Relationship between Nurses' Knowledge about Apheresis Component of Blood Therapy and Nurses' Characteristics

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ABSTRACT

Objective: Nurses in Hematology provide nursing care and management for patients with hematological illnesses and prepare patients for therapeutic apheresis procedures. The purpose of this study is to assess nurses' knowledge about apheresis procedure and to identify the relationship between the nurses' knowledge about apheresis and their characteristics. It is expected to help reduce deaths, survive patients' life and prevent complication during and after apheresis by providing good knowledge about apheresis to nurses who working at hematology center.

Methodology: Descriptive design study, using one group test-retest approach, is carried throughout at Hematological Center in Medical City Directorate for the period of November 25th 2022 through April 29th 2023. A non-probability purposive sample of (30) nurse who are providing nursing care for patients in hematological center in Baghdad Medical Directorate, the knowledge question was constructed according to apheresis procedure, which was contained of (30) item as they were classified into four domains of priority care, indication, replacement fluid in apheresis, complications and nursing care, descriptive and inferential data were analyzed by using: frequency, percentage, mean of score, standard deviation and paired t test.

Results: The present study indicates that correct response of nurses' knowledge about apheresis was (19.90%), The results revealed 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 in hematological at P≥ 0.05.

Conclusions: Based on the study findings, the study concludes that Nurses' knowledge about apheresis was poor.

Keywords: Nurses' Knowledge, Apheresis Component of Blood Therapy, Hematology center, Nurses' Characteristics

INTRODUCTION

Apheresis, derived from the Greeks' language it means "ἀφαίρεσις / aphairesis" or to carry away" is the procedure whereby patients' or donors' blood is removed and separated into its components. A specified component is retained and the remainder is returned to the patient or donor. Apheresis is used to give treatment to patients with a variety of diseases. The indications, rationale, and techniques for apheresis procedures. apheresis procedures include, therapeutic plasma exchange and cytapheresis which include Erythrocytapheresis (ECP), Red cell exchange or depletion, Leukocytapheresis, and Thrombocytapheresis or depletion[1]. Plasma exchange process is used to treat a variety of disease caused by harmful substances (usually antibodies) which accumulate in the plasma. TPE can be used such as the primary treatment (e.g., immune-mediated thrombotic thrombocytopenic purpura (TTP) or as an adjunct to other therapies (e.g., anti-glomerular basement membrane disease). The effectiveness of TPE depends on numerous variables including the volume of patient's plasma removed and total plasma volume, the plasma protein binding affinity of the substance can be removed, and the number sessions of procedures. The best therapeutic results of TPE are when the substance is synthesized slowly[2]. The American Society for Apheresis (ASFA) guidelines describe the role of apheresis procedure by using the following categorization. The clinical disorders for which apheresis process is considered a standard, standard 1st-line therapy or a valuable adjunct therapy are Category I indications. Category II indications are disorders for which apheresis process is accepted as 2nd-line therapy, either alone or in combination with other modalities. Indications for which an optimum role of apheresis procedures have not been established and those for which procedures have been found to be ineffective or harmful are designated as Categories III and IV, respectively[3]. Cytapheresis this procedure can be used to deplete a pathologic cellular blood component from patients or for collection of specific cells. This includes RBC exchange (depletion of RBC), leukopheresis (depletion of WBC) and thrombocytapheresis or plateletpheresis (depletion of platelets)[4]. RBC exchange, also known as erythrocytapheresis use to remove a patient's pathologic RBC and replacement with donor's blood. This can be carried out manually or using a cell separator. The most common indications are management of complications of sickle cell anemia. Indications for RBC exchange include: sickle cell anemia with acute stroke, acute chest syndrome, and severe babesiosis[5]. Leukocytapheresis might be indicated in patients with hyperleukocytosis and symptomatic leukostasis. Leukostasis is the result of microvascular block by leukocytes that container lead to endothelial injury and hemorrhage or thrombosis of end organs, mostly commonly the brain and lungs. Signs and symptoms of leukostasis

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can arise in individuals with acute leukemia and circulating WBC counts exceeding 50 x 10^9/L, but more commonly >100 x 10^9/L. Leukocytapheresis rapidly lowers the WBC count and can potentially reverse symptoms of leukostasis, particularly if there is a delay in starting cytoreductive chemotherapy. Commonly 1.5–2.0 blood volumes are processed, and patients can require fluid replacement to maintain hemodynamic constancy. Prompt initiation of chemotherapy is paramount to avoid and remove hyperleukocytosis from recurring. Prophylactic leukocythapheresis is not shown to be beneficial and not recommended by the ASFA guidelines[6]. Thrombocytapheresis can be indicated as 2nd-line therapy for individuals with thrombocytosis due to a myeloproliferative neoplasm disease causing complications such as thrombosis or hemorrhage. Thrombocytapheresis be able to rapidly lower the platelet count and improve symptoms while waiting for cytoreductive therapy to take effect. The process be able to be repeated as necessary. Usually 1.5–2.0 blood volumes are processed; an intra-procedural complete blood count (CBC) might be of value to confirm that the desired target reduction in platelet count (usually below 400 x 10^9/L) has been achieved[7].

METHODOLOGY

A descriptive design study, is carried determine the nurses' knowledge about apheresis blood component therapy at Hematological Center in Medical City Directorate for the period of November 25th 2022 through April 29th 2023. The present study is conducted at the Hematological Center at the Medical City Directorate. This center is the first nationwide that provides treatment and therapy for hematological Purposive, non-probability sample of (30) nurse, the questionnaire contents' validity was determined by a panel of (9) experts, test-retest reliability is employed for the determination of the self-report questionnaire stability. Pearson correlation coefficient is computed on responses of (5) nurses for such purpose. Finding of this computation indicates that the correlation coefficient is (r=0.80) which is approving that the instrument is stable and reliable measure for nurses' knowledge about apheresis[8-13].

RESULTS

Table 1: The nurses' characteristics of the study sample No.=30

List	Characteristics Classification	Frequency	Percent
1	Age (Years)		
	21 – 30	20	66.7
	31 - 40	6	20.0
	41 - 50	2	6.7
	51 – 60	2	6.7
	Mean ± SD	1.53±0.89	
2	Gender		
	Male	16	53.3
	Female	14	46.7
3	Educational level		
	Secondary school nursing Graduate	7	23.3
	Medical Institute Graduate	17	56.7
	Nursing College Graduate	6	20.0
4	Year of experiences in Nursing		
	1-5 years	16	53.3
	6-10 =	7	23.3
	11-15 =	4	13.3
	16-20 =	2	6.7
	21-25 =	1	3.3
	Mean ± SD	1.83±1.11	
5	Years of Experiences in Hematology		
	1-5 years	19	63.3
	6-10 =	5	16.7
	11-15 =	5	16.7
	16-20 =	1	3.3
	Mean ± SD	1.63 ± 0.99	
5	Training		
	Untrained	28	93.3
	Trained	2	6.7

Table 1 presented the characteristics of the study sample which indicate that 66.7% of them at 21-30 years old, 53.35 was males graduated from medical institute who have a diploma in nursing which of 56.7%, 53.3% of the study sample have (1-5) year of experiences in nursing, while have experiences in hematology from 1-5 years were (63.3%) and the majority of them was untrained about apheresis (93.3%).

Table 2: Nurses knowledge at pre and post test

List	Item	Incorrect %	Correct %
1	Uses of exchange red blood cell.	90	10.0
2	performed cases of apheresis.	63.03	36.7
3	When the blood volume is removed at a rate of 20%	93.3	6.7
4	Therapeutic apheresis performed for patients.	63.3	36.7
5	The therapeutic plasma exchange performed to remove harmful substances from the body.	93.3	6.7
6	Preparing of patients	53.3	46.7
7	Leukapheresis is remove the white matter of the patient	100	0
8	Leukapheresis is performed twice the total blood volume	96.7	3.3
9	The exchanging blood plasma using the device in an amount of.	90.0	10.0
10	a blood plasma exchange procedure for patients with myasthenia gravis	83.3	16.7
11	It is preferable in the case of plasmapheresis for patients with thrombocytopenic	66.7	33.3
12	Among the risks of RBC exchange are	96.7	3.3
13	therapeutic plasma exchange for a patient suffering from hemolytic uremic syndrome,	80.0	20.0
14	a therapeutic plasma exchange for a patient suffering from Multiple Myeloma	96.7	3.3
15	A therapeutic plasma exchange for Hyper Viscosity Syndrome	93.3	6.7
16	Double Lumen tube and cavity used for therapeutic plasma exchange	90.0	10.0
17	Vital signs are measured by the nursing staff.	30.0	70.0
18	The dressing of the tube or double lumen	50.0	50.0
19	The double lumen is washed with normal saline	66.7	33.3
20	The dressing of the tube or double lumen is replaced in the event of infection every.	70.0	30.0
21	Among the most serious complications	53.3	46.7
22	Transfusion-related Acute Lung Injury complication	93.3	6.7

23	The toxicity of the anticoagulant dextrose citrate solution	93.3	6.7
24	Among the most serious side effects of anticoagulant dextrose citrate solution.	90.0	10.0
25	The nursing staff must instruct the patient	73.3	26.7
26	It is preferable to give treatment to a hospitalized patient	73.3	26.7
27	the complications caused by the double lumen tube	73.3	26.7
28	The main goal of leukapheresis is to reduce leukocytes	96.7	3.3
29	The percentage of platelet removed	100	0
30	Platelet apheresis is performed for patients.	90.0	10.0
	Total	80.09%	19.90%

Results of table 2 shows that the total incorrect nurses' responses about apheresis was 80.09% and the correct responses.

Table 3: Relationship between nurses' knowledge and their age, educational level, years of working in nursing, experiences in hematology center and training course

Nurses' Demographic Characteristics		Sum of Squares	df	Mean Square	F	Sig.
Age	Between Groups	10.750	10	1.075	1.606	.180
	Within Groups	12.717	19	.669		NS
	Total	23.467	29			
Educational Level	Between Groups	2.250	10	.225	.399	.931
	Within Groups	10.717	19	.564		NS
	Total	12.967	29			
Years of work in nursing	Between Groups	13.100	10	1.310	1.079	.423
	Within Groups	23.067	19	1.214		NS.
	Total	36.167	29			
Experiences in hematology center	Between Groups	8.900	10	.890	.843	.596
	Within Groups	20.067	19	1.056		NS.
	Total	28.967	29			
Training course	Between Groups	.667	10	.067	1.056	.439
	Within Groups	1.200	19	.063		NS.
	Total	1.867	29			

The results of table 3 revealed that there was no significant relationship between the nurse's knowledge and their characteristics at $p \geq 0.05$ level.

Table 4: Statistical differences between the nurse's knowledge and gender

	Gender	N	Mean	SD	t. test	df	Sig.
Knowledge	female	14	54.50	3.25	0.624	28	.530
	male	16	53.68	3.80	0.630		N.S.

Table 4 presented there were no statistical differences between the nurse's knowledge and gender at $p \geq 0.05$ level.

DISCUSSION

The characteristics of present study revealed that nurses' age was young adult males (21-30) year high present of them were males which as 53.3%, high present of them were Diploma Degree graduated from medical institute which of 56.7%, 63.3% of them have (1-5) year in hematology center experience[14], revealed in their study which was conducted in the Oncology Department at Assiut University Hospital in Egypt on convenience sample of 30 nurses to assess the nurses' knowledge and practices for management of chemotherapy induced neutropenia patients, they included that (70%) of nurses at age (18 to 29) years[15] conducted a non-experimental descriptive research to assess the knowledge and attitudes of nurses staff on nursing care of cancer patients undergoing chemotherapy on 50 nurses staff was selected from cancer hospitals of Punjab, the characteristics of their study was 96% of sample females, at 21-25 years ago, graduated from secondary school nursing, most of them were not married, 84% of nurses have 1-5 year of experiences, and 86% of them not attending on program related chemotherapy. Throughout the course of analysis of such assessment reveals that nurses have deficient knowledge about apheresis which is evidenced in the poor items of therapeutic red blood cell exchange is performed for patients; When the blood volume is removed at a rate of 20% of the patient's total blood volume) when performing the procedure Leukapheresis, the patient should be compensated; therapeutic apheresis can be performed for patients; the therapeutic plasma exchange process is performed to remove harmful substances from the body[16,17]. When Leukapheresis is performed once the total blood volume in the device, the quantity of white blood cells is remove The white matter of the patient is; When Leukapheresis is performed twice the total blood volume in the device, a quantity of blood cells is removed the white blood cell of the patient is; the process of exchanging blood plasma from the patient's body in most diseases is carried out using the device in an amount of; When performing a blood plasma exchange procedure for patients with myasthenia gravis, it is preferred that the patient is compensated with; it is preferable in the case of plasmapheresis for patients with thrombocytopenic purpura thrombotic Thrombocytopenia Purpura) replaced with a solution containing (ADAMS13)[18-25]. Therefore, when separating the plasma, it is preferable to compensate the patient with; among the risks of RBC exchange are; when performing therapeutic plasma exchange for a patient suffering from hemolytic uremic syndrome, the patient is compensated 100% with; when performing a therapeutic plasma exchange for a patient suffering from Multiple Myeloma, the patient is compensated 100%; a therapeutic plasma exchange for Hyper Viscosity Syndrome is performed for patients who suffer from double Lumen tube and cavity used for therapeutic plasma exchange therapeutic use for a maximum of; the double lumen is washed with normal saline by the nursing staff after the completion of the therapeutic apheresis process, in the amount of; the dressing of the tube or double lumen is replaced in the event of infection every; transfusion-related Acute Lung Injury complication occurs during a therapeutic apheresis when the patient is compensated with; the toxicity of the anticoagulant dextrose citrate solution (ACD) is observed after the completion of the apheresis process treatment by sending a blood sample to conduct test; among the most serious side effects of anticoagulant dextrose citrate solution (ACD), which is used to prevent clotting in a therapeutic apheresis device, are; the nursing staff must instruct the patient, after apheresis procedure; it is preferable to give treatment to a hospitalized patient who needs apheresis; among the complications caused by the double lumen tube that is used in the therapeutic plasmapheresis process are; the main goal of leukopheresis is to reduce leukocytes to below IU (50,000-100,000) in the case of leukemia to avoid; the percentage of platelet removed from the patient's body during platelet apheresis is and platelet apheresis is performed for patients with; . But nurses'

knowledge about apheresis has been improved post the execution of the instructional program relative to the good items which is evidenced in the posttest[19] revealed in their study which was conducted the in Baghdad Teaching Hospital in hematology word sample of the study is comprised of males (68.78 %) more half and females (31.22%), most of them are young and age group (30 - 39) year old, Diploma Degree graduates (55%) and having (1- 5) years of employment in Apheresis (81.25%) and less of half of nurses have training outside Iraq (43,75%). Objectives this study to determine nurse's knowledge about therapeutic plasma exchange procedure and to identify the relationship between nurse's knowledge and their demographic characteristics of age, gender, education and years of experience. **(**Analysis of the study finding attributed to the lack of knowledge due to the lack of the apheresis subject in the academic curricula and the lack of the training in hematology[26].

CONCLUSION

Based on the study findings' interpretations and discussion, the study concludes that: Nurses' knowledge about Apheresis was poor. And there was no relationship between nurses' knowledge and their characteristics at p≥ 0.05.

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Competing Interest: None

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