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

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Abstract

Context: Plasmapheresis considered as safe, fast and powerful therapeutic approach for chronic disease management through removing destructive antibodies and toxins from patient's blood. **Aim:** to evaluate how educational guidelines implementation can affect nurses' knowledge and practice regarding plasmapheresis process. **Methods:** The study used a quasi-experimental design, specifically employing a pre/post-test methodology on a convenience sample of (60) nurses who assigned to care for patients who underwent to plasmapheresis. This study was conducted in the hemodialysis unit at Benda University Hospital. **The study utilized the following tools: I)** Self-administered questionnaire consisting of nurses' personal data and knowledge assessment sheet. **II)** Observational checklist to evaluate nurses' skills before, during, after plasmapheresis. **Results:** 16.7% of studied nurses had satisfactory level of total knowledge about plasmapheresis process pre guidelines implementation to be significantly improved during immediate and post three months of guidelines implementation among 76.7% & 66.7% respectively. While 20.0% of studied nurses had satisfactory level of total practice about plasmapheresis process pre guidelines implementation to be significantly improved during immediate and post three months of guidelines implementation among 70.0% & 63.3%, respectively. There was a highly significant difference in total nurses' knowledge and practice score within study periods observed as p <0.001. **Conclusion:** Educational guidelines implementation effectively improved nurses' knowledge and practice toward plasmapheresis process. **Recommendation**: Conduction ongoing educational programs for nurses to update their performance is necessary.

Keywords: Educational guidelines, Nurses' knowledge and practice, Plasmapheresis.

Introduction:

Plasmapheresis "therapeutic plasma exchange" refers to plasma separation or removal of harmful blood cells as (erythrocytes, leukocytes and platelets) from a patient's blood usually less than 15% of the total blood volume. After that, the patient received fluid as a replacement that recommended by the physician based on patient's disease or condition (**Solanki et al., 2021**). By utilizing this therapeutic method, removing harmful substances (chemicals, antibodies and immune complexes, antigens, toxins) from the body of patient' suffering from conditions related to metabolic and immune disorders can be achieved (**Seyhanli et al., 2022**).

It occurs as the whole blood is drawn from the patient and separated into plasma and blood cells. The plasma that contains antibodies is substituted with another solution like saline, albumin%5, or donor plasma, and the solution is then given back to the patient. to prevent clotting of blood throughout

procedure, anticoagulant therapy should be administered (**Wu et al., 2024**).

It considered as preferred method of treatment for hematological, neurological, renal and immunological diseases such as Guillain–Barré syndrome, lupus, myasthenia gravis, and thrombocytopenia purpura. plasmapheresis process usually performed at hemodialysis or hematological units of hospitals (**Sanchez & Balogun, 2021**).

The patient is attached to plasmapheresis machine through arterio-venous fistulas, arterio-venous grafts or central venous catheter (**Golsorkhi et al., 2022**). The separation of patient's blood components is performed through two basic methods which are centrifugation method and filtration membrane method (**Redant et al., 2021**).

Nursing role before plasmapheresis procedure include assessment of patient's vascular access patency, measuring vital signs and weight, review patient's medical record for any chronic illness or allergies, evaluate findings of laboratory tests. In addition to, preparation of replacement fluid as fresh frozen plasma, albumin 5% and Normal saline (**Hassan et al., 2023**).

Care during plasmapheresis includes making sure that fresh frozen plasma or albumin preparation is completely thawed, observe the patient for any signs of allergy, high temperature, shivering, irregular heartbeat, low blood pressure, rapid breathing, administer prescribed medications like anticoagulants such as citrate or heparin as ordered by the doctor and frequent calculating intake and output through session (**Ellard et al., 2022**).

After plasmapheresis procedure: the nurse should apply vascular access care, disinfection the site (dressing application), reassessment of intake and output chart, monitoring of vital signs, assess patient's for any complications include; paresthesia related to hypocalcemia, transfusion allergic reaction as drop in blood pressure, faintness, blurred vision, dizziness, feeling cold, blood borne infection ,blood clotting ,in addition, the nurse should notify the physician immediately to control and reduce further adverse side effects (**Mathew et al., 2023**).

Significance of the study:

The prevalence rate of patients undergoing plasmapheresis as treatment regimen is increasing annually. It is commonly employed as rescue intervention for individuals who are experiencing a crisis or severe deterioration. World widely about 24,5 million of people with autoimmune disease and require plasmapheresis treatment is rising annually (**American Autoimmune Related Disease Association, 2022**). In Egypt, according to annual report of Benha University Hospital Statistical office (2023) the number of patients admitted to hemodialysis unit and underwent to plasmapheresis were 200 cases. So that, improving nursing performance regarding plasmapheresis is required to achieve quality of care and satisfaction.

Aim of the study: to evaluate how educational guidelines implementation can affect nurses' knowledge and practice regarding plasmapheresis process.

Research hypotheses:

H1-Nurses' knowledge level regarding plasmapheresis process could be significantly improved after educational guidelines implementation than before.

H2-Nurses' practice level regarding plasmapheresis process could be significantly improved after educational guidelines implementation than before.

H3-There could be a significant and positive correlation between nurses' knowledge and

practice score post educational guidelines implementation.

Subjects and Method:

Study design: a quasi-experimental design, specifically employing a pre/post-test and follow-up to achieve study aim.

Study setting:

The study was carried out in hemodialysis unit at Benha University Hospital, Qualyubia Governorate, Egypt. It located in second floor and includes three rooms; (Two rooms for dialysis and one room for nurses). Total hemodialysis machines are (42), 36 of them used for hemodialysis process and 6 of them are Nikkiso machine that used for therapeutic plasma exchange.

Subjects:

Sample type: A convenience sample of nurses who already working in hemodialysis unit and assigned to provide care to patient who undergoing plasmapheresis were recruited in study. Total number of them was 60 after exclusion of nurses who involved in pilot study.

Tools for data collection: the researchers used two tools which were:

Tool I: Self-administered questionnaire

This tool was designed by the researchers based on a thorough review of recent and related literature **(Oto et al., 2022, Sergent& Ashurst, 2022 & Mathew et al., 2023).** It was in multiple-choice questions format consisting of two parts as follows:

Part (I): Nurses' personal data as**:** Age, gender, marital status, educational level, years of experience in nursing field, years of experience in hemodialysis unit and attendance of training courses on plasmapheresis patient' care.

Part (II): Nurses' knowledge assessment: It contains (30 questions) to appraise knowledge of nurses toward:

- Anatomy and physiology of blood (3 questions)
- Definition of plasmapheresis process (5 questions)
- Indications of plasmapheresis process (3 questions)
- Methods of plasmapheresis (6 questions)
- Complications of plasmapheresis (3 questions)
- Nursing care for patient with plasmapheresis (10 questions).

Scoring system:

- One point was allotted for each correct answer and zero point was given for each incorrect answer. Total knowledge score was summed up "30 points'' that converted into a percentage and categorized into:
- < 80% was considered unsatisfactory knowledge level (< 24 score).
- ≥80% was considered satisfactory knowledge level (≥24 score).

Tool II: Nurses' practice observational checklist: This tool adapted from **(Camedda et al., 2023, Nicabi et al., 2023)** and modified by researchers after reviewing literature and jury opinion. It is used to evaluate nurses' actual practices before, during and after care of patient undergoing plasmapheresis process. This tool included three parts:

Part 1: Nursing practice before plasmapheresis (126 steps) including:

- Obtain patients ' consent (1steps)
- Hand washing (15 steps)
- Wearing the PPE (12 steps)
- Measuring weight & height (14 steps)
- Measuring vital signs as temperature (33 steps)
- Insertion of subcutaneous butterfly (14 steps)
- Obtaining blood sample (14 steps)

- Assessing vascular access & preparing plasmapheresis machine (23 steps).

Part 2: Nursing practice during plasmapheresis including: Connecting the patient with the machine (20 steps).

Part 3: Nursing practice after plasmapheresis including: Care of vascular access and patients' safety measures & infection control measures in hemodialysis unit (60 steps).

Scoring system

The total practice score was 206 score distributed as one mark for each step correctly done and zero for step that incorrectly done or not done. The total practice score graded as: -

- < 85% represents unsatisfactory practice (< 175 score).
- ≥ 85% represents satisfactory practice (≥175 score).

Nursing guidelines booklet:

It designed according to study purpose based on relevant and recent literature (**Musyoka, 2021; Reddy, 2021 & O'Leary et al., 2023**), it contained two parts: **The theoretical part** including basic knowledge related to anatomy and physiology of blood, plasmapheresis definition, indications, contraindications and methods of plasmapheresis as well as complications and nursing care for patient undergoing plasmapheresis. **The practical part** including practical skills that should be performed by nurses before, during and after plasmapheresis session.

Validity and reliability of tools:

Tools were evaluated by a panel consisting of five experts from the medical surgical nursing department to ensure their comprehensiveness, clarity and applicability. While Cronbach alpha test was used for tools reliability that resulting in values of 0.78 for tool I & 0.81 for tool II indicating good reliability.

Ethical consideration:

Scientific Research Ethics Committee at Benha University's Faculty of Nursing approved the study with code **REC-MSN-P 63** to conduct study**.** Also**,** official endorsement gained from the dean of the nursing faculty and hemodialysis unit director at Benha University Hospital. The study's aim was clarified to nurses along with freedom to discontinue their participation at any moment without any rationalization. Throughout study phases, researchers ensured the privacy, confidentiality and anonymity. Participated nurses provided verbal and written consent.

Pilot study:

Ten percent (6 nurses) of the study sample shared in a pilot study to test the tools' applicability, clarity, and the amount of time needed to complete them. After analyzing the data from the pilot study, the required modifications done. Exclusion of subjects who shared this study from actual sample was done later.

Fieldwork:

From the beginning of July, 2023 to end of March 2024, collection of data pertinent to study was completed through four phases:

1-Assessment phase: (pretest)

The researchers visited pre- mentioned setting at morning & afternoon shifts three days/week. each nurse was provided questionnaire (**Tool I**) to fill it completely and time assumed was 30-45 minutes. While nurses' practical skills were evaluated by researchers using direct observation guided by observational checklist (**Tool II**) before, during and after plasmapheresis. The time of process assumed was between 2-3 hours. This assessment helps the researchers to define and detect nurses'

deficits in knowledge and practice.

2-Planning phase:

Based on data gathered throughout the assessment phase, the researchers reviewed pertinent literature, designed an educational booklet with illustrations in Arabic language depending on nurses' needs and their performance gaps then, put schedule for educational sessions conduction. In addition, preparation of teaching materials that helped in theoretical and practical information coverage was done involving video, pictures, PowerPoint presentation and booklet.

3-Implementation phase:

In this phase, the researchers distributed studied nurses into small groups (10 groups) and each group was about (6 nurse) and start application of teaching sessions as each session was about (30-45 minute) including;

Session one: (Theoretical session)

It included components, the function of blood and plasmapheresis process.

Session two: (Practical session)

It included demonstration of skills concerned to preparations that the nurse should perform before plasmapheresis

Session three: (Practical session)

It included demonstration of skills concerned to care of patient during and after plasmapheresis.

Session four (Practical session):

It contained demonstration of patient safety and infection control measures in hemodialysis unit that the nurse should follow.

4- Evaluation phase:

Post test was done immediately and post three months of data collection using the same tools to evaluate how educational guidelines implementation can affects nurses' knowledge and practice.

Statistical analysis:

Data analysis was performed using (SPSS Program), version 25. For determining the normal distribution of quantitative variables was used to Kolmogorov-Smirnov test. Qualitative data was presented as a number and percent. Furthermore, quantitative data was described as mean or standard deviation, as appropriate. Chi-square test was used to examine the difference and relation between qualitative variables during different periods. McNemar test for differences on dependent variable between two related groups. Spearman method was used to test correlation between numerical variables. A p-value $\leq$ 0.05 was considered significant, and $\leq$ 0.001 was considered highly significant. and not significant for p > 0.05

Results:

Table (1): The personal data reveals that 36.6% of studied nurses aged within 30- <40 years with a mean age of 39.20 ± 0.96 years. Concerning gender, 86.7% of the studied nurses were female and 83.3 % of them were married. As for educational level, 63.4% of the studied nurses had bachelor degree in nursing qualification, 43.3% of them had 5-< 10 years of experience in nursing, and 73.3% of nurses reported attending training courses on plasmapheresis, since $\geq$ 6 months among 59.1% and 54.5% of them attended for one time only.

Table (2): Reveals that there was a statistically significant differences between pre and post guidelines implementation periods (p = <0.001**), in term of significantly improvement in knowledge level. Where, role of nurses for patient undergoing plasmapheresis was of the highest area of correct knowledge during immediate, and post 3 months period among 86.7% & 76.7%, respectively compared to 33.3% pre guidelines implementation.

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

Figure (1): Illustrates that, 16.7% of studied nurses had satisfactory level of total knowledge about plasmapheresis process pre guidelines implementation, while they had satisfactory knowledge level during immediate and post three months periods of guidelines implementation among 76.7% & 66.7% of them respectively.

Table (3): Reveals that there was a statistically significant differences regarding nurses' total practice throughout plasmapheresis phases between pre and post guidelines implementation periods, in term of improvement in practice level. Where, butterfly needle insertion before plasmapheresis was of the highest area of competent practice during immediate and post 3 months period among 96.7% & 90.0 %, respectively, also, patient monitoring and teaching post plasmapheresis was of the highest area of competent practice during immediate and post 3 months period among 96.7% compared to 73.3% pre guidelines implementation.

Figure (2): Illustrates that, 20.0% of studied nurses had satisfactory level of total practice about plasmapheresis process pre guidelines implementation, while they had satisfactory practice level during immediate and post three months periods of guidelines implementation among 70.0% & 63.3%, respectively.

Table (4): Clarifies that there was a positive and significant correlation between total nurses' knowledge with their total practice of plasmapheresis process pre, immediate and post 3 months of guidelines implementation with p-value of ($< 0.001^{**}$) and r ranged from 0.602 to 0.847.

Table (1): Distribution of the studied nurses according to their demographic data (n=60).

Nurses' personal data	Variables	(No.)	%
Age (in years)	21- < 30	16	26.7
	30-< 40	22	36.6
	40-< 50	16	26.7
	50- 60	6	10.0
	SD ± $\bar{\chi}$	39.20 ± 0.96	
Gender	Male	8	13.3
	Female	52	86.7
Marital status	Married	50	83.3
	Single	8	13.4
	Divorced	2	3.3
Educational Level	Diploma in nursing	2	3.3
	Technical nursing institute	18	30.0
	Bachelor degree i nursing	38	63.4
	Post graduate studie	2	3.3
Years of experience in nursing	1-<5 years	18	30.0
	5-<10 years	26	43.3
	≥ 10 years	16	26.7
Years of experience in dialysis unit	1-<5 years	32	53.4
	5-<10 years	14	23.3
	≥ 10 years	14	23.3
Attended training courses on plasmapheresis	Yes	44	73.3
	No	16	26.7
The last time of attending training course (n=44)	< 6 months	18	40.9
	≥ 6 months	26	59.1
Times of receiving training course (n=44)	One time	24	54.5
	Two times	8	18.2
	Three times	12	27.3

Table (2): Difference between the studied nurses' total main components knowledge level regarding plasmapheresis process throughout different study phases (n=60).

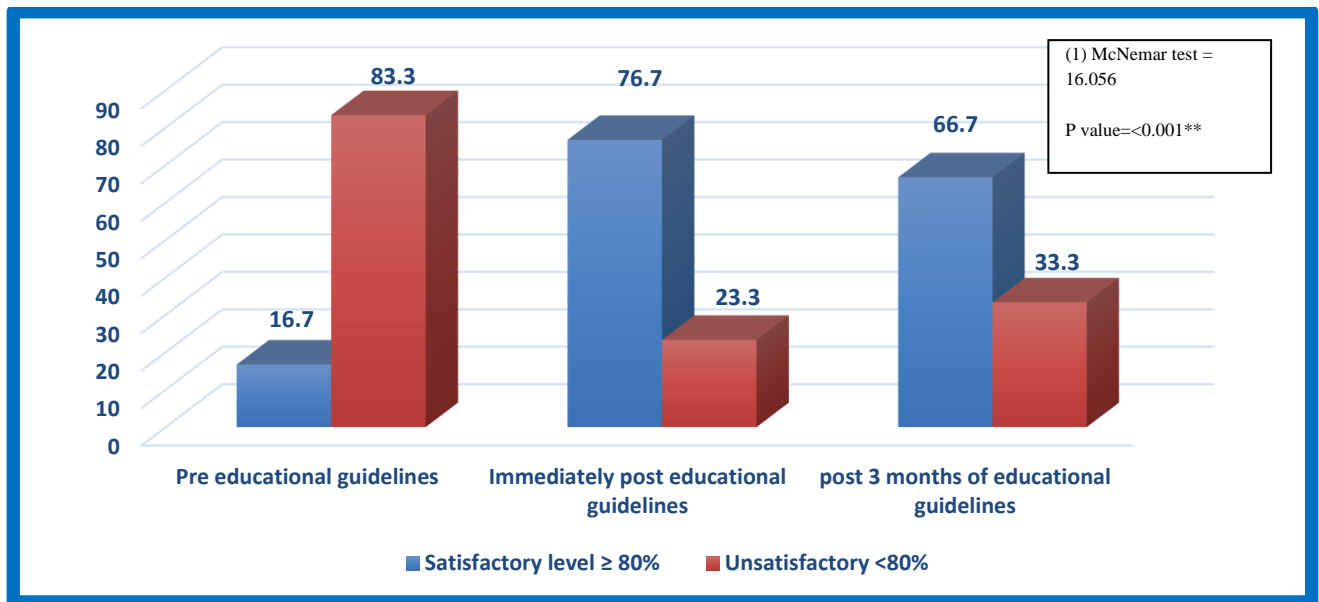| Nurses' total knowledge level of main components		Pre-educational guidelines (n=60)		Immediately Post educational guidelines (n=60)		3 months Post educational guidelines (n=60)		Mc nemar χ^2 P value (1)	Mc nemar χ^2 P value (2)
		No	%	No	%	No	%		
Basic knowledge regarding blood components, function and plasmapheresis	Satisfactory ≥80%	14	23.3	46	76.7	44	73.3	16.056 <0.001**	10.562 0.001**
	Unsatisfactory <80%	46	76.7	14	23.3	16	26.7		
Plasmapheresis methods and its complications	Satisfactory ≥80%	14	23.3	46	76.7	44	73.3	14.062 <0.001**	13.067 <0.001**
	Unsatisfactory <80%	46	76.7	14	23.3	16	26.7		
Nurses' role for patient undergoing plasmapheresis	Satisfactory ≥80%	20	33.3	52	86.7	46	76.7	14.067 <0.001**	11.077 <0.001**
	Unsatisfactory <80%	40	66.7	8	13.3	14	23.3		

Figure (1). Difference between the studied nurses' total knowledge levels about plasmapheresis process throughout study phases (n=60).

Table (3): Difference between the studied nurses' total main components practice levels regarding their role for patient undergoing plasmapheresis throughout different study phases (n=60).

Nursing practices	Total practice levels		Pre-educational guidelines (n=60)		Immediately Post guidelines (n=60)		3 months Post guidelines (n=60)		Mc nemar χ^2 P value (1)	Mc nemar χ^2 P value (2)
			No	%	No	%	No	%		
Hand washing	Before plasmapheresis	Satisfactory ≥ 85% Unsatisfactory <85%	8 52	13.3 86.7	46 14	76.7 23.3	38 22	63.3 36.7	17.053 <0.001*	13.067 <0.001**
PPE wearing		Satisfactory ≥ 85% Unsatisfactory <85%	4 56	6.7 93.3	50 10	83.3 16.7	44 16	73.3 26.7	21.043 <0.001*	18.050 <0.001**
Assessing height & weight		Satisfactory ≥ 85% Unsatisfactory <85%	14 46	23.3 76.7	54 6	90.0 10.0	50 10	83.3 16.7	18.050 <0.001*	16.056 <0.001**
Monitoring vital signs		Satisfactory ≥ 85% Unsatisfactory <85%	18 42	30.0 70.0	52 8	86.7 13.3	40 20	66.7 33.3	15.059 <0.001*	9.091 0.001**
Butterfly needle insertion		Satisfactory ≥ 85% Unsatisfactory <85%	16 44	26.7 73.3	58 2	96.7 3.3	54 6	90.0 10.0	19.048 <0.001*	17.053 <0.001**
Obtaining sample and assess lab investigations		Satisfactory ≥ 85% Unsatisfactory <85%	24 36	40.0 60.0	56 4	93.3 6.7	50 10	83.3 16.7	14.062 <0.001*	11.077 <0.001**
Preparing machine		Satisfactory ≥ 85% Unsatisfactory <85%	40 20	66.7 33.3	56 4	93.3 6.7	52 8	86.7 13.3	6.125 0.008*	4.167 0.031*
Patient connection to machine and monitoring	**Care during plasma pheresis**	Satisfactory ≥ 85% Unsatisfactory <85%	36 24	60.0 40.0	54 6	90.0 10.0	50 10	83.3 16.7	5.818 0.012*	4.000 0.039*
Patient monitoring and teaching	Post plasmapheresis	Satisfactory ≥ 85% Unsatisfactory <85%	44 16	73.3 26.7	58 2	96.7 3.3	58 2	96.7 3.3	4.000 0.039*	4.000 0.039*
Patients' safety measures in hemodialysis unit		Satisfactory ≥ 85% Unsatisfactory <85%	14 46	23.3 76.7	50 10	83.3 16.7	46 14	76.7 23.3	16.056 <0.001*	14.062 <0.001**
Infection control measures		Satisfactory ≥ 85% Unsatisfactory <85%	10 50	16.7 83.3	48 12	80.0 20.0	42 18	70.0 30.0	17.053 <0.001*	14.062 <0.001**

* Significant at p ≤0.05.   **Highly significant at p ‹0.001.

(1) Difference between total practice pre and immediately post educational guidelines implementation

(2) Difference between total practice pre and 3 months post educational guidelines implementation
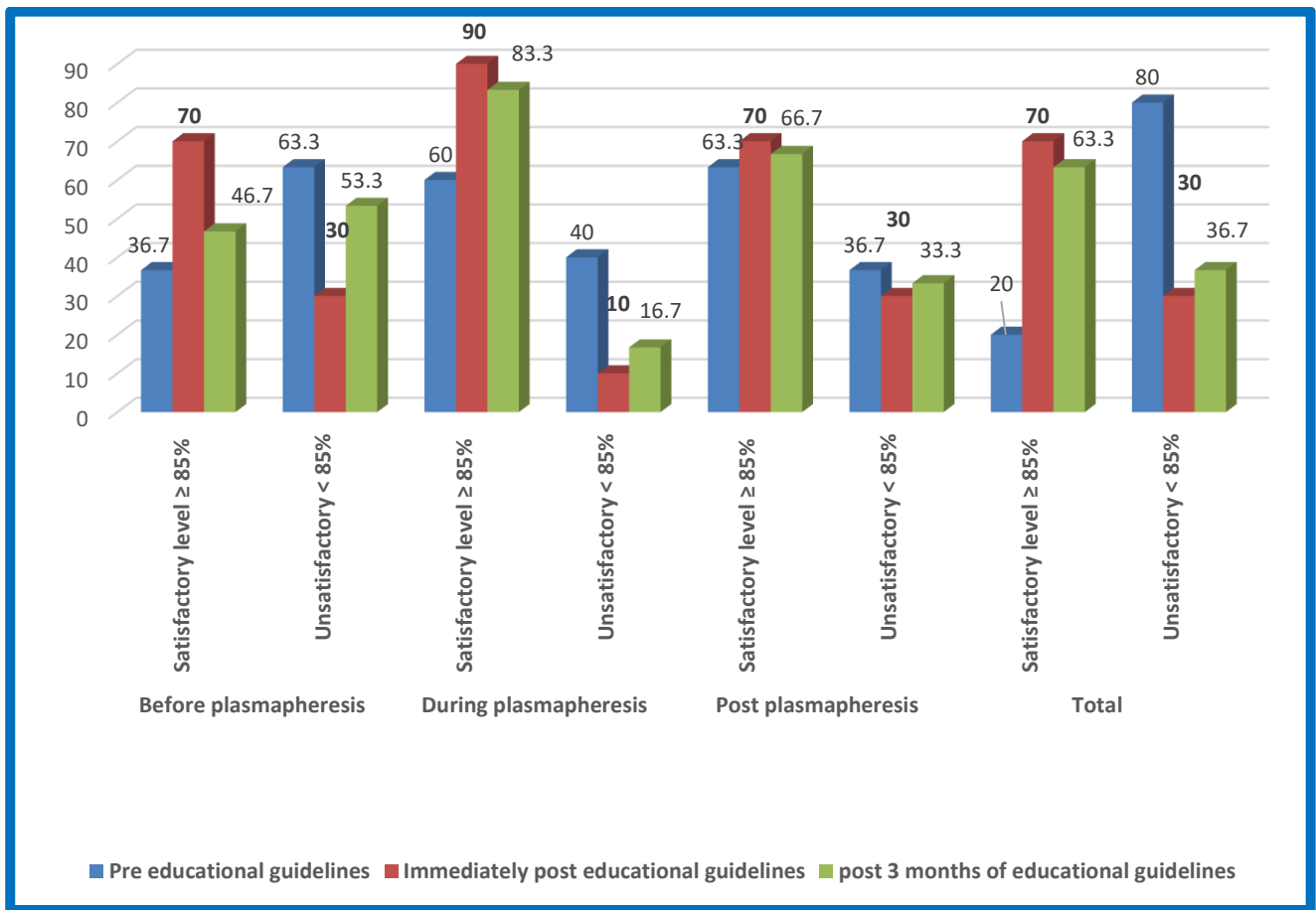
Figure (2). Difference between the studied nurses total practice level regarding plasmapheresis process throughout study phases (n=60).

Table (4): Correlation between total knowledge and total practice among the studied nurses throughout study phases of educational guidelines implementation (n=60)

Variables	Study periods	Total Knowledge score	
		r	P value
Total practice	Pre educational guidelines	0.602	<0.001**
	Immediately post educational guidelines	0.674	<0.001**
	Post 3 months of educational guidelines	0.847	<0.001**

**Highly significant at p ≤0.001.

Discussion:

Nursing care provided to patients underwent plasmapheresis should be holistic that covers physical, mental and psychosocial aspects of health as general health level in these patients considered low. Continuous observation should be provided during plasmapheresis sessions to be able to apply relevant care as necessary and to prevent further complications through early determination of potential changes. So that, dialysis nurses could use their own skills and experience to improve the care process and ensuring the resolution of health problems (**Morton & Thurman, 2023).**

Concerning studied nurses' personal data, the findings of the current study indicate that more than one third of them aged from 30 to less than 40 years old with mean age 39.20 ± 0.96. This result was in alignment with **Júnior et al., (2022)** who studied " Bleeding outcomes of patients receiving therapeutic plasma exchange in Durham " and reported that less than half of the studied nurses from 30 to 39 years old. On the other hand, disagreed with **Osman et al., (2021)** who reported that the majority of the studied nurses' age ranged between 20-30 years old.

Current study revealed that the majority of studied nurses were females. From the researchers' point of view, this may be due to profession of nursing in Egypt usually preferred among females than males. This result agreed with **Choudhary& Chaudhary, (2019)** who reported that the majority of nurses were females. While this finding disagreed with **Júnior et al., (2022)** revealed that nearly three quarters of studied nurses were males.

The current study revealed that more than two fifths of studied nurses had from 5 to less than 10 years of experience. This result supported by **Mukhtad et al., (2019)** and revealed that the majority of studied nurses were 5-10 years.

While, **Hadi & Alreda, (2021)** found that, more than half of subjects had 1 to 5 years of experience, that was in contrast with this finding.

Regarding their educational level :nearly two thirds of them equipped bachelor degree. This finding agreed with **Ahmed & Kaplan, (2020)** who reported in their study that more than half of the nurses were bachelor. But this finding disagreed with **Hadi & Alreda, (2021)** who conducted a study and clarified that nearly half of subjects had nursing diploma.

Regarding attending training courses on plasmapheresis, the current study revealed that nearly three quarter of the studied nurses attended training courses on plasmapheresis. From the researchers' view, this may be due to hospital policy and administration keen on improving nurses' knowledge and skill through training programs. In addition to newly graduated nurses who are interested in attending training programs.

This result supported by **Osman et al., (2021)** and reported that the majority of studied nurses participated in training courses. But this result disagreed with **Elbashir, (2019)** who conducted a study in hemodialysis unit in Khartoum State, Sudan and reported that more than three quarter didn`t attend any training courses.

Concerning Nurses' knowledge toward blood component and its function, the present study revealed that less than one quarter of studied nurses had satisfactory level pre guidelines implementation, while improved to more than three quarter of them immediately post-guideline implementation. This finding agreed with **Abdalla & Idris, (2022)** who found knowledge gap among majority of hemodialysis nurses regarding components and function of blood. On contrast, **Simsek et al., (2024)** in study conducted to evaluate nurses' performance toward safe blood transfusion found that half of

the nurses had sufficient knowledge about components and functions of blood.

Concerning Nurses' knowledge about plasmapheresis methods and its complications, the study findings reported that less than one quarter of studied nurses had satisfactory level of knowledge prior to guidelines implementation, which improved to more than three quarter of them immediately post guidelines implementation. This finding agreed with **Mazahir et al., (2021),** who revealed in their study that nurses' knowledge about plasmapheresis methods and its risks was adequate among the majority of them.

This study discovered that one third of studied nurses had satisfactory level of knowledge about their role toward plasmapheresis patient' care prior to guidelines implementation, while improved to the majority of them post educational sessions. This result is in accordance with, **Hassan et al., (2023)** who revealed that more than half of the studied nurses had adequate knowledge level toward their role during plasmapheresis.

As regard to nurses' total knowledge about plasmapheresis process, this study reported a great improvement in knowledge score among majority of nurses post educational sessions than before. This finding agreed with **Elsayed et al., (2024)** who found good knowledge level among majority of dialysis nurses working at Ain shams university hospital.

Concerning nurses' practice regarding butterfly needle insertion, the present study reported that more than one quarter of studied nurses' practice were at satisfactory level regarding butterfly needle insertion pre guidelines implementation, while majority of their practice improved to be at satisfactory level post guidelines implementation. This finding is

consistent with **Abdel Hakeem et al., (2020)** who found that three quarters of studied nurses had incompetent practice regarding butterfly needle insertion before plasmapheresis session. However, on contrast, **EL Mehdaoui et al. (2021)** found in their descriptive study that the most of nurses had adequate practice level particularly needle insertion.

Concerning difference of nurses' total practice levels regarding their role for patient undergoing plasmapheresis: the present study revealed that one fifth of the studied nurses were at satisfactory level of total practices regarding care of patient undergoing plasmapheresis at pre guidelines implementation, while nearly three quarter of their practice improved to be at satisfactory level immediately post guidelines implementation.

These findings corresponded with the finding of studies conducted by **Yones et al., (2019)** who reported that less than three quarter of studied nurses had unsatisfactory level of total practice. On the other hands, these results disagreed with **EL Mehdaoui et al., (2021)** who found that the most of nurses had competent level of practice regarding care of patient undergoing plasmapheresis in pre-evidence-based guidelines phase.

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 showed that there was a positive and highly statistically significant correlation between total knowledge and total practice score of plasmaphereses pre, immediate post and after three month of guidelines implementation therefore, three stated research hypotheses were supported. From the researchers' point of view, when the

knowledge increased, the level of nursing practice increased.

This finding was in agreement with **Hendy et al., (2019)** who studied "Nursing performance regard caring for patients undergoing plasmapheresis in Mansoura University Hospital, Egypt" and revealed that there was significant correlation between nurses' knowledge and their practice. On the other hand, this result disagreed with **Ibrahim et al., (2019)** who illustrated that there was no statistically significant correlation between nurses' knowledge and practice in their study.

Conclusion:

The educational guidelines effectively improved nurses' knowledge and practice regarding plasmapheresis process as there was highly statistically significant correlation between total knowledge and total practice scores of nurse's post guidelines implementation, that confirmed research hypotheses.

Recommendations:

- Continuing educational programs is necessary to update nurses' performance
- Designing and distributing Arabic booklets for hemodialysis nurses illustrating how to care of patient undergoing plasmapheresis.
- Strict evaluation of staff 'performance should be conducted to identify their practice gaps.
- Study should be replicated on larger sample from different geographic distribution for results generalization

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

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تأثير تنفيذ الإرشادات التعليمية على معلومات الممرضين وممارساتهم فيما يتعلق بعملية فصل البلازما

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فصل البلازما هو إجراء يتم لمختلف الأمراض المهددة للحياة كعلاج أساسي أو كمساعد مع أساليب العلاج الأخرى. لذا هدفت الدراسة إلى تقييم تنفيذ الإرشادات التعليمية على معلومات الممرضين وممارساتهم فيما يتعلق بعملية فصل البلازما.و تم استخدام تصميم شبه تجريبي لإجراء الدراسة (اختبار قبلي وبعدي) . وقد أجريت هذه الدراسة في وحدة غسيل الكلى بمستشفى بنها الجامعي، القليوبية، مصر على جميع الممرضين المتاحين (٦٠ ممرض) (بعد إستبعاد ٦ ممرضين تم مشاركتهم في الدراسة التجريبية). وتم جمع البيانات باستخدام الأدوات التالية: الأداة (الأولى): استمارة الاستبيان الذاتي. والأداة الثانية: استمارة الملاحظه لتقييم ممارسات الممرضين. بناء على نتائج الدراسة الحالية تم استنتاج ان الإرشادات التعليمية أثبتت فعاليتها فى تحسين معلومات وممارسات الممرضين الخاضعبن للدراسة تجاه عملية فصل البلازما ، كما أنه وجد علاقة ذات دلالة إحصائية بين معلومات وممارسات الممرضين تجاه عملية فصل البلازما مما يدعم فرضيات الدراسة . واوصت الدراسة بإستمرار تنفيذ البرامج التعليمية لجميع الممرضين من أجل تحديث مستوى معلوماتهم وممارستهم فيما يتعلق بفصل البلازما.