Correlation between nursing practices regarding blood transfusion and its adverse reactions among patients at medical department

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Abstract

Background: Blood transfusion is considered one of the most effective therapeutic alternatives in the treatment of certain conditions, although it is lifesaving, there is a risk for the patient to develop transfusion-related adverse reactions. Nursing professionals have a central role in the transfusion process. **The aim of the study:** is to assess correlation between nursing practices regarding blood transfusion among patients at medical department and its adverse reactions. **Research design** descriptive correlation research design was utilized in the current study. **Subjects** A convenience sampling of (39) adult patients who were going to receive blood transfusion were included in the current study. **Setting:** This study was carried out in medical department at Minia university hospital. **Tools of data collection:** Two tools were used in this study: 1-Patient's assessment sheet 2- immediate reactions of blood transfusion assessment sheet. **Results:** illustrated that there were a markedly decline in the total nursing practices regarding three phases of blood transfusion (pre, administration and end) for studied sample as the Mean ± SD was 11.7 ± 0.9 **Conclusion:** there was a negative correlation (-0.080) between the studied sample' immediate blood transfusion adverse reactions and level of blood transfusion practices score. **Recommendations:** Based on the research findings the researcher recommended that 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.

Key Words: Nursing practices, Blood transfusion, Patients, Adverse reactions.

Introduction

Blood transfusion 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 blood transfusion is a common medical procedure that is often lifesaving, there is a risk for the patient to develop transfusion-related adverse reactions **(Miao, 2019).**

Transfusion reactions can occur during the transfusion (acute transfusion reactions) or days to weeks later (delayed transfusion reactions) **(Khoyumthem et al., 2018).**Acute transfusion reactions (ATR) are those occurring within 24 hours of the administration of blood or blood components ,they occur in about 0.5%–3% of transfusions and include the following; Acute hemolytic reactions(AHTRs), Febrile non-hemolytic reactions (FNHTRs), Allergic and anaphylactic reactions, septic (bacterial contamination), Transfusion-Related Acute Lung Injury (TRALI), Transfusion-Associated Circulatory Overload (TACO) **(Castillo et al., 2018)**. Any reaction beyond 24 hours of transfusion is termed a delayed transfusion reaction **(Tinegate et al., 2012; Hillis et al., 2016).**

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).** According to statistics the majority of mistakes related to blood transfusion occurring in hospitals, include neglect in observation of recipients during transfusion, patient misidentification and transfusion of wrong blood units, these errors are associated with inadequate training and lack of experience **(Shamshirian et al., 2017)**

Significance of the Study

According to world Health Organization **(WHO, 2016)** and Global Database on Blood Safety (GDBS) more than (67,000) hospitals performing blood transfusions serving globally, **(Gu et al., 2015))**. **Flood and Higbie, (2016)** stated that (WHO) reported that over nine million patients in (90) different countries receive blood in a year **(Gu et al., 2015)** . According to Serious Hazards of Transfusion program **(SHOT, 2016)** about (62.6%) of all reported adverse reactions were related to unsafe practice by individual staff members **(SHOT, 2016)**.Through the researcher' clinical opinion during students training period at medical department many patients who received blood transfusion were exposed to many complications, the researcher revised that there was no previous studies was done in this location about this point of research.

Aim of the Study:

Assess correlation between nursing practices regarding blood transfusion among patients at medical department and its adverse reactions.

Research question:

What is the relation between nursing practices regarding blood transfusion among patients at medical department and its adverse reactions?

Subjects and Methods
Study design:-

Descriptive correlation study design was utilized to fulfill the purpose of this study.

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Setting:-

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

Subject:

A convenience sampling of (39) adult patient who were going to receive blood transfusion during the study period and were meet the inclusion criteria in medical department was assigned in this study sample size that was calculated by **Slovin'S formula (Slovin, 1960)** which is computed as $n = N / (1+Ne^2)$; whereas:

n = sample size   N = total population

e = desired margin of error   n= 43 / $[1+ (43) (0.05)^2 = 39$ patients

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.

Data Collection Tools

Two tools were used in this study that were developed and collected by the researcher after revising extensive relevant literature review as **(Dougherty et al., 2015; Rutala et al., 2015; Bolton-Maggs, 2017)** and also reviewed by a panel of five experts, three in the field of Medical Surgical Nursing Faculty of Nursing Assuit University, one in the field of Medical Surgical Nursing Faculty of Nursing Ain Shams University and one in the field of Community Nursing Faculty of Nursing at Minia University for validity testing. These tools were as following:-

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)

Tool II: immediate reactions of blood transfusion assessment sheet: it was filled through patients 'subjective and objective data and was consisted of signs, symptoms of immediate transfusion reactions which might be occur for patient within (24) hours from transfusion, It was ranked as present or not present of the following signs and symptoms as (fever, flushing, headache and dyspnea, …………… etc.)

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.

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 immediate reactions from blood transfusion assessment sheet was (0.77)

Ethical Consideration

A written approval obtained from the ethical and research committee of the faculty of Nursing, Minia University, Agreement from Egypt Academic for Research Center and Technology. And Hospital, 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.

Study 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).

The data collection was assessed by researcher from studied sample who received a routine hospital care during blood transfusion administration by their nursing staff in about three months by using tool I and tool II.

The researcher trained the internship nursing students who had shift in the same study setting as co-researcher to use tool II (immediate reactions from blood transfusion assessment sheet) to follow up the studied sample for signs and symptoms of blood transfusion adverse reactions during the time when the researcher didn't attain with the patients.

Pilot study

A pilot study was carried out on 10% (n = 4) 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.

Statistical analysis of data

Data were summarized, tabulated, and presented using descriptive statistics in the form of means and standard deviations as a measure of dispersion. A statistical package for the social science (SPSS), IBM (24) was used for statistical analysis of the data, as it contains the test of significance given in standard statistical books. Qualitative data were expressed as percentage. For quantitative data, Probability (P-value) is the degree of significance, less than 0.05 was considered significant. The smaller the P-value obtained, the more significant is the result (*), less than 0.001 was considered highly significant (**) .Graphs were done for data visualization using Microsoft Excel

Results
Table (1): Distribution of the studied sample according to personal data and clinical profile (n = 39).

Personal data	Studied sample (n = 39)	
	No.	%
Age / years		
18- 33 years	1	2.6
33 – 48 years	12	30.8
48 – 65 years	26	66.7
Mean ± SD	49.3 ± 10.5	
Gender		
Male	19	48.7
Female	20	51.3
Educational level		
Illiterate	17	43.6
Read and write	8	20.5
Primary school	8	20.5
Secondary school	6	15.4
University	0	.0
History of previous blood transfusion		
Yes	17	43.6
No	22	56.4
Medical diagnosis		
Anemia	14	35.9
Liver cirrhosis	25	64.1
Chief complain		
Bleeding	15	38.5
Low hemoglobin	14	35.9
Active bleeding and low HB	10	25.6

Table (1): Showed that the mean age among studied sample was (49.3 ± 10.5). In respect to gender; the results revealed that the highest percentage were female .Related to educational level the majority of the current studied sample were illiterate while the minority were university. Also the table illustrated that the majority of the same group had no history of previous blood transfusion that constituted (56.4%), concerning their medical diagnosis more than half of the studied sample (64.1%) had liver cirrhosis, moreover the table represented that the highest percentage constituted (38.5%) had bleeding,
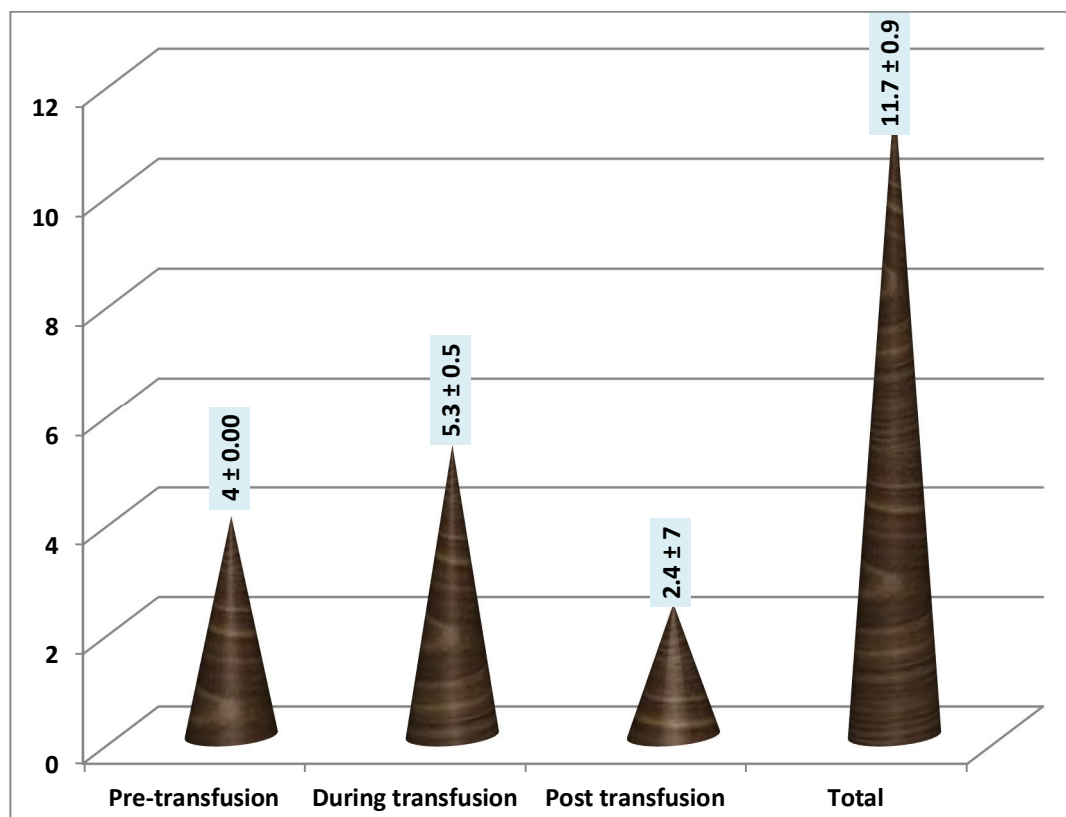

Figure (1): Mean average scoring and standard deviation for nursing practice regarding three phases of blood transfusion (pre, administration and end) for studied samples (n=39)

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 studied sample as the Mean ± SD was 11.7 ± 0.9
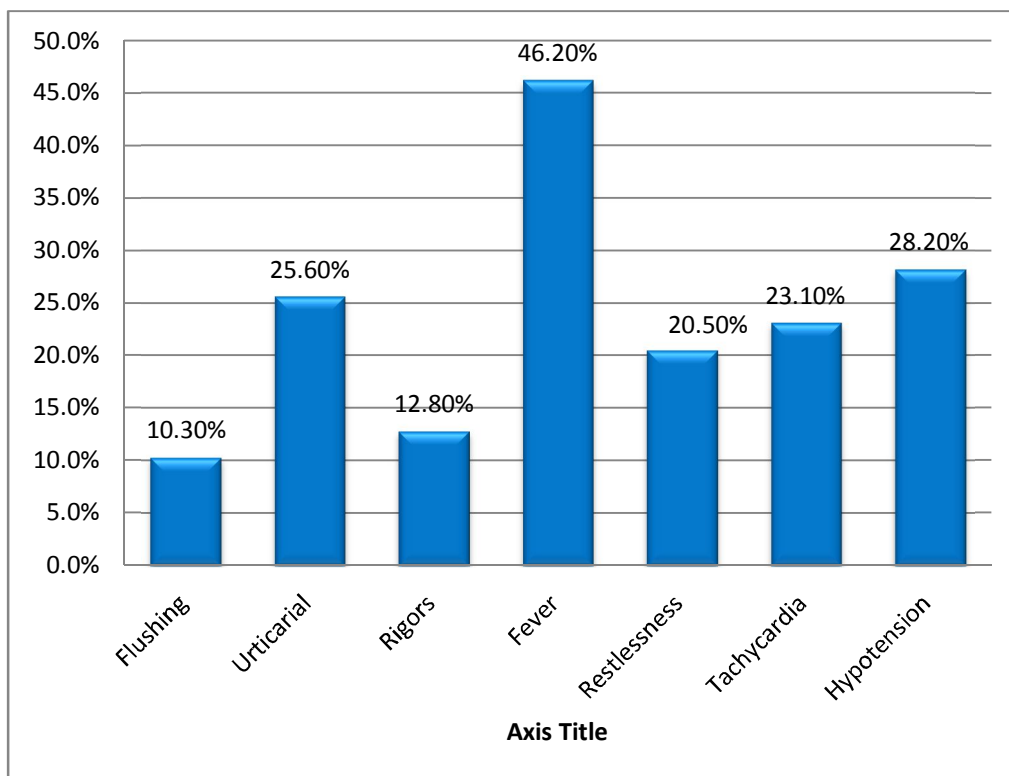
Figure (2) Percentage distribution of the studied sample according to observation of immediate blood transfusion adverse reactions' signs (n = 39)

Figure (2): Showed that the highest percentage of the studied sample had fever and the lowest percentage of the same group had flushing constituted (46.2%) (10.3%) respectively
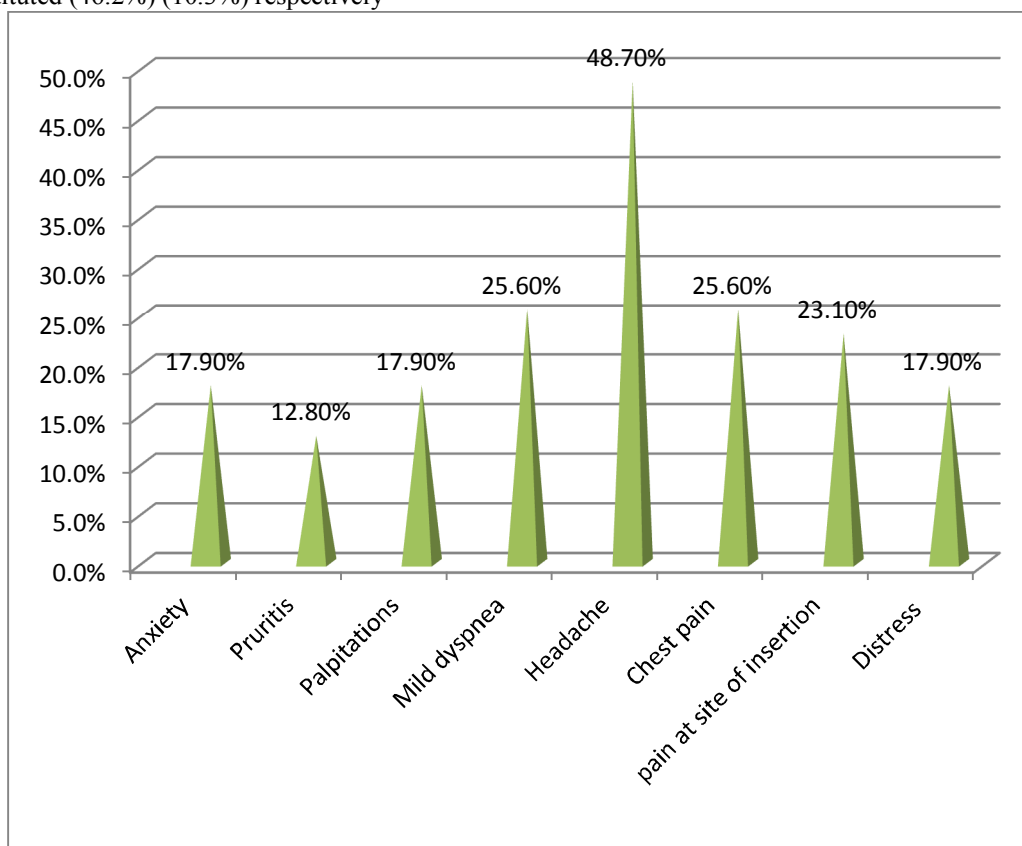
Figure (3) Percentage distribution of the studied sample regarding to immediate blood transfusion adverse reactions' symptoms (n = 39)

Figure (3): Represented that the highest percentage of symptoms among the studied sample was headache, mild dyspnea and chest pain constituted (48.70% & 25.6% & 25.6%) respectively.

Table (2): Correlations between Level of Blood Transfusion Practices Score and Immediate blood transfusion adverse reactions (n=39)

Variables	Level of Blood Transfusion Practices Score	
	Studied sample (n=39)	
	r	P
Immediate blood transfusion adverse reactions	-0.080	0.629

Table (2): Highlighted that there was a negative correlation (-0.080) between the studied sample' immediate blood transfusion adverse reactions and level of blood transfusion practices score.

Discussion

The present study showed that the highest percentage of studied sample had an age between (48-65 years) with mean constituted (47.1 ± 12.6) 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).

Concerning gender the present study demonstrated that the majority of the studied sample was 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%) 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 studied sample 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 studied sample 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.

The current study results illustrated that there were a markedly decline in the total nursing practices regarding three phases of blood transfusion (pre, administration and end phase) by the studied sample this is related to lack of proper blood transfusion guidelines as well as inadequate continues in-service educational programs that provided for nurses to update their knowledge and practices about safe blood transfusion administration. These findings was in accordance with a study done by **Ahmed (2019)** who reported that 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 results showed that the highest percentage of the studied sample suffered from blood transfusions' signs as (fever, hypotension urticaria, and tachycardia) and also the same group complained from the following blood transfusion's symptoms like (respiratory distress and pruritus), fever may be related to that the patient's body is reacted to white blood cells, plasma or platelets in the donated blood while the other signs and symptoms may be related to improper nursing practices regarding blood transfusion administration these results were compatible with **Hatayama et al. (2018)** who found that the most clinical manifestations of blood transfusion reactions were urticaria and pruritus that constituted (39.3% & 20.7%) respectively ,while they reported in the same study that the lowest percentage of signs and symptoms of blood transfusion reactions were hypotension 3.7%,, respiratory distress 2.5% and tachycardia 2.5% that didn't match with the current study results,

In the same line with the present results **Chavan et al. (2017)** who found that most common signs of blood transfusion reactions was pruritus that constituted 26.60%. Also the result was supported by **Charkravaty–Vartak et al. (2016)** who reported that the most common signs of acute blood transfusion reaction were fever and tachycardia that constituted (38% &18%,) respectively. Moreover **Negi et al. (2015)** and **Kumar et al. (2013)** mentioned that the Common presenting complaints of blood transfusion in their study were fever and hypotension which constituted (54.2% &29.62%) respectively.

The current result highlighted that there was a negative correlation between the studied sample' immediate blood transfusion adverse reactions and level of blood transfusion practices score this may be related to improper nursing staff practices of blood transfusion administration this study findings were corroborated with **Elsayed et al. (2019)** who reported that occurrence of patient complications in study group were less than in control group during transfusion and first 24 hours of transfusion,

Conclusion

The current study findings concluded that there were a markedly decline in the total nursing practices regarding three phases of blood transfusion (pre, administration and end) for studied sample as the Mean ± SD was 11.7 ± 0.9.it also illustrated that there was a negative correlation (-0.080) between the studied sample' immediate blood transfusion adverse reactions and level of blood transfusion practices score.

Recommendations

Based on the findings of the present study, the researcher suggested that;

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..

Acknowledgment

References

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

2. Bolton-Maggs, P. (2017). Serious hazards of transfusion–conference report: celebration of 20 years of UK haemovigilance. *Transfusion Medicine, 27*(6), 393-400.

3. CAPMAS. (2018). Central Agency for Public Mobilization and Statistics in Egypt

4. Castillo, B., Dasgupta, A., Klein, K., Tint, H., & Wahed, A. (2018). *Transfusion Medicine for Pathologists: A Comprehensive Review for Board Preparation, Certification, and Clinical Practice*: Academic Press.

5. Charkravaty–Vartak, U., Shewale, R., Vartak, S., Faizal, F., & Majethia, N. (2016). Adverse reactions of blood transfusion: A study in a tertiary care Hospital. *International Journal of Scientific Study, 4*(2), 90-94.

6. Chavan, S., Patil, G., & Rajopadhye, P. (2017). Adverse blood transfusion reactions at tertiary care hospital. *Int J Res Med Sci, 4*(6), 2402-2407.

7. 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.

8. 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.*

9. 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

10. Dougherty, L., & Lister, S. (2015). *The Royal Marsden manual of clinical nursing procedures*: John Wiley & Sons.

11. 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).

12. Gu, Y., Kokar, C., Gooday, C., Morrow, D., & Dhatariya, K. (2015). A 5-Year Follow-up Study to Assess Clinical Outcomes of Patients with Diabetes Undergoing Lower Limb Angiography for Significant Peripheral Artery Disease. *Diabetes Therapy, 6*(4), 481-493.

13. 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

14. Hatayama, Y., Matsumoto, S., Hamada, E., Kojima, N., Hara, A., Hino, N., & Motokura, T. (2018). Analysis of Acute Transfusion Reactions and Their Occurrence Times. *Yonago acta medica, 61*(1), 87-90. doi:10.33160/yam.2018.03.013

15. 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.

16. Hillis, C. M., Shih, A. W., & Heddle, N. M. (2016). Best practices in the differential diagnosis and reporting of acute transfusion reactions. *International Journal of Clinical Transfusion Medicine, 4*, 1-14.

17. 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

18. Karafin, M. S., Bruhn, R., Westlake, M., Sullivan, M. T., Bialkowski, W., Edgren, G., . . . Donor Evaluation, S., III. (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

19. 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

20. Khoyumthem, P., Rachandra, K., Goswami, S., Lyngdoh, L., Sharma, A., & Singh, A. (2018). Acute transfusion reactions in a tertiary hospital: A 2-year retrospective study. *Journal of Medical Society, 32*(1), 47-50. doi:10.4103/jms.jms_41_17

21. Kumar, P., Thapliyal, R., Coshic, P., & Chatterjee, K. (2013). Retrospective evaluation of adverse transfusion reactions following blood product transfusion from a tertiary care hospital: A preliminary step towards hemovigilance. *Asian journal of transfusion science, 7*(2), 109-115. doi:10.4103/0973-6247.115564

22. 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.

23. Miao, W. (2019). Understanding the Nursing Practices and Perspectives of Premedication and Transfusion Reaction Reporting: A Qualitative Description Study.

24. Negi, G., Gaur, D. S., & Kaur, R. (2015). Blood transfusion safety: A study of adverse reactions at the blood bank of a tertiary care center. *Advanced biomedical research, 4*, 237-237. doi:10.4103/2277-9175.168604

25. 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

26. Rutala, W. A., & Weber, D. J. (2015). Disinfection, sterilization, and control of hospital waste. *Mandell, Douglas, and Bennets principles and practice of infectious diseases, 2*, 3294-3309.

27. 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.*

28. Shamshirian, A., Alirahimi, Z., Ghorbanpour, A., Motamen, S., Maadi, N., Zamani, P., & Mohseni, A. R. (2017). Knowledge and Awareness of Nursing Students on Blood Transfusion. *International Journal of Medical Investigation, 6*(4), 0-0.

29. SHOT, Serious Hazards of Tansfusion. (2016). SHOT Report 2016 / SHOT-Report-2016_web_11th-July.

30. Slovin, M. (1960). Slovin's formula.

31. Tinegate, H., Birchall, J., Gray, A., Haggas, R., Massey, E., Norfolk, D., . . . Allard, S. (2012). Guideline on the investigation and management of acute transfusion reactions Prepared by the BCSH Blood Transfusion Task Force. *British journal of haematology, 159*(2), 143-153. doi:10.1111/bjh.12017