Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 2, pp: (191-200), Month: May - August 2020, Available at: www.noveltyjournals.com

Impact of implementing a designed blood transfusion nursing guideline on patient's outcomes at medical department

Eman Abdel Razik Abdel Hakim[1], Inshrah Roshdy Mohammed[2]

[1]Assistant Lecturer of Medical Surgical Nursing (Adult Nursing), Faculty of Nursing-Minia University

[2]Assistant prof. of Medical-Surgical Nursing, Faculty of Nursing– Minia University.

Corresponding Author: Eman AbdelRazik Abdel Hakim

Abstract: **Blood transfusion is the most common therapeutic procedure performed for hospitalized patients. Although transfusion enhance patients 'life, it is not without risks .Good clinical practice contributes to safe and effective transfusion. Blood product safety is an important part of improving patient safety outcomes. Aim of the study: To evaluate Impact of implementing a designed blood transfusion nursing guideline on patient's outcomes at medical department Research design: Quasi-experimental research design was utilized in the current study. Subjects: A Convenience sampling of (78) adult patients who were classified equally into two group; study and control (n =39).Setting: This study was carried out in medical department at Minia university hospital. Tools of data collection: Patient's assessment sheet and patient's outcomes assessment sheet after blood transfusion administration. Results: current study findings revealed that there were positive outcomes among study group as the highest percentage covered without signs and symptoms of immediate blood transfusion reactions constituted (70.40%) while there were negative outcomes among control group as the highest percentage covered with signs and symptoms of immediate blood transfusion reactions constituted (66.70%). It also showed that there were five deaths of participants probable and possible related to blood transfusion among the control group that constituted (10.30%) & (2.60%)respectively. Conclusion: The study findings concluded that there was a statistical significant positive correlation between patient's outcomes and implementing a designed blood transfusion nursing guideline among study group Recommendations: Based on the research findings the researcher recommended that establishing skills and competencies tools for continuous assessment of nursing knowledge and practices can improve blood transfusion administration.**

Keywords: **blood transfusion, nursing guideline, patient outcomes.**

I. INTRODUCTION

Blood transfusion is the most common therapeutic procedure performed for hospitalized patients; about 15% of inpatients receive blood components during their hospital stay. (**Panch et al., 2019)**. It is considered one of the most effective therapeutic alternatives in the treatment of certain conditions as surgery, trauma severe anemia , acute blood loss and in the replacement of blood components that are essential for maintenance of life (**Cherem et al., 2017)** It is defined as the process by which the blood of one person is injected into another one's circulation for medical purposes.**(IslamiVaghar, 2018)**

Although transfusion enhance patients 'life, it is not without risks. There are multiple adverse reactions of blood transfusion that may range in severity from minor to life-threatening**. (Adorno et al., 2016; Garraud et al., 2018)**. Good clinical practice contributes to safe and effective transfusion by ensuring that the right blood and blood product is given to

the right patient at the right time, appropriate decision-making about the appropriate use of blood based on assessment of clinical findings and laboratory parameters, and the monitoring of patients for adverse reactions of transfusion and their management if they occur and documentation of the process.**(Kipkulei et al., 2019).**

Nursing professionals have a central role in the transfusion process, when performing a blood transfusion, nurses must pay attention to 4 basic elements: appropriate blood, correct patient, proper procedure, and right timing of transfusion these requires specific knowledge and skills to ensure the safety and efficiency of this procedure. Errors in practice may therefore lead to severe and sometimes life-threatening consequences to the patients **(da Sila et al., 2016; Kavaklioglu et al., 2017**). The knowledge and skills of health care professionals are fundamental to developing and strengthening the quality of blood transfusion procedures. **(Encan et al., 2019)**

Considering the number of transfusions occurring around the world, the safety of blood products is an important part of improving patient safety outcomes. Patient safety has been defined, reduced and mitigated from insecure actions within the health care system, as well as through the use of best practices that have been shown to lead to better patient outcomes. It has identified blood safety as a high priority health care issue and launched the Global Blood Safety Cooperation (GCBS) as the world's effort to improve blood safety by building on knowledge, using existing experiences, encouraging dialogue, realistic suggestion, effort and a practical mechanism. (**Ismail et al., 2017)**

Significance of the study:

According to world Health Organization (WHO) and Global Database on Blood Safety (GDBS) more than (67,000) hospitals performing blood transfusions serving globally**.(WHO, 2017).** Serious Hazards of Transfusion program reported that about (62.6%) of all reported adverse reactions were related to unsafe practice by individual staff members **(SHOT, 2016)**. According to The International Surveillance of Transfusion-Associated Reactions and Events (ISTARE) about (25%) of adverse reactions were severe, about (58%) of death rate was due to pulmonary complications (TACO 27%, TRALI 19% and TAD 12%), and about(11.2%) due to allergic reactions **(Politis et al., 2016).**

Aim of the study:

The aim of the present study was to evaluate the impact of implementing a designed blood transfusion nursing guideline on patient's outcomes at medical department.

Research hypothesis:

Implementing a designed blood transfusion nursing guideline would have a positive effect on patient outcomes.

II. SUBJECTS AND METHODS

Research design

Quasi-experimental research design (study & control) was utilized in the current study.

Sample and sampling:

A Convenience sampling of (78) adult male and female patients were collected through six months and they were classified equally into two groups (study and control); each group (n =39) who were going to receive blood transfusion.

Inclusion Criteria:

1. Patient's age from 18 to 65 years.
2. Conscious patient**.**

Exclusion Criteria:

- Patients with previous history of blood transfusion adverse reactions.

Setting:-

The current study was carried out in medical department at Minia university hospital

Tools of data collection:

Two tools were used in this study that were developed and collected by the researcher after revising extensive relevant literature review.

Tool I: Patient's assessment sheet: that was contain two parts

Part 1: Personal data: to collect patient personal data through individually interview related to the following: age, gender and educational level.

Part 2: Patient's clinical profile: to assess patient's medical data though patient's medical file and individually interview and it was consisted of six items such as (history of previous blood transfusion, patient's medical diagnosis, chief complaint for blood transfusion …….. etc.)

Tool II: Patient's outcomes assessment sheet after blood transfusion administration: it consisted of three items with ranking present or not present as the following

No. 1) Mean that patient recovered without reactions

No.2) Mean that patient recovered with reactions

No.3) Mean that death from transfusion

N.B) there are details regarding No.3 that was explored the etiological cause of death if

- Unlikely related to transfusion.
- Possible related to transfusion.
- Probable related to transfusion.

Tools validity:-

Content validity was done to identify the degree to which the used tools measure what was supposed to be measured. The developed tools were examined by a panel of five experts opinion in the field of the study {one from Minia University faculty of nursing (Community Nursing Department), three from Assuit University faculty of nursing (Medical –surgical Nursing Department), and one from Ain-Shams University faculty of nursing (Medical –surgical Nursing Department). All jury members (100%) agreed that current study tools were valid and relevant with the aim of the study.

Tool Reliability:

Reliability was ascertained statistically by using Alpha Cronbach's test to ensure that the study tools were reliable and the results of patient's assessment sheet was (0.92) and Patient's outcomes assessment sheet after blood transfusion administration was (0.77)

Pilot study:-

A pilot study was carried out on 10% (n = 8) of the total sample to test the clarity of tools and estimate the time required for fulfilling it. Based on results of the pilot study no modifications or refinements were done and the subjects included to the actual sample.

Ethical Considerations:-

A written approval obtained from the ethical and research committee of the faculty of Nursing, Minia University. Oral consent obtained from each participant after explaining the nature & objectives of the study to gain their cooperation. Each assessment sheet was coded and subjects' names were not appeared on the sheets for the purpose of anonymity and confidentiality. Subjects were free to withdraw from the study at any time.

A designed blood transfusion nursing guideline: was developed by the researcher after extensive review of related literature that was used as a guide for researcher when providing care for study group who received blood transfusion during study period. It was consisted of (37 items) grouped into three phases pre-transfusion phase (13 items) and administration phase (18 items) and end phase (6 items).

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 2, pp: (191-200), Month: May - August 2020, Available at: www.noveltyjournals.com

Procedure:-

The current study was conducted by preparing of different data collection tools, in addition to obtaining formal paper agreement from study setting. Collection of study data was done through daily basis (2 days / week) during evening shift. Within average (2-3 patients through day). During the data collection period, the researcher reached the hospital and stayed enough time to assess and obtain blood bags from blood bank for each patient who was ordered for blood transfusion in both groups (study and control).

The data Collection of the studied sample was started firstly from control group that was received a routine hospital care during their blood transfusion procedure by nursing staff in about three months of the study duration by using tool I, tool II

Secondly data collection from study group was started by the researcher after finishing control group at the second three months of the study duration by using the same Previous mentioned tools except that the researcher implemented a blood transfusion procedure for them by herself using a designed blood transfusion nursing guideline.

The researcher trained the internship nursing students who had shift in the same study setting as co- researcher to follow up the studied sample for signs and symptoms and Patient's outcomes from the blood transfusion adverse reactions during the time when the researcher didn't attain with the patients (morning and night shifts) by using tool II.

III. RESULTS

Table (1): Distribution of personal data for both studied groups (n = 78).

Personal data	*Study (n = 39)*		*Control (n = 39)*		X^2	*P – value*
	No.	*%*	*No.*	*%*		
Age / years						
18- 33 years	*4*	*10.3*	*1*	*2.6*	*1.984*	*0.371*
33 – 48 years	*12*	*30.8*	*12*	*30.8*		
48 – 65 years	*23*	*59.0*	*26*	*66.7*		
Mean ± SD	*47.1 ± 12.6*		*49.3 ± 10.5*			
Gender						
Male	*17*	*43.6*	*19*	*48.7*	*0.206*	*0.650*
Female	*22*	*56.4*	*20*	*51.3*		
Educational level						
Illiterate	*13*	*33.3*	*17*	*43.6*		.
Read and write	*7*	*17.9*	*8*	*20.5*		
Primary school	*7*	*17.9*	*8*	*20.5*	*4.267*	*0.371*
Secondary school	*9*	*23.1*	*6*	*15.4*		
University	*3*	*7.7*	*0*	*.0*		

Table (1): Showed that the mean age among study and control groups was nearly similar that constituted (47.1 ± 12.6, 49.3 ± 10.5) respectively. In respect to gender; the results revealed that the highest percentage among study and control groups were female constituted (56.4% & 51.3%) respectively. Related to educational level the majority of the current study sample were illiterate while the minority were university, there were no significant differences between study and control groups regarding to personal data.

Table (2): Distribution of the studied sample according to clinical profile (n=78)

Clinical profile	*Study (n = 39)*		*Control (n = 39)*		X^2	*P – value*
	No.	*%*	*No.*	*%*		
History of previous blood transfusion						
Yes	*14*	*35.9*	*17*	*43.6*	*.482*	*.488*
No	*25*	*64.1*	*22*	*56.4*		
Medical diagnosis						
Anemia	*20*	*51.3*	*14*	*35.9*	*1.877*	*.171*

Liver cirrhosis	*19*	*48.7*	*25*	*64.1*		
Chief complain						
Bleeding	*11*	*28.2*	*15*	*38.5*		
Low hemoglobin	*21*	*53.8*	*14*	*35.9*	*2.545*	*.280*
Active bleeding and low HB	*7*	*17.9*	*10*	*25.6*		
Volume of whole blood transfusion						
500 ml	*39*	*100.0*	*39*	*100.0*	*…*	*…*
Intravenous fluid administration						
Yes	*7*	*17.9*	*4*	*10.3*	*.953*	*.329*
No	*32*	*82.1*	*35*	*89.7*		
If yes describe type:						
Normal saline	*7*	*100.0*	*4*	*100.0*	*…..*	*…..*
Amount within average						
500 ml	*7*	*100.0*	*4*	*100.0*	*…..*	*…..*

Table (2): illustrated that the majority of the both groups (study and control) had no history of previous blood transfusion constituted (64.1% & 56.4%) respectively, concerning their medical diagnosis more than half of the study group constituted (51.3%) had anemia but more than half of the control group constituted (64.1%) had liver cirrhosis. Also the table represented that the highest percentage of the study group had low hemoglobin as a chief complain constituted (53.8%) but the highest percentage of the control group had bleeding . According to the volume of blood transfusion all studied sample received about (500 ml) of whole blood, lastly the majority of the current studied sample didn't receive intravenous fluid; as the minority of them received normal saline within average (500 ml). There were no significant differences between study and control groups regarding to clinical profile.

Figure (1): Mean average scoring and standard deviation of implementing a designed blood transfusion nursing guideline regarding three phases of blood transfusion (pre, administration and end) among both groups (study and control) (n=78).

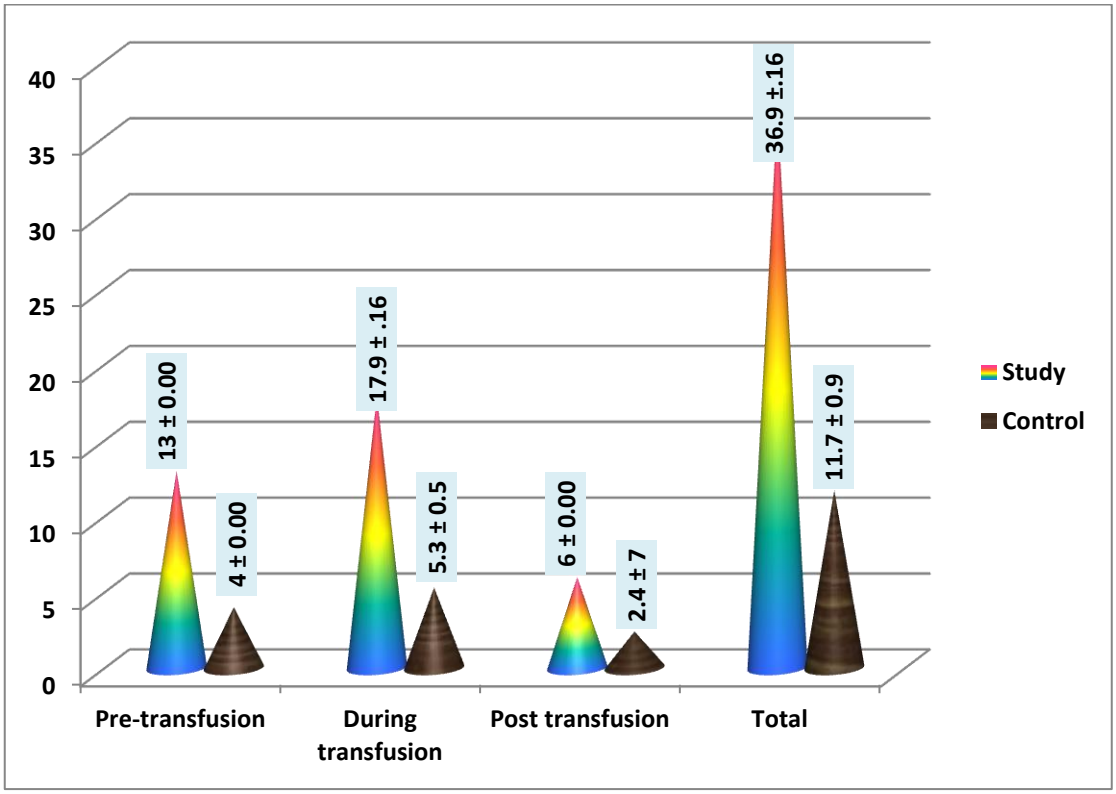

Figure (1): illustrated that there were a markedly decline in the total nursing practices regarding three phases of blood transfusion (pre, administration and end) for control group compared to study group as the Mean ± SD was (11.7 ± 0.9 & 36.9 ± 0.16) respectively.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 7, Issue 2, pp: (191-200), Month: May - August 2020, Available at: www.noveltyjournals.com

Figure (2) Percentage distribution of patient's outcomes of blood transfusion among both studied groups (n = 78)

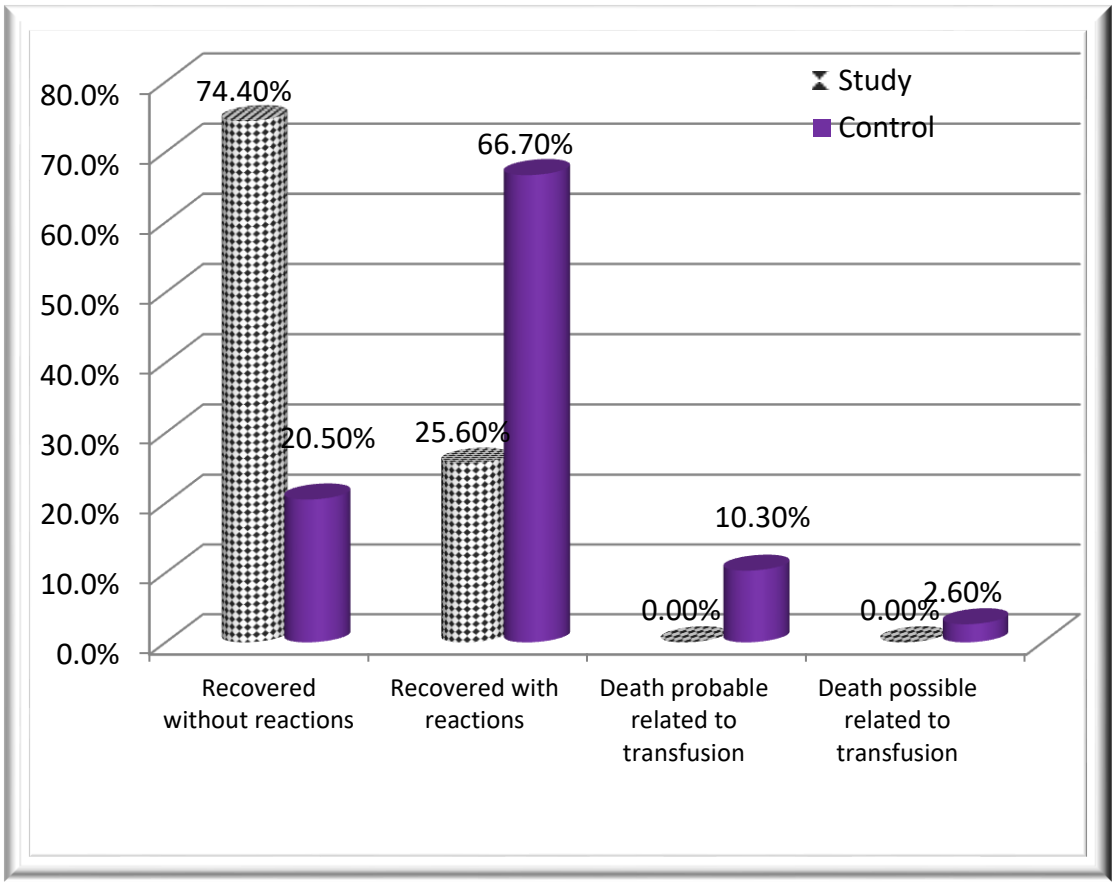

Figure (2): illustrated that there were positive outcomes among study group as the highest percentage covered without signs and symptoms of immediate blood transfusion reactions constituted (70.40%) while there were negative outcomes among control group as the highest percentage covered with signs and symptoms of immediate blood transfusion reactions constituted (66.70%). It also showed that there were five deaths of participants probable and possible related to blood transfusion among the last group that constituted (10.30%) & (2.60%) respectively.

Table (3): Correlations between implementing a designed blood transfusion nursing guideline and Patient's outcomes of blood transfusion (n=78)

Variables	Level of Blood Transfusion Practices Score			
	Study (n=39)		Control (n=39)	
	r	*P*	*r*	*P*
Patient's outcomes of blood transfusion	**0.766**	**0.049***	**0.029**	**0.862**

**** Statistical significant difference (P ≤ 0.05)***

Table (3): Highlighted that, there was a statistical significant positive correlation (0.766) between Patient's outcomes of blood transfusion and implementing a designed blood transfusion nursing guideline among study group in which (P – value = 0.049***).**

IV. DISCUSSION

The present study showed that the highest percentage among study and control groups had an age between (48-65 years) with mean constituted (47.1 ± 12.6 & 49.3 ± 10.5) respectively, this is related to participants of studied sample was had medical conditions that required blood transfusion such as (anemia and liver cirrhosis) this result was compatible with

Karafin et al. (2017) who found that transfusion incidence when stratified by age occurred in the 60–69 year age group. Further validation by **De Santo et al. (2017)** who documented that the highest rate of blood transfusion according to the decade of patients' age was in patients aged (40 to 50 years) followed by patients aged (50 to 60 years).Finally in the same line the current study finding was suitable with **Reis et al. (2016)** who observed that the mean age of patients undergoing transfusion was 49.5 years.

Concerning gender the present study demonstrated that the majority of the studied sample (study and control groups) were female , this findings came in accordance with **Okoroiwu et al. (2018)** who reported that the majority of the 2336 transfusion recipients studied were females also Sawadogo et al. (2018) found that the majority of patients who received blood transfusion were female constituted (59.5%) Moreover Reis et al. (2016) observed that blood transfusion in relation to gender occurred in 50.2% (n = 508) of women . On the other hand this result was in contrast with **Gwaram et al. (2012)** who reported that more than half of transfused patients were males constituted 94 (52.2%) with the male: female ratio 1.1:1.

Regarding educational level the present study findings demonstrated that the highest percentage of both groups (study and control) were illiterate this result was in consistent with Central Agency for Public Mobilization and Statistics in Egypt **(CAPMAS, 2018)** which reported that Upper Egypt had the highest rates of illiteracy in 2017; al-Minya ranked as firstly that was recording 37.2 percent, followed by 35.9 percent in Bani Suef, 34.6 percent in Assiut, 34 percent in Fayoum and 33.6 in Sohag.

Findings of the present study showed that more than two third of study group had no history of previous blood transfusion this result was supported by **Elsayed et al. (2019)** who documented that the majority of studied sample in their study constituted (63%) had no history of previous blood transfusion.

Concerning medical diagnosis the present study result demonstrated that the majority of the study group had anemia, it is related to blood transfusion is one strategy for the treatment of anemia when medications are not enough for medical management this result was in consistent with **Vidya et al. (2016)** who mentioned that the major reason for blood transfusion was anemia constituted 197 patients (49.25%) .

Concerning intravenous fluid administration the current results revealed that normal saline was the only fluid that was received with blood transfusion by studied sample ,this is related to hospital policy to use normal saline with blood transfusion this result was supported by **Blumberg et al. (2018)** who mentioned that normal saline was the solution which most widely employed in hematology and transfusion medicine and the only compatible IV solutions that used along with blood transfusion. in the same line the current study result was supported by **Ghartimagar (2017).**

The current study results illustrated that there were a markedly decline in the total nursing practices regarding three phases of blood transfusion (pre, during and post) by the control group compared to study group, this related to previous rationales were mentioned by researchers. These findings was in accordance with a study done by **Ahmed (2019)** who reported total practices scores among study subjects of nurses had bad practices related to blood transfusion before implementing his training module as the mean was (7.07±6.769, 8.11±7.977 and 7.22±6.508, 8.11±7.847) among both groups in Egypt and Sudan. In the same line the present study result was supported by **Lahlimi et al. (2015)** who displayed that highest percentage of the participants nurses (75%) have inappropriate knowledge and practice with all steps of blood transfusion. Finally this result was in agreement with **Hijji et al. (2013)** who found that only 13 nurses (5%) in their study were aware of the routine activities that they should perform after transfusion initiation until its end.

The present study revealed that there were negative outcomes among control group as the highest percentage covered with signs and symptoms of immediate blood transfusion reactions constituted (66.70%). It also showed that there were five deaths of participants probable and possible related to blood transfusion among the same group that constituted (10.30%) & (2.60%) respectively. This may be related to what were mentioned above regarding improper nursing staff practices of blood transfusion administration in its three phases (pre, administration and end), these findings were supported by **Elsayed et al. (2019)** who reported that occurrence of complications from blood transfusion administration in study group were less than in control group .Also in the same line the current result was in agreement with **Silva et al. (2017)** who found that more than two third of the studied sample of nurses (79%) were unaware of the types of reactions that

may occur with transfusion and (87%) were unaware of the how to report them, this may cause serious harm to patients, including death. lastly this result was supported by **Kavaklioglu et al. (2017)** who reported that a lot of nurses did not know enough about complications that may occur in a blood transfusion or the signs of potential reactions complications.

The present study highlighted that there was a statistical significant positive correlation (0.766) between patient's outcomes of blood transfusion and implementing a designed blood transfusion nursing guideline among study group this is related to best practice for administering a blood transfusion as well as knowledge about the variables that can lead to undesirable transfusion effects and their control enable risk management, thus reducing blood transfusion adverse reactions and also improve patient's outcomes.

V. CONCLUSION& RECOMMENDATIONS

Based on current study findings, there was a statistical significant positive correlation (0.766) between patient outcomes of blood transfusion and level of blood transfusion practice score among the study group in which (P – value = 0.049*).

1. In-service training programs based on evidence practice and regular inter- professional meeting that illustrate purposes and guideline procedure of safe blood transfusion administration to nursing staff that have positive effects on patient's safety outcomes should be provided..

2. Establishing skills and competencies tools for continuous assessment of nursing knowledge and practices to improve the blood transfusion administration

3. Replication of the current study on a larger sample size and in other settings like blood banks and other hospital departments as (surgical, dialysis, Obstetric) to achieve generalizable results replicated.

4. Encourage further researches regarding nursing knowledge, skills and attitude related to blood transfusion procedure and its outcomes.

Acknowledgment

The researchers would like to acknowledge the contribution of all participants who kindly agreed to take part in the study. They generously gave their time and attention to conduct this study. This study would have been impossible without their generosity.

REFERENCES

[1] Adorno, G., & Bonchi, C. (2016). Prevention in Transfusion Medicine.

[2] Ahmed, R. (2019). Effects of Intervention Training Module Regarding Hospital Nurse's Preparedness for Patient's Blood Transfusion. 102-116.

[3] Blumberg, N., Cholette, J. M., Pietropaoli, A. P., Phipps, R., Spinelli, S. L., Eaton, M. P., . . . Refaai, M. A. (2018). 0.9% NaCl (Normal Saline) - Perhaps not so normal after all? *Transfusion and apheresis science : official journal of the World Apheresis Association : official journal of the European Society for Haemapheresis, 57*(1), 127-131. doi:10.1016/j.transci.2018.02.021

[4] CAPMAS. (2018). Central Agency for Public Mobilization and Statistics in Egypt

[5] Cherem, E., Alves, V., Rodrigues, D., Souza, F., Guerra, J., & Maciel, V. (2017). Nurses' knowledge of blood transfusion in neonate. *Revista gaucha de enfermagem, 38*(1), e63557-e63557.

[6] da Sila, K. F. N., Floriano, D. R., Duarte, R. D., Tavares, J. L., dos Santos Félix, M. M., Silva, Q. C. G., . . . Barbosa, M. H. (2016). Blood transfusion in cancer patients: Knowledge of the nursing team. *International Archives of Medicine, 9*.

[7] De Santo, L. S., Romano, G., Mango, E., Iorio, F., Savarese, L., Numis, F., & Zebele, C. (2017). Age and blood transfusion: relationship and prognostic implications in cardiac surgery. *Journal of thoracic disease, 9*(10), 3719-3727. doi:10.21037/jtd.2017.08.126

[8] Elsayed, I.-H. M., & Hussein, A.-Z. (2019). Effect of Applying Nursing Intervention Program on Reducing Complications of Blood Transfusion. *IOSR Journal of Nursing and Health Science*(2).

[9] Encan, B., & Akin, S. (2019). Knowledge of blood transfusion among nurses. *The Journal of Continuing Education in Nursing*, *50*(4), 176-182.

[10] Garraud , O., Sut, C., Haddad, A., Tariket, S., Aloui, C., Laradi, S., . . . Aubron, C. (2018). Transfusion-associated hazards: a revisit of their presentation. *Transfusion Clinique et Biologique*, *25*(2), 118-135.

[11] Ghartimagar, D. (2017). Rational Clinical Use of Blood and Blood products – A summary. *Journal of Pathology of Nepal*, *7*, 1111. doi:10.3126/jpn.v7i1.16949

[12] Gwaram, B., Borodo, M., Dutse, A., & Kuliya-Gwarzo, A. (2012). Pattern of acute blood transfusion reactions in Kano, North-Western Nigeria. *Nigerian Journal of Basic and Clinical Sciences*, *9*(1), 27-32. doi:10.4103/0331-8540.102110

[13] Hijji, B., Parahoo, K., Hussein, M. M., & Barr, O. (2013). Knowledge of blood transfusion among nurses. *Journal of clinical nursing*, *22*(17-18), 2536-2550.

[14] IslamiVaghar, M. (2018). The Impact of an Educational Program on Blood and Blood Products Transfusion on Nurses' Level of Knowledge and Performance. *Journal of medicine and life*, *11*(3), 238-242. doi:10.25122/jml-2018-0016

[15] Ismail, K. S., Mahjoub, H. M., Abdulilah, K., Elkheir, H. A., & Taha, U. (2017). Study of Patient Safety Regarding Blood Transfusion in four Hospitals in Khartoum State.

[16] Karafin, M. S., Bruhn, R., Westlake, M., Sullivan, M. T., Bialkowski, W., Edgren, G., . (2017). Demographic and epidemiologic characterization of transfusion recipients from four US regions: evidence from the REDS-III recipient database. *Transfusion*, *57*(12), 2903-2913. doi:10.1111/trf.14370

[17] Kavaklioglu, A. B., Dagci, S., & Oren, B. (2017). Determination of health workers' level of knowledge about blood transfusion. *Northern clinics of Istanbul*, *4*(2), 165-172. doi:10.14744/nci.2017.41275

[18] Kipkulei, J. C., Buziba, N. G., & Mining, S. K. (2019). Documentation of the Clinical Blood Transfusion Practice at a Teaching and Referral Hospital in Western Kenya. *American Journal of Health Research*, *7*(1), 8-11.

[19] Lahlimi, F., Tazi, I., Sifsalam, M., Bouchtia, M., & Mahmal, L. (2015). Assessment of transfusion practice: assessing nurses' knowledge in transfusion medicine at Mohamed VI Hematology and Oncology Center of Marrakesh, Morocco. *Transfusion clinique et biologique: journal de la Societe francaise de transfusion sanguine*, *22*(1), 12-16.

[20] Okoroiwu, H. U., & Okafor, I. M. (2018). Demographic characteristics of blood and blood components transfusion recipients and pattern of blood utilization in a tertiary health institution in southern Nigeria. *BMC Hematology*, *18*(1), 16. doi:10.1186/s12878-018-0112-5

[21] Panch, S. R., Montemayor-Garcia, C., & Klein, H. G. (2019). Hemolytic transfusion reactions. *New England Journal of Medicine*, *381*(2), 150-162.

[22] Politis, C., Wiersum, J. C., Richardson, C., Robillard, P., Jorgensen, J., Renaudier, P., . . . Wood, E. M. (2016). The International Haemovigilance Network Database for the Surveillance of Adverse Reactions and Events in Donors and Recipients of Blood Components: technical issues and results. *Vox Sang*, *111*(4), 409-417. doi:10.1111/vox.12447

[23] Reis, V. N. d., Paixão, I. B., Perrone, A. C. A. d. S. J., Monteiro, M. I., & Santos, K. B. d. (2016). Transfusion monitoring: care practice analysis in a public teaching hospital. *Einstein (São Paulo)*, *14*, 41-46.

[24] Sawadogo, S., Nebie, K., Millogo, T., Sontie, S., Nana, A., Dahourou, H., . . . Kafando, E. (2018). Traceability of Blood Transfusions and Reporting of Adverse Reactions in Developing Countries: A Six-Year Postpilot Phase Experience in Burkina Faso. *Advances in hematology, 2018*.

[25] SHOT, Serious Hazards of Transfusion. (2016). SHOT Report 2016 / SHOT-Report-2016_web_11th-July.

[26] Silva, E. M., Vieira, C. A., Silva, F. O., & Ferreira, E. V. (2017). Desafios da enfermagem diante das reações transfusionais [Nursing challenges in responding to transfusion reactions][Retos de la enfermería ante las reacciones transfusionales]. *Revista Enfermagem UERJ, 25*, 11552.

[27] Vidya, M., T, V., Prasad, S., & Rh, S. (2016). A Study on Blood and Blood Components Transfusion, Adverse Reaction at a Tertiary Care Teaching Hospital, Bangalore. *Journal of Blood Disorders & Transfusion, 07*. doi:10.4172/2155-9864.1000372

[28] WHO, World Health Organization (2017). The 2016 global status report on blood safety and availability.