



Original Research

The Effect of Nursing Intervention-based Levine Conceptual Model Program on Rehabilitation Process among Fracture Patients

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ABSTRACT

Introduction: The nursing intervention program is a strategy for the rehabilitation process among fracture patients. The Levine conceptual model program is a practical nursing theory using energy conservation, energy, structural integrity, personal integrity, and social integrity. The study aims to identify the effect of nursing intervention based on Levine's theory of the rehabilitation process among fracture patients.

Methods: A quasi-experimental with equivalent control group design was applied in this study. Sixty-two respondents were selected into the experimental group (n=31) and control group (n=31) by using a consecutive sampling technique. The patients' rehabilitation on fracture included sleep disorder, pain, anxiety, and family support as dependent variables. Researchers used the Sleep Quality Scale (SQS) instrument, the Numeric Rating Scale, the Hamilton Anxiety Rating Scale, and the family support scale. Data were analyzed using a Wilcoxon Signed Rank Test.

Results: The results showed a significant effect of patients' recovery on fracture among patients after receiving Levine-based nursing intervention than before receiving the intervention ($p < 0.05$). The results of research on the nursing intervention program are based on Levine's conceptual model of sleep disorders, pain, anxiety, and family support ($p < 0.05$). In conclusion, there was significantly different nursing intervention based on Levine in energy conservation, energy, structural integrity, personal integrity, and social integrity.

Conclusion: The nursing intervention program based on Levine's conceptual model could be part of independent nursing intervention to deal with recovery in fracture patients. Based on this description, the researcher is interested in examining the effect of nursing intervention based on Levine's conceptual model program on rehabilitation process among fracture patients.

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INTRODUCTION

Fracture condition is caused by pressure that exceeds the ability of the bone to withstand excessive stress on the bone. It could cause massive trauma and difficulty to perform activities (Einhorn & Gerstenfeld, 2015). Fractures cause malfunctioning parts of the body that can result in permanent disability and even cause death after the trauma experienced. It can cause significant changes in a person's life, with the result of loss of independence. Thereby, immediate treatment for fracture recovery is required (Buza & Einhorn, 2016). Fracture recovery is a stage of the fracture healing process that

starts from the beginning of the trauma until the fracture process, enabling the body to recover from the trauma experienced. Fracture recovery from injury due to trauma requires a different recovery time, from a few weeks to months, depending on the type of trauma, location, and severity of the fracture (Bhandari et al., 2008).

Data from the World Health Organization (WHO) in 2011 revealed fracture incidence of approximately 5.6 million people who died due to accidents, and 1.3 million people experienced permanent physical disabilities. In addition, Basic Health Research in the Republic of Indonesia (2018) also showed that fractures had significant impacts on lower limbs

(67.9%), upper limbs (32.7%), head (11.9%), back (6.5%), chest (2.6%), and abdomen (2.2%).

The prevalence of fractures in North Sumatera was 864 people, which included lower limb fractures as many as 549 people (63.5%), upper limb fractures were 250 people (28.9%), pelvic fractures were 39 people (4.5%), and spinal fractures as many as 26 people (3.1%) (Moesbar, 2013). A pilot survey conducted at H. Adam Malik hospital, Medan in 2018, showed that of 196 people, lower limb fractures accounted for 94, upper limb fractures 45, shoulder and upper arm fractures 31, and foot fractures 26.

Fracture patients often experience physical and psychological changes. The physical changes included sleeping disorder, pain, anxiety, and low family support (Potter, Perry, Stockert, & Hall, 2016), all of which could hinder the recovery process of fracture healing. Factors associated with fracture recovery include age, length of hospitalization, and other complications (Crowley, 2011). In maintaining the ability of fracture patients to resist obstacles, make appropriate adaptations, and deal with disabilities, a conceptual conservation model is required in this study. Fracture patients often have complex problems, such as sleep disorders, pain, anxiety, and low family support. Therefore, fracture patients have limited activities and are still dependent on other people around them (Paech, 2007).

The concept of the Levine model is a nursing intervention program that has various conservation principles. Levine's conceptual model has never been studied in fracture patients, so the researcher is interested to look at this phenomenon. Thus, it could impact on functional of life among individuals even when faced with difficult challenges. Levine's conceptual model aims to maintain the needs of individuals using the principle of energy conservation, conservation of structural integrity, conservation of personal integrity, and conservation of social integrity (Abumaria et al., 2015).

The conceptual model of the nursing intervention program is in accordance with operational standards of the procedure and the results of this study have a significant effect on the recovery of fracture patients. The complex problems previously stated can be overcome by carrying out nursing interventions based on Levine's conceptual model. The novelties in this study were the intervention of Levine's nursing intervention program among fracture patients and it aimed to identify the effect of nursing intervention based on the Levine concept on fracture recovery among fracture patients.

MATERIALS AND METHODS

A quasi-experimental study design was applied in this study to examine the effect of nursing intervention based on the Levine conceptual model program on the rehabilitation process among fracture patients. In the intervention group, the nursing intervention program was carried out based on the Levine conceptual model, while the control group was given

hospital-based nursing interventions. Nursing interventions based on Levine's conceptual model consist of four programs: Benson relaxation techniques, deep breathing relaxation techniques, progressive muscle relaxation techniques, and providing health education.

The frequency of nursing interventions based on Levine's conceptual model was carried out for six days and a duration of 40 minutes for each of the nursing problems. In the intervention group, Levine's conceptual program action was taken from each nursing intervention and evaluated every day for six days, whereas the control group was not given a nursing intervention based on Levine's conceptual model but only given based on hospital standards.

The study was conducted in H. Adam Malik Hospital, Medan, between August 10th and October 29th, 2019. Sixty-two samples consisted of 31 samples were allocated in the experimental group and 31 samples for the control group. Allocation techniques in this study consisted of patients included in the inclusion criteria. We applied a nonprobability sampling with consecutive sampling to select the samples. This method is a strategy to choose all individuals found and who met with the inclusion criteria (Polit & Beck, 2015).

The criteria inclusion included: (a) all hospitalized fracture patients aged between 17 to 65 years old, (b) patients with upper and lower limb fractures, (c) cooperative in discussion process, (d) rehabilitation length between 1 to 3 months. The data were gathered using a Sleep Quality Scale (SQS) to measure sleeping disorders. Hamilton Anxiety Rating Scale (HARS) was used to measure anxiety level (Hamilton, 1959). Hamilton Anxiety Rating Scale (HARS) was one of the first rating scales developed to measure the severity of anxiety symptoms and is still widely used today in both clinical and research settings. Family Support Scale (FSS) was used to measure family support (Espe-Sherwindt, 2008).

Before data collection process ethical consideration was approved by the ethics committee, Faculty of Nursing, North Sumatera University with ethical clearance number 1874/VIII/SP/2019. Informed consent was signed by all respondents who were willing to participate in this study.

RESULTS

Three experts validated those questionnaires with the validation scores reported as: Sleep Quality Scale (SQS) 0.94, Hamilton Anxiety Rating Scale (HARS) 0.97 and Family Support Scale (FSS) 0.98. Test-retest was applied to measure the reliability of the questionnaire with Cronbach's alpha of Sleep Quality Scale (SQS) as 0.80, Hamilton Anxiety Rating Scale 0.86, and the Family support scale 0.81.

Description of Respondents' Characteristics

Table 1 shows that the highest distribution of respondents' characteristics based on age among the intervention group was 17-25 years old (29.0%).

Table 1. The Distribution of Frequency and Percentage of Characteristic Demographic Data among the Intervention and the Control Group (n=62)

Characteristics	Intervention		Control	
	n	%	n	%
Aged				
17-25 years old	9	29.0	9	29.0
26-35 years old	6	19.4	10	32.3
36-45 years old	3	9.7	2	6.5
46-55 years old	6	19.4	5	16.1
56-65 years old	6	19.4	5	16.1
>65 years old	1	3.2	-	-
Mean ± SD	38.68± 16.782		36.55± 15.714	
Gender				
Male	21	67.7	26	83.9
Female	10	32.3	5	16.1
Mean ± SD	1.32± .475		1.16±.374	
Education				
Junior high school	4	12.9	1	3.2
High school	23	74.2	24	77.4
Diploma 3	1	3.2	3	9.7
Bachelor	3	9.7	3	9.7
Mean ± SD	4.10± .746		4.26±.682	
Occupation				
Housewife	5	16.1	-	-
Entrepreneur	10	32.3	17	54.8
Private employees	5	16.1	5	16.1
Farmer	1	3.2	4	12.9
Student	8	25.8	5	16.1
Civil servant	2	6.5	-	-
Mean ± SD	3.10±1.640		2.90±1.165	
Duration of hospitalization				
One day to 1 week	14	45.2	23	74.2
2 to 3 weeks	10	32.3	6	19.4
1 to 2 months	6	19.4	2	6.5
Three months	1	3.2	-	-
Mean ± SD	1.81± .873		1.32± .599	

Also, the control group showed that most respondents were 26-35 years old (32.3%). The distribution of respondents based on gender among the intervention group was 67.7% male, while the control group also showed that most of them were male (83.9%). Regarding respondents' characteristics based on education, most of the respondents in the both the intervention group and control group were high school with 74.2% and 77.4%, respectively. In regard to distribution of respondents based on occupation, both the intervention group (32.3%) and the control group (54.8%), were entrepreneurs. In terms of the distribution of respondents based on the duration of hospitalization, it showed that most of them were hospitalized from between one day to 1 week, accounting for 45.2% of the intervention group and 74.2% in the control group. Analysis in the intervention group used the Kolmogorov Smirnov test while the analysis in the control group used the Mann Whitney Test.

Rehabilitation of fracture patients

Table 2 shows that, in the distribution of patients' rehabilitation of fracture on sleep disorder among the

intervention group before receiving the Levine-based model of nursing intervention, the majority of sleep quality was poor, which is 26 respondents (83.9%). Whereas among the control group before receiving the standard care from the hospital, all 31 respondents (100%) had poor sleep quality. For the distribution of respondents after receiving the Levine-based nursing intervention, the majority of respondents had better quality of sleep (74.2%), and among the control group after receiving the standard intervention from the hospital, all respondents had a poor quality of sleep (100%).

The results of the study showed that the distribution of patients' rehabilitation of fractures on the pain level among the intervention group before receiving the Levine-based nursing intervention was 23 respondents (74.2%), while among the control group before receiving the standard intervention from the hospital, the majority of respondents with mild pain were 20 respondents (64.5%). For the distribution of respondents after receiving the Levine-based nursing intervention, all 31 respondents (100%) were mild pain, whereas among the control group after receiving the standard

Table 2. The Distribution Frequency and Percentage on Patients' Rehabilitation of Fractures among the Intervention Group and the Control Group before Receiving the Nursing Intervention based on the Levine Model (n=62)

Rehabilitation of fracture patients	Intervention				Control			
	Pre		Post		Pre		Post	
	n	%	n	%	n	%	n	%
Sleep disorder								
Very poor	26	83.9	-	-	-	-	-	-
Poor	5	16.1	-	-	31	100	31	100
Good	-	-	8	25.8	-	-	-	-
Very good	-	-	23	74.2	-	-	-	-
Mean ± SD	66.10 ± 3.655		47.87 ± 6.328		90.55 ± 3.686		89.65 ± 4.294	
Min-Max	59-73		38-56		85-99		80-99	
Pain								
Light	8	25.8	31	100	20	64.5	23	74.2
Mild	23	74.2	-	-	11	35.5	8	25.8
Severe	-	-	-	-	-	-	-	-
Mean ± SD	3.71 ± 0.529		2.06 ± 0.512		3.19 ± 0.703		3.10 ± 0.651	
Min-Max	2-4		1-3		2-4		2-4	
Anxiety								
Light	-	-	1	3.2	-	-	-	-
Mild	-	-	30	96.8	-	-	-	-
Severe	31	100	-	-	31	100	31	100
Mean ± SD	58.19 ± 3.240		29.52 ± 5.476		56.19 ± 3.902		55.52 ± 4.419	
Min-Max	52-64		20-43		51-63		47-63	
Family support								
Good	-	-	31	100	-	-	-	-
Enough	24	77.4	-	-	-	-	-	-
Poor	7	22.6	-	-	31	100	31	100
Mean ± SD	38.81 ± 7.534		61.84 ± 1.508		56.19 ± 3.902		54.97 ± 3.071	
Min-Max	27-58		57-64		51-63		49-62	

Table 3. The effect of the Levine-based Nursing Intervention on Rehabilitation of Fracture Patients among the Intervention Group and the Control Group (n=62)

Rehabilitation of fracture patients	Intervention				Control			
	Mean	SD	Z	p-value	Mean	SD	Z	p-value
Sleep disturbance								
Pretest	88.77	4.318	-4.862	0.000	90.55	3.686	-2.032	0.042
Posttest	47.87	6.328			89.65	4.294		
Pain								
Pretest	3.71	0.529	-4.824	0.000	3.19	0.703	-1.732	0.083
Post-test	2.06	0.512			3.10	0.651		
Anxiety								
Pretest	58.19	3.240	-4.862	0.000	56.19	3.902	-1.604	0.109
Posttest	29.52	5.476			55.52	4.419		
Family support								
Pretest	38.81	7.543	-4.865	0.000	56.19	3.902	-1.486	0.137
Posttest	61.84	1.508			54.97	3.071		

intervention from the hospital it showed that some of them were mild pain, with 23 respondents (74.2%).

Based on the results it shows that in regard to the distribution of patients' rehabilitation of fracture on anxiety among the intervention group before receiving the Levine-based nursing intervention all 31 respondents (100%) had severe anxiety, whereas in the distribution of respondents after receiving the Levine-based nursing intervention, the majority of them, as many as 30 respondents (96.8%) had severe anxiety and with 31 respondents (100%) among the

control group after receiving the standard nursing intervention from the hospital.

The effect of the Levine-based nursing intervention on the rehabilitation of fracture patients among the intervention group and the control group

Based on Table 3 of the bivariate analysis using the Wilcoxon Signed-Rank statistical test, it was obtained the significance value of p-value in the intervention group before and after the nursing intervention

program based on the Levine conceptual model for the recovery of fracture patients (sleep disturbance, pain, anxiety, and family support) $\alpha = 0.000$ ($p < 0.05$). Thus, it can be said that the nursing intervention program based on Levine's conceptual model influences the recovery of fracture patients (sleep disorders, pain, anxiety, and family support) in patients who experience fractures.

The results of the bivariate analysis using the Wilcoxon Signed-Rank statistical test showed no effect on the control group on fracture patient recovery (sleep disturbance $\alpha = 0.042$, $p < 0.05$, pain $\alpha = 0.083$, $p < 0.05$, anxiety $\alpha = 0.109$, $p < 0.05$, and family support $\alpha = 0.137$, $p < 0.05$). Thus, it can be said that there is no significant effect of an intervention on recovery among fracture patients. There are sleep disorders, pain, anxiety, and family support in the control group in patients who have fractures.

DISCUSSION

Based on the study, results showed that the Levine-based nursing intervention had a significant effect on sleep quality ($\alpha=0.000$, $p<0.05$). The nursing intervention conducted in this study to improve sleep in fracture patients is Benson's relaxation technique. This can improve sleep because it can stimulate endorphin hormone secretion. This hormone is related to the neurotransmitter serotonin, which has a role in the sleep process (Rambod et al., 2013). Benson and Proctor (2000) state Benson's relaxation techniques can be approved by a good environment. This finding showed significant effect on the sleep quality of the respondents (p -value 0.000). Rahman, Handayani, & Sholehah (2019) stated that the Benson relaxation technique could improve sleep quality among elderly patients.

The Levine-based nursing intervention also showed a positive effect on pain ($\alpha=0.000$, $p<0.05$). The results of the bivariate analysis using the Wilcoxon Signed Ranking statistical test showed no difference in the control group in pain ($\alpha = 0.083$, $p > 0.05$). Fracture patients with pain could use non-pharmacological management, such as deep breathing techniques (Black &, 2014). This study implemented the deep breathing relaxation technique to reduce pain among fracture patients. Based on the results, there is a significant effect on the intervention on pain among respondents (p -value 0.000). Another study from Sehon (2010) stated that deep breathing relaxation technique was effective in reducing pain post-operation for fracture.

Nursing intervention-based on the Levine model could also provide a positive impact on anxiety ($\alpha=0.000$, $p<0.05$). Zhao et al. (2012) said that progressive muscle relaxation techniques can be used to reduce anxiety, which can suppress sympathetic nerves and suppress tension experienced by respondents reciprocally so that counter conditioning will arise. Xie et al. (2016) state that progressive muscle relaxation techniques are effective in reducing anxiety in patients with limb fractures undergoing

surgery. Based on this intervention, it showed that there is a positive effect of the intervention on anxiety among respondents (p -value 0.000). A study from Hardono & Amirudin (2020) said that muscle progressive relaxation technique could reduce anxiety levels among pre operated fractures patients. In addition, another study from Zhao et al. (2012) also said that muscle progressive relaxation technique could be used to reduce anxiety and that it could suppress the sympathetic nerves and the tension experienced by the respondents reciprocally so that there will be counter conditioning.

Other findings showed positive effect of the Levine-based nursing intervention on family support ($\alpha=0.000$, $p<0.05$). Nursing interventions conducted in this study to improve family support in fracture patients were to provide health education. This family support can be in the form of task orientation that can be given to family, friends, and even neighbors (Friedman, Browden, & Jones, 2010). The health education was implemented to educate fracture patients. This finding indicated that there is a significant difference in the intervention on family support among respondents (p -value 0.000). The result was consistent with previous study from Helmi (2012) which said that there is a positive effect of health education on anxiety levels among pre-operated patients. The limitation of this study is that it still takes a long time to provide nursing intervention for the recovery of fracture patients so that nursing intervention can be felt and utilized by patients suffering from fractures.

CONCLUSION

There is a positive effect of Levine-based nursing intervention on sleep disorder, pain, anxiety, and family support. The findings recommend applying the different instruments for measuring sleep disorder, pain, anxiety, and family support to identify the results effectively. Further studies are also needed to conduct a similar study with longer and expected duration and frequency of Levine-based nursing intervention. The results of this study can be an evidence-based nursing practice that can strengthen the body of knowledge of nursing, especially those related to the nursing intervention program based on Levine's conceptual model.

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