

# **RESEARCH ARTICLE**

#### EFFECT OF IMPLEMENTING NURSING CARE GUIDELINES ON NURSES' KNOWLEDGES AND PRACTICES REGARDING EXTERNAL FIXATION IN ORTHOPEDIC PATIENTS

#### Shaimaa Sakr Ali Abdelhady<sup>1</sup>, Amira Ahmed Hassanien<sup>2</sup>, Hany Mohamed Hamed<sup>3</sup> and Madiha Hassan Nabih Mohamed<sup>4</sup>

- 1. Assistant Lecturer, Department of Medical Surgical Nursing, Faculty of Nursing, Kafrelsheikh University, Egypt.
- 2. Professor, Department of Medical Surgical Nursing, Faculty of Nursing, Mansoura University, Egypt.
- 3. Assistant Professor, Department of Orthopedic Surgery, Faculty of medicine, Kafrelsheikh University, Egypt.
- 4. Assistant Professor, Department of Medical Surgical Nursing, Faculty of Nursing, Mansoura University, Egypt.

### Manuscript Info

# 

*Manuscript History* Received: 15 February 2022 Final Accepted: 18 March 2022 Published: April 2022

#### Key words:-

External Fixation, Knowledge, Nursing Guidelines, Practice

#### Abstract

**Background:**Pin site infections are a major hazard of external fixation that can be extremely stressful. Nurses are vital in the prevention of pin site infections.

**Aim:**to assess the effect of implementing nursing care guidelines on nurses' knowledges and practices regarding external fixation in orthopedic patients.

Method: a quasi-experimental research approach was used.

**Sample:** A convenient sample of 40 nurses from the orthopaedic departments of Kafrelsheikh University Hospital and a general hospital was used. **Tools:**Data were taken using two tools: the first was a self-administered questionnaire sheet, which included two parts: part 1 covered demographic data of the nurses and part 2 included nurses' knowledge of the care provided to patients with external fixation. The second tool was an observation checklist for nurses to use before and after external fixation. **Results:**after implementing the guidelines; there were significant statistical increase in nurses' knowledge and practice (p0.001), as well as a statistically significant relationship between nurses' educational level and their knowledge and practice (p=0.016, 0.001, respectively).

**Conclusion**: The use of the developed nursing care guidelines was efficient in increasing nurses' knowledge, preoperative practice, and postoperative practice while caring for patients with external fixation. **Recommendations:** provide nurses with ongoing training courses.

Copy Right, IJAR, 2022,. All rights reserved.

#### Introduction:-

External fixation devices have been the fundamental basis for treating many forms of fractures that cannot be treated with traction or casts. It is placed outside of the body and is attached to the bone by transcutaneous pins or wires. External fixation was primarily used to treat comminuted fractures, open fractures, and bone loss, but its applications expanded over time to repair congenital and acquired abnormalities, limb lengthening, mobilizing tight joints, and healing infected nonunion. (**Bhardwaj, Singh, Kapila& Boparai, 2019**).

.....

# **Corresponding Author:- Shaimaa Sakr Ali Abdelhady** Address:- Assistant Lecturer, Department of Medical Surgical Nursing, Faculty of Nursing, Kafrelsheikh University, Egypt.

The usage of external fixation devices comes with a number of disadvantages. PSIs (Pin Site Infections) are one of the most prevalent complications, with rates ranging from 7% to 100%. Frame or pin/wire failure or loosening and other complications as osteomyelitis, non-union, soft-tissue impalement, neurovascular damage, compartment syndrome, and refracture around the pin are all examples of malunion. (Morsy, Sheta& Mohamed, 2021).

#### (Morsy, Sheta & Mohamed, 2021).

The fundamental components of orthopaedic nursing care include the nurses' abilities, attitudes, communication, and continuity of care.Because of the intricate and critical role that orthopaedic nurses play in the treatment of patients with external fixation, new nurses want to learn how to provide effective and satisfying nursing care for themselves and their patients.Because nursing provides assistance or services to the public, nurses must achieve and maintain a high level of nursing knowledge and performance in order to be effective in practice.Before beginning practice, nurses must learn nursing expertise (Mahmoud, Hassanien, Sherief & Soliman, 2016).

Despite the significance of nursing guidelines for the reasons stated above, there are no existing nursing guidelines for preoperative and postoperative external fixation nursing care, all nurses didn't attend any training courses regarding external fixation and the rate of pin site infections is high in almost cases.

#### Significance of the Study

Every year, 234 million surgical procedures are conducted over the world. Therefore, surgical site infection rate in orthopaedic surgery and its consequences still remain a major problem. Representing a heavy psychological and financial burden (**Tucci, etal., 2019**).Pin tract infection is one type of surgical site infection, and it is the most prevalent complication of external fixation, accounting for 43 % of complications. The presence of pin tract infection reduces the strength of the pin-bone connection, resulting in pin loosening.(**Mohammed, 2017**). Orthopedic pin site infections lead to prolonged hospital stay add to costs which may be increased to more than 300%. (**Bader & Atiyah, 2017**). There is a limited data available with regard to orthopedic pin site infections rate in Egypt

As a result, there is an urgent need to perform this study to assess nurses' knowledge and practice about the care provided to patients before to and after external fixation. As a result, the current study aims to evaluate the impact of applying nursing care guidelines on nurses' knowledge and practices regarding external fixation in orthopaedic patients.

#### Aim of the Study:

The study aimedto assess the effect of implementing nursing care guidelines on nurses' knowledges and practices regarding external fixation in orthopedic patients

#### **Research Hypothesis:**

Implementation of nursing guidelines would improve nurses' knowledge and practice regardingcare of patient with external fixation.

#### Subject and Method:-

#### Research design and setting

In this research, a quasi-experimental one group (time series) approach was used at orthopedic departments at Kafrelsheikh University Hospital and Kafrelsheikhgeneral hospital.

## Study sample

#### Sampling

A representative sample of all nurses who are available (40 nurses), providing care to orthopedic patients at orthopedic departments at Kafrelsheikh University Hospital andKafrelsheikh general hospital andaccepted to participate in this study from both sexes with diverse ages, years of experiences, and different levels of education

#### **Tools of data collection**

In this study, two instruments were utilized to gather data on the study variables: a self-administered questionnaire and an observation checklist.

Tool 1 :

I) Self-administered questionnaire: It was created by the researcher and written in plain Arabic after a review of the associated literature: (Dirksen, 2011; Williams and Hopper, 2011; White, Duncan, and Baumle, 2013; Velazquez, Bell, and Armstrong, 2015; Linton, 2016; Bader and Atiyah, 2017). It consists of two parts,

**Part I;** Consists of demographic variables consisted of (5) questions: age; gender; educational level, years of nursing experience, nursing experience in orthopaedic wards

**Part II**;It is concerned with assessing nurses' knowledge regarding a-Fractures and consists of (6) questions; definition, causes, signs and symptoms, types, complications and treatment.

b-External fixation which composed of (6) questions; definition, indication, contraindication, advantage, disadvantage and complication.

c-Pre and postoperative care of patient with external fixation which composed of (12) questions; aim of preoperative, nurse role preoperative, patient education, aim of postoperative care, risk factors for acquiring pin site infection, signs of pin site infection, neurovascular disorder, importance of range of motion, nutrition, pin site care, warning signs and symptoms and discharge plan.

#### Scoring system:

The correct answers were selected based on the literature. A score of (2) was given to the correct and complete answer, a score of (1) was given to the correct but incomplete answer, and a score of (0) was given to the wrong or when the nurse said "she does not know." Total knowledge scores were determined by summing the number of correct answers to all questions. The overall score will then be calculated out of 100. It was divided into the following categories: -

Categories of knowledge	Percentage
Poor	< 50%
Fair	50- <75%
Good	≥75%

#### Tool 2:

**II**) **Observation Checklist:**After conducting a comprehensive review of the relevant literature, the investigator created this tool:

(Radhi& Tawfiq ,2016; Perry, Potter & Desmarais, 2018). It entails two main parts,

#### Part I (A)-Preoperative Nursing Practice Regarding External Fixation in Orthopedic Patients

It evaluated nurses' preoperative practice in seven sections, which involved:

- 1. Collecting a medical history from the patient (5) steps
- 2. Assist the physician with the patient's physical examination (2) phases
- 3. Confirming that the patient has completed all necessary investigative (3) steps.
- 4. Educating patients about their health before surgery (7 steps).
- 5. complete the operation consent (3) steps
- 6. providing preoperative physical preparations, (7) steps are involved.
- 7. giving preoperative psychological care (6) steps

# Part II (B)-Postoperative Nursing PracticeRegardingExternal Fixation in Orthopedic Patients.consists of two parts.

#### a- Nurses' practice during the 1st day after external fixation

- It evaluated nurses' practice in four sections, which were as follows:
- 1. Nurses' intervention concerning early care after surgery (3) steps
- 2. Nurses' intervention concerning pain (4) steps.
- 3. Nurses' intervention regarding skin integrity and drainage (7) steps.
- 4. Nurses' intervention regarding nutritional status (6) steps.

#### **b** - External fixation pin site care checklist

It evaluated nurses' performance in five areas, which were as follows:

1. Nurses' intervention regarding pain management (2) steps.

- 2. Nurses' intervention regarding Neurovascular assessment (8) steps.
- 3. Nurses' intervention regarding Range of Motion upper and lower extremities (13) steps.
- 4. Nurses' intervention regarding Warning Signs of pin site infection (4) step.
- 5. Nurses' intervention regarding Pin Site Care(14) steps.

#### Scoring system:

The checklist elements were marked with a done, partially done, or not done choice to indicate whether or not the practice was conducted accurately. The completed step received a score of two, whereas the partially completed step received a score of one, and the not completed step received 0 score. The scores from each component were added up to provide the overall score, which was then divided by the number of steps in each portion. Following that, these scores were converted to a Percentage score, which was then applied to the following categories: -

Practice categories	Percentage
low	< 50%
Moderate	50- <75%
High	≥75%

#### **Content Validity and Reliability:**

After the researcher developed the instruments, their component-validation was examined by a panel of five experts, two of whom were orthopedists and three of whom were medical surgical nursing, to test their content validity. Modifications on clarity, appropriateness, and completeness of the tools' content were carried out according to the experts' recommendations.

#### **Reliability**:

Cronbach's Alpha was used to assess reliability in knowledge, preoperative practice, and postoperative practice (= 0.813, 0.903, 0.881, respectively), and the results were rated "very good."

#### **Pilot Study**

A pilot study was conducted on 10% (4 nurses) of individuals who met the selection criteria to assess the effectiveness and simplicity of the tools, as well as the time necessary to complete these tools. Because of the limited number of nurses in the orthopaedic department and to strengthen the research findings, the pilot study's sample was used in the main research sample. The pilot research discovered that the average time required to complete the tools was between 20 -30 minutes.

#### **Ethical Consideration**

Before collecting data, the Research Ethics Committee of Mansoura University's Faculty of Nursing obtained initial permission. In addition, official authorization was obtained from Kafrelsheikh University hospital authorities. Following that, each nurse was told of the study's goal and value. The researcher stated that participation in the research is completely voluntary, and that any nurse may withdraw from the study at any moment for any reason. Each assessment sheet will be classified for anonymity and confidentiality, and the names of the participants will not appear on the sheets. After meeting the selection criteria and agreeing to participate in the study, the nurse was told to sign an informed written permission form.

#### **Procedure:**

Data was collected over a four-month period, beginning in February 2021 and ending in May 2021. The investigation was carried out in four phases:

#### Preparation phase.

During this phase a formal approval was taken from the hospital's administrator, nursing supervisors of the orthopedic departments. It also includes a recent review of related literature for the development of various data gathering techniques and guidelines, and teaching materials such as booklets, power point presentation, etc....

#### 2- Assessment phase.

Once approval to carry out the intended research was given.

a- Individual interviews with nurses were performed to discuss the nature and purpose of the study. Measures were taken to protect the subjects' ethical rights. Each interested participant completed an informed consent form. Participation was entirely voluntary, and secrecy and anonymity were guaranteed.

- b- The researcher made a plan for observing nurses' practices (pretest) in the orthopaedic departments on an equal and random basis. The nurses in the research were monitored for 6 hours per day, in separate shifts, to complete the performance checklist.
- c- Nurses' knowledge (pretest) were assessed using Nurses' Knowledge of External Fixation questionnaire. and the average time to fill it was estimated about 20 to 30 minutes. These pre-tests were done before developing the nursing guidelines to assess level of nurses' knowledge, preoperative practice, and postoperative practice for caring of patients with external fixation.

#### **3-** Implementation phase.

1-The researcher provided the nursing guidelines to the study nurses in four sessions over the course of two weeks.Each session lasted 30–45 minutes, and the researcher divided the nurses into eight groups (each group contained five nurses).

2- The researcher delivered a summary of the whole nursing guideline made in the course of the sessions. Following that, each session received an overview of what had already been discussed.

3- A variety of instructional materials were utilized, including group discussions, questionnaires, manikan demonstrations, and actual patient performances. Furthermore, a variety of learning strategies were utilized, including colored graphics, data displays, video tapes, and actual materials (manikan of external fixation).

4- Throughout the sessions, the researchers utilized reinforcement and motivation to enhance nurses' learning.

#### 4- Evaluation phase.

Following the implementation phase, an evaluation phase was begun to investigate nurses' knowledge and practice regarding external fixation using a pre-post-test questionnaire. The same methods that were used in the initial phase were used to assess the guidelines' efficacy on nurses' knowledge and practices (post-tests). The researcher compared the post-test outcomes to the pre-test results to examine the influence of the guidelines on nurses' knowledge and practice.

#### Statistical design:

SPSS for Windows version 23 was used for all statistical analyses. Numbers and percentages were used to convey categorical data. For comparing variables using categorical data, the Chi-square test was performed. All continuous data were normally distributed and reported in terms of mean standard deviation (SD). When comparing two variables with continuous data, the paired t test was utilized. To test for correlations between two variables using continuous data, the correlation co-efficient test was utilized.

#### **Results:-**

#### Part1: Demographic characteristics of the studied nurses.

#### Table (1): Distribution of the studied nurses according to their demographic characteristics (n=40).

Table (1) Demonstrated that the distribution of age group was an above half (55 %) ranged from (25-30 yrs) with a mean age SD (26.5 3.05); furthermore, almost two thirds (72.5 %) of the examined nurses were females and about one third (35 %) were married. In terms of education, 57.5 % of the nurses tested had a Bachelor's degree in nursing, while 27.5 % had a Technical Institute diploma.

When it comes to years of experience in the field of orthopedics, the majority (80.0 %) had (less than 5 years) and just one-fifth (20 percent) had more than 5 years (5-10 years).

Data of nurses	N	%	
Age			
< 25	12	30	
25 - 30	22	55	
> 30	6	15	
Mean ± SD26.5 ± 3.05	· · · · · · · · · · · · · · · · · · ·		
Gender			
Male	11	27.5	
Female	29	72.5	
Marital status			

Table (1):- Distribution of the studied nurses according to their demographic data (n=40).

Single	26	65.0
Married	14	35.0
Educational level		
Nursing Secondary School	6	15.0
Technical institute	11	27.5
Bachelor of nursing	23	57.5
Experience in orthopedic (Years)		
< 5	32	80.0
5 - 10	8	20.0

# Figure 1:Comparison of the total nurses' knowledge level before, and after implementation of nursing guidelines (n=40).

As shown in Figure 1, just 10% of the nurses evaluated had a total good knowledge score, compared to (65%) when the nursing guidelines were implemented. A very statistically significant alteration occurred as well (p 0.001).



Chi- square test: 2

Poor: a score of less than 50% Fair: score between 50 %to75% 75% is a Good score If the P value is less than 0.05, it is considered significant.

### Figure 2: Comparison of the total nurses' practice level before and after implementation of nursing guidelines.

Figure 2 illustrates only 12.5 % of the nurses tested had a total high practice score before to the application of nursing guidelines, compared to (75 %) after the application of nursing guidelines, indicating a statistically significant change (p 0.001).



Chi- square test:  $\Box 2$ 

Poor: a score of less than 50% Fair: score between 50 %to75% 75% is a Good score If the P value is less than 0.05, it is considered significant. The finding is statistically significant.

# Table (2):The relationship between nurses' demographic data and their overall knowledge before and after nursing care guidelines were applied.

This table showed the relationship between nurses' demographic features and their overall knowledge before and after nursing guidelines were applied. There were no statistically significant relationships between nurses' age, gender, or marital status and their total knowledge (p = 0.435, 0.260, 0.866) prior to the implementation of nursing guidelines, but there was a statistically significant association between nurses' educational and years of experience in nursing and their total knowledge (p = 0.016, 0.020) after the application.

**Table 2:-** The relationship between nurses' demographic data and their overall knowledge before and after nursing guidelines were applied.

	Pre implementation of nursing guidelines									Post implementation of nursingguidelines								
	Poor Fair			r	G	ood	Chi	square	Po	or	Fa	nir	Go	od	Chi	square		
	(n=26)		=26) (n=10)		( <b>n=4</b> )		test	_	(n	=5)	( <b>n=9</b> )		( <b>n=26</b> )		test	_		
Nurses'	n	%	n	%	n	%	X2	р	n	%	n	%	n	%	X2	р		
characterist								-								-		
ics																		
Age																		
< 25	9	34.	3	30.0	0	0.0			1	20.0	4	44.4	7	26.				
		6												9				
25 - 30	1	50.	5	50.0	4	100.			3	60.0	3	33.3	1	61.				
	3	0				0							6	5				
> 30	4	15.	2	20.0	0	0.0	3.790	0.435	1	20.0	2	22.2	3	11.	2.472	0.650		
		4											_	5				
Gender																		
Male	5	19.	4	40.0	2	50.0			1	20.0	1	11.1	9	34.				
		2												6				
Female	2	80.	6	60.0	2	50.0	2.691	0.260	4	80.0	8	88.9	1	65.	2.014	0.365		
	1	8	-										7	4				
Marital	-	-												-				
status																		
Single	1	65.	6	60.0	3	75.0			2	40.0	6	66.7	1	69.				
8	7	4			_								8	2				
Married	9	34.	4	40.0	1	25.0	0.287	0.866	3	60.0	3	33.3	8	30.	1.589	0.452		
		6												8				
Educational																		
level																		
Nursing	2	7.7	0	0.0	0	0.0			0	0.0	2	22.2	0	0.0				
Secondary																		
School																		
Technical	1	42.	0	0.0	0	0.0			3	60.0	0	0.0	8	30.				
institute	1	3												8				
Bachelor of	1	50.	1	100.	4	100.	10.37	0.034*	2	40.0	7	77.8	1	69.	12.09	0.016		
nursing	3	0	0	0		0	0						8	2	8	*		
Experience					l				l									
in nursing																		
(Years)																		
< 5	2	84.	4	40.0	0	0.0			5	100.	9	100.	1	46.				
	2	6								0		0	2	2				
5 - 10	4	15.	4	40.0	4	100.			0	0.0	0	0.0	1	46.				

		4				0							2	2		
11 - 15	0	0.0	2	20.0	0	0.0	19.81	< 0.001	0	0.0	0	0.0	2	7.6	11.59	0.020
							9	*							8	*
Experience																
in																
orthopedic																
(Years)																
< 5	2	84.	6	60.0	4	100.			5	100.	9	100.	1	69.		
	2	6				0				0		0	8	2		
5 - 10	4	15.	4	40.0	0	0.0	18.84	< 0.001	0	0.0	0	0.0	8	30.	5.385	0.067
		4					6	*						8		

# Table (3): The relationship between nurses' demographic data and their overall practice before and after nursing guidelines were applied.

This table showed the relationship between nurses' demographic features and their total practice before and after nursing guidelines were applied .There were no statistically significant relationships between nurses' age, educational level, marital status, and total postoperative practice (p = 0.390, 0.120, 0.488) prior to the implementation of nursing guidelines, but there was a strong association between nurses' educational level and their years of experience in nursing, and total practice (p = 0.001, 0.034) after the application.

Table 3:- Shows the relationship between nurses' demographic data and their overall practice before and after nursing guidelineswere applied.

	Pre- implementation of nursingguidelines P									Post- implementation of nursingguidelines								
	Low		Mo	derat	H	igh	Chi	square	L	DW	Mo	derat	Hi	gh	Chi	square		
	(n=	=29)	e (n=9)		(n=2)		test		(n	=5)	e (n=8)		(n=27)		test			
Nurses'	n	%	n	%	n	%	X2	р	n	%	n	%	n	%	X2	р		
characteris																		
tics																		
Age																		
< 25	1	37.9	1	11.1	0	0.0			1	20.0	3	37.5	8	29.				
	1													6				
25 - 30	1	48.3	6	66.7	2	100.			3	60.0	3	37.5	1	59.				
	4					0							6	3				
> 30	4	13.8	2	22.2	0	0.0	4.11	0.390	1	20.0	2	25.0	3	11.	1.76	0.779		
							7							1	4			
Gender																		
Male	6	20.7	3	33.3	2	100.			1	20.0	1	12.5	9	33.				
						0								3				
Female	2	79.3	6	66.7	0	0.0	6.10	0.047	4	80.0	7	87.5	1	66.	1.50	0.471		
	3						1	*					8	7	5			
Marital																		
status																		
Single	1	65.5	5	55.6	2	100.			2	40.0	5	62.5	1	70.				
	9					0							9	4				
Married	1	34.5	4	44.4	0	0.0	1.43	0.488	3	60.0	3	37.5	8	29.	1.73	0.419		
	0						3							6	8			
Educationa																		
l level																		
Nursing	2	6.9	0	0.0	0	0.0			0	0.0	1	12.5	1	3.7				
Secondary																		
School																		
Technical	1	37.9	0	0.0	0	0.0			5	100.	0	0.0	5	18.				
institute	1									0				5				
Bachelor of	1	55.2	9	100.	2	100.	7.30	0.120	0	0.0	7	87.5	2	77.	19.0	< 0.00		
nursing	6			0		0	5						1	8	28	1*		

Experience in nursing (Years)																
< 5	2 1	72.4	5	55.6	0	0.0			5	100. 0	8	100. 0	1 3	48. 2		
5 - 10	8	27.6	2	22.2	2	100. 0			0	0.0	0	0.0	1 2	44. 4		
11 - 15	0	0.0	2	22.2	0	0.0	12.0 62	0.017 *	0	0.0	0	0.0	2	7.4	10.3 7	0.034 *
Experience in orthopedic (Years)																
< 5	2 9	100. 0	1	11.1	2	100. 0			5	100. 0	8	100. 0	1 9	70. 4		
5 - 10	0	0.0	8	88.9	0	0.0	34.4 44	<0.00 1*	0	0.0	0	0.0	8	29. 6	4.81 5	0.090

# Figure3: Post-implementation of educational guidelines, correlations between nurses' total knowledge and total practice.

Pre-application of nursing guidelines, there were associations between nurses' total knowledge and practice score, as shown in figure 3.

There was a statistically significant association between nurses' knowledge and their practice (r=0.354 at p=0.025) prior to the application of educational guidelines.



**Figure 3:-** Correlation between total knowledge score and practice score pre-implementation of nursing guidelines. \* P value significant if  $\leq 0.05$ r= Correlation Coefficient

# Figure 4: Post-implementation of educational guidelines, correlations between nurses' total knowledge and total practice.

Figure 4 shows the relationships between nurses' total knowledge and total practice after nursing guidelineswere applied. After applying nursing guidelines, there were highly significant associations between nurses' knowledge and their practice (r=0.681, p=0.001).



Figure 4:- Post-implementation of educational guidelines, correlations between nurses' total knowledge and total

practice

\* P value significant if ≤0.05 r= Correlation Coefficient

### **Discussion:-**

Throughout the present study 40 orthopedic nurses participated, It has been shown that the most of studied nurses' age in the third decade with the mean age (Mean  $\pm$  SD26.5  $\pm$  3.05) yrs old, more than two third of them were females, more than half of nurses had bachelor degree in nursing and the majority of nurses had from one to five years of experience in orthopedic departments.

In regard to the total knowledge scores of the investigated nurses prior to the implementation of guidelines, the current study found that more than two-thirds of the studied nurses had low total knowledge concerning orthopedic external fixation. This finding was in the same regardwith**Mohamady**, **Taha and Moghazy** (2020), who reported in their study that, nearly two thirds of the studied nurses were having unsatisfactory total knowledge about orthopedic external fixation.

Also, the current study was supported by the study of **Bader and Atiyah** (2017), who reported in their study that nurses' knowledge regarding orthopedic external fixation was poor among the nurses under the study. On the other hand, this results are in disagreement with **Hassan**, **Mohamed**, **Farouk and Ghanem** (2014), who reported in a study in Egypt at Assuituniversity hospital that more than two thirds of nurses had good knowledge level regarding external fixation.

More than two-thirds of nurses had a good level of knowledge in all measured domains after implementing the nursing care guidelines, showing a great improvement in nurses' knowledge. This demonstrated that the nursing care guidelines had a strong beneficial impact on nurses' knowledge, and that nurses were able to acquire and enrich their knowledge. This result was similar with the findings of a study done by **Konda (2020)**, who found in his study that the majority of his researched nurses had enough knowledge of external fixation after providing the information booklet.

Also, the current study was supported by the study of Ahmed & El-kady, (2015) who reported in their studyafter implementation of the designed educational program regarding external fixation, more than half of his studied

nurses gain satisfactory level of knowledge. This improvement might be due to the fact that a large number of nurses have a strong desire to learn skills and knowledge.

In terms of total practice score for the researched nurses prior to guidelines, the current study found that more than half of the examined nurses had low total practice when it came to caring for patients with external fixation. This observation is consistent with **Mohamady**, **Taha and Moghazy** (2020) who mentioned almost half of the studied nurses were having inadequate total practice regarding care of patient with external fixation. But this result disagrees with **Hassan**, **Mohamed**, **Farouk and Ghanem** (2014), who revealed that the majority of nurses had adequate practice regarding care of the patient with external fixation.

Post implementing of the guidelines, in compared to their practices before to the implementation of the guideline, nurses' total and sub-total postoperative practices improved significantly. This revealed the nursing care guidelines' significant impact on nurses' postoperative practices. **Taha and Abd Elaziz (2015)** found that a comprehensive education program improved nurses' postoperative care practice for patients with external fixation, which is consistent with our findings.

In terms of nurses' gender, the current study revealed that there was no significant correlation between nurses' gender and their knowledge and practice before and after guidelines. This was consistent with the findings of **Bader** and Atiyah (2017), who discovered that there is no significant association between gender and total score rate of orthopaedic nurses' knowledge relative to pin track infection for external fixation for the study group post-test. In contrast, Fashafsheh, Ayed, Eqtait, and Harazneh (2015) reported a strong correlation between nurses' gender knowledge and practice in their study.

The present study discovered no statistically significant association between the age of nurses and their knowledge and practice. This result was matched with the findings of **Bader and Atiyah (2017)**, who discovered that for the study group post-test, there is no significant association between age and total score rate of orthopaedic nurses' knowledge associated to pin track infection for external fixation. These findings were contradicted with **Hafez** (2014), who discovered that nurses' age had an influence on their knowledge and practice.

In terms of educational level, the present study discovered a statistically significant relationship between nurses' educational level and their total knowledge and practice before and after the implementation of nursing care guidelines, as nurses' knowledge and practice improved as their level of education increased. This results supported the findings of **Younis, Bahgat, Hosney, and Elsayed (2021)**, who discovered a statistically significant association between nurses' education and their knowledge and practice. This finding, in my opinion, may be founded on the basis that highly trained nurses were more likely than others to acquire new knowledge fast and easily. They were also able to use newly acquired knowledge to their profession when giving nursing care to patients.

In terms of experience years, the present study discovered a strong association between nurses' experience and their knowledge and practice. Similarly, **Hafez** (2014) observed that increasing nurses' experience had an effect on their knowledge and practice. In contrast, **Fashafsheh**, **Morsy**, **Ismaeel**, **and Alkaiasi** (2013) revealed no statistically significant association between nurses' experience and their knowledge and practice.

### **Conclusion:-**

1- before implementing the nursing care guidelines, total nurses' knowledge, preoperative practice, and postoperative practice regarding the care provided to patients with external fixation were low.

2- After implementing nursing care guidelines, they were able to effectively increase their knowledge, preoperative practice, and postoperative practice, resulting in an improvement in the quality of nursing care.

### **Recommendations:-**

It was suggested, based on the study's findings:

1. Periodic in-service training courses should be provided to the orthopedic nurses with emphasizing on the weak points to increase their knowledge and practice regarding external fixation and pin site care.

2. Providing the orthopedic nurses with educational booklets containing guidelines especially regarding external fixation and pin site care.

3. To accomplish generalization, the study should be replicated on a large sample size.

### **References:-**

- 1. Ahmed, A. M., & El-kady, H. A. E. R. (2015). Effect of nursing educational program on nurses' knowledge and practice regarding patients with anterior cruciate ligament surgery at Assiut university hospital. Zagazig Nursing Journal, 11(2), 42-50.
- 2. Bader, T. & Atiyah, H. (2017): Effectiveness of an educational program on orthopedic nurses' knowledge concerning pin track infection of external fixation in Al-Emamin AL- Khadamin Medical City; 6, (4) Ver. I: P15-21.
- 3. Bhardwaj, R., Singh, J., Kapila, R., & Boparai, R. S. (2019). Comparision of Ilizarov ring fixator and rail fixator in infected nonunion of long bones: a retrospective followup study. Indian journal of orthopaedics, 53(1), 82-88.
- 4. Dirksen, R. (2011): Medical Surgical Nursing, 8th ed., Mosby, USA, pp.592-623.
- 5. Fashafsheh, I, Ayed, A., Eqtait, F., & Harazneh, L. (2015). Knowledge and Practice of Nursing Staff towards Infection Control Measures in the Palestinian Hospitals. Journal of Education and Practice, 6 (4), 79-90.
- 6. Hafez, E. (2014). Effect of physical restraint guidelines on nurses' performance at Mansoura University Hospitals, doctorate degree. Mansoura University.
- Hassan, S. A., Mohamed, Z. A., Farouk, O. A. & Ghanem, H.M. (2014). Standards of Nursing Care for Patients Undergoing External Fixation in Trauma Unit at Assuit University Hospital. Assuit Scientific Nursing Journal, 2(4), 128-135.
- **8.** Khorais, A., Ebraheim, M., & Barakat, A.(2018). Self-Care Program: Quality of Life and Satisfaction among Patients with External Skeletal Fixation. IOSR Journal of Nursing and Health Science, 7(4), 71-83.
- 9. Konda, S. (2020). Effectiveness Of Information Booklet On Prevention Of Pin Site Infection. European Journal of Molecular & Clinical Medicine, 7(11), PP 1189-1193
- 10. Linton D., (2016): "Introduction to Medical Surgical Nursing E-Book". 6th edition, Elsevier, Canda, p 939-974.
- 11. Mohamed, N. M., Taha, N.M. & Moghazy, N.A. (2020). Nurses performance regarding orthopedic patients with external fixation at Zagazig University Hospitals. Egyptian Journal of Health Care, 11(1), PP115-126.
- 12. Mohammed M.R., (2017): "pin tract infection after uniplanarexternal fixator of open fracturesat Kenyatta national hospital". A master thesis. College of health science –school of medicine-departement of orthopedic surgery.
- 13. Mahmoud, A. M. S., Hassanien, A., Sherief, W., & Soliman, H. (2016). Nurses 'knowledge Regarding Traction Care in Orthopedic Unit at Mansoura University Hospital. Mansoura Nursing Journal, 3(1), 1-21.
- Morsy, R.M., Sheta, A. E. S., & Mohamed, R. F. (2021). Effectiveness of Nursing Guidelines Regarding Self-Care Strategies for Patients with External Skeletal Fixation. Journal of Nursing Science Benha University, 2(2), 526-545
- 15. Perry A.G.; Potter P.A. and Desmarais P.L. (2018): Nursing Skills and Procedures, 8th ed., by Mosby, an imprint of Elsevier, China, p.491, p. 626.
- 16. Radhi, T. A., & Tawfiq, N. B. (2016). Assessment of postoperative nurses' practices concerning care of fracture treated by external fixation. kufa Journal for Nursing sciences, 6(1).
- 17. Taha, N., & Abd Elaziz, N. (2015). Effect of nursing intervention guidelines on nurses' role, patients' needs, and visual problems post cataract surgery. American Journal of Nursing Science, 4(5), 261-269.
- 18. Tucci G., Romanini E., Zanoli G., Pavan L., Fantoni M. and Venditti M., (2019): "Prevention of surgical site infections in orthopaedic surgery: a synthesis of current recommendations" European Review for Medical and Pharmacological Sciences 2019; 23(2), 224-239.
- 19. Velazquez, R.J.; Bell, D.F. and Armstrong, P.F. (2015): Complications of use of the Ilizarov technique in the correction of limb deformities in children. J Bone Joint Surg, Wolters Kluwer Health, 75: pp. 1148-1156
- 20. White, L.; Duncan, G. and Baumle, W. (2013): Medical Surgical Nursing: An Integrated Approach, 3rd ed., Delmar, Cengage Learning. USA, pp. 930-940.
- 21. Williams, L. S. and Hopper, P. D. (2011): Understanding Medical Surgical Nursing, 4th ed., F.A. Davis, Philadelphia, pp. 1060-1070.
- 22. World Health Organization (2021).Road traffic injuries. Available at: https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries
- 23. Younis, R. A. H., Bahgat, R. S., Hosney, M. M., & abd Elnaby Elsayed, N. Effect of Implementing Pre and Post-Operative Nursing Intervention on Nurses Performance for Caring of Children with Musculoskeletal trauma.