5)	13	(7.3)	22	(12.4)	59	(33.2)
46-59	11	(6.2)	13	(7.3)	12	(6.7)	36	(20.2)
Mean	32.91		34.63		32.56		33.24	
SD	11.31		13.98		13.00		12.63	
Gender								
Male	58	(32.6)	39	(21.9)	55	(30.9)	152	(85.4)
Female	9	(5.1)	9	(5.1)	8	(4.4)	26	(14.6)
BMI*								
< 18.5	13	(7.3)	2	(1.1)	4	(2.2)	19	(10.7)
18.5 to 24.9	54	(30.3)	44	(24.7)	55	(30.9)	153	(86.0)
25 to 29.9	0	(0.0)	2	(1.1)	4	(2.2)	6	(3.3)
Marital Status								
Single	31	(17.4)	15	(8.4)	35	(19.7)	81	(45.5)
Married	35	(19.7)	33	(18.5)	28	(15.7)	96	(53.9)
Divorced	1	(0.6)	0	(0.0)	0	(0.0)	1	(0.6)

Table 1 Demographic and Clinical Characteristics of Study Participants (N = 178) (Cont.)

	Hospital A (N = 67)		Hospital B (N = 48)		Hospital C (N = 63)		Total (N = 178)	
	n	(%)	n	(%)	n	(%)	n	(%)
Number of Years in School								
Illiterate (0 year)	1	(0.6)	0	(0.0)	2	(1.1)	3	(1.7)
Primary School (1–5 years)	18	(10.1)	10	(5.6)	15	(8.4)	43	(24.1)
Middle School (6 – 9 years)	25	(14.0)	16	(9.0)	19	(10.7)	60	(33.7)
High School (10 – 11 years)	14	(7.9)	17	(9.6)	16	(9.0)	47	(26.5)
University student (12 – 14 years)	2	(1.1)	2	(1.1)	5	(2.8)	9	(5.0)
Graduate (15 years)	7	(3.9)	3	(1.7)	6	(3.4)	16	(9.0)
Income (kyats per month with USD equivalents)								
No income	8	(4.5)	10	(5.6)	15	(8.4)	33	(18.5)
< 100,000 (< $70)	4	(2.3)	1	(0.6)	2	(1.1)	7	(4.0)
100,000 to < 200,000 ($70 to < $140)	11	(6.2)	12	(6.7)	10	(5.6)	33	(18.5)
200,000 –300,000 ($140 –$210)	39	(21.9)	25	(14.0)	35	(19.7)	99	(55.6)
> 300,000 (> $210)	5	(2.8)	0	(0.0)	1	(0.6)	6	(3.4)
Occupation								
Professional	5	(2.8)	1	(0.6)	4	(2.2)	10	(5.6)
Clerk	3	(1.7)	3	(1.7)	2	(1.1)	8	(4.5)
Craftwork	2	(1.1)	2	(1.1)	4	(2.2)	8	(4.5)
Salespersons	8	(4.5)	0	(0.0)	2	(1.1)	10	(5.6)
Worker	17	(9.5)	6	(3.4)	13	(7.3)	36	(20.2)
Laborer	11	(6.1)	14	(7.9)	11	(6.2)	36	(20.2)
Farmer	13	(7.3)	12	(6.7)	12	(6.7)	37	(20.8)
Unemployed	5	(2.8)	2	(1.1)	1	(0.6)	8	(4.5)
Others	3	(1.7)	8	(4.5)	14	(7.9)	25	(14.1)
Type of Injury								
Motorcycle accident	43	(24.1)	26	(14.6)	47	(26.5)	116	(65.2)
Car accident	9	(5.1)	12	(6.7)	8	(4.5)	29	(16.3)
Fall from height	2	(1.1)	4	(2.2)	5	(2.8)	11	(6.2)
Sports	3	(1.6)	0	(0.0)	1	(0.6)	4	(2.2)
Other	10	(5.6)	6	(3.4)	2	(1.1)	18	(10.1)
Fracture Location								
Femur	24	(13.5)	8	(4.5)	24	(13.5)	56	(31.5)
Tibia	6	(3.4)	4	(2.2)	4	(2.2)	14	(7.8)
Both tibia and fibula	37	(20.8)	36	(20.2)	35	(19.7)	108	(60.7)
Type of Fracture								
Closed	37	(20.7)	22	(12.4)	32	(18.0)	91	(51.1)
Gustilo Type I	24	(13.5)	23	(12.9)	30	(16.9)	77	(43.3)
Gustilo Type II	6	(3.3)	3	(1.7)	1	(0.6)	10	(5.6)
Type of Surgery								
Locking nail	56	(31.5)	45	(25.3)	57	(32.0)	158	(88.8)
Locking plate	11	(6.1)	3	(1.7)	6	(3.4)	20	(11.2)

Table 1 Demographic and Clinical Characteristics of Study Participants (N = 178) (Cont.)

	Hospital A (N = 67)		Hospital B (N = 48)		Hospital C (N = 63)		Total (N = 178)	
	n	(%)	n	(%)	n	(%)	n	(%)
Length of Hospital Stay (days)								
≤ 7	5	(2.8)	3	(1.7)	10	(5.6)	18	(10.1)
> 7 – 14	16	(9.0)	29	(16.0)	16	(9.0)	61	(34.3)
> 14 – 21	28	(15.7)	13	(7.3)	29	(16.3)	70	(39.3)
> 21 – 30	14	(7.9)	3	(1.7)	7	(3.9)	24	(13.5)
> 30 days	4	(2.2)	0	(0.0)	1	(0.6)	5	(2.8)

Note:* BMI = body mass index based on international category

Study Variables

More than half of the participants had secondary school level educational status. Concerning pain with activity, it was at a mild level. When the mean scores of psychological distress, quality of discharge teaching, satisfaction with care, and POFA were compared with the midpoints of the maximum possible score, the psychological distress displayed a low level, while quality of discharge teaching, satisfaction with care, and POFA were found as a moderate level (**Table 2**).

Table 2 Descriptive statistics of study variables (N=178)

Variables	Possible range	Actual range	Mean	SD
Education Status (Number of years in school)	0-20	0-15	8.35	3.43
Psychological Distress	0-88	0-28	9.88	8.52
Avoidance	0-32	0-15	3.18	3.20
Intrusion	0-32	0-12	4.01	3.63
Hyperarousal	0-24	0-12	2.69	2.88
Quality of Discharge Teaching	0-180	22-175	98.45	22.28
Content need	0-60	45-60	54.53	3.73
Content received	0-60	0-60	29.98	10.70
Delivery	0-120	18-117	68.47	17.00
Pain with Activity	0-10	0-5	1.23	1.44
Median = 0				
Satisfaction with Care	19-95	19-80	54.46	9.26
Postoperative Functional Ability	0-100	32-76	58.25	10.01

Predictors of POFA

Table 3 displays a correlation matrix among study variables. Overall, a multicollinearity correlation was not problematic. However, psychological distress and pain with activity had a negative correlation with POFA ($r = -.330$, $p < .01$; $r = -.153$, $p < .05$, respectively). A contrast correlation was found between hospital setting and POFA and between quality of discharge teaching and POFA ($r = .518$, $p < .01$; $r = .263$, $p < .01$, respectively). In the regression model, the structure of care variable, patient characteristics (educational status and psychological distress) were entered into the model first, followed by organizational characteristics (hospital setting), then the process of care variable (quality of discharge teaching), and finally, the immediate outcome variables (pain with

activity and satisfaction with care) were entered. All four models were significant although the final model demonstrated insignificant $F_{change\ (2,\ 170)} = 2.66$ ($p = .073$). In the first model, psychological distress was a significant predictor and the first model explained 13.1% of variance in POFA. After controlling patient characteristics, the hospital setting was a significant predictor and explained additional 23% of variance in POFA in the second model. After controlling patient characteristics and organizational characteristics in the third model, quality of discharge teaching was a significant predictor, and explained an additional 1.4% of the variance in POFA. In the final model, all predictors explained 39.4% of the variance in POFA. After controlling for patient characteristics, organizational characteristics, and the process of care variables, pain with activity was a significant predictor, and this explained and extra 1.9% of the variance in POFA. Although the model showed insignificant F_{change}, pain with activity was accepted as a vital factor influencing patients' ability to perform activity, the final model was included in this study. However, educational status and satisfaction with care were insignificant predictors in the models.

Table 3 Correlation between study variables

Variables		1	2	3	4	5	6	7	8
1	Education Status	1.000							
2	Psychological Distress	-.083	1.000						
3	Hospital A	-.104	.162*	1.000					
4	Hospital B	.061	-.435**	-.472**	1.000				
5	Quality of Discharge Teaching	-.072	-.027	-.181*	.302**	1.000			
6	Pain (with Activity)	-.237**	.240**	.242**	-.219**	.030	1.000		
7	Satisfaction with Care	-.031	.045	-.223**	.322**	.496**	-.009	1.000	
8	Postoperative Functional Ability	.004	-.330**	.039	.518**	.263**	-.153*	.137	1.000

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Table 4 Results of Hierarchical Regression Analysis of factors predicting postoperative functional ability (N = 178)

Model	Predictors	b	S.E. (b)	Beta	t	Sig
1	(Constant)	61.714	2.054		30.053	.000
	Education Status	.086	.205	.029	.417	.677
	Psychological Distress	-.423	.083	-.360	-5.109	.000
$R = .363$, $R^2 = .131$, R^2 Adjust = .122, Overall $F_{(2.175)} = 13.243$, $p = .000$						
2	(Constant)	52.878	2.113		25.028	.000
	Education Status	.123	.178	.042	.690	.491
	Psychological Distress	-.194	.079	-.165	-2.462	.015
	Hospital A	7.292	1.430	.354	5.100	.000
	Hospital B	13.048	1.695	.580	7.697	.000
$R = .601$, $R^2 = .361$, R^2 Adjust = .346, R^2 change = .230, Overall $F_{(4.173)} = 24.452$, $p = .000$						
3	(Constant)	47.345	3.494		13.550	.000
	Education Status	.164	.178	.056	.926	.356
	Psychological Distress	-.209	.078	-.178	-2.661	.009

Table 4 Results of Hierarchical Regression Analysis of factors predicting postoperative functional ability (N = 178) (Cont.)

Model	Predictors	b	S.E. (b)	Beta	t	Sig
	Hospital A	7.404	1.419	.359	5.218	.000
	Hospital B	12.371	1.716	.550	7.211	.000
	Quality of discharge teaching	.056	.028	.124	1.979	.049
$R = .613$, $R^2 = .375$, R^2 Adjust = .357, R^2 change = .014, Overall $F_{(5.172)} = 20.674$, $p = .000$						
4	(Constant)	50.459	4.415		11.430	.000
	Education Status	.082	.180	.028	.457	.649
	Psychological Distress	-.167	.080	-.142	-2.075	.039
	Hospital A	7.868	1.426	.382	5.517	.000
	Hospital B	12.508	1.759	.556	7.111	.000
	Quality of discharge teaching	.072	.031	.161	2.358	.020
	Satisfaction with care	-.064	.076	-.059	-.842	.401
$R = .628$, $R^2 = .394$, R^2 Adjust = .369, R^2 change = .019, Overall $F_{(7.170)} = 15.813$, $p = .000$						

Note: Significance at the .05 level.

Discussion

Results from this study demonstrated the predictive power of the care structure (patient characteristics: educational status and psychological distress, and organizational characteristics: hospital setting), care process (quality of discharge teaching), and immediate outcomes (pain with activity and satisfaction with care) on POFA.

In the first model of regression, only psychological distress showed significant predictability on POFA, while educational status was insignificant. This result is partially supported by previous studies which indicate that psychological distress due to a traumatic event is a negative predictor of both short-term and long-term functional outcomes[5] and educational status as a positive predictor of POFA.[10] Prediction of psychological distress on POFA may be because psychological distress causes fear of re-injury and avoidance of activities. It also causes negative moods in people that may disturb their functioning. Any form of psychological distress, low or high, reduces a person's motivation to engage in rehabilitation activities fully.[21] These might have led to psychological distress influencing the POFA of people with simple LEF in this study. However, the discrepancy of insignificant correlation and prediction of educational status on POFA might be because this study had different participant characteristics and time of assessment of functional ability to previous studies. In previous studies, most of the participants were at least high school level-educated,[10] suffered severe lower extremity injury, and functional ability was assessed at a year or more after injury. In this study, the participants suffered only simple LEF, and functional ability was assessed at six weeks postoperatively. After the treatment, patients with LEF needed continuing care for short-term and long-term recovery. For short-term recovery, numerous opportunities and holistic approaches were provided for people with LEF, including educational resources,[21] while the long-term care required a period of time for recovery, which was enhanced by connecting to long-term rehabilitation services, support groups, and social support networking. In this study, most of participants had a low educational level; they might be less likely to access the long-term services attributable to low intellectual reasoning and socioeconomic status. Thus, educational status might have insignificance correlation and prediction to POFA.

After adding hospital settings into the second model, Hospital A and Hospital B were found to be significant predictors of POFA. The people with simple LEF in Hospital A and Hospital B had POFA higher than people in Hospital C. Among the three hospital settings, Hospital B showed the most robust prediction in POFA. The explanation of the different POFA of the patients discharged from different hospital settings was that hospital specialization and hospital volume were important hospital characteristics contributing to POFA. General hospitals attended a wide variety of health conditions while specialty hospitals targeted a specific service and high-quality care performance[11,38] that might have been due to the specialist nature of orthopedic care team. Additionally, a previous study reported that the larger the hospital, the slower the response to patients' health care needs which largely affected patient satisfaction and functional ability.[24] Another reason might be nursing staffing in the hospital. Inadequate staffing was associated with omitting essential care and adverse patient outcomes.[26] In Hospital A, being the biggest general hospital and due to the availability of 24-hour emergency service, the number of people with acute traumatic orthopedic problems was approximately double the number of the sanctioned beds in the two trauma and orthopedic wards. The beds were always full and chairs or tables were pushed together to create additional space for patients. Therefore, nurse-to-patient ratios were low in Hospital A on most days. Hospital C was an orthopedic specialist hospital dealing with cold orthopedic cases such as degenerative conditions, tumors, and infections cases; however, when the theatre waiting list of traumatic fracture patients in Hospital A was long, some of them were referred to Hospital C. Therefore, nurse-to-patient ratios in wards people with LEF admitted became low. In Hospital A and C, nurses had lengthy experience in orthopedic care, and the number of nurses who accomplished orthopedic specialty nursing training were high. However, they were actually nurses in charge of the ward and occupied with ward management. Direct patient care was mostly carried out by trained nurses who had little experience and not attain orthopedic specialty training. This might have affected the quality of discharge teaching and patient outcomes. These researcher observations might be the cause of the lower POFA score of the participants in Hospital A and C than that of Hospital B.

The Hospital B was the most robust predictor among the three hospital settings. It may be because the Hospital B exercised a close collaboration between orthopedic surgeons and nurses in the daily management of patients. Positive collaboration between nurses and physicians is essential in clinical practice because it has a significant relationship with the quality, safety, accountability, and responsibility of care. Sharing education and teamwork, working, and learning together are the key factors that both professions comprehend;[39] therefore, nurses in Hospital B might have enthusiasm in close collaboration among themselves and with the existing orthopedic group, the Myanmar Orthopedic Society. Also, both professions appeared to be practicing clinical collaboration. Because of high professional collaboration in Hospital B, patient care might be more streamlined, and outcomes including POFA might also be better. Moreover, nurses in Hospital B might be motivated strongly by research activities. Fortunately, nurses in each ward of Hospital B got a precious opportunity to start practicing departmental research while nurses in other hospitals had fewer chances of conducting research. Therefore, patient care in Hospital B might have been more evidence-based and people with LEF might have the better POFA. In summary, focusing specialized orthopedic care, high case volume of people with LEF, practicing close collaboration between nurses and orthopedists in patient care, more streamline in care provision, conducting research and provision of evidence-based care were the factors that led Hospital B to be superior to the Hospital A and C in prediction of POFA of people with simple LEF.

After being added into the third model, the quality of discharge teaching was found to be a significant predictor of POFA. Consistent findings from previous international studies reported that discharge teaching in orthopedics improved POFA.[40] The reason for this finding may be that the people undergoing orthopedic surgery received discharge information from the nurses and/or other healthcare providers with/without instruction; patients had better understanding in performing rehabilitation exercises and daily activities which lead to positive results in reinstating physical function. As a consequence, patient outcomes including POFA were improved.

Regarding immediate outcomes, after controlling patient characteristics, structural characteristics, and process of care, pain with activity was a significant predictor of POFA; however, satisfaction with care was insignificant. The findings partially supported that of previous studies which presented pain with activities and satisfaction with care as predictors of POFA. Similar findings were presented in previous international studies which found that pain affected the ability to perform activities of daily living of patients at early postoperative days for up to 6 weeks.[13] When people with LEF experience pain while performing lower extremity function, they intentionally restrict activities. As a result, early rehabilitation might be hindered and functional ability improvement might also be slower. In this study, although most of the participants' pain with activity was only mild, people with simple LEF who experienced more pain at discharge presented the low perceived POFA. Therefore, this finding supported the idea that pain consistently predicted functional ability.

Satisfaction with care was a predictor of positive health outcomes among people undergoing orthopedic surgery and other patient populations.[14] The inconsistent finding of this study might be due to differences in characteristics of samples, instruments, and meaning of satisfaction of care compared to previous studies. Another reason was that satisfaction with care was significantly correlated with the quality of discharge teaching; therefore, when quality of discharge teaching was entered into the model first, it left less space for the satisfaction with care to explain the variance in POFA.

The findings of this study support the Donabedian model in that good structure should lead to good process, and in turn good outcomes, and incorporating patient characteristics gave more understanding of the linkage between process and outcome.[17,19] This study added the findings that immediate outcomes significantly correlated and predicted the targeted outcome, POFA.

Limitations

The limitations of this study include:1) Generalizability of the results is limited because of using purposive sampling with a set of criteria for selecting participants; 2) Social desirability bias might go to the participant's self-presentation of the quality of discharge teaching, satisfaction with care, and the POFA because of using self-report questionnaires; 3) Hospital setting was the only organizational variable included in this study; other issues, such as the nurse practice environment, or supportive facility system, were not focused in detail; and 4) Causal linkages between domains of the Donabedian model were not tested.

Conclusion and Implication for Nursing Practice

Based on the Donabedian model, psychological distress in patient characteristics variables, hospital setting of organizational characteristics variable, quality of discharge teaching in process of care variable and pain with activity in outcome variables were significantly correlated and predicted POFA of people with simple LEF six weeks after surgery. Correlation between patient characteristics and organizational characteristics to the process of care and correlation between process of

care and immediate outcomes were also identified. The findings highlighted that psychosocial distress due to traumatic event is as important as physical injury among people with simple LEF, and it is vital to facilitate an appropriate rehabilitation program plan for the patients in the context of nursing care with multidisciplinary care team. Therefore, nurses need to assess patients' psychological distress and provide appropriate psychological intervention as early as possible. Although hospital settings and quality of discharge teaching influenced POFA, reorganization of the hospital and clinical services in the settings may be difficult. However, enlarging human resources by increasing the number of well-prepared nurses is necessary to provide better care. Thus, nurses in orthopedic hospitals should try their best to become specialized and better educated. At this point, achievement of orthopedic nursing specialty training is an important matter in Myanmar, where nurses need to pay more attention to quality discharge teaching by putting a value on patient teaching, coherence in discharge teaching, appropriate communication skills, emphasizing patient's right, supervision and control over discharge teaching, and motivation and rewarding system in the organization. Additionally, nurses need training regarding evaluating postoperative pain and the prescription of the analgesia for people undergone orthopedic surgeries.

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ปัจจัยที่มีอิทธิพลต่อความสามารถในการทำกิจกรรมหลังผ่าตัดในผู้ที่มีกระดูกรยางค์ส่วนล่างหักแบบไม่ซับซ้อน

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บทคัดย่อ: การฟื้นฟูความสามารถในการทำกิจกรรมระยะแรกในผู้ที่มีกระดูกรยางค์ส่วนล่างหักเป็นสิ่งจำเป็นที่จะช่วยให้สามารถกลับมาทำกิจกรรมได้อย่างรวดเร็ว การรักษาผู้ใหญ่วัยทำงานที่มีกระดูกรยางค์ส่วนล่างหักแบบไม่ซับซ้อนด้วยการผ่าตัดจะช่วยให้ผู้ป่วยฟื้นฟูความสามารถในการทำกิจกรรมหลังการผ่าตัดได้เร็ว แม้การผ่าตัดรักษาดังกล่าวจะประสบผลสำเร็จ แต่การฟื้นฟูความสามารถในการทำกิจกรรมของผู้ป่วยยังขึ้นอยู่กับหลายปัจจัย การศึกษาสหสัมพันธ์เชิงทำนายครั้งนี้เพื่อประเมินความสามารถในการทำนายของ สถานะภาพการศึกษา ความทุกข์ทางจิตใจ ลักษณะโรงพยาบาล คุณภาพการสอนผู้ป่วยก่อนจำหน่าย ความปวดขณะมีกิจกรรม และความพึงพอใจต่อการดูแล ต่อความสามารถในการกิจกรรมหลังผ่าตัดหกสัปดาห์ในผู้ใหญ่วัยทำงานที่มีกระดูกรยางค์ส่วนล่างหักแบบไม่ซับซ้อน กลุ่มตัวอย่าง 178 ราย ตอบแบบสอบถาม ได้แก่ แบบบันทึกข้อมูลส่วนบุคคล แบบประเมินผลกระทบของอุบัติเหตุฉบับปรับปรุง แบบประเมินคุณภาพการสอนผู้ป่วยก่อนจำหน่าย แบบประเมินความปวด แบบประเมินความพึงพอใจต่อการดูแล และแบบสอบถามการทำกิจกรรมของผู้ป่วยกระดูกรยางค์ส่วนล่างหัก วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา ค่าสัมประสิทธิ์สหสัมพันธ์ของสเปียร์แมน และการวิเคราะห์ถดถอยพหุคูณแบบเชิงชั้น

ผลการวิจัยพบว่าความทุกข์ทางจิตใจ ลักษณะโรงพยาบาล คุณภาพการสอนผู้ป่วยก่อนจำหน่าย และความปวดขณะมีกิจกรรม เป็นตัวทำนายความสามารถในการกิจกรรมหลังผ่าตัดในผู้ที่มีกระดูกรยางค์ส่วนล่างหักแบบไม่ซับซ้อน โดยตัวแปรดังกล่าวร่วมกันทำนายโดยอธิบายความแปรปรวนความสามารถในการทำกิจกรรมหลังการผ่าตัด 6 สัปดาห์ได้ ร้อยละ 39.4% อย่างไรก็ตาม สถานะภาพการศึกษา และความพึงพอใจต่อการดูแล ไม่ใช่ตัวแปรทำนายความสามารถในการกิจกรรมหลังผ่าตัดในการศึกษาครั้งนี้ ผลการศึกษานี้ช่วยให้พยาบาลนำไปออกแบบกิจกรรมการพยาบาลในการจัดการความทุกข์ทางจิตใจ การสอนผู้ป่วยก่อนจำหน่าย และการควบคุมความปวดโดยคำนึงถึงความสอดคล้องกับลักษณะโรงพยาบาล ซึ่งกิจกรรมการพยาบาลดังกล่าวจะช่วยพัฒนาคุณภาพการพยาบาล และผลลัพธ์ทางคลินิก โดยช่วยให้ผู้ที่มีกระดูกรยางค์ส่วนล่างหักแบบไม่ซับซ้อนสามารถฟื้นฟูกลับมาทำกิจกรรมได้อย่างรวดเร็วตามศักยภาพ

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คำสำคัญ: คุณภาพการสอนก่อนจำหน่าย ความสามารถในการทำกิจกรรมหลังผ่าตัด โรงพยาบาลกระดูกรยางค์ส่วนล่างหัก สาธารณรัฐแห่งสหภาพเมียนมา ความปวด

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