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Effect of Educational Guidelines on Nurses' Performance Regarding complications associated plasmapheresis for patients with autoimmune disorders

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⁽¹⁾Tayser Esam Goda, Clinical Instructor in Medical Surgical Nursing, Faculty of Nursing, Zagazig University.

⁽²⁾Nadia Mohamed Taha, Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University.

⁽³⁾ Fathia Atia Mohamed, Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University.

⁽⁴⁾ Aida Ahmed Mohamed. Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Department of Nursing, North private college of nursing ,North border.Arar.

Email: springflower17992tm@gmail.com

Abstract:

Background: Plasmapheresis is extracorporeal removal of plasma from other blood components, discarding and replacing plasma with physiological fluids. A wide variety of immune-mediated diseases can be treated with plasmapheresis.

Aim of study: This study aimed to evaluate the effect of educational guidelines on nurses' performance regarding complications associated plasmapheresis.

Design: A quasi experimental design was utilized in this study.

Setting: Data was collected from intensive neurological care unit, hemodialysis unit and neurology unit at Zagazig university hospitals.

Subjects: The study was conducted on convenience sample of 40 nurses working in previous departments.

Tools of data collection: Two tools were used for collection of data, first, structured interview questionnaire for nurses, Second tool was an observational check list to assess nurses' practice regarding plasmapheresis.

Results: 52.5% of nurses aged from 30-40 years, Three quarters were female, 72.5% were married, as well, half had diploma in nursing, , with 57.5% of them had less than three year experience with plasmapheresis and all nurses didn't have training course on plasmapheresis and its complications. In pre intervention only five% of studied nurses had

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total satisfactory knowledge regarding plasmapheresis compared to 87.5% in post intervention, ten % had total satisfactory practice in pre intervention compared to 92.5% in post intervention with statistical significant difference.

Conclusion: It can be concluded that the educational guidelines significantly improved nurses' knowledge and practice regarding plasmapheresis.

Recommendations: It is recommended that periodic evaluation and validation of the training given and training programs should be included both theoretical and practical.

Keywords: Educational Guidelines, Nurses' Performance, Complications, Plasmapheresis.

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Introduction:

Plasmapheresis is a clinical procedure for the replace of plasma, which aims to remove the immune system's extracellular components and the pro inflammatory agents from the blood. These factors pathogenesis are the key importance in the pathogenesis of many diseases. During Plasmapheresis, the patient's plasma is separated and removed. Along with the patient's plasma, specific, potentially pathogenic factors such as: antibodies (Ag) including alloantibodies, monoclonal protein, circulating immune complexes, complement activation products, cytokines, atherogenic substances, and toxic compounds will be removed (Bładzińska, et al., 2020).

Plasmapheresis is the standard treatment for autoimmune diseases including Guillain Barre syndrome, good pasture's syndrome, myasthenia gravis, familial hypercholesterolemia, and thrombotic thrombocytopenic purpura. Moreover, it is the second line of treatment for various neurologic, hematologic, or nephrologic diseases such as chronic inflammatory demyelinating polyradiculoneuropathy, hyperviscosity syndrome, cryoglobulinemia, pediatric neuropsychiatric disorders, Rh incompatibility-associated serological disorders, and renal transplant rejection (Nieto-Aristizabal, et al., 2020).

Plasmapheresis can be achieved by two different techniques: either by membrane separation (filtration) or by centrifugation to remove plasma from the blood and replace with another blood product, such as fresh frozen plasma, albumin with crystalloids, electrolyte solution, or clotting factors (depending on the underlying condition). The blood is filtered out using a vascular access that removes the blood through a tube into a machine. Once the blood is filtered in the machine, it is placed back in the body with the added blood product (Ahmes & Kaplan., 2020).

Plasmapheresis as well as any therapeutic procedure is associated with the incidence of several complications that are categorized into life-threatening and non-life-threatening. The life-threatening complications include hypotension requiring pressor amines, shock, hemolysis, and

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arrhythmias requiring treatment. Non-life-threatening complications include: hypotension not requiring pressor amines, arrhythmias need fluid supply or sinking naturally, anxiety/ or agitation need sedation, bradycardia, tachycardia, allergic reactions, sensation of cold/ or paresthesias, fever, lower limb pain, vascular accesses bleeding or hematoma, abdominal pain and eyelid tremor (Ahmed& Elderiny, 2020).

Less severe reactions and symptoms are more common, e.g. perioral, finger sensory abnormalities caused by hypocalcemia, hypotension, muscle spasm, headache and urticaria related to replacement therapy, establishment of vascular access, and anticoagulation. Others include muscle contractions, dizziness, nausea, vomiting, transiently elevated temperature, shivers, seizures, head and chest pains. Taking into consideration isolated deviations from reference values in laboratory tests, which predominantly include: reduced levels of haemoglobin, thrombocytopenia, hypokalaemia, and reduced concentrations of fibrinogen. The safety of procedures markedly depends on experiences of the therapeutic team and disease severity (Lu, et al., 2019).

Plasmapheresis is a relatively unfamiliar area of nursing practice. It requires a particular set of technical skills and specialized knowledge. All nurses must be appropriately qualified and trained in the procedures that regularly perform. Level of nurses' performance and patient knowledge regarding plasmapheresis will effect on the incidence and severity of complications (Hamza, et al., 2019).

The role of the nurse is to provide personalized, humanistic and comprehensive nursing care to plasmapheresis patients. In clinical practice, plasmapheresis nurse has to be an effective practitioner able to establish and maintain high quality evidence-based nursing services and to work with the multi-disciplinary team to ensure that patients receiving plasma exchange have access to special care, knowledge and expertise. Also, the nurse has to ensure patients that have an understanding of their disease, treatment options and support services in conjunction with the responsible doctors (Gerogianni, et al., 2015).

Significance of the study:

Autoimmune diseases were estimated by the National Institutes of Health as the most prevalent in the USA, affecting up to 23.5 million Americans, but the American Autoimmune Related Disease Association (AARDA) said that 50 million americans suffer from autoimmune disease. Autoimmune diseases can affect virtually every site in the body, including the endocrine system, connective tissue, gastrointestinal tract, heart, skin, and kidneys (AARDA, 2019).

Plasmapheresis has been used for three decades in the treatment of various disease and the scope of diseases treated with it has broadened greatly in the past decade. Plasmapheresis has emerged

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Effect of Educational Guidelines on Nurses' Performance Regarding complications associated plasmapheresis for patients with autoimmune disorders as a powerful therapeutic modality in the treatment of autoimmune mediated disorders. (Leonard, et al., 2022).

Plasmapheresis is a relatively unfamiliar area of nursing practice. It requires a particular set of technical skills and specialized knowledge. All nurses must be appropriately qualified and trained in the procedures that regularly perform. Level of nurses' performance and patient knowledge regarding plasmapheresis will effect on the incidence and severity of complications (Hamza, et al., 2019).

So, there is a need to determine the potential effect of education on prevention and management of complications associated with plasmapheresis. Therefore, the current study was designed to update nursing staff performance and aid them in establishing comprehensive management plan for patients undergoing plasmapheresis with autoimmune disorders. Which reflected on positive and satisfying patients' outcome.

Aim of the study: Was to evaluate the effect of educational guidelines on nurses' performance regarding complications associated plasmapheresis.

Research Hypothesis:

- Nurses' knowledge score post educational guidelines will be improved than pre-educational guidelines.
- Nurses' practice level regarding plasmapheresis will improve post educational guidelines than pre-educational guidelines.

Research design: A quasi experimental design was conducted to achieve the aim of the study.

Setting: The study was conducted in intensive neurological care unit at intensive care building with payment, hemodialysis unit at internal medicine hospital and neurology unit at new surgery Zagazig university hospitals.

Subjects: Convenient sample of all available nurses with 6 months of experience working in the above-mentioned setting (40 nurses).

Tools of data collection:

Tool I: A Structured interview questionnaire for Nurses (Main, 2017); (Nemec, 2017); (Smallhee, 2018) & (Norris, 2024): (pre- post test): was designed by the researcher after revising of related literature and opinions of expertise for content of validity to assess nurses' knowledge regarding complications associated plasmapheresis. and consisted of the following parts:

Part 1: Demographic characteristics of nurses: seven closed ended questions covered (age,

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gender, social status, academic qualifications, department, years of experience in plasmapheresis and attending previous training courses about plasmapheresis). This part was used only once because the included nurses in the pre-test were the same in the post-test.

Part 2: Nurses' knowledge regarding plasmapheresis (pre/ post test): It was included (81) questions in the form of MCQ questions, it was covered the following five sections:-

First section:- Nurses knowledge regarding autoimmune diseases. It was consisted of nine questions about: definition of autoimmunity, causes, risk factors, common types, common signs and symptoms, treatment, , complications and prevention.

Second section:- Nurses Knowledge regarding plasmapheresis process. It was consisted of 29 questions about; Composition of blood , the largest percentage of blood components, definition, percentage, basic components and function of plasma , definition, aims, indications, contraindications and methods of plasmapheresis, as well as effective preparation for the separation process, evaluation of vascular catheterization, adjusting parameters of machine, causes of troubleshooting alarms, the number of sessions patient needs per week, the average duration of each session , the number of cycles during one session , type and caution of replacement fluids, discontinued when and factors affect the patient's response.

Third section:- Nurses' knowledge regarding complications associated plasmapheresis process, its care and prevention It was consisted of 22 questions about; the complications during and after plasmapheresis, life-threatening complications, , vascular access complications, cause of hypotension, cause of an allergic reaction, cause of muscle spasm and pain, cause of immunodeficiency and risk of infection, the nursing care to hypotension, allergic reaction, nausea and vomiting, bleeding at catheter site, and hypocalcemia, care and preventive measures to previous complications

Fourth section:- Nurses' knowledge regarding nursing care of patient with autoimmune disease undergoing plasmapheresis process. It consisted of 11 questions about; items nursing care before, the correct position, Patient evaluated before procedure, Preparation of the machine, setting the machine parameters, Patient's psychological support, nursing care during the procedure, frequency of patient evaluation during the procedure, continuous follow-up, monitoring the machine and nursing care after procedure.

Fifth section:- nurses' knowledge about necessary guidelines about plasmapheresis that given to patient. It consisted of 10 questions about; instructions before the procedure, the patient's diet, the foods decreased or avoid a few days before the procedure, instructions pre and during the procedure, during the separation process the patient should avoid and instructions after the procedure.

The scoring system

The rating scale was graded according the items of interviewing questionnaire. The answers of respondents nurses were evaluated using model key answer prepared by the researcher, total score of knowledge was 100% graded. The total knowledge score was classified as the following: each correct answer =one (1) and incorrect answer and don't know=zero (0). The scores then transformed into score percent as the following:

$$\text{Score \%} = (\text{the observed score} / \text{the maximum score}) \times 100$$

The score % of knowledge then transformed into categories based on statistical analysis as the following:

Unsatisfactory level of knowledge: for those who had score % < 70% of the maximum score.

Satisfactory level of knowledge: for those who had score % ≥ 70% of the maximum score.

Tool II: Observational Checklist to Assess Nurses' Practice regarding patients with autoimmune disorders undergoing plasmapheresis (Douglus, et al., 2015); (Gerogianni, et al., 2015); (Aljur, et al., 2021) & (Johnson, 2024): It included three parts; (pre/ posttest)

- **The first part was about** nursing intervention steps to patients before plasmapheresis procedure, it included 16 steps about: Confirm physician's order, introduce herself to the patient, identify patient correctly, place patient on comfortable position, keep patient privacy, explains the procedure to the patient, prepare needed equipment, ensures that consent is obtained, prepare the patient, prepares machine, prepare the substitute liquid, washes hands, wear personal protective equipment, set the machine parameter, check and prime of plasma filter carefully.
- **The second part was about** the nursing intervention steps to patients during plasmapheresis procedure. It consisted of six steps about: Adjusting blood pump and trans-membrane pressure, adjusting venous pressure and arterial pressure, ensure the complete thawing of fresh frozen plasma or albumin preparation, administers replacement fluid as needed, monitor the patient's condition and reassessment every 30 minutes till the end of session.
- **The third part was about** the nursing intervention steps to patients after plasmapheresis procedure. It consisted of five steps about: monitor the access site, machine disinfection, discard blood circuit and all the unnecessary supplies according to west disposal management, wash hands and documents the required data such as conditions of vascular access, vital signs, unexpected outcomes and fluid replacement type/amount.

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Scoring System:

AS for knowledge, also score 1 was given if the nurse correctly did the practice and score 0 if not. The scores then transformed into score percent as the following:

Score % = (the observed score / the maximum score) x 100

The score % of practice then transformed into categories as the following:

1. Unsatisfactory level of practice: for those who had score % < 70% of the maximum score.
2. Satisfactory level of practice: for those who had score % ≥ 70% of the maximum score.

Administrative and ethical consideration:

An official permission was obtained from the dean of the faculty of nursing and from the director of Zagazig university hospital before conducting the study. Then Permission to carry out the study was obtained from the head of mentioned setting. After explaining the purpose of the study additional oral consents were taken from the nurses who participated in the study after explaining its purpose. They were given an opportunity to refuse the participation, and they were assured that the information would be used for research purposes only. All ethical issues were taken into consideration during all phases of the study. The ethical research considerations in this study included the following: The research approval was obtained before intervention guidelines implementation, the objectives and the aims of the study were explained to the participants, the researcher confirmed the anonymity and confidentiality of subjects, and subjects were allowed to choose to participate or not and they had the right to withdraw from the study at any time without penalty. The researcher confirmed that the data and information collected would be confidential.

Pilot study:

A pilot study was carried out in order to test whether the tools are clear, understandable, feasible, applicable, and time consuming. Ten percent from the total sample size that equal four nurses were selected within selected criteria to participate in testing of the tools. The time required for ending the questionnaire was ranged between 20 to 30 minutes. The results of the data obtained from the pilot study helped in modification of the tools, items were then corrected or added as needed. Those nurses were excluded from the main study sample.

Field work:

After an official permission was taken from the dean of the faculty of nursing, from the manager of Zagazig University Hospitals and from the head of internal medicine, new surgery and ICU with payment hospitals, the implementation phase for data collection started as following: The selection of nurses, the collection of data, and the implementation of the intervention guidelines

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lasted over a period of 11 months, began from Mars 2023 to the end of January 2024. The questionnaire was designed by the researcher. Data used was collected where the researcher was available from Sunday to Thursday weekly from 9 am to 5 pm where the educational guidelines were implemented. According to finding of the pilot study the time was shortage to fill out the interviewing questionnaire so increase to 30-45 min and some questions modified accordingly. Nurses were grouped; each group included 4-5 nurses. It was necessary for the researcher to introduce herself for the nurses and explain the purpose of the study.

Assessment phase: The researcher started to recruit the sample according to eligibility criteria. Those who agreed to participate were interviewed individually using the data collection form. The information obtained served as baseline data or pretest, and guided the researcher in the preparation to educational guidelines booklet.

Planning phase: Using the assessment data and related literature, the researcher developed educational guidelines according to nurses' needs and deficiencies in their performance to train nurses and improve their knowledge, practice and outcomes of patients. The educational guidelines included a theoretical and a practical part. The researcher prepared an illustrated guideline booklet in simple Arabic language to help nurses assimilate and refresh the information provided to achieve aim of the study.

Implementation phase: The intervention guidelines consisted of 21 sessions; one third of the sessions (8) were theoretical, and (13) were practical. Each interview took approximately 30 minutes in each theoretical session and 30-45 minutes in each practical session. The data was collected in a simplified Arabic language, with motivation and reinforcement to enhance learning. The sessions began with one session for assessment of nurses' condition (interviewing the nurses regarding demographic characteristics and identification), and one session for demonstrating the importance of the educational guidelines and for assessing the nurses' knowledge and practice by filling questionnaire of knowledge and observational checklist.

In each session, ten minutes pre and post are directed for re-demonstration and implanted in simplified way by using pictures and booklet, through group discussion, to identify self-reflection, evaluate with feedback and oral exam. In the practical session as the same with implementation and in the 20th session (post-test) included the reassessment of nurses' knowledge, practice and patient outcome after applying the intervention guidelines. Questionnaires were filled by the nurses and observation of practice.

Evaluation phase: Each nurse in the study was evaluated two times using the same data collection tools. This was done upon recruitment (pre-test), immediately after the end of the educational guidelines (post-test). To evaluate improvements in level of knowledge, practice among patients with autoimmune disease undergoing plasmapheresis before and after

Content validity& Reliability:

Content validity was used for the modified tools and the designed booklet to determine whether the tools covered the aim or not. It developed by a jury of five experts in medical surgical nursing, college of nursing, Zagazig university. Reliability was done by using Cronbach test and retest. It was used to examine whether the questionnaire had internal consistency or not. The knowledge and practice tools had good internal consistency or not, the test was done. The agreement percentage for structured interview questionnaire was 75% and for observational checklist was 96%.

Statistical analysis:

All data were collected, tabulated and statistically analyzed using SPSS 20.0 for windows (SPSS Inc., Chicago, IL, USA 2011)). Quantitative data were expressed as the mean \pm SD and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Mc nemar test was used to compare between two dependent groups of categorical data. Paired t-test was used to compare between two dependent groups of normally distributed variables. While, Wilcoxon Signed Ranks Test was used to compare between two dependent groups of not normally distributed variables. Percent of categorical variables were compared using Chi-square test or Fisher's exact test when appropriate. ANOVA (One way analysis of variance) test was used for comparison between more than two different groups of quantitative data which were normally distributed. While, Kruskal Wallis Test was used for comparison between more than two different groups of quantitative data which were not normally distributed. The student "t" test was used for comparison of means of two independent groups of quantitative data which were normally distributed. While, The Mann-Whitney U test was used for comparison of means of two independent groups of quantitative data which were not normally distributed Spearman correlation coefficient was calculated to assess relationship between study variables, (+) sign indicate direct correlation & (-) sign indicate inverse correlation. Multiple linear regression (step-wise) was also used to predict factors which affect practice score. Cronbach alpha coefficient was calculated to assess the reliability of the scales through their internal consistency. P-value < 0.05 was considered statistically significant, p-value < 0.001 was considered highly statistically significant, and p-value \geq 0.05 was considered statistically non-significant.

Results:

The demographic characteristics of the nurses in the study sample **Table 1:** Revealed that Illustrated demographic characteristic of the studied nurses. More than half of the studied nurses

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(52.5%) aged from 30-40 years with mean \pm SD (36.72 \pm 8.81) year, three quarters were female, 72.5% were married, as well, half had diploma in nursing, more than half (55.0%) worked at renal dialysis, with more than half (57.5%) had less than three year experience with plasmapheresis. Additionally, all nurses didn't have training course on plasmapheresis and its complications.

Table 2: Illustrates that only (5.0%, 7.5%, 12.5%) of studied nurses had satisfied knowledge about "Instruction should given to the patient, plasmapheresis, and complications " respectively through pre intervention phase , that improved to (77.5 %,82.5 % , 85.0) respectively in post intervention, there was statistically significant increase in all nurses' knowledge items post intervention compared with pre intervention with P value <0.001. Also, there was highly statistically significant increase in total satisfactory nurses' knowledge post intervention compared to pre intervention with highly statistically significant difference in nurses knowledge pre and post intervention with P. value <0.001.

Table 3: reflected nurses' practice level regarding complications associated Plasmapheresis, it was found that only 5.0% of studied nurses had satisfied practice before procedure through pre-intervention phase, while in post intervention phase about three quarter (72.5%) of studied nurses' practice improved before procedure. Also, there was highly statistically significant increase in all dimensions and total score of studied nurses' practice regarding plasmapheresis post intervention compared to pre intervention phase with P. value was <0.001. Finally, there was highly statistically significant increase in total satisfactory nurses' practice post intervention compared to pre intervention, with highly statistically significant difference in nurses practice pre and post intervention with P. value was<0.001.

Table 4: Shows that there were statistically significant relation between satisfactory nurses' knowledge and their age, academic qualifications and years of experience in plasmapheresis in pre and post intervention phase with P. value (0.001, <0.001, 0.043) respectively.

Table 5: Shows that there was statistically significant relation between satisfactory practice level of studied nurse and their age with (P value 0.048).

Table 6: Reveals that there was statistically positive correlation between total scores of nurses' knowledge and practice throughout Study Phases with P. value (0 .031).

Discussion:

Regarding demographic characteristics, results of the present study revealed that more than half of the studied nurses aged from 30-40 years with mean \pm SD (36.72 \pm 8.81) years. The finding of the present study is supported with El Sayed, et al., (2024) in the study of "Improving Nurses' Performance Regarding Care of Neonates with Hyperbilirubinemia

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Undergoing Blood Exchange: An Educational Program” the author found that the mean age of studied nurses was 31.33 ± 8.142 years.

Related to Gender, results of the present study showed that three quarters of studied nurses were female. It could be justified with most of nurses were in various countries are female, by the nature of femininity of this job. The present study is consistent with **Mehdaoui, et al., (2021)** in study of “Knowledge of health professionals in transfusion and transfusion safety in Morocco” found that more than two thirds of the nurses were female. These findings are at same line with **Abdelmonem, et al., (2018)** in the study of “Effect of teaching Program on Nurse`s Performance Regarding Guillian Barre Syndrome Patients at Neurological Care Unit.” Found that all studied nurses were female.

Related to marital status, the present study revealed that nearly three quarter of studied nurses were married. This finding agree with **Yones, et al., (2019)** in study of “Assessment of nurses performance regarding caring of patients on anticoagulant therapy in port-said hospitals” found that nearly three quarter of studied nurses were married. These findings are matched with **Mohamed, et al., (2022)** in study of “Nurses ' Performance regarding the Care of Patients with Multiple Sclerosis Relapse: A Suggested Guideline” found that majority of studied nurses were married.

Regarding to academic qualifications, the current study revealed that half of studied nurses had diploma in nursing with 10% had bachelor in nursing this can be due to one quarter of studied nurses aged more than 40 years old and most of this age group had only diploma in nursing. The present study is consistent with **Azizan, et al., (2024)** in study of “knowledge and practice on blood transfusion among staff nurses in a selected private medical center, klanG VALLEY” found that more than three quarter of studied nurses possess a diploma in nursing, with only 21.2% holding a bachelor in nursing.

The present study revealed that more than half of studied nurses worked at renal dialysis, with nearly two thirds had less than three year experience with plasmapheresis. The present study is consistent with **Hassan, et al., (2022)** in study of “Nurses' Knowledge and Practices toward Patients Undergoing Plasmapheresis” that all nurses worked at hemodialysis unit and more than half of studied nurses had one year to more than five years of experiences with plasmapheresis.

Regarding attending training courses on plasmapheresis, the current study revealed that all nurses didn't have training course on plasmapheresis. This finding can be due to lack of training programs related to this area in nursing. Also, this result might be because of shortage of the nursing staff which might influence on attending the training courses to prevent interruption of the work or this might be due to lacking of nurses' motivation as they felt that attending the training courses had no value for them and not affecting their salary.

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In contrast with Farag, et al., (2023) in the study about “Effect of Implementing Educational Guidelines on Nurses' Knowledge and Practice regarding Plasmapheresis Process” found that nearly three quarter of studied nurses attended training courses on plasmapheresis.

Concerning nurses' total knowledge about plasmapheresis pre implementation of educational guidelines, majority of the nurses had unsatisfied knowledge about plasmapheresis. This lack of nurses knowledge in this important critical area might be as result of half of studied nurses had diploma in nursing and most of books are written in English and their schooling in Arabic, this motive a hassle for them to learn, nearly two thirds had less than three years of experience, and all studied nurses didn't attend training courses about plasmapheresis. In my opinion other causes can include unfamiliarity of this area in nursing, lack of pre employment orientation program and nurses' exhaustion due to increased work load because of shortage of the nursing staff in comparison to the number of patients which may hinder their ability to read and update their knowledge. Characteristics” found that more than three quarters of the studied nurses had unsatisfactory level of total knowledge regarding plasmapheresis.

Regarding post-implementation of educational guidelines, the results of the current study showed that majority of the studied nurses had satisfied total knowledge score and the minority of them had unsatisfactory knowledge. This improvement in nurses' knowledge may be due to the use of different teaching strategies as lecture, discussion, a colored booklet, and video playing, in addition to the researcher's reinforcement of information received at the end of each session and pre the next session together with adherence of the subjects to the given instructions regarding plasmapheresis. Moreover, education for nurses have a perceptive effect on their knowledge and understanding the complications associated with plasmapheresis.

These findings were matched with Farag, et al., (2023) who found that, nurses' knowledge regarding patient undergoing plasmapheresis process improved immediately post guidelines implementation at satisfactory level. Furthermore, these improvements in total knowledge were statistically highly significant ($p < 0.001$). This finding was similar to Abolwafa, et al., (2023) on study of “Effect of Instructional Based Nursing Intervention Program on Nurses Performance of Exchange Transfusion for Neonates” who reported that there was statistically significant difference between the nurses' knowledge in pre-test and post-test with ($P = 0.02$).

The current study revealed that majority of studied nurse had un satisfactory level practice regarding plasmapheresis pre implementation of educational guidelines. This could be attributed to lack of nurses' knowledge, which reflects on their practice, inadequate continuous training program, sometimes insufficient equipment and lack of guidelines. This agree with Abdel-Salam, et al., (2023), found that more than three quarter of studied nurses had incompetent level of total practice at pre evidence based guidelines phase.

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Regarding post-implementation of educational guidelines, the current study revealed that there was highly statistically significant increase in satisfactory nurses' practice before, during and after procedure of plasmapheresis post intervention, with highly statistically significant difference in total score of nurses practice with P. value was <0.001. This positive outcome suggests that the educational guidelines effectively enhanced nurses' proficiency and practice regarding plasmapheresis procedures. The use of diverse educational methods including lectures, demonstrations, and audiovisual aids likely contributed to these promising results. Further, the implementation of direct bedside teaching with immediate corrective feedback might have provided valuable learning opportunities.

This findings is agreed with **Amein, et al., (2024)**, in the study of "Effectiveness of plasmapheresis educational and training program on nurses' competency" found that nurses had un satisfied practice before, during and after procedure of plasmapheresis and over half of the staff nurses exhibited low levels of practice of plasmapheresis pre intervention that improved to satisfied level post intervention. This reinforces the evidence supporting the beneficial impact of structured learning programs in enhancing healthcare professionals' clinical practice.

Concerning Relation between Total Satisfactory Nurses' Knowledge level and their Demographic Characteristics, the current study Showed that there were statistically significant relation between satisfactory nurses' knowledge and their age, academic qualifications and years of experience in plasmapheresis with P. value (0.001, <0.001, 0.043) respectively. These findings matched with **Hassan et al., (2022)** showed significant difference between the nurses' level of knowledge and their age P = 0,000. In contrary **Flyh& Hassan, (2023)** in study of "Relationship between Nurses' Knowledge about Apheresis Component of Blood Therapy and Nurses' Characteristics" reported that there is no a significant relationship between the nurse's knowledge and their level of education, year of experiences in nursing, and year of experiences at $P \geq 0.05$.

Regarding Relation between Total Satisfactory Nurses' Practice level and their Demographic Characteristics, the present study revealed that there was statistically significant relation between satisfactory practice level of studied nurse and their age with (P value 0.04). This can be interpreted that nurses' practice was based on repeated practice and work with plasmapheresis machine not on education, training or updating their knowledge. In contrary **Elsayed, et al., (2024)** reported that there was no statistically significant relation between nurses age and nurses' level of practice. The result of current study also disagree with **Farag, et al., (2023)** who reported the relation between total satisfactory nurses' practice level and their demographic characteristics including (age, gender, education level, years of experience and training course) found that there was a highly statistically significant relation between nurses' level of practice and nurses demographic characteristics items except age, gender and marital status.

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Regarding Correlation Coefficient between total knowledge and Practice level of Studied Nurses throughout Study Phases, the current study revealed that there was statistically positive correlation between total scores of nurses' knowledge and practice throughout Study Phases with P. value (0 .031). This strong positive correlation suggests knowledge and performance were related in this study. Whereas, nurses who got unsatisfactory knowledge had unsatisfactory practice, this means that the level of nurses' practice depend on the nurses' knowledge, so training programs are recommended to provide nurses' with continuous professional development and knowledge to make nurses aware about how to deal with patients undergoing TPE.

These findings agree with **Amein, et al., (2024)** stated that there was strong, positive correlation between nurses' knowledge and their practice, both before and after the educational and training program. In contrary **Ahamed& Sallam, (2018)**, in study of "The effect of nursing instructions on nurses' knowledge, practice and suggestions regarding adverse events in hemodialysis" found that there no correlation between total level of knowledge and total competence level of practice pre and post intervention.

Finally, the findings of the present study supported the research hypothesis that nurses' knowledge score post educational guidelines was improved than pre-educational guidelines, nurses' practice level regarding plasmapheresis was improve post educational guidelines than pre-educational guidelines.

Conclusion:

Based on the findings of the present study it can be concluded that the educational guidelines significantly improved nurses' knowledge and practice regarding complications associated with plasmapheresis.

Recommendations:

In view of the main results of the study the following recommendations were derived and suggested Lectures and seminars should be organized about plasmapheresis with the help of consultants and professors for nurses. Complete manual procedures should be in Arabic language, easily used and available to all nurses. Knowledge and competence of nursing staff should be periodically evaluated, documented and up to date if necessary. Periodic evaluation and validation of the training given and training programs should be included both theoretical and practical.

Table 1: Frequency and Percentage Distribution of Demographic Characteristics of the Studied Nurses (n=40).

Demographic characteristics	NO	%
Age (year)		
≤30	9	22.5
>30-40	21	52.5
>40	10	25.0
Mean ±SD	36.72	
Range	±8.81	
	20-57	
Sex		
Male	10	25.0
Female	30	75.0
Marital status		
Married	29	72.5
unmarried	11	27.5
Academic qualification		
Diploma	20	50.0
Technical Institute	16	40.0
Bachelor	4	10.0
The department		
Renal dialysis department	22	55.0
Department of intensive care	18	45.0
Years of experience in plasmapheresis		
<3	23	57.5
3-5	14	35.0
>5	3	7.5
Have you attended training courses on plasmapheresis and its complications		
Yes	0	0.0
No	40	100.0

Table 2: Frequency and Percentage Distribution of Total Satisfactory Scores of Nurse Knowledge throughout Study Phases (n=40).

Nurses Knowledge	Total Satisfactory knowledge \geq 70%				MCP-value
	Pre- Intervention		Post – Intervention		
	No.	%	No.	%	
Autoimmune diseases	12	30.0	38	95.0	<0.001**
Plasmapheresis	3	7.5	33	82.5	<0.001**
Complications	5	12.5	34	85.0	<0.001**
Nursing care for the patient	8	20.0	35	87.5	<0.001**
Instruction should given to the patient	2	5.0	29	72.5	<0.001**
Total Nurses knowledge level	2	5.0	35	87.5	
Satisfactory level \geq 70%	38	95.0	5	12.5	<0.001**
Unsatisfactory level <70%					

MC: Mcnemar test

**: statistically highly significant (p<0.001)

Table 3: Frequency and Percentage Distribution of Satisfactory Nurses' Practice about the Plasmapheresis Process throughout Study Phases (n=40).

Nurses Practice about plasmapheresis	Satisfactory Practice \geq 70%				MCP-value
	Pre-Intervention		Post-Intervention		
	No.	%	No.	%	
Before procedure	2	5.0	29	72.5	<0.001**
During procedure	12	30.0	37	92.5	<0.001**
After procedure	7	17.5	34	85.0	<0.001**
Total Nurses practice	4	10.0	37	92.5	
Satisfactory Level \geq 70%	36	90.0	3	7.5	<0.001**
Unsatisfactory Level <70%					

MC: Mcnemar test

**: statistically highly significant (p<0.001)

Table 4: Relation between total satisfactory nurses' knowledge and their demographic characteristics throughout study phases (n=40).

Demographic characteristics of studied nurses	Satisfactory knowledge level ($\geq 70\%$)				χ^2 (1p-value)	χ^2 (2p-value)
	Pre-intervention (n=2)		Post-intervention (n=35)			
	No.	%	No.	%		
Age						
20-30	1	50.0	9	25.7	1.236 (0.539)	9.350 (0.001**)
>30-40	1	50.0	20	57.1		
>40	0	0.0	6	17.1		
Academic- qualification						
Diploma	0	0.0	16	45.7	2.171 (0.338)	18.947 (<0.001**)
Technical Institute	0	0.0	15	42.9		
Bachelor	2	100.0	4	11.4		
The department						
Renal dialysis department	0	0.0	19	54.3	FET (0.196)	FET (0.99)
Department of intensive care	2	100.0	16	45.7		
Years of experience in plasmapheresis						
<3	0	0.0	22	62.9	3.910 (0.142)	17.132 (0.001*)
3-5	2	100.0	10	28.6		
>5	0	0.0	3	8.6		

χ^2 : Chi square test, 1p: Relation in pre intervention, 2p: Relation in post intervention, FET: Fisher exact test

Table 5: Relation between total satisfactory nurses' practice level and their demographic characteristics throughout study phases (n=40).

Demographic characteristics of nurses	Satisfactory practice level ($\geq 70\%$)				χ^2 (1p-value)	χ^2 (2p-value)
	Pre-intervention (n= 4)		Post-intervention (n=37)			
	No.	%	No.	%		
Age						
20-30	0	0.0	9	24.3	0.944	6.085
>30-40	1	25.0	19	51.4	(0.624)	(0.048*)
>40	3	75.0	9	24.3		
Academic qualification						
Diploma	3	75.0	17	45.9	1.250	3.243
Technical Institute	1	25.0	16	43.2	(0.535)	(0.198)
Bachelor	0	0.0	4	10.8		
The department						
Renal dialysis	4	100.0	19	51.4	FET	FET
Intensive care	0	0.0	18	48.6	(0.114)	(0.238)
Years of experience in the hospital						
<3	1	25.0	21	56.8	3.182	0.293
3-5	3	75.0	13	35.1	(0.204)	(0.864)
>5	0	0.0	3	8.1		

0 χ^2 : Chi square test, 1p: Relation in pre intervention, 2p: Relation in post intervention, FET: Fisher exact test

Table 6: Correlation Coefficient between total knowledge and Practice level of Studied Nurses throughout Study Phases. (n =40)

	Pre-intervention		Practice		Post-intervention		Practice	
	R	P	R	P	R	P	R	P
Knowledge	0.295	0.064	0.341	0.031*				

Non significant($p>0.05$), *: statistically significant ($p<0.05$), r: correlation coefficient

References:

- [1] Abdelmonem SE, Shehata GA& Abdelaziz MA, (2018): Effect of Teaching Program on Nurses Performance Regarding Guillian Barre Syndrome Patients at Neurological Care Unit, *Assiut Scientific Nursing Journal*, 6(15), Pp: 46-52.
- [2] Abdel-Salam AA, Sharshour SM, Aziz AE& Mohammed S, (2023): Effect of evidence based guidelines on nurses' performance and attitude regarding care of children undergoing plasmapheresis, *Tanta Scientific Nursing Journal*, 32(4), Pp: 192-221.
- [3] Abolwafa NF, Shehata HB& Hasan AS, (2023): Effect of Instructional Based Nursing Intervention Program on Nurses Performance of Exchange Transfusion for Neonates, *Assiut Scientific Nursing Journal*, 11(39), p: 91.
- [4] Ahmed S& Kaplan A, (2020): Therapeutic Plasma Exchange Using Membrane Plasma Separation, *Clinical Journal of the American Society of Nephrology*, 15 (9), Pp:1364–1370.
- [5] Ahmed SA& Elderiny SN, (2020): Effect of Educational Package on Complications Associated with Plasmapheresis among Patients with Autoimmune Disorders, *Egyptian Journal of Health Care* , 11(3), P:878.
- [6] Aljur FM, Snowden JA, Hajden P, Orchard KH& Mcgrath E, (2021): Quality management and accreditation in hematopoietic stem cell transplantation and cellular therapy, training program, 1st ed, springer, UK, P: 157.
- [7] Amein NM, Elkodoos RF, Mostafa H. AA, Ismail LMN& Hegazy MAK, (2024): Effectiveness of plasmapheresis educational and training program on nurses' competency, *Egyptian Nursing Journal*, 21(1), Pp: 39-52.
- [8] Azizan NA, Bit-liany & Abu bakar R, (2024): knowledge and practice on blood transfusion among staff nurses in a selected private medical centre, klang valley, *journal of integrated sciences*, 4(3), p:281.
- [9] Bładzińska AG, Mazur K, Dębiec A, Gargas K, Psujek HB, (2020): Safety and tolerability of therapeutic plasma exchange in autoimmune neurological diseases — a retrospective single-centre analysis, 54(4), p:344.

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- [10] Douglas K, Elgarianic CK, Taylor P, Potok D, Rintala T& Watkins S, (2015): guidelines on the clinical use of apheresis procedures for treatment of patients and collection of cellular therapy products, official journal of the british blood transfusion society, doi:10.1111/tme.12205, p: 57-78.
- [11] El Sayed DZ, Said KM& Abdullah RM, (2024): Improving Nurses' Performance Regarding Care of Neonates with Hyperbilirubinemia Undergoing Blood Exchange: An Educational Program, *Journal of Nursing Science - Benha University*, 5(1), P: 572.
- [12] Farag SA, Mahmoud MH, Mohamed HA& Mohamed NF,(2024): Effect of Implementing Educational Guidelines on Nurses' Knowledge and Practice regarding Plasmapheresis Process, Doctorate thesis, Banha university, available at <https://bu.edu.eg/staff/sarafarag-publications/54089>, accessed at 28/7/2024.
- [13] Flayh AJ& Hassan HB, (2023): Relationship between Nurses' Knowledge about Apheresis Component of Blood Therapy and Nurses' Characteristics, *Bahrain Medical Bulletin*, 45(3), Pp: 1607-1609.
- [14] Gerogianni sk, Panagiotou MC& Grapsa EI, (2015): The Role of Nurses in Therapeutic Plasma Exchange Procedure, *International Journal of Caring Sciences*, 8(1), P: 196.
- [15] Hamza G, Mohamed HA& Hassanein AA, (2019): Effect of Applying Guideline for Patients Undergoing Plasmapheresis Outcomes at Mansoura University Hospital, 8(3), P: 80.
- [16] Hassan AA, Elgamil AE, Yakout RA& Hafez MK, (2022): Nurses' Knowledge and Practices toward Patients Undergoing Plasmapheresis, *Alexandria Scientific Nursing Journal*, 24(1), p: 51.
- [17] Johnson k, (2024): AACN procedure manual for progressive and critical care, Apheresis and therapeutic plasma exchange, 8th ed, Elsevier, India, Pp: 1040-1051.
- [18] Leonard H, Calabrese DO, John D, Clough MD, Randall S, Krakauer M D, Cerald A &Hoeltge MD, (2022): Plasmapheresis therapy of immunologic disease, *Cleveland Clinic Quarterly*,47(1), p: 53.
- [19] Lu J, Zhang L, Xia C& Tao Y, (2019): Complications of therapeutic plasma exchange: A retrospective study of 1201 procedures in 435 children, *Medicine*, 98 (50), p: 3.
- [20] Main S, (2017): Expanding nursing knowledge for therapeutic plasma exchange a literature review paper, *Transfusion and Apheresis Science*, 56(5), Pp: 774–777.
- [21] Mehdaoui FE, Soulaymani A, ELKhiari M , Laghawati SB& Alami R, (2021): Knowledge of health professionals in transfusion and transfusion safety in Morocco, In *E3S Web of Conferences*, 319, <https://doi.org/10.1051/e3sconf/202131901069>, p:2.
- [22] Mohamed MA, Abdullah KF& Khalifa AM, (2022): Nurses' Performance regarding the Care of Patients with Multiple Sclerosis Relapse: A Suggested Guideline, *Egyptian Journal of Health Care*, 13(4), Pp: 1206-1219.
- [23] Nemeč R, (2017): Apheresis education: One center curriculum design experience, *Transfusion and Apheresis Science*, 56(2), Pp:263–267.

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[24] Nieto-Aristizabal I, Vivas AJ, Ruiz-Montaña P, Arago CC, Osorio IP, Quiñones J, Rivillas JA, & Tobo'n GJ, (2020): Therapeutic Plasma Exchange as a Treatment for Autoimmune Neurological Disease, Hindawi, <https://doi.org/10.1155/2020/3484659>, p:1.

[25] Norris R, (2024): The physiology and pathology of the blood, Dr Norris of mammalian blood, 1st ed, outlook, USA, Pp: 199- 230.

[26] Smallhee BA, (2018): Syndromes in Organ Failure, An Issue of Nursing Clinics, immunosuppressive/ autoimmune disorders, 1st ed, Elsevier, USA. p: 319.

[27] Yones FE, Qalawa SA, Abo El- Ata AB & Ahmed HM, (2019): Assessment Of Nurses' Performance Regarding Caring Of Patients On Anticoagulant Therapy In Port-Said Hospitals, *Port Said Scientific Journal of Nursing*, 6(3), Pp: 1-15.