

Blood Transfusion :Impact of Implementing a Design Nursing Intervention Protocol to Minimize Patient's Complications.

Shaymaa S. Khalil, Zienab A. Mohammad, Manal E. Ez El-Deen, & Nagwa M. Ahmed

Demonstrator in Adult Nursing Department , Faculty of Nursing, Assiut University, Egypt

Professor of Medical Surgical nursing, Faculty of Nursing, Assiut University, Egypt

Lecturer in Internal Medicine Department, Faculty of Medicine, Assiut University, Egypt

Lecturer in Adult Nursing Department, Faculty of Nursing, Assiut University, Egypt

Abstract

Blood transfusion generally refers to the therapeutic use of blood and components. There are several risks associated with blood transfusion. According to WHO (2009) more than 81 million units of blood are collected globally every year. Through 2010, units of blood for internal medicine and blood disease unit are more than 3168 units. The nurse plays a critical role in caring for patients undergoing blood transfusion. **The aim** of the study was 3 folds: the first is to assess the patient undergoing blood transfusion of physical and psychological needs; the second is to assess nurses' knowledge and practice before and after implementing the protocol and the third is to design nursing intervention protocol. Hypotheses: **Hypotheses** were formulated: (1) The post mean knowledge score of nurses who would be exposed to design nursing intervention protocol would be higher than their pre mean knowledge scores. (2) The post mean practice scores of nurses who will be exposed to design nursing intervention protocol will be higher than their pre mean practice scores. (3) A positive relationship would exist between knowledge and practice score obtained by nurses receiving the designed nursing intervention protocol. (4) The incidence of complications of blood transfusion after protocol implementation would be lesser than that developed pre protocol. **Research design:** A quasi-experimental research design was utilized in this study on a convenient sample of 55 nurses and 30 patients control group and 30 study group patients. The study will be conducted in the general medical departments (B and C) and blood diseases unit at Assiut University Hospital. **Tools** utilized for data collection were a) pre and post nurses' intervention interview sheet. b) Construction of designed nursing intervention protocol. c) Patients' complications assessment sheet. **Results:** The first and the second hypotheses were supported as a good improvement in the mean knowledge & practice scores were found after the implementing of nursing intervention protocol. The third hypothesis was supported as was not able to extract the statistical significance of the relationship between knowledge and nursing practices before and after the study but extract a positive correlation by figure. The fourth hypothesis was supported as the complications of blood transfusion after protocol implementation were lesser than that developed pre protocol. **Conclusion:** Improved nurses' knowledge and practice can favorably affect the incidence of complications for patient undergoing blood transfusion. **Recommendation:** Nurses are in need for in-service training programs and refreshing courses to improve their knowledge which will reflect on their practice while providing care to patients.

Key words : *Blood transfusion, design nursing intervention protocol & patient.*

Introduction

Blood component (red cells, platelets, fresh frozen plasma and cryoprecipitate) therapy is frequently used in managing hemologic diseases. Many therapeutic and surgical procedures depend on blood product support. However, blood component therapy only temporarily supports the patient until the underlying problem is resolved. Because transfusions are not free from hazards, they should be used only if necessary. The research regarding red blood cell substitutes is ongoing. To reduce the use of blood products, anti-fibrinolytic agents and other products may be used in some situations. (Kirschman, 2004) Whole blood used in shock, hemorrhage, low

hemoglobin, hematocrit, and circulating volume cases. PRBCs used for anemia associated with cancer, liver, and cardiac disease, renal disease and for moderate blood loss. Fresh frozen plasma useful in case of bleeding due to liver disease and hemophilia, disseminated intravascular coagulopathy (DIC), hemorrhage, massive transfusion. Also platelet used in bleeding that resulting from thrombocytopenia and thrombocytopathy and bone marrow depression (Osborn & Wraa, 2010)

A blood transfusion reaction is an adverse reaction to blood transfusion therapy that can range in severity from mild symptoms to a life-threatening condition. Because complications of transfusion therapy may be significant, judicious evaluation of the patient is

required. Blood transfusion reaction can be classified as acute or delayed (later). Acute or immediate reactions can occur as soon as 5 minutes after starting the transfusion, whereas delayed transfusion reactions may occur from 48 hours to 6 months (**Brecher, 2002**)

If an acute transfusion reaction occurs, the following steps should be taken (1) stop the transfusion; (2) maintain a patent IV line with saline solution; (3) notify the blood bank and the health care provider immediately; (4) recheck identifying tags and numbers; (5) monitor vital signs and urine output; (6) treat symptoms per doctor order; (7) save the blood bag and tubing and send them to the blood bank for examination; (8) complete transfusion reaction reports; (9) collect required blood and urine specimens at intervals stipulated by hospital policy to evaluate for hemolysis; and (10) document on transfusion reaction form and patient chart. The blood bank and lab and laboratory are responsible for identifying the type of reaction. (**Lewis & Heitkemper, 2007**)

Blood components can be administered safely through a 23 gauge needle, but this usually impedes infusion device. Ensure that the blood does not run over the maximum time of 4 hours. Most blood product administration tubing is of "Y" type with a micro aggregate filter. Not other additives (include medications) should be given via the same tubing as the blood unless the tubing is cleared with saline solution. When the blood or blood components have been obtained from the blood bank, positive identification of the blood donor and recipient must be made. The blood bank is responsible for typing and crossmatching the donor's blood with the recipient's blood. (**Gajic & Moore, 2005**)

Make sure that the patient understands the procedure and the signs and symptoms to report, and that he or she agrees with the treatment plan. Take the patient vital signs before the beginning of the transfusion so the you have a baseline measure; if the patient has abnormal vital signs, such as an elevated fever, call the doctor to clarify when the blood component may be administered. The blood should be administered as soon as it is brought to the patient. It should not be refrigerated on the nursing unit. If the blood not used within 30 min, it should be returned to the blood bank. (**Wu & Snyder, 2005**)

During the first 15 min or 50 ml of blood infusion the nurse should remain with the patient. If there is any untoward reaction, they are most likely to occur at this time. The rate of infusion during this period should be not more than 2ml/min. After the first 15 min, vital signs are usually retaken, the transfusion should not take more than 4 hours to administer because of the increased risk of bacterial growth in

the product once it is out of refrigeration. (**Stone , O'Connell & Sekeres , 2004**)

After blood transfusion the nurse obtain vital signs and compare with baseline measurements then dispose of used materials properly, document procedure in patient's medical record, including patient assessment findings and tolerance to procedure, and monitor patient for response to and effectiveness of the procedure (**Carven, 2007**).

The aims of the study

1. To assess the patient undergoing blood transfusion of physical and psychological needs.
2. To assess nurses knowledge and practice before and after implementing the protocol.
3. To design nursing intervention protocol.

Hypothesis:

To fulfill the aim of the study the following research hypothesis will be formulated:-

1. The post mean knowledge score of nurses who will be exposed to design nursing intervention protocol will be than their pre mean knowledge scores.
2. The post mean practice scores of nurses who will be exposed to design nursing intervention protocol will be higher than their pre mean practice scores.
3. A positive relation ship will be exist between knowledge and practice score obtained by nurses receiving the designed nursing intervention protocol.
4. The incidence of complications of blood transfusion after protocol implementation will be lesser than that developed pre protocol.

Incidences

According to WHO (2009) more than 81 million units of blood are collected globally every year. Through 2010, units of blood for internal medicine and blood disease unit are more than 3168 units. (According to Assiut University hospital records: 2010). From the researchers' clinical experience in internal medicine departments many patients were receiving blood transfusion and exposed too many complications. These patients are in need for special nursing care to minimize their complications. This study will be the first study in this location handling this topic to help those patients reducing blood transfusion complications and provide a designed nursing intervention protocol to develop nurses' knowledge and practice.

Subjects & Methods

Research design

quasi-experimental research design was utilized in this study.

Setting: The study was conducted in the general medical departments (B and C) and blood diseases unit at Assiut University Hospital.

Sample: a convenience sample of 55 nurses, control group 30 patients and study group 30 patients with whom the intervention protocol was applied.

Inclusion criteria

1. Adult conscious patient.
2. Age range between (18 – 65 years).

Exclusion criteria:

1. Unconscious patients.
2. Patients on mechanical ventilation.
3. Patients over 65 years.

Tools

Tool- I: pre and post nurses' intervention interview sheet: consisted of three parts:

Part (1): Socio- demographic data for nurses.

Part (2): Nurses' knowledge about blood, blood transfusion and complications of blood transfusion.

Part (3): Observation check list sheet.

Tool II: Construction of designed nursing intervention protocol: it included two parts:- Knowledge and Practice about blood transfusion.

Tool III: Patients' complications assessment sheet: include three parts:

Part (1): Socio demographic data about the patient.

Part (2): General assessment.

Part (3): Assessment of blood transfusion complications.

Scoring system

- For observation checklist: total score: 136 degree, two degrees for each correct step and one degree for each incorrect step and zero for step that was not done.
- For pre/post test questionnaire sheet: total score was 176 degree, The total scores about blood and blood transfusion were 82 and about complication of blood transfusion were 94. Scores less than 50% were considered having poor level. Scores 50%-70% were considered having satisfactory level scores more than 70% were considered having good level. Statistical significance was considered at P-value < 0.05.

Ethical approval

Each patient and nurse was informed with the purpose of the study. The investigator emphasized that the participation is voluntary and confidentially and anonymity of subjects will be assured through coding of all data, and protection of the patient from hazard. Verbal consent was obtained from each patient and nurse prior to his/her contribution in the present study. Confidentiality of any obtained information was secured.

Procedure study was conducted through:

- Developed tools were revised for content validity by (5) expertise (medical staff) from the medical

field & (Nursing staff) from the medical-surgical nursing field .

- An official permission was obtained from the head of the internal medicine department to conduct the study.
- At initial interview the researcher introduce herself to initiate communication, explain the nature and purpose of the study to nurses in groups .
- Ask nurses to fill out the questionnaire sheet (tool I) to assess nurses' knowledge
- Each nurse involved in the study was assessed for his or her knowledge pre and post test (tool I), it take about 30 min.
- At initial interview the researcher introduce her self to initiate line of communication, explain the nature & purpose of the designed nursing protocol and fill out the interview sheet (tool I) to assess nurse's knowledge before application of designed nursing protocol. The tools filled through interviewing. The study was carried out at morning, and after noon shifts.
- Each nurse was observed directly while performed routine blood transfusion care, that take about 30 min.
- The researcher explained nature and purpose of the researcher to the selected patients who were willing to participate in the study. Assessment of blood transfusion complications of the control group (tool III).
- The application of designed nursing intervention protocol (tool II) was performed by researcher then by nurses, researcher prepared the training places, teaching aids and media (pictures, handouts). This was followed by arranging for the teaching schedule based on the contents of protocol, number of staff involved, time availability, shifts as well as the resources available. Also schedule with the nurses the teaching sessions for both theoretical and practical and the nurses were divided into small groups, each group contains 2 to 4 nurses. Each group of nurses chooses the optimal time for receiving the teaching sessions whenever they have minimal workload.
- Teaching had been implemented for nurses in terms of sessions and teaching on the spot during their official working hours. There were a total of 9 sessions. Number of nurses in each session ranged between 2- 4 nurses. The duration of each session was 30 minutes, including 10 minutes for discussion and feedback. Each session usually started by a summary of what has been taught during the previous sessions and the objectives of the new topics. Feedback and reinforcement of teaching was performed according to the nurses needs to ensure their understanding. Each nurse obtained a copy of the designed nursing protocol

booklet that included all the training contents. Data were collected through the period from 1/2 /2011 to 1/9/2011.

- Immediately after implementation of the designed nursing intervention protocol (tool **II**). The nurses' knowledge and practice had been evaluated by the researcher through filling the tool (**I** and **II**). As well as the researcher filled the patient complication assessment sheet (tool **III**) through asking the patient or observation while the blood was transfused or after transfusion for 30 min.

Data analysis

Data collected and analysis by computer program SPSS" ver. 19" Chicago .USA Data expressed as mean, Standard Deviation, number, and Percentage. Using T- test to determine significant for numeric variable. Using Chi square to determine significant for non-parametric variable. A probability level of 0.05 was adopted as a level of significance for testing the research hypothesis.

Result

Table (1): Socio-demographic characteristics of the nurses in the study group (n=55).

Socio-demographic characteristics	No. (n= 55)	%
Age: (years)		
< 30	20	36.4
≥ 30	35	63.6
Mean ± SD	32.95 ± 6.99	
Sex		
Male	18	32.7
Female	37	67.3
Educational level		
Diploma of nursing	42	76.4
Diploma of nursing + special	5	9.1
Nursing institute	2	3.6
Bachelor of nursing	6	10.9
Years of experience		
< 5	11	20.0
5 – 10	11	20.0
> 10	33	60.0
Previous training related to blood transfusion		
Yes	4	7.3
No	51	92.7

Table (2): Total score of knowledge about blood, blood transfusion and complication in pre and post tests.

Knowledge	Pre (n= 55)		Post (n= 55)	
	No.	%	No.	%
Poor	54	98.2	1	1.8
Satisfactory	1	1.8	6	10.9
Good	-	-	48	87.3
P-value	0.0001*			

Chi-square test

* Statistical significant difference ($P < 0.05$)

Table (3): Total mean practice scores obtained by nurses pre and post implementing the designed nursing intervention protocol.

Practice items	Pre (n= 55)	Post (n= 55)	P-value T-test
	Mean \pm SD	Mean \pm SD	
Pre transfusion care (60)	24.80 \pm 6.86	38.71 \pm 10.59	0.0001*
During transfusion care (52)	26.11 \pm 7.68	42.13 \pm 6.44	0.0001*
Post transfusion care (24)	6.62 \pm 4.92	15.11 \pm 5.07	0.0001*
Total score of practices(136)	57.53 \pm 16.79	95.95 \pm 21.84	0.0001*

Table (4): Correlation between nurses' knowledge and practice score pre implementing designed nursing intervention protocol (n=55).

Items	Pre implementation of the protocol
r-value	0.162
p-value	0.237

Table (5): blood transfusion reaction of the studied group (n=60).

Transfusion reaction	Pre (n= 30)		Post (n= 30)	
	No.	%	No.	%
Pre-transfusion				
Present	6	20	3	10
Absent	24	80	27	90
First 15 min. of transfusion				
Present	6	20	3	10
Absent	24	80	27	90
30 min. of transfusion				
Present	4	13.3	3	10
Absent	26	86.7	27	90
End of transfusion				
Present	4	13.3	3	10
Absent	26	86.7	27	90
After transfusion				
Present	5	16.7	1	3.3
Absent	25	83.3	29	96.7

T-test

Table (6): Percentage distribution of blood transfusion complications as regard pre and post implementing designed nursing intervention protocol of the studied patients (no= 60).

Signs and symptoms	Pre				Post			
	Present		Absent		Present		Absent	
	No.	%	No.	%	No.	%	No.	%
Hemolytic reaction								
Chills	3	10	27	90	-	-	30	100
Fever	5	16.7	25	83.3	2	6.7	28	93.3
Tachycardia	3	10	27	90	-	-	30	100
Hypotension	1	3.3	29	96.7	-	-	30	100
Tachypnea	2	6.7	28	93.3	-	-	30	100
Febrile reaction: (non-hemolytic)								
Sudden chills	3	10	27	90	1	3.3	29	96.7
Fever raise >1°C	4	13.3	26	86.7	2	6.7	28	93.3
Flushing	2	6.7	28	93.3	1	3.3	29	96.7
Anxiety	4	13.3	26	86.7	-	-	30	100
Headache	2	6.7	28	93.3	-	-	30	100
Vomiting	-	-	30	100	-	-	30	100
Muscle pain	1	3.3	29	96.7	-	-	30	100
Mild allergic reaction:								
Flushing	1	3.3	29	96.7	-	-	30	100
Itching	-	-	30	100	2	6.7	28	93.3
Chills	2	6.7	28	93.3	1	3.3	29	96.7
Wheezing	2	6.7	28	93.3	-	-	30	100
Severe allergic reaction								
Anxiety	2	6.7	28	93.3	-	-	30	100
Dyspnea	-	-	30	100	-	-	30	100
Hypotension	-	-	30	100	-	-	30	100
Cyanosis	-	-	30	100	-	-	30	100
Shock	-	-	30	100	-	-	30	100
Cardiac arrest	-	-	30	100	-	-	30	100
Cardiac overload								
Cough	1	3.3	29	96.7	-	-	30	100
Dyspnea	-	-	30	100	-	-	30	100
Headache	2	6.7	28	93.3	1	3.3	29	96.7
Hypertension	2	6.7	28	93.3	1	3.3	29	96.7
Tachycardia	-	-	30	100	-	-	30	100
Distended veins	-	-	30	100	-	-	30	100
Contaminated blood administered								
High fever	-	-	30	100	-	-	30	100
Chills	1	3.3	29	96.7	1	3.3	29	96.7
Diarrhea	1	3.3	29	96.7	-	-	30	100
Vomiting	-	-	30	100	-	-	30	100
Hypotension	1	3.3	29	96.7	-	-	30	100

Table (1): Shows that; the mean age of nurses was (32.95 ± 6.99).the majority of studied sample were female (67.3%), nursing diploma (76.4%), (60%) had an experience more than 10 years. As regard to previously of attended training programs, it was found that (92.7%) of nurses did not attend any training program about blood transfusion.

Table (2): Showed the mean scores for total knowledge are poor before implementing the designed nursing intervention protocol (98.2%). However, there was a good improvement in the mean knowledge scores after the implementation of the designed nursing intervention protocol (87.3%).

Table (3) Showed the baseline mean scores for total practice are high post implementing the designed nursing intervention protocol (95.95 ± 21.84). There was a significant relation between nurse's practice in relation to mean practice score with $P < 0.0001$.

Table (4) this table showed that, there was no positive correlation has been founded between nurses'knowledge and practice score pre implementing designed nursing protocol.

Table (5) Showed that there was statistical difference between control and study group before and after protocol regarding blood transfusion reaction.

Table (6) Revealed that the incidence of blood transfusion complications after application of the designed nursing intervention protocol was be lesser than pre implementation of the designed nursing protocol.

Discussion

Table (1): Socio-demographic characteristics of the nurses in the study group ($n=55$). Shows that; the mean age of nurses was (32.95 ± 6.99).the majority of studied sample were female (67.3%), nursing diploma (76.4%), (60%) had an experience more than 10 years. As regard to previously of attended training programs, it was found that (92.7%) of nurses did not attend any training program about blood transfusion. Based on the results of the present study, the majority of the nurses their ages were more than 30 years, female, and have diploma of nursing, more than half of them, their experience was more than 10 years. It was found that the majority of nurses did not attend any previous training program about blood transfusion. **Ahamed, (2011)**, in the same line with the current study findings conducted a study in hemodialysis unit of Assiut University Hospital, entitled developing the designed protocol regarding the care offered to hemodialysis patients which revealed that the majority of nurses their ages were from 20 - 40 years. The majority of nurses were female and nursing diploma was the highest proportion, less than half of them have an experience

more than ten years and all of them have no in service training courses related to dialysis. **Marquis and Huston (2009)** agree that education and training are two components of staff development that occur after an employees' indoctrination (which refers to planned, guided adjustment of employee to the organization and work environment). The staffs' knowledge level and capabilities are a major factor in determining the number of staff required to carry out unit goals. The better trained and more competent the staff, the fewer the staff required, which in turn saves the organization money and rise reproductively.

Table (2): Total score of knowledge about blood, blood transfusion and complication in pre and post tests. Showed the mean scores for total knowledge are poor before implementing the designed nursing intervention protocol (98.2%). However, there was a good improvement in the mean knowledge scores after the implementation of the designed nursing intervention protocol (87.3%).

Data collected before the designed nursing intervention protocol implementation (pre-test) showed unsatisfactory level of knowledge about blood, blood transfusion and complications of blood transfusion, which reflects the lack in their scientific preparation. The implementation of the designed protocol showed an improvement in the nurses' level of knowledge regarding the care offered to patients undergoing blood transfusion.

So, we can conclude from the data collected and analysis in the present study that all studied nurses weren't properly prepared prior to their working and/or dealing with such patients receiving blood transfusion and really they got their experience while being there, working and managing the patients in the real life emergency situations.

The present study showed statistically significant difference in level of nurses' knowledge about blood and blood transfusion on pre and post test, also there is statistically significant difference in level of nurses' knowledge about complications of blood transfusion on pre and post test. This result supported by **Abd-Allah (2000)** who documented that the in service training program has a beneficial effect in improving the nurse's knowledge and skills. also recommended that educational programs should be organized according to the needs of nurses with continuous evaluation.

The current study revealed a great improvement in knowledge score about blood, blood transfusion and complication of blood transfusion after application of nursing intervention protocol. The score of knowledge high in nurses there age less than 30 years of age; this age group might have good readiness for learning new things, also the score of knowledge was high in nurses whom years of experience ranged from

5 to 10 years, in male rather than female and those who didn't attend any previous training program about blood transfusion. These results are in agreement with those of **Meyer and Elliott (1999)**, who noted that nurses' knowledge scores were higher among younger and newly graduated nurses who attend training program. In the same line; a study that was conducted in orthopedic department of Assiut University Hospital " by **Ghanem (1997)**, entitled as " Impact of training program on the quality of nursing care to old patients in orthopedic department of Assiut University Hospital" on all nurses working in orthopedic departments which revealed that there was a statistically significant relation between nurses' knowledge scores with their duration of experience. The current study revealed a great improvement in knowledge score about complications of blood transfusion after application of nursing intervention protocol. These results disagree with those of **Abd Al-Magid (2011)**; who noted that nurses' knowledge scores were higher among younger and newly graduated nurses who attending nursing care standards for cancer patients undergoing chemotherapy.

In the same line a study by **Masoud (2006)**; entitled as " The impact of Educational and Training Program on the knowledge and performance of nursing practice in the hematology and emergency units at pediatric department of Assiut University Hospital " which revealed that there was a statistically significant associations between knowledge and nurses' total and current job experience, with knowledge increasing as the years of experience increased.

These results are in agreement with those of **National Institute for clinical Excellence (2000)**; which stated that, nurses with many years of experience may require a minimum of additional instruction before they are ready to take a patient assignment; nurses with years of experiences in one clinical specialty may need a moderate amount of instruction to acquire through training program.

The results in the present study showed that no significant difference between nurses' knowledge and their age group, sex, years of experience and previous training in medical surgical nursing, observed during the pre-test. These results agree with **Ahmed (2011)**; who stated that there was no significant difference between nurses' knowledge and their practice observed during the pre-test. This may be attributed to insufficient courses related to blood transfusion included in their undergraduate curriculum of nursing education and also there is no available Arabic source for updating and continuing their education.

Table (3): Total mean practice scores obtained by nurses pre and post implementing the designed nursing intervention protocol. Showed the baseline mean scores for total practice are high post implementing the designed nursing intervention protocol (95.95 ± 21.84). There was a significant relation between nurse's practice in relation to mean practice score with $P < 0.0001$.

Table (4): Correlation between nurses' knowledge and practice score pre implementing designed nursing intervention protocol ($n=55$). This table showed that, there was no positive correlation has been founded between nurses' knowledge and practice score pre implementing designed nursing protocol.

The majority of experts agree that caring must be provided for each patient before blood transfusion administration, as for preparation area and equipment this result was in line with **Lynn (2010)**; who stated that only registered nurse can collect blood & blood component from blood bank, check with technologist in the blood bank, ensure that requested unit is properly labeled and identification details of patient and blood component are the same on the compatibility label attached to the blood component, assess the blood products for any abnormalities in color ...etc. Only registered nurses from staff nurse level and above, may administer blood product (2) registered nurses or (1) nurse and (1) doctor may identify patient and blood product, bedside check is a vital step in preventing transfusion error, explain the procedure to the patient, make sure there is a signed informed consent form before the therapy is started.

Hogg (2006) stated that the nurse should double-check the labels with the ABO group and Rh type agrees with the compatibility record and check that patient's blood has been cross-matched. Also

the result of the current study was supported by **Hessig, Arcand and Frost (2004)**; who stated that before blood transfusion the nurse should take baseline vital signs of temperature, pulse and respiratory rate (TPR), and BP and commence an observation record solely for the period of transfusion. Ensure a blood administration set with an integral filter is ready for use. An IV administration set may be primed with 0.9% saline solution before transfusion, the IV cannula patency confirmed with a 0.9% saline flush and the blood administration set primed then with blood.

The present study showed that the majority of the study group in **pre protocol application** prepare equipments correctly and take body temperature; this finding may be related to the facilities in the department. **After the application** all the studied group done correctly eight steps (confirm that the transfusion has been prescribed, check the patient

identification, double-check the labels with the ABO group and Rh type agrees with the compatibility record, check the patient's blood has been cross-matched, prepare equipments, obtain body temperature and pulse, check presence of IV catheter, if not present insert a large size catheter in a large vein) but the score in other steps was improved. In relation to ensure that caring that should be provided for each patient during blood transfusion administration the majority of experts agree about this competency, as for obtaining packed blood from the blood bank after the intravenous line is inserted, using special set with drip chamber containing a large filter and make sure that blood transfusion is initiated within 30 min after removal of the blood container from the blood bank refrigerator this result was in line with **Gray (2007)** who stated that the nurse should invert the blood bag gently several times to mix the cells with the plasma, expose the port on the blood bag by pulling back the tube, insert the remaining Y set spike into the blood bag, open the filter to expel any residual air within the filter, close the clamp, insert firmly the Y set into the IV catheter and run the transfusion slowly (10 to 15 drop/min) for first 15 minutes. **Obsborn and Wraa (2010)** stated that the nurse should monitor vital signs, compare vital signs against base line reading, observe the patient carefully for adverse effects, increase the flow rate if no adverse effects occur during the first 15 min, unless the patient is at high risk for circulatory overload, monitor closely for 15–30 min to detect signs of reaction, monitor vital signs after 30 min of infusion, compare results with baseline measurements, be alert for signs of adverse reactions: circulatory overload, sepsis, febrile reaction, allergic reaction, and acute hemolytic reaction, monitor vital signs at the end of infusion, be sure that the infusion time not exceed than 4 hours, disconnect the blood unit and flush line with saline.

The present study showed that the majority of the studied sample in **pre protocol application** done eight steps correctly (obtain packed blood from the blood bank after the intravenous line is inserted, use special set with drip chamber containing a large filter, expose the port on the blood bag by pulling back the tube, insert the remaining Y set spike into the blood bag, open the filter to expel any residual air within the filter, close the clamp, insert firmly the Y set into the IV catheter, run the transfusion slowly for first 15 min and disconnect the blood unit). **After the application** all study group done 11 steps (obtain packed blood from the blood bank after the intravenous line is inserted, use special set with drip chamber containing a large filter, expose the port on the blood bag by pulling back the tube, insert the remaining Y set spike into the blood bag, open the

filter to expel any residual air within the filter, close the clamp, insert firmly the Y set into the IV catheter, run the transfusion slowly for first 15 min, obtain body temperature, increase the flow rate if no adverse effects occur during the first 15 min, unless the patient is at high risk for circulatory overload and disconnect the blood unit) but the score in other steps was improved. In relation to **ensuring that care is provided for each patient after blood transfusion administration** the majority of experts agree about this competency, as for disposing of used materials properly, this result was in line with **Lynn, Wiegand & Carlson (2010)**; who stated that obtaining vital signs, comparing vital signs with baseline measurements, hand washing, documenting the procedure in patient's medical record, including patient assessment findings and any adverse reaction, document procedure in patient's medical record, document the time the infusion was started and completed, document the blood product volume and number, monitor patient for response to and effectiveness of the procedure and signature.

The current study showed inadequate level of total practice score in most items pre implementation of the nursing intervention protocol for patients undergoing blood transfusion. **Marquis and Huston (2009)** reported that each organization and profession must set standards and objectives to guide individuals and practitioners in performing safe and effective care. Also not only must standards exist, but leader and managers also must see that subordinates know and understand the standards and employee must be aware that their performance will be measured in terms of their ability to meet the established standards. **Mahmoud (2004)** reported that teaching programs for nursing staff constitutes an important part. These programs are urgently designed to assist staff nurses in developing and enhancing their skills needed to provide high standards of care to their patients. This agreed with the present study as nurse's knowledge and practice improved after implementation of the nursing intervention protocol. **Youssef (2007)**; in the same line with the current study findings conducted a study at the reconstructive microsurgical and grammatology care units in Assiut University Hospital. Entitled "Microvascular free tissue transfer surgeries, Impact of a designed teaching protocol on nurses' knowledge, practices and patient's outcome" which revealed that an improvement in nurses' practice after the attendance at continuing nursing education sessions. Research findings indicated that continued nursing education programs increase knowledge, practice and can also improve attitudes.

However, the study of **Carroll & Susan (2005)**; demonstrated that nurses must be accountable and responsible for the

assessment, planning, intervention, teaching supervision and evaluation of care to ensure that the patient will receive safe care. Also the WHO (2002) found that in order to maintain and improve the quality of patient care; continuous data collection, documentation and analyzing patient information is essential.

The current study revealed a great improvement in the practice score levels obtained by nurses after implementation of nursing intervention program. This has been concluded by the presence of significant differences between results of pre-test and post-test. This may be attributed to lack of continuous education and in-service training program. The results in the present study showed that there was no significant difference between nurses' knowledge and practice scores with age and years of experience observed during the pre -test. This may be attributed to the transfer of inappropriate knowledge and practice from old to new nurses, who in turn lead to following the same mistakes in caring for patients. These results agree with the study of **El-Masry (2012)**; entitled as "Effect of Implementing a designed nursing protocol on nurses' knowledge and practice regarding epileptic patients outcomes" which revealed that no significant difference between nurse's practice scores with their years of experience observed during pre-test.

Table (5): blood transfusion reaction of the studied group (n=60). Showed that there was statistical difference between control and study group before and after protocol regarding blood transfusion reaction.

Table (6): Percentage distribution of blood transfusion complications as regard pre and post implementing designed nursing intervention protocol of the studied patients (no= 60). Revealed that the incidence of blood transfusion complications after application of the designed nursing intervention protocol was be lesser than pre implementation of the designed nursing protocol.

In the present study the majority of patients were male, married, their age was above 30 years, not working, illiterate, from rural and their blood group was (A) positive Rh. This study finding was supported by **WHO (2011)**; which reported that the most frequently transfused patient group (all transfusions) is over 65 years old.

The results in the present study revealed that, the highest percentage in the study group have anemia, leukemia and liver cirrhoses. And the majority in the control group of patients has hemophilia and anemia.

Two thirds of the patients were receiving blood more than two times per week. This study finding was supported by **Obsborn & Wraa (2010)**; who reported that whole blood is useful in case of

bleeding due to liver disease and hemophilia. Also the rate of Rh+ is considered, it was reported to be about 85% in all the population. However, varying percentages were reported in various countries of the world.

As regard blood transfusion data of the studied patients, the present study found that the majority of the patients in both the control and study groups received whole blood.

This study finding was supported by **Abdel-Wahab (2006)**; who reported that patients with a demonstrated deficiency in either whole blood or a specific component of blood are given a blood transfusion.

As regard the indications for blood transfusion; it greatest percentage of patients receive the blood to correct the decrease in platelets. As regard the amount of blood received it was the majority of control and study groups received 500cc at upper limb. As regard the duration of blood transfusion pre and post implementation of the nursing intervention protocol with a mean value was nearly equal pre and post implementing nursing intervention protocol.

As regard blood general assessment of the studied patients in the present study found that the majority of patients pre and post intervention protocol received previous blood transfusion which was whole blood. As regard the times of previous blood transfusion; the majority of control group received from 1 to 2 times and of study group received 3 times or more.

This study finding was supported by **Abdel-Wahab, Healy and Dzik (2006)**; who reported that patients with a demonstrated deficiency in either whole blood or a specific component of blood are given a blood transfusion.

Also a general appearance (weight) with a mean value for pre and post implementing nursing intervention protocol was nearly equal among study and control groups, (height) with a mean value for pre and post implementing nursing intervention protocol was nearly equal among study and control groups.

The greatest percentage of patients in study and control group hasn't any chronic illness. As regard medical diagnosis of the studied patients; the present study found that the majority of patients in study group have anemia, leukemia and liver cirrhoses and in control group patients there was hemophilia and anemia.

This study finding was supported by **Scott, Seifert & Grimson (2008)**; who reported that transfusion represents one treatment option for patients with anemia and blood transfusions are an effective way to raise hemoglobin levels and reduce anemia-related symptoms.

As regard the duration of blood transfusion pre and post implementation of the nursing intervention protocol with a mean value of (1.8 ± 0.7) pre and (1.8 ± 0.6) post implementing nursing intervention protocol. This study finding was supported by **American Society of Anesthesiologists (2006)**; which reported that the time for transfusion for all blood components not more than four hours.

As regard patient's progress record of the studied patients in the present study found that there was no significant difference of body temperature, pulse and blood pressure either systole or diastole. But there was significant difference of respiration during first 15 min. of transfusion pre and post implementing nursing intervention protocol. Also there was significant difference of respiration during 30 min. of transfusion pre and post implementing nursing intervention protocol.

As regard blood transfusion complications in the present study it was found that, the incidence of blood transfusion complications after application of the designed nursing intervention protocol was lesser than pre implementation of the designed nursing intervention protocol. The most common complications which occurred pre implementing the nursing intervention protocol were fever, anxiety, chills, and tachycardia.

Eder and Chamber (2007); who reported that early complications of transfusion are rare, occurring in less than 1 in 1,000 transfusions, but tends to be more severe.

SHOT. Annual Report (2006); Reported that signs and symptoms of hemolytic reaction are; chills, fever, low back pain, feeling of head fullness; flushing, tachycardia, tachypnea, hypotension, vascular collapse, hemoglobinuria, hemoglobinuria, bleeding and acute renal failure that occurs in about 0.016 percent of transfusions.

Finally, it can be concluded that, the nursing intervention protocol for patients who were undergoing blood transfusion achieved the protocol objectives by improving nurses' knowledge and practice regarding blood transfusion for those patients and application of this care by nursing staff help in reducing and / or preventing post transfusion complications for those patients. This further was supported by **Porth (2000)** and **Storch and Rice (2005)**; who stated that professional nurses have a large role to play in the minimization and prevention of blood transfusion complications and should be clinically well versed in all aspects of the condition, current strategies to address risk minimization and prevention management and advocates for patient safety.

Summary

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

- Patient undergoing blood transfusion is exposed for several complications. These complications can be classified as acute or delayed. Acute reactions include allergic, febrile, septic, and hemolytic reactions, air embolism, and circulatory overload. Delayed reactions include delayed hemolytic reactions, iron overload, infectious diseases (eg, hepatitis B, hepatitis C, CMV, Epstein-Barr virus, malaria, HIV).
- Nurse's knowledge and practice regarding blood transfusion in the general medical departments (B and C) and blood diseases unit at Assiut University Hospital are inadequate. Nurses are potentially capable to improve their knowledge and practice after exposure to designed nursing intervention protocol after.

Conclusion

Improved nurses' knowledge and practice can favorably affect the incidence of blood transfusion complications after implementing the designed nursing intervention protocol on nurse's knowledge and practice regarding blood transfusion.

Recommendations

Based on results of the present study it can be recommended that:

For nurses

1. Continued nursing education and inservice training programs in general medical departments (B and C) and blood diseases unit should be well organized within Assiut University Hospital and equipped with the necessary educational facilities and materials necessary to upgrade the knowledge and skills of practicing nurses, which will be reflected on better outcome and service for the inpatients.
2. Nurses should add to their routine obligations the regular reading of up-to-date references (periodicals, textbooks, etc.). They should always be encouraged to attend scientific meetings and conferences to keep pace with the rapidly growing wealth of knowledge and practice necessary for proper nursing service.
3. Newly employed nurses in general medical departments (B and C) and blood diseases unit are required to successfully complete a test of basic knowledge and skills before assuming independent responsibility for patient care.

For patients

1. Patients are to be provided with sufficient relevant written information to remind them about what they can or can not do to assist them cope with the treatment.
2. The multidisciplinary approach must be used in caring for patients requiring blood transfusion. Available resources should include the patient, the patient's family, the nurse, and other staff, the social worker and psychologist.

For administration

1. Adequate supplies and facilities should be available in the unit.
2. Periodic monitoring of nurses knowledge and practice to evaluate the level of nurses.
3. Orientation program for all newly nurses and in services training program for experienced nurses about blood, blood transfusion and complication.
4. The general medical departments (B and C) and blood diseases unit should have a written policy about the standardized nursing care that should be delivered to every patient receiving blood in the unit.
5. Availability of manual procedures for nurses to be aware of handling any problems that may arise.
6. Presence and reviewing of patient's records for proper follow up for patient undergoing blood transfusion procedure.
7. Placement and use of hand washing facilities in the unit as (sink, antimicrobial soap, paper towels for drying).
8. Following routine testing policies; hepatitis B and C and HIV antibodies for patients and staff.

For further research

1. Replication of the study on a larger probability sample acquired from different geographical areas in Egypt to figure out the main aspects of this problem.
2. It is recommended that similar studies should be replicated on longitudinal bases till one year as a minimum time period for follow up.

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