

Factors Affecting Patients' Mobility Post Hip Fractures Surgery

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Abstract

Back ground: Mobility from second day post hip fractures surgery considered the optimal line for early recovery and prevention of complications. There are several patient and environmental related factors that affect patients mobility. **Aim:** This study was to conducted to assess factors affecting patients' mobility post hip fractures surgery through the followings: Assessing patients' medical data regarding hip fractures surgery, assessing patients' knowledge regarding mobility, assessing patients' ability to practice allowed exercise post hip fractures surgery and assessing patient related factors as physical, psychological and social in addition to environmental factors that affect patients' mobility post hip fractures surgery. **Method:** This study was conducted at the orthopedic and trauma units at El. Demerdash Hospital affiliated to Ain Shams University. **Sample:** Purposive sample of 66 adult patients were recruited in the present study. **Tools:** 1) Patient's interviewing questionnaire. 2) Oxford hip scale. 3) Factors affecting patients' mobility post hip fractures surgery. **Results:** The present study revealed that, more than three thirds of studied sample had negative affect by total physical factors. Less than two thirds of studied sample had negative affect by total psychological factors. More than two thirds of studied sample had positively affected by total social factors. The majority of studied sample had positive affect by total surrounding environment factors as well as available mobility aids. **Conclusion:** The results of this study concluded that, the factors which had positive effect on patients' mobility post hip fractures surgery were social factors, surrounding environmental factors and available mobility aids while; the factors which had negative effect were physical and psychological factors. **Recommendations:** Further studies should be designed to overcome physical and psychological factors that have negative effect on patients' mobility post hip fractures surgery.

Key words: Factors, Hip fractures surgery, Mobility.

Introduction

Hip fractures (HF) refer to fractures occur in proximal part of femur between the edge of the femoral head (FH) and 5 centimeters below the lesser trochanter. It is a common serious traumatic injury among older people. It occurs after relatively low energy trauma in patient with fragile bone or high injury trauma in people with normal bone (*Egol, Koval & Zuckerman, 2012*).

The common principle for HF treatment is the early surgery within 48hrs. Hip fractures surgeries (HFS) involve internal fixation (IF) or arthroplasty. In IF surgery; a surgical rods, wires or nailing were used to across the fracture site for

stabilization; while in arthroplasty a FH replace with artificial prosthesis. IF is the common surgical procedure utilize due to immediate, precise reduction as well less complication (*Gosney, Harper & Conroy, 2012*).

Mobility post HFS is the ability of patients to make a physical movement in order to practicing allowed exercises and engaging in activity of daily living(s) (ADLs). Early mobility from second day post HFS with nil weight bearing (NWB) technique is very effective to increase muscles strength, achieve higher state of physical functioning, decrease level of dependency and avoid post-operative complications (*Griffin, 2015*).

Mobility post HFS is affected by many factors related to patients and environment. Patients related factors can be classified into physical, psychological and social factors which lead to positive or negative affection on functional mobility post HFS, while the environmental related factors refer to any surrounding context that, encouraging or suppress post-operative mobility (*Kane, Ouslander, Resnick & Malone, 2017; Morri, et al., 2018*).

Significance of the study:

Hip fractures are remaining a much-feared injuries affecting functional mobility state. It is a major cause of morbidity and mortality among older adults. The incidence of HF expected to increase dramatically to 6.3 million worldwide by 2050. This rise will be in great part due to the huge increase in elderly people around worldwide (*Veronese & Maggi, 2017*). The prevalence of HF among Egyptian population included in geriatric homes was 21% with 10% mortality rate in first month after fractures occur and 30% within 12 months (*Amer, Hamza, El-Kawaly & Arif, 2016*).

Early surgical intervention for patient who were diagnosed with HF followed by early mobility from the second day post HFS were considering a protocol for treatment of those patients; to promote functioning, prevent complications as well as decrease length of stay (LOS) in hospital (*Conti et al., 2017*).

Aim of the study:

The present study aimed to assess:

Factors affecting patients' mobility post hip fractures surgery through the followings:

- (1) Assessing patients' medical data regarding hip fractures surgery.
- (2) Assessing patients' knowledge regarding mobility.
- (3) Assessing patients' ability to practice allowed exercise post hip fractures surgery.
- (4) Assessing patient related factors as physical, psychological and social in addition to environmental factors that affect patients' mobility post hip fractures surgery.

Research questions:

This study was conducted for answering the following question:

What are the factors affecting patients' mobility post hip fractures surgery?

Subjects and Methods

A-Research design:

A descriptive exploratory design was utilized to develop a better understanding of problem. It often accomplished by using descriptive statistics (*Hair, Celsi, Money, Samouel & Page, 2011*).

B- Setting:

This study was conducted in orthopedic surgical units and trauma units at El. Demerdash Hospital affiliated to Ain Shams University.

C- Subjects:

A purposive sample composed of 66 patient post hip fractures surgery who was admitted to previous setting.

The sample size was calculated according to equation based on patient admission in the pervious year 2016 with the power of 80 %, $\alpha = 0.05$ and the ratio of patients' post hip fractures surgery that represent 30% from patients' admitted to the orthopedic surgical units and trauma units at Ain Shams University Hospital (2016). The required sample size was calculated using Epicalc 2000 info software.

Patients were selected according to the following criteria:

Inclusion criteria:

1. Adult patients form both gender.
2. Having no cognitive impairment.
3. Patients' with femoral neck, intertrochantric and subtrochantric fractures post internal fixation surgery.
4. Accepting to participate in the study.

Exclusion criteria:

1. Patients' with chronic orthopedic diseases.
2. Neurological disorders affecting mobility (stroke, spinal cord injury, neuromuscular disorders as myasthenia gravis).

D-Tools for data collection:

Three tools were used:-

1) Patients' interview questionnaire:

This questionnaire was developed in a simple Arabic language and filled by the researcher. It

was composed of four parts based on reviewing of relevant, recent and related literatures (*Anderson, Krettek, Jupiter & Browner, 2014; De Salvo, Dinkler & Stevens, 2015; Klemetti, et al., 2015; Ignatavicius & Workman, 2015; Gesar, Homme, Hedin & Baath, 2017; Kosar, Thomas, Gozalo, Ogarek, & Mor, 2018*).

Part 1: Patients' demographic characteristics:

It included six questions in form of multiple choices question (MCQ) regarding age, gender, marital status, education, occupation and living status.

Part 2: Patients' habits:

It included four questions in form of MCQ regarding exercise and smoking.

Part 3: Patients' medical data:

It was used to collect the clinical data for patients post hip fractures surgery. It composed of two subgroup regarding anthropometric measurement and patient history. It included 13 closed ended questions divided into three questions regarding; anthropometric measurements included weight, height and body mass index (kg/M^2) and 10 questions regarding patient's history included four regarding present history as chief complain, types of fracture, duration of fractures and time of surgery, five regarding past history as chronic illness, allergy, previous significant injuries, previous hospitalization and surgeries and one regarding long term medications.

Part 4: Patients' knowledge assessment:

This part was developed by the researcher to assess patient knowledge regarding surgery and mobility. It included 16 questions in the form of MCQ. It was divided into two parts as follow:

(A) Patients' knowledge regarding hip fractures surgery:

It included eight questions in the form of MCQ to assess patient's knowledge regarding aim, types, indications, advantages of surgery, types of implants used, criteria for surgery selection and complications of surgery.

(B) Patients' knowledge regarding mobility post hip fractures surgery:

It included eight questions in the form of MCQ to assess patient's knowledge regarding allowed time for patients' mobility, importance

of mobility, allowed exercise, recommended frequency of practicing allowed exercise, post-surgical mobility precautions, precautions during changing position in bed as well during starting walking and complications of immobility.

Scoring system for patients' knowledge:

The total score was 16 marks. Every question was given one score for correct answer and zero for incorrect answer.

If the total level of patients' knowledge was $\geq 70\%$ (≥ 12 marks) was considered satisfactory while $< 70\%$ (< 12 marks) was considered unsatisfactory.

2) Oxford hip scale (OHS): This tool developed and filled by the researcher in a simple Arabic language. It composed of three parts and used to assess severity of pain, ability to practice allowed exercise for affected hip and ability to perform activity of daily living from second to fifth day post hip fractures surgery based on reviewing of relevant and related literatures (*FRCS & Gooding, 2017; Ahmed, 2009*).

Part one: Assessment of Pain:

It was used to assess severity of pain post hip fractures surgery for affected hip. It included four questions in the form of MCQ regarding severity of pain during rest, dressing, practicing allowed exercise and performing activities of daily living.

Scoring system:

The total score for severity of pain was 40 score. The patients' responses were given on a scale ranging from one to ten and the total scores were categorized into three levels as follow: Mild pain = 1 – 12, moderate pain = 13 – 24 and severe pain = >24 score.

Part two: Ability to practice allowed exercises for affected hip:

It was used to assess ability to practice allowed exercises for affected hip. It included eight statements regarding allowed exercises post hip fractures surgery. The responses for every statement were either "able" or "unable".

Scoring system:

The total score for ability to practice allowed exercise was eight scores. The response of patients' for each statement was ranging as one score for able and zero score for unable.

If the total patients' score $\geq 70\%$ (6 scores or more) from the total was considered "able" to practice allowed exercise for affected hip, while total patients' score $< 70\%$ (less than 6 scores) was considered "unable".

Part three: Ability to perform activities of daily living (ADLs):

It was used to assess ability to perform activities of daily living post hip fractures surgery. It included 10 questions. The response for every question ranges from "totally unable" to "able without assistance".

Scoring system:

The total score for all activities was calculated 30 scores. The patients' response was given based on three Likert scale categorized as follow: Able without assistance 24 - 30 score, able with assistance 17 - 23 score and totally unable 10 - 16 score.

3) Factors affecting patients' mobility post hip fractures surgery:

This tool developed and filled by the researcher in a simple Arabic language. It was used to assess factors affecting patients' mobility post hip fractures surgery. It was composed of two parts regarding patients' related factors and environmental related factors based on reviewing of relevant related literatures (*Ware & Sherbourne, 1992; Jin, Sklar, Oh, & Li, 2008*).

Part one: Patients' related factors: It was composed of 30 statements regarding physical, psychological and social factors.

Physical factors: It was composed of 10 negative statement regarding patient related physical factors that affect patients' mobility post hip fractures surgery.

Psychological factors: It was composed of 10 statements classified into; five positive statements and five negative statements regarding patients' related psychological factors that affect patients' mobility post hip fractures surgery.

Social factors: It was composed of 10 statements classified into; five positive statements and five negative statements regarding patients' related social factors that affect patients' mobility post hip fractures surgery.

Scoring system: The total score for each subgroup from patient related factors were

ranging from 10 to 20 score. The responses for positive statements on two scale where "positive effect" = 2 and "negative effect" = 1, while the response for negative statements where "positive effect" = 1 and "negative effect" = 2.

If the patient's total score $\geq 70\% = 14$ score or more were considered positive effect, while the patient's total score $< 70\% =$ less than 14 score, were considered negative effect.

Part two: Environmental related factors: It was composed of 16 statements regarding surrounding environmental factors and available mobility aids.

Surrounding environmental factors:

It was composed of 10 positive statements concerning cleansing, arrangement, calmness, presence of adequate light, suitable temperature, ventilation, distance and dryness, flatness & non-sliding floors.

Scoring system:

The total score for surrounding environmental factors were ranging from 10 to 20 score. The responses for statements on two scale where "Positive effect" = 2 and "Negative effect" = 1.

If the patient's total score $\geq 70\% = 14$ score or more were considered positive effect, while the patient's total score $< 70\% =$ less than 14 score, were considered negative effect.

Available mobility aids:

It was composed of six questions regarding effect of bed side rails, trapeze bar, crutches, walker, wheelchair and medical shoes on patients' mobility post hip fracture surgery.

Scoring system:

The total score for effect of available mobility aids were ranging from 6 to 12 score. The responses for statements on two scale where "Positive effect" = 2 and "Negative effect" = 1.

If the patient's total score $\geq 70\% = 10$ score or more were considered positive effect, while the patient's total score $< 70\% =$ less than 10 score, were considered negative effect.

II. Operational design:

The operational design includes preparatory phase, face and content validity and reliability, pilot study and fieldwork.

Preparatory phase:

It includes reviewing of relevant recent related literature and theoretical knowledge of

various aspects of the study using books, articles, internet periodicals and magazines to develop study tools.

Validity and reliability: Testing validity of the proposed tool using face, content validity by using factor analysis. Face validity aimed to inspecting the items to determine whether the face of the tools measures what it supposed to measure. Content validity was conducted to determine whether the tool covered the aim. This stage developed by a jury of seven experts, three of them was orthopedic surgeons in El - Demerdash Hospital and other four members were doctors of medical surgical nursing in faculty of nursing, Ain Shams University. They were from different academic categories (i.e. professors and assistant professors). Every jury member was informed about the aim of the study. Modifications in phrasing and sequencing of some items were carried out.

Reliability was tested statistically for the developed tools using cronbach's coefficient alpha statistical test for internal consistency of the tool items. The data was analyzed; the correlation coefficient for interview questionnaire was ($\alpha= 14.7$), oxford hip scale was ($\alpha= 13.9$) and factors affecting patients' mobility post hip fractures surgery was ($\alpha= 16.1$).

Pilot study:

Before embarking on the actual study, a pilot study was carried out on 10% from the study patients (7 patients) who met the inclusion criteria to test the applicability, clarity and efficiency of the tools, as well as to estimate the time needed to answer it. The modifications were done for the used tools according to the results of pilot study then the final form were developed. Data obtained was excluded from the study.

Field work:

- The sample of the study was recruited according to the inclusion criteria.

- The actual fieldwork started and completed within Six months from November 2017 to April 2018.

- One to three patients per week were interviewed, while the first week was orientation

- Testing validity of proposed tools using face and content validity added to testing reliability.

- The purpose of the study was simply explained to the patients who agreed to participate in the study prior to any data collection.

- The tools for data collection were filled in by the researcher.

- The patients were assessed from second to fifth day post internal fixation surgery.

- Data was collected during post-operative period by the researcher for two days per week, at morning and afternoon shifts using the developed tools.

- The patients' files were screened for eligibility. The types of fractures, patients' weight, height and BMI were all obtained from the file.

- Assessment of severity of pain was done after teaching the patient on description of pain.

- Assessment of ability to practice allowed exercise using was done after teaching patient about how to practice it.

- The time needed for completing the three tools was about 45 - 60 minutes. Each tool needed about 15 - 20 minutes.

III. Administrative Design:

To carry out the study, an official letter were directed from the Faculty of Nursing, Ain Shams University to the director of El - Demerdash Hospital affiliated to the Ain Shams University Hospitals in which the study was conducted to obtain permission and help to conduct the study in their facilities. The study was carried out with full cooperation of the different levels of authority after official letters were issued from the Faculty of Nursing, Ain Shams University to the medical directors, nursing directors and nursing supervisors of the setting under the study, explaining the purpose and the methods of the data collection for the study. The patients included in the study were informed about aim of the study. An oral permission was obtained from them, and confidentiality was assured.

IV. Statistical Design:

Data were organized, categorized, analyzed through a personal computer using Statistical Package for Social Sciences (SPSS

version 20) to assess factors affecting patients' mobility post hip fractures surgery. Data were presented in tables and graphs. The statistical analysis included; percentages (%), the arithmetic mean (\bar{x}), standard deviation (SD), Chi-square test (χ^2) and Correlation coefficient (r).

- Frequency and the percentages were calculated for qualitative variables: gender, educational level, exercise, knowledge and factors.

- Arithmetic mean (\bar{x}) and standard deviation (SD) were used as measures of central tendency and dispersion respectively for normally distributed quantitative data: age, weight, height and body mass index.

- Chi-square test (χ^2) was used in order to compare proportions between two qualitative parameters.

- Correlation coefficient (r) test was used to test the relation between two quantitative variables

- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the P - value was considered significant as the following:

- P-value ≤ 0.05 was considered significant.

- P-value ≤ 0.01 was considered a highly significant.

- P-value > 0.05 was considered insignificant.

Results

Table 1: Number and percentage distribution of the studied patients regarding demographic characteristics presents that; 60.6 % of patients' age were ≥ 60 years with the mean age was 57.9 ± 13.2 while 54.5% were females, 62.1% were married, 42.4% were illiterate, 59.1% were not working and 84.8% were living with others.

Figure 1. This figure illustrates that; 22.7% of the studied patients' had satisfactory level of knowledge regarding hip fracture surgery & mobility and 77.3% of them had unsatisfactory level.

Table 2: Number and percentage distribution of patients' regarding component of oxford hip scale post hip fractures surgery shows that; 77.3% of the studied patients' had moderate pain, 51.5% of them were unable to practice allowed exercise and 72.7% were able to perform ADLs with assistance.

Figure 2. Percentage distribution of total factors affecting patients' mobility post hip fractures surgery shows that, the mobility of 81.8% of the studied patients had negatively affected by patient related physical factors while; 89.4% of them had positively affected by surrounding environmental factors, followed by the availability of mobility aids 86.4%.

Table 3: Relation between demographic characteristics and component of oxford hip scale reveals that, there was a statistical significant relation between patients' age, severity of pain and ability to perform ADLs at $\chi^2 = 9.07$ & 9.22 and P value = 0.049 & 0.046 . Also, there was a statistical significant relation between patients' gender and severity of pain ($\chi^2 = 7.28$ at P value = 0.026), while there was no statistical significant relation between ability to practice allowed exercises, ability to perform ADLs and patients' gender pain at $\chi^2 = 0.051$ & 2.68 and P value = 0.822 & 0.261 .

Table 4: Relation between demographic characteristics and factors affecting their mobility shows that, there was a highly statistical significant relation between patients' age, physical factors and psychological factors at $\chi^2 = 9.89$ & 7.15 and P value = 0.007 & 0.027 . Also, there was a highly statistical significant relation between patients' age and effect of available mobility aids ($\chi^2 = 8.14$ at P value = 0.017). Furthermore, highly statistical significant relation between patients' gender and psychological factors ($\chi^2 = 8.39$ at P value = 0.003).

Table 5: Relation between ability to practice allowed exercise and factors affecting patients' mobility shows that, there was a statistical significant relation between ability to practice allowed exercise, physical factors and social factors at $\chi^2 = 4.12$ & 7.50 and P value = 0.042 & 0.006 , while there was a highly

significant relation between ability to practice allowed exercise and effect of surrounding environment ($\chi^2 = 7.36$ at P value = 0.006).

Table 6: Relation between ability to perform ADLs and factors affecting patients' mobility shows that, there was a highly statistical significant relation between ability to perform ADLs, physical factors and effect of

available mobility aids at $\chi^2 = 8.77$ & 9.93 and p value = 0.012 & 0.006.

Table 7: Relation between ability to perform ADLs and severity of pain shows that, there are a highly statistical significant relation between ability to perform ADLs and severity of pain ($\chi^2 = 12.52$ at p value = 0.000)

Table 1: Number and percentage distribution of the studied patients regarding demographic characteristics (n=66).

Items	No.	%
Age		
20 - < 40 years.	9	13.6
40 - <60 years.	17	25.8
≥ 60 years.	40	60.6
mean ± SD	57.9 ± 13.2	
Gender		
Male.	30	45.5
Female.	36	54.5
Marital status		
Unmarried.	25	37.9
Married.	41	62.1
Education		
Illiterate.	28	42.4
Read and write.	13	19.7
Secondary education.	21	31.8
Higher education.	4	6.1
Work		
Working.	27	40.9
Not working.	39	59.1
Living Status		
Live alone.	10	15.2
Live with others.	56	84.8

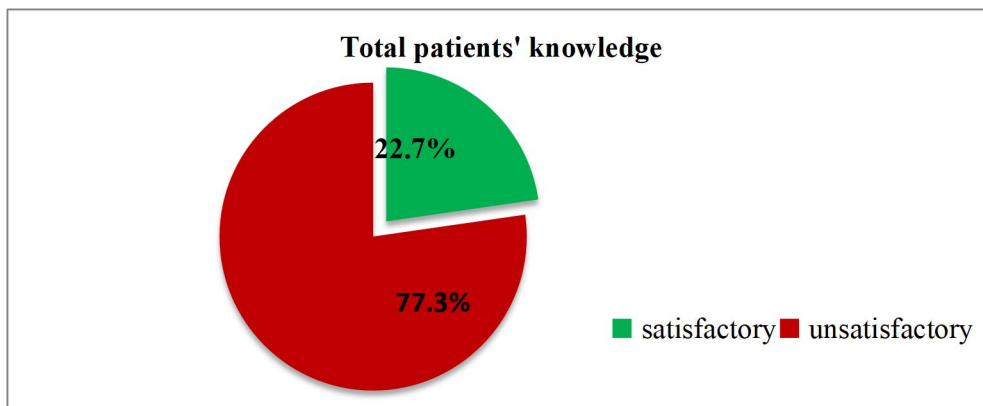


Figure 1. Percentage distribution for total patients' knowledge regarding hip fracture surgery and mobility (n = 66).

Table 2: Number and percentage distribution of patients' regarding component of oxford hip scale post hip fractures surgery (n =66).

Items	No.	%
Severity of pain		
Mild.	4	6.1
Moderate.	51	77.3
Severe.	11	16.7
Ability to practice allowed exercises		
Able.	32	48.5
Unable.	34	51.5
Ability to perform activities of daily living		
Able without assistance.	5	7.6
Able with assistance.	48	72.7
Totally unable.	13	19.7

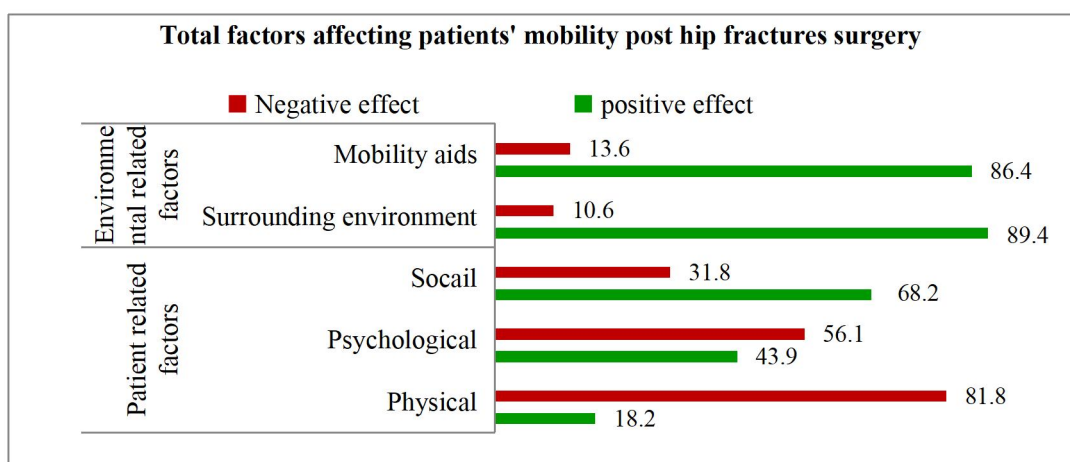


Figure 2. Percentage distribution of total factors affecting patients' mobility post hip fractures surgery (n = 66).

Table 3: Relation between demographic characteristics and component of oxford hip scale (n=66).

Oxford hip scale	Patients' age (years)						Chi-square test χ^2 (p)	Patients' gender				Chi-square test χ^2 (p)
	20 - 40		40 - 60		≥ 60			Male		Female		
	No.	%	No.	%	No.	%		No.	%	No.	%	
Severity of pain												
Mild.	1	1.5	0	0.0	3	4.5	9.07	2	3.0	2	3.0	7.28
Moderate.	8	12.1	19	28.8	24	36.4	(0.049*)	19	28.8	32	48.5	(0.026*)
Severe.	0	0.0	1	1.5	10	15.2		9	13.6	2	3.0	
Ability to practice allowed exercises												
Able.	4	6.1	9	13.6	19	28.8	0.27	15	22.7	17	25.8	0.051
Unable.	5	7.6	11	16.7	18	27.3	(0.870*)	15	22.7	19	28.8	(0.822)
Ability to perform ADLs												
Able without assistance.	2	3.0	3	4.5	0	0.0	9.22	4	6.1	1	1.5	2.68
Able with assistance.	7	10.6	13	19.7	28	42.4	(0.046*)	20	30.3	28	42.4	(0.261)
Totally unable.	0	0.0	4	6.1	9	13.6		6	9.1	7	10.6	

*P - value ≤ 0.05 was considered significant.

Table 4: Relation between demographic characteristics and factors affecting their mobility (n=66).

Factors affecting patients' mobility	Patients' age (years)						Chi-square test χ^2 (p)	Patients' gender				Chi-square test χ^2 (p)
	20 - 40		40 - 60		≥ 60			Chi-square test χ^2 (p)		Chi-square test χ^2 (p)		
	No	%	No	%	No	%		Male	%	Female	%	
	
Patient related factors												
Physical												
Positive effect	5	7.6	2	3.0	5	7.6	9.89	8	12.1	4	6.1	2.66
Negative effect	4	6.0	18	27.3	32	48.5	(0.007**)	22	33.3	32	48.5	(0.102)
Psychological												
Positive effect	7	10.6	5	7.6	17	25.8	7.15	19	28.8	10	15.1	8.39
Negative effect	2	3.0	15	22.7	20	30.3	(0.027*)	11	16.7	26	39.4	(0.003**)
Social												
Positive effect	8	12.1	14	21.2	23	34.8	2.42	20	30.3	25	37.9	0.05
Negative effect	1	1.5	6	9.2	14	21.2	(0.297)	10	15.1	11	16.7	(0.809)
Environmental related factors												
Surrounding environmental factors												
Positive effect	8	12.1	17	25.8	34	51.5	0.65	27	40.8	32	48.5	0.02
Negative effect	1	1.5	3	4.5	3	4.5	(0.721)	3	4.6	4	6.1	(0.883)
Available Mobility aids												
Positive effect	7	10.6	15	22.7	35	53.1	8.14	25	37.9	32	48.5	0.42
Negative effect	2	3.0	6	9.1	1	1.5	(0.017**)	5	7.6	4	6.1	(0.512)

*P - value ≤ 0.05 was considered significant.**P - value ≤ 0.01 was considered highly significant.

Table 5: Relation between ability to practice allowed exercise and factors affecting patients' mobility (n=66).

(n = 66).						
Factors affecting patients' mobility	Ability to practice allowed exercise				Chi-square test	
	Able		Unable		χ^2	P - value
	No.	%	No.	%		
Patient related factors						
Physical						
Positive effect	9	13.6	3	4.6	4.12	0.042*
Negative effect	23	34.9	31	46.9		
Psychological						
Positive effect	11	16.7	18	27.3	2.30	0.1288
Negative effect	21	31.8	16	24.2		
Social						
Positive effect	27	40.9	18	27.3	7.50	0.006**
Negative effect	5	7.6	20	30.3		
Environmental related factors						
Surrounding environmental factors						
Positive effect	32	48.5	27	40.9	7.36	0.006**
Negative effect	0	0.0	7	10.6		
Available mobility aids						
Positive effect	25	37.9	32	48.5	0.95	0.957
Negative effect	7	10.6	2	3.0		

*P-value ≤ 0.05 was considered significant**P-value ≤ 0.01 was considered highly significant.

Table 6: Relation between ability to perform ADLs and factors affecting patients' mobility (n=66).

Factors affecting patients' mobility	Ability to perform ADLs						Chi-square test	
	Able without assistance		Able with assistance		Totally unable		χ^2	p-value
	No.	%	No.	%	No.	%		
Patient related factors								
Physical								
Positive effect	3	4.6	9	13.6	0	0.0	8.77	0.012**
Negative effect	2	3.0	39	59.1	13	19.7		
Psychological								
Positive effect	2	1.5	18	28.8	9	13.6	4.21	0.121
Negative effect	3	6.1	30	42.4	4	6.1		
Social								
Positive effect	2	3.0	36	54.5	7	10.6	2.89	0.235
Negative effect	3	4.6	13	19.7	5	7.6		
Environmental related factors								
Surrounding environmental factors								
Positive effect	5	6.6	47	71.2	7	10.6	21.59	2.043
Negative effect	0	0.0	1	1.5	6	9.1		
Available mobility aids								
Positive effect	2	3.0	43	65.2	12	18.1	9.93	0.006**
Negative effect	3	4.6	5	7.6	1	1.5		

**P-value ≤ 0.01 was considered highly significant.

Table 7: Relation between ability to perform ADLs and severity of pain (n=66).

Ability to perform ADLs							Chi-square test	
Severity of pain	Able without assistance		Able with assistance		Totally unable		χ^2	p-value
Patient related factors	No.	%	No.	%	No.	%		
Mild	2	3.0	2	3.0	0	0.0	12.52	0.000**
Moderate	3	4.6	42	63.6	6	9.1		
Severe	0	0.0	1	1.5	10	15.2		

Discussion

Hip fractures are a break in proximal part of femoral bone. Early Surgical intervention for patients' had diagnosed with HF followed by early mobility from second day post-surgery with weight bearing precautions is considered the first recommended line for decreasing complications and returning patients' to functional mobility state as possible. Patients' mobility post HFS is affected by multiple patients' related factors involving physical, psychological and social factors. Also there are environmental related factors which had greater influence on patient's mobility (Kisner, Colby & Borstad, 2018).

Concerning demographic characteristics of the studied patients, the

result revealed that; about two thirds of studied patients' age was ≥ 60 years and the mean age of them was 53.4 ± 15.5 . From the researcher's point of view, this age group might be less resistance to trauma due to aging process. This finding was in agreement with a study done by Klop et al. (2015) titled about "The epidemiology of hip and major osteoporotic fractures in a Dutch population of community-dwelling elderly: Implications for the Dutch FRAX® algorithm" who found that, the incidence rate of HF is increasing among patients' over 50 years.

On the other hand, this finding was incongruent with the study done by Tang et al. (2017) titled about "Rates of recovery to pre-fracture function in older persons with hip

fracture: An observational study" who found that, the mean ages was 84 ± 7.3 .

Regarding gender, the study result revealed that more than half of the studied patients' were females. From the researcher's point of view, this might be due to, that females are more risk for disturbed level of bone mineralization (calcium and vitamin D) especially with advanced age leading to decrease bone density and increase potential for HF.

This result goes in the same line with **Gibson, Sadler and Lanham-New. (2018)** who did study about "Authorised European United health claims for calcium and calcium with vitamin D (for low bone mineral density and risk of fractures)" and reported that, the risk of HF increased among females due to lower bone minerals.

Regarding patients' marital status the present study showed that, more than three fifths of the studied patients' were married. This finding was in agreement with a study done by **Benetou et al. (2015)** titled about " Education, marital status, and risk of hip fractures in older men and women: The chances project" who found that, more than three quarters of studied patients' were married.

One of the noticeable finding of the study was that more than two fifths of the studied patients' were illiterate. This result was in agreement with the result of **El. Haweet. (2017)** who done study about " Discharge planning: Effect on outcomes and satisfaction of patients with orthopedic external fixation" and found that, the majority of patients' under the study were illiterate.

In concern to patients' occupation, the study result showed that, near three fifths of the studied patients' were not working. From the researcher's point of view, this might be due to; presence of retired patients as well as there were some house wife females in the studied sample. This finding goes in the same line with the finding of study done by **Lee, Lee and Rodiek. (2017)** titled about " Neighborhood

factors and fall-related injuries among older adults seen by emergency medical service providers" who found that, more than three quarters of the study sample were not working.

As regards patients' living status, the current study showed that, the majority of the studied patients were living with others. From the researcher's point of view, this might be attributed to; three fifths of the patients' age were ≥ 60 years and need assistance from significant others during perform ADLs. This result was congruent with **Peng et al. (2016)** who did a study about " Survival benefits of post-acute care for older patients with hip fractures in Taiwan: A 5-year prospective cohort study" and found that, more than three quarters of patients, were living with others.

Concerning **total patients' knowledge**, the study result showed that, more than three quarters of the studied patients had unsatisfactory level of knowledge. This result was consistent with **El. Haweet. (2017)** about " Discharge planning: Effect on outcomes and satisfaction of patients with orthopedic external fixation " who found that, the majority of the studied patients' had unsatisfactory level of knowledge regarding HFS and post-surgical expectation.

Concerning **total severity of pain**, the result of present study revealed that, more than three quarters of the studied patients had moderate pain post HFS. From the researcher's point of view, this result might be due to; decrease the severity of pain after fixation of fracture as well as due to effect of strong pain killer drugs that the patients received post operatively.

This finding is supported by **Mak, Klein, Mason and Cameron. (2015)** who done a study about " Contemporary pain management in elderly patients after hip fracture surgery: Cross-sectional analyses at baseline of a randomized controlled trial" and found that, the severity of pain was decrease to moderate level post HFS.

As regards **total patients' ability to practice allowed exercises**, the present study revealed that, more than half of the studied patients were unable to practice allowed exercises, from the researcher's point of view, this result might be attributed to fear from increasing severity of pain during moving the affected limb.

This finding was contradicted with the study of **Briggs et al. (2018)** about " High-intensity multimodal resistance training improves muscle function, symmetry during a sit-to-stand task, and physical function following hip fracture" who found that, the majority of the study sample was able to practice allowed exercise post HFS.

As regards **total ability to perform ADLs**, the present study revealed that, near three quarters of patients were able to perform ADLs with assistance. From the researcher's point of view, this result might be due to the ADLs post HFS are consider very simple and doesn't need strenuous effort to do it.

This finding goes in the same line with the finding of a study done by **Asplin, Carlsson, Ziden and Kjellby-Wendt (2017)** about " Early coordinated rehabilitation in acute phase after hip fracture: A model for increased patient participation" who found that, about three quarters of the studied patients were partially dependent during perform ADLs.

On other hand this result was contradicted with the study result done by **Fukuda, Imai, Nakadera, Wagatsuma and Horiguchi. (2018)** about " Postoperative daily living activities of geriatric patients administered general or spinal anesthesia for hip fracture surgery: A retrospective cohort study" who found that, near three quarters of the studied patients were totally dependent during performing ADLs post HFS.

Concerning **total factors affecting patients' mobility**. The study result revealed that, the mobility of more than three quarters of patients' had negatively affected by total patient related physical factors. From the researcher

point of view, this result may be due to; effect of anesthesia, pain, changes of body temperature at the first few days postoperatively and effect of postoperative medication. In addition to, there are more than two fifths from the studied patients' had mild degree of obesity and they had difficulty in their mobility due to increasing their weights.

This result goes in the same line with a study done by **Wallace and Ellington. (2014)** about " Factors affecting post-surgery hip fracture recovery " who found that, there were a preoperative, perioperative and postoperative physical factors that may hinder patients mobility post HFS.

Illustrating the surrounding environmental factors that, the mobility of majority of patients had positively affected by total surrounding environmental factors. From the researcher point of view, this result may be due to; present of adequate light and dryness of floors in patients' units.

This result agreed with what was reported by **Graves. (2012)** about " Clinical decision making for the physical therapist assistant: Across the continuum of care " who found that, suitable surrounding environment had positive effect on patient mobility post HFS.

Other result regarding environmental related factors revealed that, the mobility of majority of patients had positively affected by total available mobility aids. From the researcher point of view, this result may be attributed to; present of bed side rails, churches, wheelchair and walker in patients units.

This result goes in the same line with a study done by **Stenvall, Olofsson, Nyberg, Lundström and Gustafson. (2007).** about " Improved performance in activities of daily living and mobility after a multidisciplinary postoperative rehabilitation in older people with femoral neck fracture: A randomized controlled trial with 1-year follow-up" who found that, the mobility aids had positive effect on patient mobility post HFS.

Concerning **the relation between patients' age and severity of pain as component of OHS**, the study result revealed that, there was a statistical significant relation between patients' age and severity of pain, in which that, more than two fifths from patients age group ≥ 60 years were suffering from moderate pain. From the researcher view, this result was due to the patients' ≥ 60 years are more risk for bone fragility and disturbed oxygen level which leading to increase sensitivity to bone pain.

This result was consistent with a study done by **Ko, Rubenstein, Lee, Siu and Sean Morrison. (2017)** about "TNF- α and sTNF-RII Are associated with pain following hip fracture surgery in older adults" who found, a significant relation between pain and patients ages.

The study results also revealed that, there was a statistical significant **relation between patients' age and ability to perform ADLs**, in which more than two thirds of patients' ≥ 60 were able to perform ADLs with assistance, from the researcher point of view, this result may be due to decrease strength of muscles among old age.

This result was in agreement with **Sprague et al. (2018)** who did a study titled about "Factors associated with health-related quality of life, hip function, and health utility after operative management of femoral neck fractures" and who found, a positive correlation between age and level of dependency post HFS.

Concerning a relation between **patients' gender and severity of pain as a component of OHS**. The study result revealed that, there was a statistical significant relation between patients' gender and severity of pain, in which about half were females and suffered from moderate pain. From the researcher point of view, this result may be due to; female patients are more liable to disturb level of calcium, vitamin D, decrease strength of muscles in addition to, surgical trauma in large weight bearing muscles and bone. This result was in agreement with what reported by **Fillingim. (2017)** about "Sex, gender, and pain" and who

reported that, the hip pain was increasing among women with disturbed level of bone minerals than men.

Regarding **the relation between patients' age and factors affecting patients' mobility**. The study results revealed that, there was a highly statistical significant relation between patients' age and patient related physical factors, in which near half of the studied patients in age group ≥ 60 years had negatively affected by total physical factors. From the researcher point of view this result may be due to; decrease strength of muscles and skeletal changes secondary to aging process as easy fatigability among old age patients which lead to negative effect on mobility.

This finding was consistent with a study done by **Haywood, Brett, Tutton and Stanisewska. (2017)** about "Patient-reported outcome measures in older people with hip fracture: A systematic review of quality and acceptability" and who found that, there was a limited level of mobility among patients > 60 years.

Concerning a relation between **patients' age and patient related psychological factors affecting patients' mobility** that, there was a significant relation between patients' age and patient related psychological factors, in which less than one third of the studied patients' in age group ≥ 60 years had negatively affected by total psychological factors, from the researcher point of view, this result may be due to; presence of post-operative pain, and increase level of dependency after surgery which leading to decrease level of self-confidence to returning to their functioning and increase level of frustration, depression and feeling of impending doom.

This finding was in agreement with a study done by **Mc Gilton et al. (2016)** about "Factors influencing outcomes of older adults after undergoing rehabilitation for hip fracture " and who found, a significant relation between psychological factors and the ability of older adult to mobile post HFS.

Regarding the relation between **patients' age and environmental related factors**. The study results showed that, there was a highly statistical significant relation between patients' age and available mobility aids, in which more than half of the studied patients' in age group ≥ 60 years had positively affected by available mobility aids. From the researcher point of view, this result may be due to; availability of most mobility aids as trapeze bar, bed side rails, cane, walker and wheelchair that old age patients' needed to help him during changing their position, standing, transferring and walking.

This finding was in constant with what reported by **Cifu, Lew, and Oh-Park. (2018)** about " Geriatric Rehabilitation " and who emphasis on, importance of mobility aids to improving mobility of geriatric patients after hip surgery.

Regarding **the relation between patients' gender and patient related factors**. The study results revealed that, there was a statistical significant relation between patients' gender and psychological factors, in which up two fifths from female patients' had negatively affected by psychological factors. From the researcher point of view, this result may be due to; the females more sensitive to the stressors as decreasing body image and increasing dependency which leading to negative effect on mobility.

This finding was incongruent with a study done by **Oh, Sieber, Leoutsakos, Inouye, and Lee. (2016)** about " Sex differences in hip fracture surgery: preoperative risk factors for delirium and postoperative outcomes " and who found that, the postoperative outcome was worse in males than females.

Regarding **the relation between ability to practice allowed exercises and patient related factors**, the study results revealed that, there was a statistical significant relation between ability to practice allowed exercise and physical factors, in which less than half of the studied sample who unable to practice allowed exercises had negatively affected by patient related physical factors. From the researcher

point of view, this result may be attributed to that the patient post HFS were suffering from fatigue and pain which led to inability to practice allowed exercise.

On other scope, effect of post-operative muscles relaxant medications which has been given to patient post operatively led to decreasing ability of muscle to contract. This finding was in agreement with opinion of **Kisner et al. (2017)** in his book titled about " Therapeutic exercise: Foundations and techniques" who reported that, the muscles relaxant medications have decrease contractility of muscles as well as ability to practice exercise.

Illustrated the relation between ability to practice allowed exercises and social factors that, there were a highly statistical significant relation between them, in which two fifth from the studied patients who able to practice allowed exercises had positively affected by patient related social factors, from the researcher point of view, this result may be due to, presence of social support their relatives and medical staff which encouraged patients' to practice allowed exercises.

This finding was in agreement with **Hammond et al. (2017)** who did a study about " PERFECTED enhanced recovery (PERFECT-ER) care versus standard acute care for patients admitted to acute settings with hip fracture identified as experiencing confusion: Study protocol for a feasibility cluster randomized controlled trial" and found that, there were a significant difference in improving physical activity among patients' who receive social support than patients' who doesn't receive social support.

Regarding **the relation between ability to practice allowed exercises and environment related factors**, the study results revealed that, there was a highly statistical significant relation between ability to practice allowed exercise and surrounding environmental factors, in which less than half of the studied patients who able to practice allowed exercises had positively affected by surrounding environment, from the researcher point of view, this result may be due to,

presence of suitable surrounding environment in his units as clean, quite environment with adequate temperature, light, dry and non-sliding floors.

This finding goes in the same line with a study done by **Riemen and Hutchison. (2016)** about " The multidisciplinary management of hip fractures in older patients" and who emphasis on, the important of good environment for enhance physical outcome for patients after HF.

Concerning **a relation between ability to perform ADLs and patient related factors**, the study results revealed that, there was a highly significant relation between ability to perform ADLs and patient related physical factors, in which near three fifths of the studied patients who able to perform ADLs with assistance had negatively affected by physical factors, from the researcher point of view, this result may be due to; their feeling of pain and exhaustion as well as the present of surgical wound which consider a challenge during perform ADLs.

This finding goes in the same line with a study done by **Fukuda et al. (2018)** titled about " Postoperative daily living activities of geriatric patients administered general or spinal anesthesia for hip fracture surgery: A retrospective cohort study" who found that, a significant relation between ability to perform ADLs and physical factors affecting postoperative prognosis.

Concerning **a relation between ability to perform ADLs and environmental related factors**, the study results revealed that, there was a highly significant relation between ability to perform ADLs and available mobility aids, in which about two thirds from the studied patients who able to perform ADLs with assistance had positively affected by available mobility aids. From the researcher point of view, this result may be due to; patients post HFS already need assistance and the availability of mobility aids led to improve patient ability to perform ADLs.

This result goes in the same line with a study done by **Ibrahim et al. (2018)** about "

Activities of daily living and determinant factors among older adult subjects with lower body fracture after discharge from hospital: A Prospective Study. " who found that, there was a significant relation between present of walking aids and ability to perform ADLs post HFs.

Concerning **a relation between severity of pain and ability to perform ADLs**, the result revealed that, there was a highly statistical significant relation between severity of pain and ability to perform ADLs, in which more than two fifths from the studied patients who had moderate pain are able to practice perform ADLs with assistance. From the researcher's point of view, this result may be due to; the severity of pain after surgical operation hinders their abilities to perform ADLs' independently.

This result was agreement with **Hida et al. (2018)** who done a study about " Association between acute postoperative pain and recovery of independent walking ability after surgical treatment of hip fracture" and who found that, the degree of postoperative recovery of patients who were surgically treated for hip fracture was decreasing, If the intensity of pain increase.

Conclusion

The results of this study concluded that, the factors had positively effect on patients' mobility post hip fractures surgery were social factors, surrounding environmental factors and available mobility aids while; the factors had negatively effect on patient mobility were physical and psychological factors.

Recommendations

- A simplified and comprehensive booklet including guidelines about HFS should be introduced to the patients after admission to orthopedic surgical departments.
- Further studies should be designed to overcome physical and psychological factors that have negative effect on patients' mobility post hip fractures surgery.

References

- Ahmed, N. A. (2009). *The effect of nursing interventions on reducing the complications among patients with internal fixation for hip fractures* (Published doctoral dissertation). Assuit university, Assuit, Egypt.
- Amer, M. S., Hamza, S. A., El-Kawaly, W. H., & Arif, E. R. (2016). Fracture risk assessment in geriatric home in Egypt. *Indian Journal of Medical Research and Pharmaceutical Sciences*, 3 (10). Retrieved from www.ijmrps.com/Issues%20PDF/Vol.3/October-2016/2.pdf, accessed at May 18, 2018.
- Anderson, P., Krettek, C., Jupiter, J., Browner, B. (2014). *Skeletal trauma: Basic science, management and reconstruction* (5th ed.). Philadelphia, PA: Elsevier Health Sciences. P.1671.
- Asplin, G., Carlsson, G., Zidén, L., & Kjellby-Wendt, G. (2017). Early coordinated rehabilitation in acute phase after hip fracture: A model for increased patient participation. *BMC geriatrics*, 17(1), 240.
- Benetou, V., Orfanos, P., Feskanich, D., Michaëlsson, K., Pettersson-Kymmer, U., Ahmed, L. A., ... & Wilsgaard, T. (2015). Education, marital status, and risk of hip fractures in older men and women: The chances project. *Osteoporosis International*, 26(6), 1733-1746.
- Briggs, R. A., Houck, J. R., Lastayo, P. C., Fritz, J. M., Drummond, M. J., & Marcus, R. L. (2018). High-intensity multimodal resistance training improves muscle function, symmetry during a sit-to-stand task, and physical function following hip fracture. *The journal of nutrition, health & aging*, 22(3), 431-438.
- Cifu, D., Lew, H., & Oh-Park, M. (2018). *Geriatric Rehabilitation* (1st ed.). Saint Louis, MO: Elsevier Health Sciences. P. 36.
- Conti, D., Ballo, P., Salucci, L., Benvenuti, E., Metrangola, L., Barucci, R., ... & Sarti, A. (2017). Clinical impact of recovery room on post-operative walking performance in elderly patients submitted to hip surgery: A real-world analysis. *Aging clinical and experimental research*, 1-5. Retrieved from <https://link.springer.com/article/10.1007/s40520-017-0860-2>, accessed at May 12, 2018.
- De Salvo, K., Dinkler, A., & Stevens, L. (2015). The US office of the national coordinator for health information technology: Progress and promise for the future at the 10 year mark. *Annals of emergency medicine*, 66(5), 507-510.
- Egol, K., Koval, K & Zuckerman, J. (2012). *Handbook of Fractures* (4th ed.). Philadelphia, PA: Lippincott Williams & Wilkins. P. 100.
- El Haweet, E. A. (2017). *Discharge planning: Effect on outcomes and satisfaction of patients with orthopedic external fixation* (Published doctoral desertion). Ain Shams University, Cairo, Egypt.
- Fillingim, R. B. (2017). Sex, gender, and pain. In M. J. Legato. (Ed.), *Principles of Gender-Specific Medicine* (3rd ed.) (Pp. 481-496). London, United Kingdom: Academic Press.
- FRCS, M. K. & Gooding, C. (2017): oxford hip scale, retrieved from <http://www.orthopaedicscores.com>. Accessed on 20/4/2017.
- Fukuda, T., Imai, S., Nakadera, M., Wagatsuma, Y., & Horiguchi, H. (2018). Postoperative daily living activities of geriatric patients administered general or spinal anesthesia for hip fracture surgery: A retrospective cohort study. *Journal of Orthopaedic Surgery*, 26(1), 1-9. DOI: 10.1177/2309499017754106, accessed at April 8, 2018.
- Gesar, B., Hommel, A., Hedin, H. & Baath, C. (2017). Older patients' perception of their own capacity to regain pre-fracture function after hip fracture surgery: An explorative qualitative study. *International Journal of Orthopaedic and Trauma Nursing*, (24), 50-58. DOI: 10.1016/j.ijotn.2016.04.005, accessed at April 12, 2017.
- Gibson, P. S., Sadler, M. J., & Lanham-New, S. A. (2018). Authorised EU health claims for calcium and calcium with vitamin D (for low bone mineral density and risk of fractures). *Foods, Nutrients and Food Ingredients with Authorised EU Health*

- Claims*, (3) 35-47. DOI: [10.1016/B978-0-08-100922-2.00003-6](https://doi.org/10.1016/B978-0-08-100922-2.00003-6), accessed at March 20, 2018.
- Gosney, M., Harper, A., & Conroy, S. (2012).** *Oxford desk reference: Geriatric medicine*. London, England: Oxford University Press. P. 454.
- Graves, R. A. (2013)** Clinical decision making for the physical therapist assistant: Across the continuum of care. Philadelphia, PA: F.A. Davis, P.182
- Griffin, J. (2015).** *Client-centered exercise prescription* (3th ed). Champagin, IL: Human Kinetics. P. 420.
- Hair, J., Celsi, M., Money, A., Samouel, P. & Page, M. (2011).** *Essentials of Business Research Methods* (2nd ed.). New York, NY: M.E. Sharpe. P.147.
- Hammond, S., Cross, J., Shepstone, L., Backhouse, T., Henderson, C., Poland, F., ... & Lambert, N. (2017).** PERFECT enhanced recovery (PERFECT-ER) care versus standard acute care for patients admitted to acute settings with hip fracture identified as experiencing confusion: study protocol for a feasibility cluster randomized controlled trial. *Trials*, 18(1), 583.
- Haywood, K., Brett, J., Tutton, E., & Staniszewska, S. (2017).** Patient-reported outcome measures in older people with hip fracture: A systematic review of quality and acceptability. *Quality of Life Research*, 26(4), 799-812.
- Hida, M., Deguchi, Y., Miyaguchi, K., Nakazono, M., Hirata, N., Nakagawa, R., & Kitayama, A. (2018).** Association between acute postoperative pain and recovery of independent walking ability after surgical treatment of hip fracture. *Progress in Rehabilitation Medicine*, 3, 20180012. DOI: <https://doi.org/10.2490/prm.20180012>, accessed at July 29, 2018.
- Ibrahim, N., Ahmad, M., Zulfarina, M., Zaris, S., Mohamed, I., Mohamed, N., ... & Shuid, A. (2018).** Activities of daily living and determinant factors among older adult subjects with lower body fracture after discharge from hospital: A prospective study. *International journal of environmental research and public health*, 15(5), 1002.
- Ignatavicius, D. D. & Workman, M. L. (2015).** *Medical-surgical nursing: Patient-centered collaborative care* (8th ed.). Saint Louis, MO: Elsevier Health Sciences. P. 927.
- Jin, J., Sklar, G. E., Oh, V. M. S., & Li, S. C. (2008).** Factors affecting therapeutic compliance: A review from the patient's perspective. *Therapeutics and clinical risk management*, 4(1), 269.
- Kane, R., Ouslander, J., Resnick, B., Malone, M. (2017).** *Essentials of clinical geriatrics* (8th ed). Boca Raton, FL: McGraw Hill Professional. P. 263.
- Kisner, C., Colby, L., & Borstad, J. (2018).** *Therapeutic exercise: Foundations and techniques*. Philadelphia, PA: F.A. Davis. P. 747.
- Klemetti, S., Leino-Kilpi, H., Cabrera, E., Copanitsanou, P., Ingadottir, B., Istomina, N.,... & Valkeapaa, K. (2015).** Difference between received and expected knowledge of patients undergoing knee or hip replacement in seven European countries. *Clinical nursing research*, 24(6), 624-643.
- Klop, C., Welsing, P., Leufkens, H., Elders, P., Overbeek, J., Den Bergh, J., ... & De Vries, F. (2015).** The epidemiology of hip and major osteoporotic fractures in a Dutch population of community-dwelling elderly: Implications for the Dutch FRAX® algorithm. *PLoS ONE*, 10(12), e0143800. DOI: <https://doi.org/10.1371/journal.pone.0143800>, accessed at March 10, 2018.
- Ko, F., Rubenstein, W., Lee, E., Siu, A., & Sean Morrison, R. (2017).** TNF- α and sTNF-RII: Are associated with pain following hip fracture surgery in older adults. *Pain Medicine*, 19(1), 169-177.
- Kosar, C., Thomas, K., Gozalo, P., Ogarek, J., & Mor, V. (2018).** Effect of obesity on postacute outcomes of skilled nursing facility residents with hip fracture. *Journal of the American Geriatrics Society*, 47, 777-780. DOI: 10.1111/jgs.15334, accessed at May 1, 2018.
- Lee, S., Lee, C., & Rodiek, S. (2017).** Neighborhood factors and fall-related injuries among older adults seen by

- emergency medical service providers. *International journal of environmental research and public health*, 14(2), 163.
- Mak, J. C., Klein, L., Mason, R. S., & Cameron, I. D. (2015).** Contemporary pain management in elderly patients after hip fracture surgery: Cross-sectional analyses at baseline of a randomized controlled trial. *The clinical journal of pain*, 31(9), 788-793.
- Mc Gilton, K., Chu, C., Naglie, G., Wyk, P., Stewart, S., & Davis, A (2016).** Factors influencing outcomes of older adults after undergoing rehabilitation for hip fracture. *Journal of the American Geriatrics Society*, 64(8), 1601-1609.
- Morri, M., Forni, C., Marchioni, M., Bonetti, E., Marseglia, F., & Cotti, A. (2018).** Which factors are independent predictors of early recovery of mobility in the older adults' population after hip fracture? : A cohort prognostic study. *Archives of orthopaedic and trauma surgery*, 138(1), 35-41.
- Oh, E. S., Sieber, F. E., Leoutsakos, J. M., Inouye, S. K., & Lee, H. B. (2016).** Sex differences in hip fracture surgery: preoperative risk factors for delirium and postoperative outcomes. *Journal of the American Geriatrics Society*, 64(8), 1616-1621.
- Peng, L. N., Chen, W. M., Chen, C. F., Huang, C. K., Lee, W. J., & Chen, L. K. (2016).** Survival benefits of post-acute care for older patients with hip fractures in Taiwan: A 5-year prospective cohort study. *Geriatrics & gerontology international*, 16(1), 28-36.
- Riemen, A. H., & Hutchison, J. D. (2016).** The multidisciplinary management of hip fractures in older patients. *Orthopaedics and trauma*, 30(2), 117-122.
- Sprague, S., Bhandari, M., Heetveld, M. J., Liew, S., Scott, T., Bzovsky, S.,... & Schemitsch, E. H. (2018).** Factors associated with health-related quality of life, hip function, and health utility after operative management of femoral neck fractures. *Bone Joint J*, 100(3), 361-369.
- Stenvall, M., Olofsson, B., Nyberg, L., Lundström, M., & Gustafson, Y. (2007).** Improved performance in activities of daily living and mobility after a multidisciplinary postoperative rehabilitation in older people with femoral neck fracture: A randomized controlled trial with 1-year follow-up. *Journal of rehabilitation medicine*, 39(3), 232-238.
- Tang, V., Sudore, R., Cenzer, I., Boscardin, W., Smith, A., Ritchie, C.,... & Covinsky, K (2017).** Rates of recovery to pre-fracture function in older persons with hip fracture: An observational study. *Journal of general internal medicine*, 32(2), 153-158.
- Veronese, N., & Maggi, S (2017).** Epidemiology of Hip Fracture and Social Costs. In **P. Falaschi & D. Marsh (Eds.), Orthogeriatrics: Practical issues in geriatrics** (pp. 19-30). DOI: 10.1007/978-3-319-43249-6, accessed at August 10, 2017.
- Wallace, S., & Ellington, B (2014).** Factors affecting postsurgery hip fracture recovery. *Journal of Orthopaedics, Trauma and Rehabilitation*, 18(2), 54-58.
- Ware J.E., & Sherbourne, C.D.(1992).** The MOS 36-item short form health survey (SF-36): I. Conceptual formwork and item selection. *Medical care*, 473-483.