Nurses' Performance Regarding Care of Patients with Long Term Epidural Catheter

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Abstract

Background: Epidural catheter insertion is common technique used to manage acute and chronic pain for patients with cancer and after major surgery and is viewed as the 'gold standard for effective mangment. Nursing mangment is essential for long term epidural analgesia to reduce the risk of complications. **Aim:** This study aimed to assess nurses' performance regarding care of patients with long term epidural catheter. **Design:** A descriptive exploratory research design was used to achieve the aim of this study. **Setting:** This study was conducted at Surgical Intensive Care Unit (SICU) at National Cancer Institute (NCI), Cairo University (CU). **Subject:** A convenient sample of all-available nurses (40) working within the previous mentioned setting. **Tools:** (I) Nurses' self-administered questionnaire. It is was composed of two parts. demographic characteristic and assessment of nurses' knowledge regarding care of patients with long term epidural catheter, (II) Nurse's practice observational checklist, and (III) Nurses' attitude (Likert Scale). **Results:** 68% of the studied nurses had unsatisfactory level of knowledge regarding care of long term epidural catheter, 60% of the studied nurses had unsatisfactory level of total practices regarding care of long-term epidural catheter and 55% of the studied nurses had negative attitude regarding care of long-term epidural catheter. **Conclusion**: this study concluded that more than two thirds of the studied nurses had unsatisfactory level of knowledge, three fifths of them had unsatisfactory level of practices and more than half of them had negative attitudes regarding care of patients with long-term epidural catheter. There was statistically significant difference between nurses' total knowledge and age and years of experience at (p<0.05), there was statistically significant difference between total practices and nurses' age at (p<0.05).and there was statistically significant differences between total attitude and nurses' age, gender, marital status, level of education and years of experience in the studied sample at (p>0.05) There was significant positive correlation between nurse's knowledge and attitude r=0.507, P<0.00. **Recommendations:** Replication of the current study on larger probability sample is recommended to achieve generalization of the results.

Key words: Long term epidural catheter,Nurses' performance.

Introduction:

Epidural catheter has become a popular and integral analgesia modality for patients. Since initial use in 1947, it has come to play a significant role in current interventional pain management for short-term and chronic conditions. Nursing care responsibilities are equally significant, and are critical for preventing complications and ensuring effective pain management **(Chumbley & Thomas, 2014).**

The epidural technique is one of the earliest ones in the field of anesthesia. Properly performed, it is a safe technique that provides multiple benefits. It is usable as a sole anesthetic for surgical procedures, therefore decreasing the need for general anesthesia and airway management, with the risks that this implies. It also reduces the exposure to volatile anesthetics as well as it may potentially decrease the narcotics requirement, during or after a procedure. The epidural technique is also highly valuable for

postoperative pain management as part of a multimodal approach **(Avila & Singh, 2019).**

Epidural catheter is often used to supplement General Anesthesia (GA) for surgical procedures in patients of all ages with moderate-to severe comorbid disease; provide analgesia in the intraoperative, postoperative, peripartum, and end-of-life settings; and can be used as the primary anesthetic for surgeries from the mediastinum to the lower extremities. In addition, epidural techniques are used increasingly for diagnostic procedures, acute pain therapy, and management of chronic pain. Epidural blockade may also reduce the surgical stress response, the risk of cancer recurrence, the incidence of perioperative thromboembolic events, and, possibly, the morbidity and mortality associated with major surgery **(Toledano & Van, 2017).**

There are two main classes of medications used in epidural catheter: opioids and local anesthetics. Both of these drugs are beneficial in reducing or eliminating pain, but are also responsible for the common side effects associated with this method of pain relief. There are also some rare and potentially fatal side effects of epidural therapy. The nurse's role is to assess and monitor patients carefully and report and respond to any concerns **(Chumbley & Thomas, 2014)**.

Nursing care is essential in caring of patients with chronic pain who is connected with epidural catheter. A specially trained nurse may initiate the infusion, administer bolus doses, adjust infusion rates, replace empty medication containers, troubleshoot the epidural infusion device, change the epidural infusion tubing and dressing, discontinue therapy, and, in some cases, remove the catheter. Nurses are also responsible for assessing the patient, monitoring for adverse effects, and providing teaching to the patient and family members. Nurses should check the guidelines of their facility, as well as the nurse practice act for the state in which they work, to determine which interventions are within their scope of care **(Chou, et al., 2016).**

Nursing role also include education about the epidural catheter, including anticipated changes in motor and sensory function; the importance of keeping follow-up appointments for reservoir filling to prevent gaps in therapy; and the associated risks and benefits. Explain the importance of immediately reporting complications, such as unexpected changes in motor or sensory function (including numbness, tingling, burning, increased pain sensitivity, bowel or bladder dysfunction, muscle weakness, and difficulty walking), fever, chills, and pruritus **(Volk & Kubulus, 2017).**

Significance of the study:

Epidural catheter is highly effective for controlling chronic pain such as cancer patients. It can provide pain relief, minimal side effects, and high patient satisfaction when compared with other methods of analgesia, however it can cause serious, potentially life-threatening complications. Epidural medications are considered high-alert medications because they may cause significant patient harm when used in error **(Kuroda, el al., 2015).**

Patients with long-term epidural catheter has a significant global health concern. Critical care nurses have an important role in patients care to prevent complications. Assessment of nurse's performance regarding long-term epidural catheter care is essential to identify nurse's knowledge, practice and attitude regarding epidural catheter and provide effective care for patients with cancer suffering from chronic pain.

Aim of the study:

This study aimed to assess nurse's performance regarding care of patients with long term epidural catheter through:

1-Assess the nurses' knowledge regarding care of patients with long term epidural catheter.

2-Assess nurses' practice regarding care of patients with long term epidural catheter.

3-Assess nurses' attitudes regarding care of patients with long-term epidural catheter.

Research Questions: -

The current study answered the following questions:

1-What are nurses' knowledge, attitude regarding care of patients with long term epidural catheter?

2-What are nurses' practical skills regarding care of patients with long term epidural catheter?

subjects and methods

Design: A descriptive exploratory study design was used to achieve the aim of this study.

Setting: The present study was conducted at Surgical Intensive Care Unit (SICU) at National Cancer Institute (NCI), Cairo University (CU).

Subject

A convenient sample of all-available nurses (40) working within Surgical Intensive Care Unit recruited in this study.

Tools of data collection: The following tools were used for data collections:

I - Nurses' self-administred questionnaire regarding care of patients with long term epidural catheter: Nurses' self-administered questionnaire regarding care of patients with long term epidural catheter (Appendix I):

This tool was developed by the researcher in simple Arabic language after reviewing the current national and international related literatures and it included the following parts:

A-The first part: Nurses' demographic characteristics: it was consisted of six items such as nurses' age, gender, level of education, year of experience, marital status and attending training courses.

B-The second part: Nurses' knowledge assessment structured questionnaire: It was used to assess nurses' knowledge regarding care of patients with long term epidural catheter for patients with cancer. It was developed by researcher after reviewing current related literatures **(William & Wilker, 2013; Burnes, 2014; Wiegand, 2017).** It included indications of epidural catheter, complications, nursing care of epidural catheter and management of complications**.** It was included 32 multiple choice questions (MCQ), it was covered the following five sections.

Section 1: It was concerned with assessment of nurses' basic knowledge regarding epidural catheter as definition, length of insertion, material of catheter, purpose, setting of insertion, contraindications and removal precautions. It was composed of seven MCQs .

Section 2: It was concerned with assessment of nurses' knowledge regarding complications of epidural catheter. It included complications during insertion, signs of worsening, signs of infection, catheter misplacement, complications after insertion, signs of hematoma and signs of dura puncture. It was composed of seven MCQs .

Section 3: It was concerned with assessment of nurses' knowledge regarding care of epidural catheter during insertion. It included type of solution for sterilization, sterilization of equipment's, fixation, position of patients, type of anesthesia, type of hand hygiene, time to insure from right place and way to insure that catheter in the right place. It was composed of eight MCQs .

Section 4: It was concerned with assessment of nurses' knowledge regarding administration of medications via epidural catheter. It included signs of epidural catheter leakage, number of analgesics given, management of catheter obstructions, bolus dose administration, test catheter efficacy and assessment of epidural catheter. It was composed of six MCQs .

Section 5: It was concerned with assessment of nurse's knowledge regarding care of patients with epidural catheter after insertion. It included time of using, frequency of care, causes of removal and cautions of care. It was composed of four MCQs.

❖ .Scoring system

The score for correct answer for each question took one grade and incorrect answer was zero. The total score of nurses' knowledge assessment were 32 marks.The satisfactory level was from 70% and more while the unsatisfactory level was less than 70% (<23 marks).

II -Nurses' practice observational checklist: It was used to assess nurses' practice regarding care of long term epidural catheter for patients with cancer. It was developed by researcher in English language after reviewing current related literatures (**Williams & Wilkins, 2013 ; Burnes, 2014; Pamela; 2015, Wiegand, 2016, Toledano, & Van de Velde, 2017**). It was included procedure of assisting in epidural catheter insertion, epidural analgesia administration, epidural catheter care and epidural catheter removal as the following:

Part 1: Observational checklist for assisting in insertion of epidural catheter: It was used to assess nurse's practices during epidural catheter insertion. It was composed of 25 steps. The response of each step was done or not done. It was included steps regarding assessment pre, during and post insertion, preparation of patients, positioning the patient, monitoring of patients, handling equipment to physician, observation and documentations.

Part 2: Observational checklist for epidural catheter's medications administration: it was concerned with assessment of nurse's practice regarding epidural analgesics administrations. It was composed of 23 steps. The response of each step was done or not done. It was contained assessment before analgesics drug administration, preparation of medications, monitoring of patients, inject the drug, flush the catheter observation, evaluation and documentations.

Part 3: Observational checklist for epidural catheter's care: It was concerned with assessment of nurses' practice regarding care of epidural catheter. It was composed of 20 steps. The response of each step was done or not done. It was included steps as assessment of epidural catheter site, catheter intactness, removing of old dressing, clean the site, covering the site by sterile dressing, observe signs of infection and documentations.

Part 4: Observational checklist for epidural catheter removal: It was concerned with assessment of nurse's practice regarding epidural catheter removal. It was composed of 21 steps. The response of each step was done or not done. It included steps as assessment of epidural catheter site, intactness, removing tap, grasping insuring catheter tip is intact, documentations.

❖ **Scoring system**

It was composed of 89 grades. The response of each step was one grade for done and zero for not done, The total score of nurses' practices assessment were 89 grades.The satisfactory level was from 70% and more while the unsatisfactory level was less than 70% ($<$ 63 marks).

3- Nurses' attitude : it was developed by the researcher based on comprehensive reviewing of recent literatures (**Yang et al., 2015 &polemic, 2017**).

It was in Arabic language to assess nurses' attitude regarding care of patients with long term epidural catheter such as attitude of nurses regarding nursing care, epidural catheter care, toward patients and relatives, work environment, and obstacles of work. The tool consisted of 16 statements (positive and negative statements) all the statement were positive except statement number 3 (continuous regular evaluation for nurses consider from obstacles to deliver nursing care for patients with epidural catheter) and statement number 13 (nurses not trained to deliver nursing care for patients with long term epidural catheter).

❖ **The Scoring system:**

The total score of nurses' attitude was 80. The response of each statement was divided into five responses strongly agree, agree, neutral, disagree and strongly disagree. The attitude scale included both positive and negative statements. Positive attitude statements were scored 5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1=strongly disagree conversely negative attitude statements were scored 5=strongly disagree, 4= disagree, 3= neutral, 2= agree, 1= strongly agree. It was considered that a score less than 80% (64 $>$ grades) was negative nurses attitude and a score equal or more than 80% (64 $\leq$ grades) was considered positive nurses attitude.

Operational design:

The preparatory phase : It included reviewing of current and past, national and international related literatures and theoretical knowledge of various aspects of the study using books, articles, periodicals, magainzes and internet to develop tools for data collection.

Validity: Ascertained by a group of seven experts six from Medical Surgical Nursing department at Faculty of Nursing at Ain Shams University (four professors and two assistant professors) and one from Medical consultants of the anesthesiology department at National Cancer Institute Cairo University, to test its face and content validity.

Reliability: The suitable reliability test was carried out to test tool reliability using internal consistency method. They proved a high degree of reliability test in which (alpha = 0.71 for nurses' knowledge questionnaire, alpha = 0.67 for nurses' observational checklist and alpha = 0.982 for nurses' attitude assessment)

Pilot study: Before performing the actual study, a pilot study was carried out on four nurses (10%) of total study subjects were included and chosen from the previously mentioned setting to test clarity, applicability of the tools and time required to fill them. No modification was done to the tools. The nurses who participated in the pilot study were included in the study.

Field of work: The study was carried out from beginning of February 2020 to the end of March 2020 and discontinued during April due to outbreak of Corona Virus (COVID 19) and closure of National Cancer Institutes as a result of transmission of Corona virus to nursing staff. The researcher resumed data collection from the beginning of May until the end of August covering a period of 6 months in the previously mentioned setting. The researcher attended three days/week; the first week was started with Saturday, Sunday, Monday through in the afternoon shift; then the second week was started with Tuesday, Wednesday and Thursday through in the morning shift. This technique was continued to collect data during the whole study period. As regards the structured questionnaire and attitude tools for nurses, this tool were filled by the nurses it took about 25-30 minutes for each nurse was working at Surgical Intensive Care Unit in the NCI. They were utilizing proper way of communications and explaining the purpose of the study before beginning of the answer.

The observational checklists were filled by researcher through observation of the care provided to the patients with long term epidural catheter. Each nurse had taken about 45-60 minutes /day for three days per week. data collections were obtained from 1-2 nurses per day. The researcher observed the nurses ' regarding care of patients with long term epidural catheter within the shift.

Ethical considerations:

Before the initial interview, an oral consent was secured from each subject after being informed about the nature, purpose and benefits of the study. Nurses were also informed that participation is voluntary and about their right to withdraw at any time without giving reasons. Confidentiality of any obtained information was ensuring through coding of all data

Administrative design:

An approval was issued from Faculty of Nursing, Ain Shams University to the director of Medical and Nursing directors of the SICU Unit at NCI Cairo University to conduct the study and requesting the permission for data collection from the studied sample.

Statistical Design:

The Statistical Package for Social Science (SPSS) version 21 was used for data analysis. Data were presented using numbers, percentage, chi-test and level of significant was thresholds at p<0.05.

Results :

Table (1): shows that, the mean age of the studied nurses was **38.20±8.398**, regarding gender 67.5% of the nurses were females and 75% of them were married. As regards the

educational level and years of experience, 62.5% of them studied diploma of nursing and 37.5% of them had more than10 years. Concerning the training courses all nurses had no attending training courses regarding epidural catheter's care.

Table (2): This table reveals that 100% of the studied nurses had un satisfactory level of knowledge regarding basic knowledge and complications of epidural catheter, 70% of studied nurses had unsatisfactory level of knowledge regarding drugs administration in epidural catheter. While 45% of the studied nurses had satisfactory level of knowledge regarding care of epidural catheter during insertion, 30% of them had satisfactory level of knowledge regarding drug administration and 62.5% had satisfactory level of knowledge regarding care of epidural catheter after insertion.

Figure (1): reveals that 68% of the studied nurses had unsatisfactory knowledge level regarding care of long term epidural catheter.

Table (3): This table reveals that, 80% of the studied nurses had un satisfactory level of practices regarding assistance in insertion of long term epidural catheter and 57.5% had unsatisfactory level of practices regarding epidural catheter's medications administration.

While 60% of the studied nurses' had satisfactory level of practices regarding long term epidural catheter's care and 50% of them had satisfactory level of practices regarding epidural catheter removal.

Figure (2): reveals that, 60% of the studied nurses had unsatisfactory level of total practices regarding care of long-term epidural catheter.

Figure (3): reveals that 55% of the Studied nurses had negative attitude regarding care of long-term epidural catheter.

Table (4): clarifies that, there were statistically significant difference between total knowledge and their age and years of experience at (p<0.05).

Table (5): clarifies that, there were statistically significant differences between total attitude and nurses' age, gender, marital status, level of education and years of experience in the studied sample at (p>0.05).

Table (6): clarifies that, there was significant positive correlation between nurse's knowledge and attitude r=0.507, P<0.00, otherwise there was no significant correlation between knowledge and practices.

Table (7): clarifies that, there was no significant correlation between nurse's practices and attitude r = -.284, P>0.00.

Table (1): Frequency and percentage distribution of demographic characteristics of the studied nurses (n=40).

Items	No.	%
Age		
18 < 25	2	5
25 < 35	13	32.5
35 < 45	15	37.5
45 < 60	10	25
Mean ±SD	38.20±8.398	
Gender		
Male	13	32.5
Female	27	67.5
Marital status		
Single	2	5
Married	30	75
Widowed / Divorced	8	20
Educational level		
Diploma education	25	62.5
Institute	15	37.5
Years of experience		
Less than 3 years	4	10
3 < 5 years	7	17.5
5 < 10 years	14	35
More than 10 years	15	37.5
Training courses		
No	40	100

Table (2): Frequency and percentage distributions of studied nurses' level of knowledge regarding care of patients with long term epidural catheter (n=40).

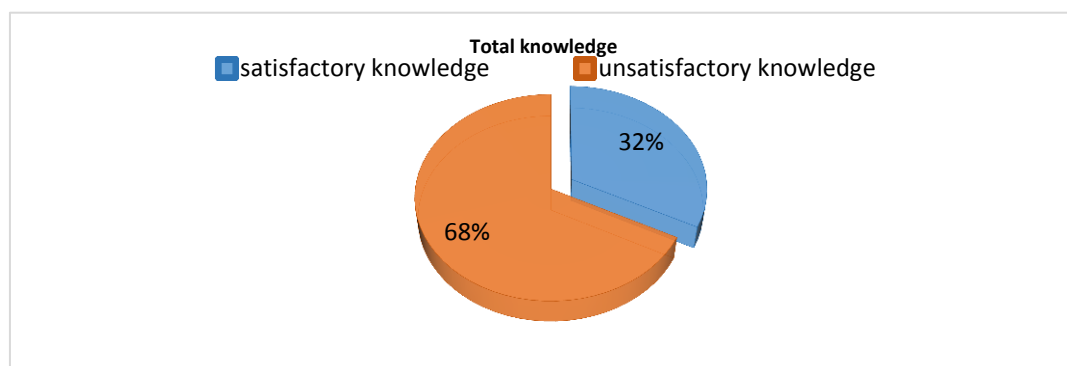| knowledge	Satisfactory		Unsatisfactory	
	No	%	No	%
Basic knowledge regarding epidural catheter.	0	0	40	100
Knowledge regarding complications of epidural catheter.	0	0	40	100
Knowledge regarding care of epidural catheter during insertion.	18	45	22	55
Knowledge regarding drugs administration in epidural catheter.	12	30	28	70
Care of epidural catheter after insertion	25	62.5	15	37.5

Figure (1): Percentage distributions of nurse's total level of knowledge regarding care of long-term epidural catheter. (n=40).

Table (3): Frequency and percentages distribution of studied nurses' practice level regarding long term epidural catheter (n=40).

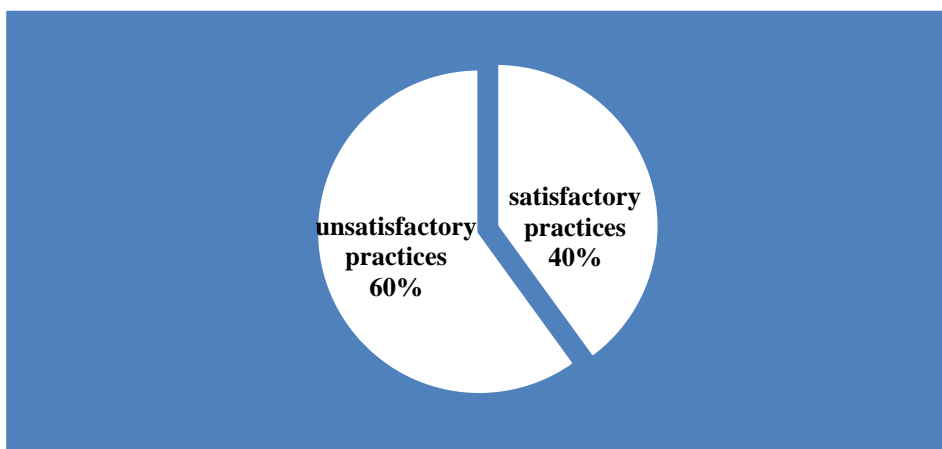| Items	Satisfactory		Unsatisfactory	
	No	**%**	**No**	**%**
Assisting in insertion of epidural catheter	8	20	32	80
Epidural catheter's medications administration	17	42.5	23	57.5
Epidural catheter's care	24	60	16	40
Epidural catheter removal	20	50	20	50

Figure (2): Percentage and distribution of studied nurses' level of total practices regarding care of long term epidural catheter.
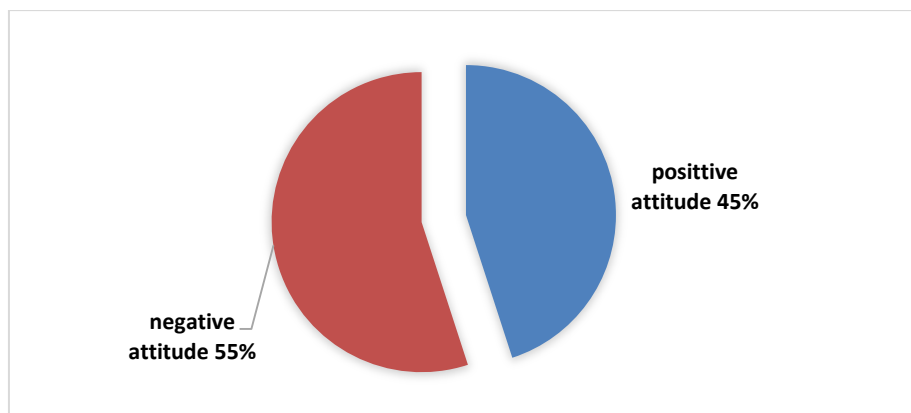

Figure (3): Percentage and distribution of studied nurses' attitude regarding care of patients with long term epidural catheter.

Table (4): Relations between nurses' demographic characteristics and their total level of knowledge. (n=40).

Demographiccharacteristics		Total knowledge				Chi-square	
		Satisfactory		Unsatisfactory		X^2	P value
		No.	%	No.	%		
Age (years)	18-25	0	0	2	100	15.6	0. 00**
	25-35	4	30.7	9	69.3		
	35-45	11	73.3	4	26.7		
	45-60	0	0	10	100		
Gender	Male	3	25	9	75	1.14	0.285
	Female	12	42.9	16	57.1		
Level of education	Diploma	11	44	14	56	1.2	0.27
	Institute	4	27	11	73		
Years of experience	<3	1	20	4	80	14.968	0. 00**
	3-5	2	40	3	60		
	5-10	11	73	4	27		
	>10	1	0.7	14	99.3		
Marital status	Single	5	33.3	10	66.7	0.44	0.504
	Married	11	44	14	56		

Non-significant. >0.05   Significant. ≤0.05* High significant. ≤0.001**

Table (5): Relations between nurses' demographic characteristics and their attitude (n=40).

Demographic characteristics		Attitude				Chi-square	
		Positive		Negative		X^2	P value
		No.	%	No.	%		
Age (years)	18-25	2	100	0	0	40	000**
	25-35	13	100	0	0		
	35-45	0	0	15	100		
	45-60	0	0	10	100		
Gender	Male	12	100	0	0	28.57	000**
	Female	3	10.7	25	89.3		
Level of education	Deplume	0	0	25	100	40	000**
	Institute	15	100	0	0		
Years of experience	<3	5	100	0	0	58.418	000**
	3-5	5	100	0	0		
	5-10	5	33.33	10	66.66		
	>10	0	0	15	100		
Marital status	Single	15	100	0	0	40	000**
	Married	0	0	25	100		

Non-significant. >0.05 Significant. ≤0.05*   High significant. ≤0.001**

Table (6): Correlation between total nurses' knowledge, practice and attitude (n=40).

Items	Total practices		Attitude	
	r	P-value	r	P-value
Total knowledge	-.283	.077	.507	.001**

** Correlation is significant at the 0.01 level

Table (7): Correlation between total nurses' practices with their total attitude (n=40).

Items	Attitude	
	r	P-value
Total practices	-.284	.076

Correlation is non-significant at the.076 level

Discussion:

Epidural analgesia is highly effective for controlling chronic pain such as cancer patients. It can provide pain relief, minimal side effects, and high patient satisfaction when compared with other methods of analgesia, however it can cause serious, potentially life threatening complication. Epidural medications are considered high-alert medications because they may cause significant patient harm when used in error. Patients with long-term epidural catheter has a significant global health concern. Critical care nurses have an important role in patients care to prevent complications. Assessment of nurse's performance regarding long-term epidural catheter care is essential to assess nurse's knowledge, practice and attitude regarding epidural catheter and patients with cancer suffering from chronic pain **(Kuroda, 2015).**

According to the demographic characteristics in the studied nurses' the results revealed that, the mean age of the studied sample was **38.20±8.398**, and about one third of them their age was ranged from 25years to 35 years this finding is consistent with **Nongqo, (2015)** in study entitled " Knowledge of epidural analgesia among labor ward nursing staff at Chris Hani Baragwanath academic hospital" who found that majority of the participant age fell in 30-39years.

Related to gender more than two thirds of the nurses in the studied sample were females. This finding is inconsistent with **Devi, (2018)** in study entitled with "Assess the effectiveness of SIM on knowledge regarding spinal anesthesia complication among staff nurses working in selected hospitals Jalgaon " who showed the two thirds of the studied sample were females. In my opinion because the nurse profession in Egypt was for women only and recently become for both genders.

As regard to educational level, about two thirds of them were diploma nurse. This finding goes in the same line with **Abdelmowla, (2017)** in study entitled with " Lumbar Puncture: Nurses` knowledge, practice and patients' satisfaction with nursing care" who stated that the majority of studied subjects were diploma education. In my opinion because the national cancer institute has a nursing institute to meet the nursing institute's needs for nursing.

As regard marital status more than two third of studied nurses were married. In my opinion because we living in Islamic community and the marriage is the part from the religious and community ethics.

Regarding past experience more than one third of studied nurses had 10 years' experience in intensive care unit. This finding is in agreement with **Gabriel, (2013)** in study entitled with "A study of relationships among three assessment methods for nurse anesthetist" who found that, mean age of experience is around 10 years. In my opinion that might be due to increasing workload and stress on the nurses in Intensive Care Unit, the nurses don't continue for a long period of time in the ICU.

Concerning the training courses all of the studied nurses had no training courses regarding epidural catheter's care. This finding is consistent with **Rijal, et al., (2019) in** study entitled with "Nurses knowledge on management of patient receiving spinal anesthesia in a Government Hospital" and who found that majority of participants had no training courses regarding spinal anesthesia. In my opinion lack of educational program plan in the studied setting, and lack of awareness about vital role of epidural catheter.

Concerning nurses' level of knowledge regarding epidural catheter, the current study

revealed that, the majority of the studied nurses had unsatisfactory level of total knowledge regarding basic knowledge of epidural catheter.

This finding goes in same line with **O'connor et al., (2015)** in study entitled " Success of an interdisciplinary educational program on nursing knowledge about epidural analgesia in a critical care setting" who found that, there was poor level of knowledge of the studied nurses regarding knowledge of epidural catheter.

Concerning nurses' level of knowledge regarding complications of epidural catheter. The current study showed that all of nurses had unsatisfactory level of total knowledge about complications of epidural catheter. This might be due to absence of guidelines in the unit to be used as guidance for nurses.

This finding was supported by **Nongqo, (2015)** in study entitled " Knowledge of epidural analgesia among labor ward nursing staff at Chris Hani Baragwanath academic hospital" who reported that the majority of the studied nurses had inadequate knowledge regarding complications of epidural catheter.

In relation to nurses' level of knowledge regarding care of epidural catheter during insertion. The current study revealed that, more than half of the studied nurses had unsatisfactory level of knowledge regarding care of epidural catheter. This finding might be due to insufficient training courses regarding care of patients with long term epidural catheter.

This finding is in agreement with **Waghchoure & Sable, (2016)** in a study entitled″ Women and nurses' knowledge and awareness regarding epidural analgesia″ who stated that nearly half of the nurses had inadequate knowledge regarding care of epidural catheter.

Concerning nurses' level of knowledge regarding drug administration in epidural catheter, the current study showed that, more

than two thirds of the studied nurses had un satisfactory level of total knowledge about drug administrations in epidural catheter. This might be due to lack of knowledge about drug administrations in epidural catheter and decrease nurses years of experience in intensive care unit.

This finding was supported by **Sawhney, (2018)** in study entitled with "Using simulation to enhance education regarding epidural analgesia for registered nurses" who reported that, the studied nurses had inadequate knowledge regarding pharmacology of epidural catheter.

Regarding total level of knowledge, the current study showed that, more than two thirds of the studied nurses had un satisfactory level of total knowledge regarding epidural analgesia.

This finding was supported by **Yu, (2020)** in study entitled with "Knowledge and attitudes of Chinese oncology nurses regarding cancer pain management—a cross-sectional study" who reported that, most Chinese oncology nurses had lack knowledge regarding cancer pain management modalities and misconceptions about cancer pain management.

This finding is in disagreement with **Luctkar-Flude, et al., (2018)** in a study entitled ″Development and evaluation of an epidural analgesia workshop for senior nursing students″ who stated Participants had good level of knowledge regarding epidural analgesia**.**

In relation to nurses' practices regarding epidural catheter, the current study revealed that, less than one fifth of the studied nurses had satisfactory level of total practices regarding assisting in insertion of epidural catheter. This result might be due to absence of an English and Arabic guidelines procedures book in the unit to be used as guidance for nurses and poor level of education.

This finding goes in the same line with the finding of **Baribeau, (2013)** in study entitled with "Organization of Perinatal Nurses' Work Following Epidural Insertion" who found lack of participants practice regarding epidural catheter analgesia.

According nurses' practices related to medications administration via epidural catheter's, the current study was revealed that, more than half of the studied nurses had un satisfactory level of practices. This result might be due to studied lack of training courses about epidural catheter.

This finding was supported by **O'Keeffe, (2017)** in the study entitled "Implementation of an evidenced-based practice curriculum to improve nursing practice for epidural administration and monitoring" who stated that the majority of the studied nurses had un satisfactory level of practices related to epidural catheter administrations and monitoring.

In relation to nurses' practices regarding care of patients with long term epidural catheter's, the current study revealed that more than half of the studied nurses had un satisfactory level of total practices regarding epidural catheter care. This result might be due to studied nurses not attended any training session or work shop about epidural catheter.

This finding was supported by **Dahlberg, et al., (2021),** in the study entitled with "Levels of education and technical skills in registered nurses working in post-anesthesia care units in Sweden Karuna" who stated that, less than one half of the studied nurses had unsatisfactory level of practices related to epidural catheter care.

Concerning with practices regarding removal of epidural catheter, the current study revealed that half of the studied nurses had unsatisfactory level of total practices regarding epidural catheter removal. This result might be due to poor level of education, and the majority of the sample diploma nursing and decrease years of experience in ICU.

This finding was supported by **Ali, et al., (2020),** in the study entitled "Knowledge, attitude and practices of labor analgesia amongst healthcare workers and patients" who stated that more than half of the studied nurses had unsatisfactory level of practices related to care of patients with epidural catheter.

This finding is in disagreement with **Charles, (2015)** in a study entitled″Specially trained registered nurses can safely manage epidural Analgesia Infusion in laboring patients″ who stated Specially trained RNs can safely initiate continuous infusions and increase the basal rate of epidural analgesia infusions or pain controlled epidural analgesia doses administered to laboring women, after insertion.

Concerning relations between demographic characteristics of the studied nurses and their total level of knowledge. The current study revealed that there was statistically significant difference between total knowledge and and their age and years of experience at ($p<0.05$).In my opinion its might be due to increase years of experience and age of studied nurses lead to increase level of knowledge

These findings are in accordance with findings of the study about "Knowledge and attitude of nurses and their practices regarding post-operative pain management in Bangladesh" by *Baska, (2010),* who found that, there was statistically significant differences between nurses' level of knowledge and their demographic characteristics regarding age and years of experience**.**

Regarding relations between demographic characteristics of the studied nurses and their total attitude regarding epidural catheter**.** The current study showed that there were statistically significant differences between total attitude and nurses' age, gender, marital status, level of education and years of experience in the studied sample

at (p>0.05).from the researcher point of view because the increase level of education, age and years of experience affect positively on nurses attitude regarding work environment.

These findings are in accordance with findings of the study about "Knowledge and Attitudes of Ethiopian Nursing Staff Regarding Post-Operative Pain Management: A Cross-Sectional Multicenter Study" by **Dessie***, et al., (2019),* who found that, there was statistically significant differences between nurses' attitude and their demographic characteristics regarding gender, level of education and years of experience**.**

Concerning correlations between nurses' level of knowledge, practice and attitude of the studied nurses. The current study found that there was significant positive correlation between nurse's knowledge and attitude r=0.507, P<0.00, otherwise there was no significant correlation between knowledge and practices and no significant correlation between nurse's practices and attitude r = -.284, P>0.076. this finding may be due to because increase level of knowledge affects positively on nurses' attitude toward epidural catheter procedure and way of delivering care, quality of care delivered to patients.

These findings are in disagreement with the study about "Nursing knowledge and assessment skills in the management of patients receiving analgesia via epidural infusion**" Bird** *and Wallis, (2002)* who found that There was only a weak correlation between knowledge and skill performance.

These findings also are in disagreement with the study about "Knowledge and Attitude of Nurses toward pain Management at Omdurman Military Hospital**" Alhage**,, *(2018)* who found that There was no correlation between knowledge and attitude.

Finally, the study results clarified that nurses had insufficient level of knowledge, practice and negative attitude regarding care of patients with long term epidural catheter.

Conclusion:

Based on the findings of present study, it can be concluded that:

More than two thirds of the studied nurses had unsatisfactory level of knowledge, three fifth of them had unsatisfactory level of practices and more than half of them had negatives attitudes regarding care of patients with long-term epidural catheter. There was statistically significant difference between total knowledge and their age and years of experience at (p<0.05). There were statistically significant differences between total attitude and nurses' age, gender, marital status, level of education and years of experience in the studied sample at (p>0.05). There was significant positive correlation between nurse's knowledge and attitude r=0.507, P<0.00.

Recommendations:

Recommendation related to nurses:

1- Educational programs for nurses to enhance their knowledge and practical skills regarding care of patients with long term epidural catheter.

2- A simplified, illustrated and comprehensive Arabic and English booklet including knowledge and care guidelines have to be disseminated in ICU for nurses about epidural catheter.

Recommendation related to research:

3-Replication of the current study on larger probability sample is recommended to achieve generalization of the results

4-Further researches are recommended to assess factors affecting nurses' practices and knowledge regarding epidural catheter

5-Further researches to investigate the effect of instructional guidelines of epidural catheter on nurse's practices.

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