

# Effect of Implementing Educational Guidelines on Nurses' Knowledge and Practice regarding Plasmapheresis Process

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## Abstract

**Background:** Plasmapheresis is a procedure performed for different life-threatening and debilitating diseases as a mode of treatment or as an adjunct with other therapies. It is a process involving extracorporeal removal of plasma from other components of blood, discarding and replacing plasma with physiological fluids. **The aim** of the study was to evaluate the effect of implementing educational guidelines on nurses' knowledge and practice regarding plasmapheresis process. **Research design:** Quasi- Experimental research design was utilized to achieve the aim of the study. **Setting:** This study was conducted at Hemodialysis departments in Benda University Hospital. **Sample:** Convenient sample of (٦٠) nurse from both sex who working at Hemodialysis departments of Benha University Hospital and agree to participate in the study. **Tools of data collection:** Two tools were used, **I:** Self-administered questionnaire which consisted of two parts to assess **A)** Nurses' sociodemographic data. **B)** Nurses' knowledge questioners about plasmapheresis process and **II:** Observational checklist for nurses' practice which consisted of three parts to evaluate nurses' actual practices before, during and after care of patient undergoing plasmapheresis process **Results:** The study revealed that nurses' knowledge and performance regarding patient undergoing plasmapheresis process pre guidelines implementation was unsatisfactory level (٨٣.٣% and ٨٠%) which improved immediately post guidelines implementation at satisfactory level (٧٦.٧% and ٧٠%) and return to decline post three month of guidelines implementation at satisfactory level (٦٦.٧% and ٦٣.٣%) respectively. **Conclusion:** There was a positive and highly statistical significant relation between total knowledge and total performance at pre, immediate post and after three month of guidelines implementation. **Recommendation:** Ongoing educational and training guidelines for nurses are needed regarding care of patients undergoing plasmapheresis process and apply the guidelines on large sample selected from Hemodialysis departments at Benha University Hospital.

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**Key words:** Plasmapheresis, Nursing knowledge, Nurses' practice.

## Introduction

Plasmapheresis or therapeutic plasma exchange (TPE), it means separation and removal of the plasma from patient's blood while simultaneously or at the same time

giving back a replacement fluid prescribed according to patient's disease or Clinically condition. Plasmapheresis is safe, fast, and powerful for emergent management of patient chronic disease. Plasmapheresis is used to remove destructive antibodies,

toxins, medications and clotting factors from the circulation (**Serkan et al., 2021**).

Plasmapheresis is the treatment of choice for renal, hematological, neurological and immunological diseases. Plasmapheresis; it is used as a therapeutic management in a wide range of conditions. Plasmapheresis is used when a substance as a part of plasma, such as; immunoglobulin, is intensely harmful and can be evacuated (**Sik et al., 2020**).

The role of nurses is great in the multidisciplinary team in the implementation of plasmapheresis process. Taking the patient medical history by nurses is vital in determining the patients whom treatment is contraindicated. Also, ensure that patient's receiving plasma exchange procedure have access to specialist care, and have right intervention by noticing complications that may occur (**David et al., 2023**).

Before starting of plasmapheresis, the nurse should confirm of the identity of right patient, informed consent should be obtaining before beginning treatment, taking a full history, preparation of plasmapheresis machine, liquids of substitution and set of venipuncture, the nurse has to inform the patient about the process of plasmapheresis and the need to secure and maintain one or two peripheral veins and in the absence of central venous line. Also, before the first session, the nurse is responsible for taking blood sample for testing; hematocrit level, viral infections, biochemical indicators, antibodies and checking for an appropriate vascular access (**Ahmed & Kaplan, 2020**).

After the connection of the patient to the plasmapheresis device, the nurse's vital role is the immediate intervention in case of any

potential complications as febrile fever or reaction, hypotension, or allergic - hemolytic reactions. During the healing process, the role of nurse is focused in monitoring the patient and the plasmapheresis machine with regular taken of physiological measurement including; vital signs, medication taken, side effects, blood pump, blood flow, amounts of ingested, replacement fluids and anticoagulants used (**Hassanein et al., 2019**).

### **Significance of the study**

World Health Organization (WHO) estimated 23,0 million of people suffer from autoimmune disease and require plasmapheresis treatment and prevalence is rising annually (**American Autoimmune Related Disease Association, 2021**). According to report of Benha University Hospitals Statistical office (2022) the number of admitted patients to hemodialysis unit and undergoing plasmapheresis was 100 cases. So that, improving nursing practice is needed to achieve quality of care and satisfaction (**Padmanabhan et al., 2019**).

### **Aim of the study:**

The study aimed to evaluate the effect of implementing educational guidelines on nurses' knowledge and practice for patients undergoing plasmapheresis process.

### **Research hypothesis:**

1-Nurses' knowledge level regarding plasmapheresis process will be significantly improved after implementation of the educational guidelines than before.

2-Nurses' practice level regarding plasmapheresis process will be significantly

improved after implementation of the educational guidelines than before.

## **Subject and Methods**

### **Research design:**

Quasi- Experimental research design was utilized to achieve the aim of the study.

### **Study setting:**

This study was conducted at Hemodialysis departments at Benda University Hospital, Qalyobia, Egypt. Where, it located in second floor and includes three rooms; total hemodialysis machines are (٤٢), (٣٦) for hemodialysis and (٦) A Nikkiso hemodialysis machine use filters for plasma exchange.

### **Sample:**

Convenient sample of (٦٠) nurses from both sexes who working at Hemodialysis departments and agree to participate in the study, in addition provide direct care to patient during plasmapheresis.

### **Tools for data collection**

Two tools were used; Self-administered questionnaire aimed to assess nurses' knowledge & observational checklist to assess nurses' practice.

**Tool I** - Self-administered questionnaire. It was developed by **Mathew et al., (٢٠٢٣), Oto, et al., (٢٠٢٢), Sergent& Ashurst, (٢٠٢٢).** and adapted by the investigator. It involved the following two parts:

**Part I: Nurses' demographic data:** Concerned with assessment of nurses' demographic characteristics related to age, gender, marital status, educational level, years of experience in the field of nursing, years of experience at Hemodialysis departments, attendance training courses on plasmapheresis process.

**Part II: Nurses' knowledge questioners:** Consisted of the following two sections:

**Section I:** Covered nurses' knowledge about plasmapheresis process. It consists of ٣٠ questions.

### **Scoring system:**

All knowledge variables were multiple choice questions & put a tick true (√) on the correct answer; two scoring levels for questions were used. Each correct answer was scored (١), each incorrect answer was scored (zero). The total score for knowledge was (٣٠) marks. The scores were converted into a percent and categorized as follows:

- Below ٨٠٪ was considered as an unsatisfactory level of knowledge. (Less than ٢٤ marks).
- ٨٠٪ and above was considered as satisfactory level of knowledge. (٢٤ marks or more).

### **Tool II: - Observational Checklist for Nurses' Practice**

It was developed by **Nicabi et al., (٢٠٢٣), Sergent & Ashurst, (٢٠٢٢)** and adapted by the investigator to assess nurses' practice pre, immediate post and after three month of guidelines implementation. It involved the following three parts to cover the following data:

- Nursing practice before plasmapheresis as: Hand washing (١٠ steps), Wearing the PPE (٨ steps), Measuring weight & height (١٤ steps), Measuring vital signs as temperature (٣٣ steps), Insertion of subcutaneous butterfly (١٤ steps), Obtaining blood sample (١٤ steps), Assessing vascular access & preparing plasmapheresis machine (١٢ steps).
- Nursing practice during plasmapheresis as: connecting the patient with the machine (١٢ steps).
- Nursing practice after plasmapheresis as care of vascular access.

## Scoring system

The score distributed as: one mark for each step correctly done, and zero for incorrectly done or not done, the total score converted into percentage and graded as the following:-

- Below 80% graded as unsatisfactory level of practice.
- 80% and above graded as satisfactory level of practice.

## Tools Validity

The tools were reviewed by a panel of five experts from Medical Surgical Nursing field at Faculty of Nursing Benha University to test the relevance, clarity of tools 'content, comprehension, understanding, applicability and necessary modification was done accordingly.

## Reliability

The investigator used test – retest – methods to test the internal consistency of the tools, by administration of the same tools to the same subjects under similar condition on two different occasions, testing the reliability of the tools through Cronbach alpha. Tool reliability for self-administered questionnaire that used to assess nurses' knowledge = 0.98, tool reliability for observational checklist that used to assess nurses' performance= 0.91.

## Ethical consideration

The aim of this study was explained to all nurses and they were reassured that all information was confidential and it was used only for their benefit and for research purpose. Nurses' written and verbal consent to participate in the study was obtained. Nurses were informed that they were allowed to choose to participate or not in the study and they had the right to withdraw from the study at any time.

## Pilot study

A pilot study was conducted on 10% of all nurses that were included in the study (7 nurses) from the total number of nurses (70) in order to test the clarity and applicability of the tools.

## Fieldwork:

Data collection of the current study was carried out from July, 2023 to end of March, 2024. The process of data collection was achieved through four phases: 1- **assessment phase (pre-test):** to have baseline assessment about nurses' level of knowledge and practice. Data collected at morning and afternoon shifts (long day shift) three days/week. Nurses' knowledge was assessed through self-administered questionnaire (**Tool I**) which given to each nurse to fill it and time required for completion of the questionnaire was ranged from 30-40 minutes. While nurses' practical skills were evaluated by the researcher using direct observation by using observational Checklist (**Tool II**) at time before, during and after plasmapheresis. The time of process assumed was between 2-3 hours. This assessment helps the researcher to define and detect nurses' deficits in knowledge and practice.

## 2-Planning phase: -

The researcher put plan for carrying out the study after collecting data about the study setting. The guidelines developed by the researcher according to nurses' needs and deficiencies in their performance. It was written in Arabic language and it was reviewed by the supervisors and the validity was done by a panel of five experts from medical surgical nursing field. Session of guidelines was prepared as well as teaching material as discussion, demonstration, video, picture and colored booklet that helped in

covering theoretical and practical information.

### ٣-Implementation phase:

-All available nurses in the Hemodialysis unit during the time of data collection and agree to participate in this study was recruited into the study.

- The researcher gave the instructional colored guidelines booklet to nurses immediately after pretest to each nurse under the study in order to help for reviewing and support teaching. The booklet was written in a simple Arabic language and supplemented by pictures and illustrations to help the nurse understanding of the content.

-The studied nurses were divided into ١٠ groups. Each group contained six nurses in every session.

-The researcher was attended three days/week in the morning and afternoon shift.

-The researcher met every group for four sessions: one session for theory and three sessions for practice. Each session ranged about ٣٠-٤٥ minutes, including the period of discussion.

- An orientation to the intervention and its process were presented. Each session started with a brief summary about what had been given through the previous session, then the objectives of the new topics, taking into consideration the use of simple language to suite the level of all nurses' education.

- Discussion, motivation and reinforcement during the intervention sessions were used to enhance learning. At the end of each session the researcher allowed for nurses to ask questions to correct any misunderstanding.

### Session one: (Introductory session)

It included orientation and explanation of reasons and importance of designed

guidelines and give an explanation about plasmapheresis such as definition, indications, contraindications, complication and nursing role regarding patient undergoing plasmapheresis.

### Session two:

It included an explanation about preparation and precautions that the nurse should be performed before plasmapheresis (during preparation phase).

### Session three:

It included an explanation about care of patient during and after plasmapheresis.

### Session four:

It contains patient safety measures and infection control measures in hemodialysis unit that the nurse should follow during and after plasmapheresis. The researcher carried revision and reinforcement according to nurses' needs. Also, at the time end of each session the nurse's question were answered and discussed to correct any misunderstanding. At the end of the guidelines, the researcher received notes from the nurses and thanked them for their cooperation. The researcher asked them about their opinion on the guidelines and their benefits from the subject, then distributed the questionnaire to do another test.

### ٤- Evaluation phase:-

Post test was done immediately and after three months of data collection to determine the effectiveness of designed guidelines on nurses' knowledge and practice regarding patient undergoing plasmapheresis process.

### Statistical analysis

The collected data were organized, categorized, tabulated and analyzed using the number and percentage distribution. The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social

Science (SPSS) version 20. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test ( $\chi^2$ ). Different between the group during the two visits were assessed by paired t test and different between the group during the three visits were assessed by repeated measures ANOVA. In addition, R- test were used to identify the correlation between the study variables.

Degrees of significance of results were considered as follows:

- P-value  $> 0.05$  Not significant (NS)
- P-value  $\leq 0.05$  Significant (S)
- P-value  $\leq 0.01$  Highly Significant (HS).

## Results:

**Table (1):** Reveals that the majority (87.7%) of studied nurses were female; (36.6%) of studied nurses aged 30-39 years old with mean age of  $39.20 \pm 0.97$  years, it was found that 83.3% of them were married, more than half of them (63.4%) were Bachelor degree in nursing. Also, (43.3%) of nurses their number of years of experience in the field of nursing were 0-4 years; while according to their number of years of experience in dialysis unit were 1-4 years and nearly three quarters of them (73.3%) attend training courses on treatment of patients with plasmapheresis, since  $\geq 6$  months among 09.1% and 04.0% of them attended for one time only.

**Table (2):** Illustrates that there was highly statistically significance difference regarding the overall knowledge about plasmapheresis at pre, immediate post and in three-month post guidelines implementation at  $p \leq 0.01$ . While there were no statistically

significant differences regarding knowledge between immediate post and after three-month guidelines implementation at  $p > 0.05$ .

**Table (3):** Shows that there was high statistically significance regarding the total practice about plasmapheresis at pre, immediate post and in three-month post guidelines implementation at  $p \leq 0.01$ .

**Figure (1):** Illustrates that, 83.3% of the studied nurses were at unsatisfactory level regarding knowledge about plasmapheresis process at pre guidelines, while (76.7%) of them were at satisfactory level of knowledge at immediate post guidelines. Post three month of guidelines implementation, the level of total knowledge of studied nurse's return to decline to (76.7%) respectively.

**Figure (2):** Illustrates that (80%) of the studied nurses were at unsatisfactory level of practice regarding care of patient undergoing plasmapheresis at pre guidelines, while (90%) of them were at satisfactory level of performance regarding care of patient undergoing plasmapheresis immediate post guidelines implementation, while (63.3%) of them were at satisfactory level of performance regarding care of patient undergoing plasmapheresis Post three month of implementation guidelines.

**Table (4): Relation between total knowledge levels with personal data of the studied nurses (n=60):** Illustrates that there

was a significant statistical relation between total nurses' knowledge with their Years of experience in dialysis unit during pre-guidelines implementation as well as a significant relation with educational level, years of experience in dialysis unit and attendance of training course regarding

plasmapheresis during immediate and post 3 months periods of guidelines implementation.

**Table (5): Relation between total practice levels with personal data of the studied nurses(n=60):** Illustrates that there were highly statistical significant relation between total nurses' practice with their years of experience in dialysis unit during pre-guidelines implementation as well as a significant relation with educational level,

years of experience in dialysis unit and attendance of training course regarding plasmapheresis during immediate and post 3 months periods of guidelines implementation.

**Table (6):** Illustrates that there was highly statistical significant relation between total knowledge and total practice at pre, immediate post and after three month of guidelines implementation at  $p < .05$ .

**Table (7): Distribution of the studied nurses according to their demographic data (n=60).**

Nurses' personal data	(No.)	%
<b>Age (in years)</b>		
21- < 30	16	26.7
30- < 40	22	36.7
40- < 50	16	26.7
50- 60	6	10.0
<b>SD ±</b> □	39.20 ± 0.96	
<b>Gender</b>		
Male	8	13.3
Female	52	86.7
<b>Marital status</b>		
Married	50	83.3
Single	8	13.3
Divorced	2	3.3
<b>Educational Level</b>		
Diploma in nursing	2	3.3
Technical nursing institute	18	30.0
Bachelor degree in nursing	38	63.3
Post graduate studies	2	3.3
<b>Years of experience in nursing</b>		
1- < 5 years	18	30.0
5- < 10 years	42	70.0

≥ 10 years	16	26.7
<b>Years of experience in dialysis unit</b>		
1-10 years	32	53.3
0-10 years	14	23.3
≥ 10 years	14	23.3
<b>Attended training courses on plasmapheresis</b>		
Yes	44	73.3
No	16	26.7
<b>The last time of attending training course since (n=44)</b>		
< 6 months	18	40.9
≥ 6 months	26	59.1
<b>Times of receiving training course (n=44)</b>		
One time	24	54.5
Two times	8	18.2
Three times	12	27.3

**Table (٢): Comparison between the studied nurses according to their total knowledge on plasmapheresis process at pre, Immediate post and after three month of guidelines implementation(n=60).**

Nurses' total knowledge		Pre-educational guidelines (n=60)		Immediately Post educational guidelines (n=60)		3 months Post educational guidelines (n=60)		Mc nemar □ <sup>2</sup> P value (١)	Mc nemar □ <sup>2</sup> P value (٢)
		No	%	No	%	No	%		
		Basic knowledge regarding components, function of blood and plasmapheresis	Satisfactory ≥80%	14	23.3	46	76.7	44	73.3
Unsatisfactory <80%	46		76.7	14	23.3	16	26.7	<0.001**	0.001**
Plasmapheresis methods and its complications	Satisfactory ≥80%	14	23.3	46	76.7	44	73.3	14.066	13.066
	Unsatisfactory <80%	46	76.7	14	23.3	16	26.7	<0.001**	<0.001**
Nurses' role for patient undergoing plasmapheresis	Satisfactory ≥80%	20	33.3	40	66.7	46	76.7		



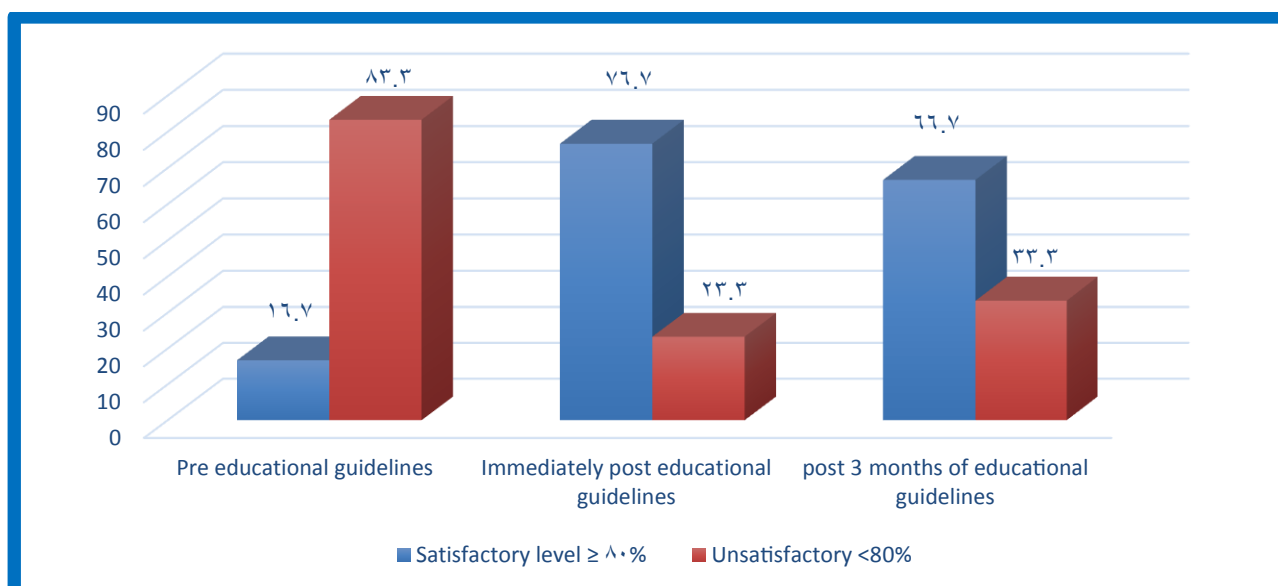
	Unsatisfactory <80%	40	77.7	8	13.3	14	23.3	14.067	11.077
								<0.001**	<0.001**

**Table (3): Comparison between the studied nurses' according to their total practice towards care of patients undergoing plasmapheresis at pre, immediate post and after one month of guidelines implementation (n=60).**

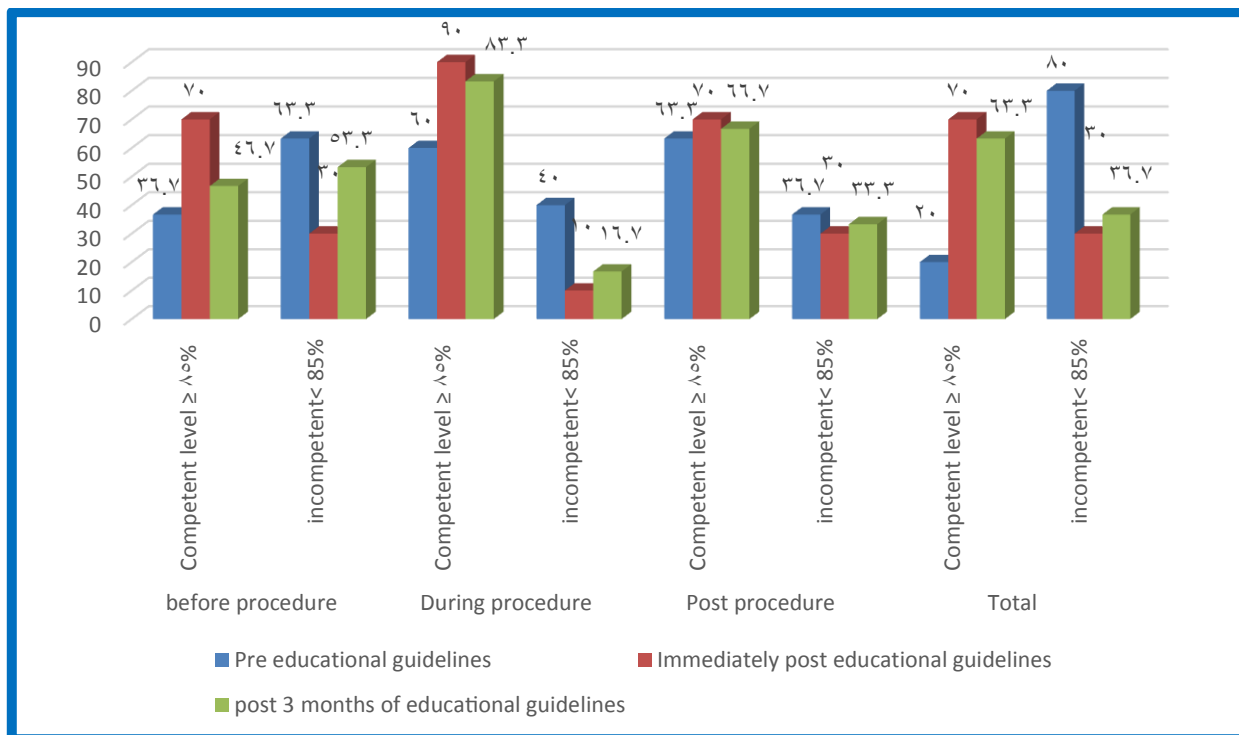
Nursing practices	total practice levels		Pre-educational guidelines (n=60)		Immediately Post educational guidelines (n=60)		3 months Post educational guidelines (n=60)		Mc nemar □ <sup>2</sup> P value (1)	Mc nemar □ <sup>2</sup> P value (2)
			No	%	No	%	No	%		
			Hand washing	Before procedure	Competent ≥ 80%	8	13.3	46		
	Incompetent <80%	52	86.7		14	23.3	22	36.7	<0.001*	<0.001*
PPE wearing	Competent ≥ 80%	4	6.7		50	83.3	44	73.3	21.043	18.000
	Incompetent <80%	56	93.3		10	16.7	16	26.7	<0.001*	<0.001*
Assessing height & weight	Competent ≥ 80%	14	23.3		54	90.0	50	83.3	18.000	16.056
	Incompetent <80%	46	76.7		6	10.0	10	16.7	<0.001*	<0.001*
Monitoring vital signs	Competent ≥ 80%	18	30.0		52	86.7	40	66.7	15.009	9.991
	Incompetent <80%	42	70.0		8	13.3	20	33.3	<0.001*	0.001**
Butterfly needle insertion	Competent ≥ 80%	16	26.7		58	96.7	54	90.0	19.048	17.053
	Incompetent <80%	44	73.3		2	3.3	6	10.0	<0.001*	<0.001*
Obtaining sample and assess lab investigations	Competent ≥ 80%	24	40.0	56	93.3	50	83.3	14.067	11.077	
	Incompetent <80%	36	60.0	4	6.7	10	16.7	<0.001*	<0.001*	
Preparing machine	Competent ≥ 80%	40	66.7	56	93.3	52	86.7	6.120	4.167	
	Incompetent <80%	20	33.3	4	6.7	8	13.3	0.008*	0.031*	
Patient connection to machine and monitoring	Care during procedure	Competent ≥ 80%	36	60.0	54	90.0	50	83.3	5.818	4.000
	Incompetent <80%	24	40.0	6	10.0	10	16.7	0.012*	0.039*	
Patient monitoring and teaching	Post procedure	Competent ≥ 80%	44	73.3	58	96.7	58	96.7	4.000	4.000
	Incompetent <80%	16	26.7	2	3.3	2	3.3	0.039*	0.039*	

Patients' safety in hemodialysis unit	Competent $\geq 80\%$	14	23.3	0	83.3	46	76.7	17.056	14.62
	Incompetent $<80\%$	46	76.7	10	16.7	14	23.3	$<0.001^*$	$<0.001^*$
Infection control measures	Competent $\geq 80\%$	10	16.7	48	80.0	42	70.0	17.053	14.62
	Incompetent $<80\%$	0	0	12	20.0	18	30.0	$<0.001^*$	$<0.001^*$

**Figure (١): Distribution of the studied nurses according to total knowledge at pre, immediately post and after three month of guidelines implementation (n=٦٠).**



**Figure (٢): Percentage distribution of the studied nurses' according to their total practice towards care of patients undergoing plasmapheresis at pre, immediate post and after three month of guidelines implementation (n=٦٠).**



**Table (4): Relation between total knowledge and practice levels with personal data of the studied nurses(n=60)**

Nurses' personal data			Total knowledge levels							
	variables	Pre educational guidelines		X <sup>2</sup> Test P value	Immediately post educational guidelines		X <sup>2</sup> Test P value	Post 3 months of educational guidelines		X <sup>2</sup> Test P value
		Satisfactory (n=10)	Un Satisfactory (n=50)		Satisfactory (n=46)	Un Satisfactory (n=14)		Satisfactory (n=40)	Un Satisfactory (n=20)	
		No. (%)	No. (%)		No. (%)	No. (%)		No. (%)	No. (%)	
Age	21- < 30	0(0.0)	16(32.0)	3.491 0.322 n.s	10(21.7)	6(42.9)	2.4 31 0.4 88 n.s	8(20.0)	8(40.0)	2.790 0.444 n.s
	30- < 40	6(60.0)	16(32.0)		16(34.8)	6(42.9)		14(35.0)	8(40.0)	
	40- < 50	4(40.0)	12(24.0)		14(30.4)	2(14.3)		12(30.0)	4(20.0)	
	50- 60	0(0.0)	6(12.0)		6(13.1)	0(0.0)		6(15.0)	0(0.0)	
Sex	Male	0(0.0)	8(16.0)	0.923 0.337 n.s	6(13.0)	2(14.3)	0.0 0.7 0.9 33 n.s	6(15.0)	2(10.0)	0.144 0.704 n.s
	Female	10(100.0)	42(84.0)		40(87.0)	12(85.7)		34(85.0)	18(90.0)	
Marital status	Married	8(80.0)	42(84.0)	0.808 0.500 n.s	38(82.6)	12(85.7)	0.3 17 0.8	32(80.0)	18(90.0)	0.700 0.703 n.s
	Single	0(0.0)	8(16.0)		6(13.1)	2(14.3)		6(15.0)	2(10.0)	

	Divorced	٢(٢٠.٠)	٠(٠.٠)		٢(٤.٣)	٠(٠.٠)	٠٤ n.s	٢(٠.٠)	٠(٠.٠)	
Educational level	Diploma in nursing	٠(٠.٠)	٢(٤.٠)	٧.٢٦٣ ٠.٠٦٤ n.s	٠(٠.٠)	٢(١٤.٣)	١٨ ٨٢.٠ <٠.٠٠١ **	٠(٠.٠)	٢(١٠.٠)	٣٠.٠٠٠
	Technical nursing institute	٠(٠.٠)	١٨(٣٦.٠)		٦(١٣.١)	١٢(٨٠.٧)		٠(٠.٠)	١٨(٩٠.٠)	<٠.٠٠١ **
	Bachelor degree in nursing	٨(٨٠.٠)	٣٠(٦٠.٠)		٣٨(٨٢.٦)	٠(٠.٠)		٣٨(٩٠.٠)	٠(٠.٠)	
	Post graduate studies	٢(٢٠.٠)	٠(٠.٠)		٢(٤.٣)	٠(٠.٠)		٢(٠.٠)	٠(٠.٠)	
Years of experience in dialysis unit	١-<٥ years	٠(٠.٠)	٣٢(٦٤.٠)	١٩.٧١	١٨(٣٩.٢)	١٤(١٠٠.٠)	٧.٩	١٢(٣٠.٠)	٢٠(١٠٠.٠)	١٣.١٢٥ ٠.٠٠١*
	٥-<١٠ years	٠(٠.٠)	١٤(٢٨.٠)	٤	١٤(٣٠.٤)	٠(٠.٠)	٨.٩	١٤(٣٠.٠)	٠(٠.٠)	*
	≥ ١٠ years	١٠(١٠٠.٠)	٤(٨.٠)	<٠.٠٠١ ١**	١٤(٣٠.٤)	٠(٠.٠)	١٨*	١٤(٣٠.٠)	٠(٠.٠)	
Attended training courses on plasmapheresis	Yes	٠(٠.٠)	١٦(٣٢.٠)	٢.١٨٢	٢(٤.٣)	١٤(١٠٠.٠)	٢٠.١٠.٩	٠(٠.٠)	١٦(٨٠.٠)	٢١.٨١٨ <٠.٠٠١ **
	No	١٠(١٠٠.٠)	٣٤(٦٨.٠)	٠.١٤٠ n.s	٤٤(٩٠.٧)	٠(٠.٠)	<٠.٠٠١ **	٤٠(١٠٠.٠)	٤(٢٠.٠)	

**Table (٥): Relation between total knowledge and practice levels with personal data of the studied nurses(n=٦٠)**

Nurses' personal data				Total practice levels						
	variables	Pre educational guidelines		X <sup>٢</sup> Test P value	Immediately post educational guidelines		X <sup>٢</sup> Test P value	Post ٧ months of educational guidelines		X <sup>٢</sup> Test P value
		Competent	Incompetent		Competent	Incompetent		Competent	Incompetent	
		(n=١٢)	(n=٤٨)		(n=٤٢)	(n=١٨)		(n=٣٨)	(n=٢٢)	
		No. (%)	No. (%)		No. (%)	No. (%)		No. (%)	No. (%)	
Age	٢١-<٣٠	٢(١٦.٧)	١٤(٢٩.٢)	٠.٧٦ ٢ ٠.٨٠ ٨ n.s	١٢(٢٨.٦)	٤(٢٢.٣)	٠.٣ ٦٤ ٠.٩ ٤٨ n.s	١٤(٣٦.٨)	٢(٩.١)	٣.٠٠٥ ٠.٣٩١ n.s
	٣٠-<٤٠	٤(٣٣.٣)	١٨(٣٧.٥)		١٦(٣٨.١)	٦(٣٣.٣)		١٢(٣١.٦)	١٠(٤٥.٥)	
	٤٠-<٥٠	٤(٣٣.٣)	١٢(٢٥.٠)		١٠(٢٣.٨)	٦(٣٣.٣)		٨(٢١.١)	٨(٣٦.٣)	
	٥٠-٦٠	٢(١٦.٧)	٤(٨.٣)		٤(٩.٥)	٢(١١.١)		٤(١٠.٥)	٢(٩.١)	
Sex	Male	٠(٠.٠)	٨(١٦.٧)	١.١٥ ٤	٦(١٤.٣)	٢(١١.١)	٠.٠ ٥٥	٦(١٥.٨)	٢(٩.١)	٠.٢٧١ ٠.٦٠٣ n.s
	Female	١٢(١٠٠.٠)	٤٠(٨٣.٣)	٠.٢٨ ٣ n.s	٣٦(٨٥.٧)	١٦(٨٨.٩)	٠.٨ ١٥ n.s	٣٢(٨٤.٢)	٢٠(٩٠.٩)	
Marital status	Married	١٠(٨٣.٣)	٤٠(٨٣.٣)	٠.٣١ ٣ ٠.٨٥ ٥ n.s	٣٦(٨٥.٧)	١٤(٧٧.٨)	٢.٤ ٢٩ ٠.٢ ٩٧ n.s	٣٢(٨٤.٢)	١٨(٨١.٨)	١.٩٦٧ ٠.٣٧٤ n.s
	Single	٢(١٦.٧)	٦(١٢.٥)		٦(١٤.٣)	٢(١١.١)		٦(١٥.٨)	٢(٩.١)	
	Divorced	٠(٠.٠)	٢(٤.٢)		٠(٠.٠)	٢(١١.١)		٠(٠.٠)	٢(٩.١)	
Educational level	Diplom in nursing	٠(٠.٠)	٢(٤.٢)	٦.٩٧ ٤ ٠.٠٧ ٣ n.s	٠(٠.٠)	٢(١١.١)	١١.٩٥٥ ٠.٠ ٠.٨*	٠(٠.٠)	٢(٩.١)	٢٥.٩٢٠ <٠.٠٠١* *
	Technical nursing institute	٠(٠.٠)	١٨(٣٧.٥)		٦(١٤.٢)	١٢(٦٦.٧)		٠(٠.٠)	١٨(٨١.٨)	
	Bachelor degree in nursing	١٠(٨٣.٣)	٢٨(٥٨.٣)		٣٤(٨١.٠)	٤(٢٢.٢)		٣٦(٩٤.٧)	٢(٩.١)	

	Post graduate studies	۲(۱۶.۷)	۰(۰.۰)		۲(۴.۸)	۰(۰.۰)		۲(۰.۳)	۰(۰.۰)	
Years of experience in dialysis unit	۱-<۰ years	۰(۰.۰)	۳۲(۶۶.۷)	۱۰.۷ ۱۴ <۰.۰ ۰.۱**	۱۴(۳۳.۳)	۱۸(۱۰۰.۰)	۱۱. ۲۰. ۰.۰ ۰.۴*	۱۰(۲۶.۴)	۲۲(۱۰۰.۰)	۱۰.۱۹۷ ۰.۰۰۱**
	۰-<۱۰ years	۲(۱۶.۷)	۱۲(۲۰.۰)		۱۴(۳۳.۳)	۰(۰.۰)		۱۴(۳۶.۸)	۰(۰.۰)	
	≥ ۱۰ years	۱۰(۸۳.۳)	۴(۸.۳)		۱۴(۳۳.۳)	۰(۰.۰)		۱۴(۳۶.۸)	۰(۰.۰)	
Attended training courses on plasmapheresis	Yes	۱۲(۱۰۰.۰)	۳۲(۶۶.۷)	۲.۷۲ ۷ ۰.۰۹ ۹ n.s	۴۲(۱۰۰.۰)	۲(۱۱.۱)	۲۰. ۴۰۰ <۰. ۰.۰۱ **	۳۸(۱۰۰.۰)	۶(۲۷.۳)	۱۸.۸۴۳ <۰.۰۰۱*
	No	۰(۰.۰)	۱۶(۳۳.۳)		۰(۰.۰)	۱۶(۸۸.۹)		۰(۰.۰)	۱۶(۷۲.۷)	

**Table (۶): Correlation between total knowledge and total practice among the studied nurses at pre, immediate post and after three month of guidelines implementation (n=۶۰)**

Variables	Study periods	Total Knowledge score	
		r	P value
Total practice	Pre educational guidelines	۰.۶۰۲	<۰.۰۰۱**
	Immediately post educational guidelines	۰.۶۷۴	<۰.۰۰۱**
	Post ۳ months of educational guidelines	۰.۸۴۷	<۰.۰۰۱**

## Discussion:

The present study revealed that more than quarter of nurses were at the age group 30-39 years old and majority of them were females and married. Also, more than the half of studied nurses were (1- 4) years of experience in the dialysis unit and nearly two thirds had training courses on plasmapheresis. This result agreed with **Osman et al., (2021)** who studied "The effects of educational interventions on nurses' knowledge and practices in Hemodialysis Unit regarding infection control practices" who reported that the majority of the studied nurses' age ranged between 30-39 years old. Also, this result agreed with **Alshammari et al., (2020)** who studied " Knowledge, attitudes, and perception on patient safety among intern nurses at hemodialysis unit" who found that majority of studied nurses were married. Additionally, this result agreed with study by **Hadi & Alreda, (2021)** who conducted study entitled "Assessment of Nurses' knowledge and Practices Concerning Hemodialysis Adequacy Guideline in Baghdad Teaching Hospitals" who found that more than half of the studied nurses had 1 year to more than 6 years of experiences in the dialysis unit.

**Concerning Nurses' total knowledge on plasmapheresis process**, this study revealed more than three quarters of studied nurses have unsatisfactory level of knowledge during pre-guidelines implementation. This finding supported by **Hassan et al., (2022)** who studied "Nurses' Knowledge and Practices toward Patients Undergoing Plasmapheresis " who revealed that more than three quarters of the studied nurses' had unsatisfactory level of total knowledge about plasmapheresis process.

**Concerning Nurses' total practice on plasmapheresis process**, this study revealed more than three quarters of studied nurses have unsatisfactory level of knowledge during pre-guidelines implementation. This finding supported by **Elsayed et al., (2024)** who studied " Nurses' Performance Regarding Patients Undergoing Therapeutic Plasma Exchange" who found that the majority of studied nurses had unsatisfactory level of total knowledge about plasmapheresis process. On the other hands, these results disagreed with **EL Mehdaoui et al., (2021)** they founded that, the most of the study nurses had competent level of practice regarding care of patient undergoing plasmapheresis in pre-evidence-based guidelines phase.

**Regarding relationship between sociodemographic data of the studied nurses and their total knowledge at pre, post and after three month of guidelines implementation:** there was a significant statistical relation between total nurses' knowledge with their Years of experience in dialysis unit during pre-guidelines implementation as well as a significant relation with educational level , years of experience in dialysis unit and attendance of training course regarding plasmapheresis during immediate and post 3 months periods of guidelines implementation. This result supported with **Raynak et al., (2020)** who conducted study about "Nurses' knowledge on routine care and maintenance of adult vascular access devices" who reported that there was significant relation between educational level and their knowledge level. This finding also was contrary with **Yones et al., (2019)** who studied "Assessment of nurses' performance regarding caring of patients on plasmapheresis" who reported that there was no statistically significant between nurses' knowledge and nurse's

educational qualifications and attendance of training courses.

**Regarding relationship between sociodemographic data of the studied nurses and their total practice at pre, post and after three month of guidelines implementation:** there was a significant statistical relation between total nurses' practice with their Years of experience in dialysis unit during pre-guidelines implementation as well as a significant relation with educational level , years of experience in dialysis unit and attendance of training course regarding plasmapheresis during immediate and post 3 months periods of guidelines implementation. This result supported with **Saleh et al., (2019)** who studied "Nurses' compliance to standards of nursing care for hemodialysis patients: educational and training intervention" reported that there was highly statistically significant relation between nurse's qualification and their performance. On the other hand, the Finding of the current study disagreed with **Hassan et al., (2022)** who studied "Nurses' Knowledge and Practices toward Patients Undergoing Plasmapheresis" and illustrated that that there was no significant difference between the nurses' level of knowledge and their sociodemographic data.

**Regarding Correlation between total knowledge and total practice scores among the studied nurses pre, immediate and post 3 months period of educational guidelines implementation:** The current study also showed that there were **positive and highly statistical significant correlation between total knowledge and total practice scores** pre, immediate post and after three month of guidelines implementation therefore the two stated

research hypothesis were supported. **From the investigator view of point**, when the knowledge increased, the competent nursing practice increased, this finding was consistent with this finding was in agreement with **Hamza et al., (2019)** who studied "Effect of Applying nursing Guideline for Patients Undergoing Plasmapheresis Outcomes at Mansoura University Hospital" who reported that there was a strong positive correlation between nurses' knowledge and their practice.

### **Conclusion**

The majority of nurses had unsatisfactory level of knowledge and practice regarding care of patient undergoing plasmapheresis at pre guidelines implementation. Also, it revealed that their knowledge and practice regarding patients undergoing plasmapheresis increased immediately post guidelines implementation and return to decline after three-month post guidelines implementation which may attribute to the nurses need more frequent follow up. Additionally, it was noticed that there was highly statistical significant relation between total knowledge and total practice at pre, immediate post and after three month of guidelines implementation.

### **Recommendations**

- 1- Designing and distributing Arabic booklets for hemodialysis nurses illustrating how to care of patient undergoing plasmapheresis.
- 2- Continuing educational programs and training workshops regularly and periodically and must be obligatory for all nurses in order to update their knowledge and practice regarding plasmapheresis.

- ٣- Continuous evaluation of nurses' performance is essential to identify their educational needs.
- ٤- Adequate supervision of nurses during their practice and providing teaching on spot with motivation and feedback is essential.
- ٥- Further study should be conducted on a larger sample size to generalize research and outcome guidelines.
- ٦- Strict observation for nurse's adherence to infection control procedures is needed.

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