



STUDY ON SAFE BLOOD TRANSFUSION PRACTICES AMONG NURSING OFFICERS IN COLOMBO SOUTH TEACHING HOSPITAL SRI LANKA

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ABSTRACT

This descriptive cross-sectional study was conducted at Colombo South Teaching Hospital (CSTH) Sri Lanka. The purpose of this study is to describe Knowledge and practices towards safe blood transfusions among nursing officers. As there are no designated transfusion nurses in Sri Lankan healthcare settings it is mandatory to assess nurses' knowledge and practices to ensure safe transfusions. This descriptive cross-sectional study was a mixed study. The quantitative component was performed using a sample of 384 nurses who were randomly selected from all wards. A modified version of the Routine blood transfusion Questionnaire was used for the data collection. Quantitative data were analyzed using SPSS 22 software. Key informant interviews were performed with 15 nursing sisters to assess factors which affect safe transfusions regarding hospital management.

Results revealed that nursing officers current nursing practices, and knowledge towards transfusion safety is satisfactory. Nursing officers' attitude towards safe transfusions is good. Nursing officers training needs are not addressed adequately. It is mandatory to improve the knowledge, and practices of nursing officers to combat the unavailability of designated transfusion nurses and to ensure safe transfusions. Current nursing practices and knowledge toward transfusion safety are satisfactory the study revealed that 58% of nurses have knowledge scores above the mean, and % of nurses have practice scores. A significant difference between the mean scores of knowledge and practice concerning N/O's working unit was found. The study recommends regularizing existing in-service training programs on safe transfusions for nurses to improve transfusion safety. According to information gathered during KII, Work environment factors and team factors are more favorable towards safe transfusions.

INTRODUCTION

Patient safety is, by definition, "the avoidance, prevention, and amelioration of adverse outcomes or injuries stemming from the process of healthcare." (Charles Vincent, 2010) Patient safety is a worldwide public health problem, and issues surrounding patient safety differ depending on the settings, local culture, and resource availability. The blood transfusion process consists of a chain of events and is a multidisciplinary science. Transfusion-related events are either inevitable reactions or preventable errors. Reactions can be major or minor, and transfusion errors are critical medical errors. Reactions are inevitable and unintentional, but early detection and urgent interventions are mandatory.

Transfusions are needed for a wide range of health conditions, including anemia, post-partum hemorrhage, accidents, emergencies, routine surgical procedures, etc. (WHO, 2008) Many specialized products are currently available for specific clinical conditions. Several staff categories are involved in the procedure, and all transfusions strictly adhere to National Blood Transfusion Service (NBTS) transfusion guidelines. Any deviations may lead to serious consequences for patients, staff, and the institute. All transfusion-related events need to be investigated. Root cause analysis of events is performed with less focus on individuals who make errors.

Clinical transfusion errors can happen both at the laboratory and ward levels. Both medical officers and nursing officers (N/O) are equally involved and responsible for clinical transfusion. Hence, patient safety can be affected at any level by both categories of staff. N/Os are involved with communication with the local blood bank, sample collection, patient preparation before transfusion, cold chain maintenance, initiation of transfusion, monitoring of the patient, completion of transfusion, and post-transfusion monitoring. There is a significant potential for human errors and the subsequent transfusion of the incorrect blood component, which can lead to serious consequences. A major reason for these ward errors is patient identification errors. (nuts, 2018) Nurses were taken to this research considering their central role in

performing blood transfusions. In developed countries, transfusions are performed by a designated category of staff named Transfusion practitioner patient blood management nurse or transfusion nurse. (L. Bielby, Stevenson and Wood, 2011) However, in Sri Lankan settings, there are no dedicated transfusion nurses.

The actual figure for transfusion-related events is not known due to underreporting. Despite all the efforts, transfusion-related events continued to happen worldwide due to various factors. According to the 2019 Serious Hazards of Transfusions (SHOT) report, 2.3 million units of blood or components were issued in the United Kingdom (UK), and 4248 adverse events and 1314 near-missed events were reported. The risk of serious harm is 1 in 17884. Out of these events, more than half of the cases are preventable. Others are not preventable but need urgent interventions to save lives. The number of errors would appear to be increasing according to the SHOT data in the UK. (SHOT, 2019) Unsafe blood practices are one of six ranked research priorities. (WHO, 2008) in the WHO priority list for patient safety. The Annual SHOT Report 2019 (UK) revealed various factors associated with transfusion-related events. N/O's sub-optimal practices, inadequate knowledge, poor attitude, and managerial issues have been identified as some of them.

In Sri Lanka, NBTS is the focal point for clinical transfusions. The country has been divided into clusters. There are 105 local blood banks under the direct supervision of the NBTS. Consultant transfusion physicians (CTPs) are the team leaders, and medical officers, nursing officers, and healthcare assistants work in those blood banks after BB training. Transfusions at the ward level are performed by ward N/O, and they are not entitled to compulsory transfusion training. Ward N/Os' competency and knowledge assessment is not performed at regular intervals. According to the hemovigilance report 2018, NBTS-SL, the total number of blood issues for the main blood components is 720,407. The total number of adverse events was 4,031 with 333 major transfusion reactions and 29 cases of ABO-incompatible blood transfusions, which are preventable. All major events should be reported to the National Blood Center (NBC) as soon as possible by phone, and all events are tracked weekly using an online system.

CSTH is one of the major government teaching hospitals and a prime center in patient care in Sri Lanka. (SL) According to statistics, 9774 red cell packs were issued, and 145 transfusion reactions were reported in 2018 in this hospital. Out of these reactions, two were ABO incompatibilities.

Many studies have been performed in international settings to describe factors affecting patient safety in various frameworks, but not much in our settings. Considering existing hemovigilance data, expert opinion from experts in the field, and evidence gathered from a literature review, the research is focused on nursing officers. Transfusion-related events are highlighted in the media. The cost of health care also increases with these events, and staff and the institution will have to face serious consequences due to legal issues. The findings of this research will help make decisions about the training needs of NCOs. The study will be an eye-opener for implementing the clinical transfusion checklist, which is a timely need.

This research aimed to describe N/O's blood transfusion practices and assess contributing factors affecting patient safety during transfusions. The relationship between N/O's sociodemographic factors and the components of their factors was also assessed in the analysis. The quantitative component of the study was designed as a self-administered questionnaire (SAQ) based on a modified version of the Routine Blood Transfusion Knowledge Questionnaire (RBTQ). (Hijji, Parahoo, Hussein, et al., no date) and safety attitude questionnaire (SAQ). The objective of this study is to assess Knowledge Attitudes and practices on blood transfusion safety among nursing officers in Colombo South Teaching Hospital.

2 Literature review (1500)

Good transfusion practice is key to safe transfusions. Avoidance of errors, appropriate use of blood and components, monitoring of patients, and management of adverse events are mandatory to ensure good practice. Nursing practices have been assessed using quantitative as well as qualitative methods in different settings in various phases of the transfusion process. A survey performed using hemovigilance data in the hemovigilance system in Spain revealed nurses' training, education and frequency of transfusion are key factors for best transfusion practices. (Jimenez-Marco et al., 2012)

A review article on Blood sampling guidelines stated that the preanalytical phase of the transfusion chain is the main contributor to most errors. Patient identification and tube labelling are the main steps with the highest risk regarding patient safety. In 16.1% of cases, patient identification is incorrectly performed, and patient identification errors (56%) are mainly due to unacceptable labelling practices. The study recommended patient identification using open questions and three identification parameters. Labelling is recommended to be done in the presence of the patient. (Cornes et al., 2019b) Standardization of the phlebotomy process has been established by various guidelines. An observational study in 12 European countries revealed the median error rate for the total phlebotomy procedure was 26.9 %, It indicates low compliance with the recommended guideline. The main errors were patient identification errors and tube labelling errors. A retrospective study performed in Japan emphasized that errors were observed during all stages of the blood transfusion process. Most errors were simple mistakes in confirmation, handling and documentation committed by the medical staff. (Ri et al., 2020) A descriptive cross-sectional study performed on 171 nurses of medical, surgical and ICU in Turkey revealed nurses had poor knowledge regarding changing blood transfusion sets (Encan and Akin, 2019)

In the United Arab Emirates descriptive study was performed by non-participants structured observation of 50 nurses and the study revealed 75% of nurses scored less than the 50% level of possible score. A strong association between the incidence of transfusion errors showed with the nurse's education deficits and low transfusion frequency ($r = 0.70$; $p = 0.01$). Nurses who transfused either daily or weekly and strictly followed transfusion guidelines showed a lower mis transfusion rate ($r = 0.93$; $p < 0.01$). (Hijji et al., 2010)

A descriptive observational study performed using the checklist in Kathmandu and Nepal, revealed time taken from issuing from the blood bank to clinical transfusion was more than 2 hours in 53.2% of cases. Blood was kept in the ward in an unprotected manner in the majority of cases and monitoring of vital signs 5 minutes after initiating the transfusion was done only about 2 to 4% of cases (Sapkota et al., 2018) A

review article on Promoting safe transfusion practice by British Journal of Nursing, identified factors affecting best transfusion practice including leadership, organizational support, education, regular competent testing and role of audit and feedback. (Gray et al., 2008) A study in North India revealed that only 31.7% of the interviewed staff were aware of the guidelines and 80.6% of the staff were not aware of the “do's and don'ts” of transfusions. There was no difference between knowledge and practices in relation about the unit (Khetthe et al., 2018) National comparative audit of bedside transfusion practice revealed patients can be misidentified and poorly monitored in the UK during the blood transfusion. Lack of awareness of good transfusion practice is the commonly identified reason for not adhering to guidelines. (Hijji, Parahoo, Hossain, et al. 2010)

Several studies were performed to assess the knowledge of nursing officers about transfusions in all phases. Majority The majority show low to moderate knowledge level (Binda et al., 2019) (Encan and Akin, 2019b) (Hijji, Parahoo, Hussein, et al., no date) (Tavares et al., 2015) (Kabinda et al., 2014) Some countries show very low levels of knowledge and practices. Only 16.7% were found to have correct answers on knowledge and practices based on blood transfusions in a study performed among medical and paramedical staff in blood transfusions in Congo (Bediako, Ofosu-Poku and Druye, 2021) Healthcare provider's attitudes about issues of patient safety is an important aspect which researchers are interested in. Positive attitude towards patients, positive behaviors, and treating people with a positive regard, are part of professionalism. (Dean, 2017) Knowledge of edge Attitudes and practices on blood transfusion safety is generally low. (Kabinda et al., 2014) An institution-based cross-sectional study design was conducted in South Africa to assess the knowledge and attitudes of nurses towards patient safety. A favourable attitude has been found among participants, but relatively poor knowledge of patient safety. Factors significantly associated with the attitude of nurses towards patient safety are training, the Age of the participant, and knowledge of patient safety. It recommends institutions arrange training for staff, design leaflets and reading materials on patient safety. (Biresaw, Asfaw and Zewdu, 2020)

3 Material and method

Research Approach

The research uses the deductive approach. The study population comprises 800 nursing officers at Colombo South Teaching Hospital. Between October 2021 and March 2022

Sample size calculation

The formula computes the minimum sample size needed, considering various factors such as the critical value (1.96) corresponding to a specified confidence interval (95%), the anticipated population proportion (P), and the acceptable level of absolute error (D).

In this scenario, the hypothesized population proportion was set at 0.5 to represent an equal distribution, and the predetermined level of acceptable absolute error was established as 0.05.

$$N = Z^2 \times P(1 - P) / D^2$$

N - Minimal sample size
Z - Critical value (1.96) of specified confidence interval which was 95%
P - Anticipated population proportion
D - Acceptable amount of absolute error
$$(0.05) N = (1.96)^2 \times 0.5(1 - 0.5) / (0.05)^2$$

The required sample size was increased by a predicted 10% non-response rate. Therefore, the sample size obtained was = 384 + 41 = 425.4

Data Collection and Analysis

Both primary and secondary data are used in this research. Primary data was collected through a structured questionnaire and 393 respondents were positively engaged with the survey. This data is analyzed using IBM SPSS 23.

During the design phase, multiple consultations were conducted with medical administrators at different hierarchical levels to ensure the questionnaire's face validity and content validity. The questionnaires underwent translation and subsequent back translations to ensure linguistic consistency. Pretesting was conducted to further validate both the checklist and questionnaire. Secondary data was gathered using international journal articles, books, reports, and other reliable secondary data sources.

Data collection

Study instruments:

1. Self-administered questionnaire (SAQ Part1) to assess Practices and knowledge.
2. Key Informant Interview (KII) guide

A modified version of the RBTKQ developed by (Hijji, Oweis, and Dabbour, 2012) was used as the data collection instrument. The RBTKQ was modified under the guidance of consultant transfusion Physician CSH and an expert panel referring to NBC Guideline,

Section A unchanged and basic demographic data and data on training are included. Section G of the RBTKQ on issues related to transfusion policies was removed and issues related to sample collection was added to the questionnaire (Section B). Section, B, C D was combined as section D and it consist of pretransfusion nursing activities. Section E of RBTKQ was named as Section D which during-transfusion initiation activities Section. Section F was not changed and included complications related to clinical transfusions. With the help of CTP, the questionnaire was subdivided into knowledge questions and practice questions for the purpose of analysis. That categorization was approved by NBTS committee.

Self-administered questionnaire (SAQ Part1) composed of sections, A, B, C, D, and E The questionnaire consists of practice questions and Knowledge questions.

Section A -Nursing officer's Demographic Details and Training details

Section B: Issues Related to Sample collection for blood bank investigation.

Section C: Pre-transfusion nursing activities.

Section D: During transfusion and post transfusion Nursing Activities and Issues

Section E: Complications Related to Blood Transfusion

KII is composed of part 1 and part 2

part A -Assess work environment and managerial factors , Staffing levels and shift patterns and workload, Availability of training, Availability of SOPs, and guidelines, Availability, of infrastructure and equipment , Awareness of hemovigilance and HTC

Part B Assess Team factors., Verbal communication Written communication, Supervision and seeking help.

Data analysis

Statistical Analysis-Quantitative data analysis was performed using SPSS version 23 software. Qualitative data analysis performed using word cloud.

Incomplete forms

All incomplete forms (Not answered more than 5 questions) were categorized as incomplete and did not enter to the data sheet.

Data cleaning

About 10% of the sample cross checked manually and proof reading done by another person.

Exploratory Data Analysis (EDA)was conducted for all scale variables using SPSS to test the data for missing values, outliers, and normality,

Missing values

Those variables consist of less than five missing values were replaced by the mean of the variable If there are more than five missing values in a respondent those respondents were deleted from the study.

Outliers

There were 8 outliers in attitude score ,5 outliers in knowledge score and 6 outliers in practice score. Those outliers were indicated in stem and leaf plot. They were replaced by mean values of relevant scores.

Basic Demographic characteristics were described using descriptive statistical tools. Categorical data analyzed using nonparametric measures. Normality tests were done for scale level variables: Knowledge score, practice score, and attitude score . Data were analyzed as follows.

Ethical and administrative Considerations

Ethical approval

Ethical clearance from PGIM ethical review committee.

The PI presented the proposal to NBC ethical committee and expert panel and took their approval.

Administration approval

permission to conduct the study was obtained from the Director Csth.

Consent

All participants were provided with the consent form and information sheet. After reading and understanding every participant sign the consent form. Confidentiality was ensured and any personal detail was not discussed /included in results at individual level.

Data storing and safety.

All completed questionnaires were collected daily basis and kept under lock and A digital copy of database was password protected for greater confidentiality.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

The sample was found to have 92.8 % female nursing officers. The feminization process of the nursing team exceeds 90%. According to WHO percentage of registered male nurses is only 9%. So, the figure is compatible with global data. 80.4% of the sample belongs to the age category 21-40 years. The majority is young. In contrast, the Global trend is an ageing workforce in healthcare. (Nurses by sex (%), 2020) Previous research studies also have similar Sociodemographic results. (Hijji, Oweis and Dabbour, 2012) In the study, 66.25% are married, and this percentage is very similar to the normal Sri Lankan population. Considering statistics, 67.8 % of the 15 years and the above population is married in SL. (Department of Census and Statistics, 2012)

More than 90% nurses of in the sample have training needs. Only nurses appointed to Blood Bank duties possess proper transfusion training in Sri Lankan settings. In contrast, dedicated Transfusion nurses are practising in the developed world, and they receive proper blood bank training, Transfusion safety officers are there to ensure safe transfusions and they have a major role in all steps of transfusions. (L Bielby, Stevenson and Wood, 2011)(Vasiliki, 2011) The study revealed only 32.2% of nurses received in-service training. KII revealed no compulsory training or competency assessment on transfusions entitled for newly appointed nursing officers, in contrast, Global studies revealed majority of nurses in other countries obtained a bachelor's degree in nursing, and they underwent in-service blood transfusion training. (Encan and Akin, 2019a) Several studies have recommended regular training for nurses and assessment of their practices to ensure transfusion safety. (Kaur et al., 2014a; Panchawagh, Melinkeri and Panchawagh, 2020; Bediako, Ofosu-Poku and Druye, 2021b)

This study revealed a statistically significant relationship between the unit of work and work experience. (chi-square value 52.14, df=14, p=0.000). Some units are performing transfusions very frequently and some are not. Nurses' knowledge and practices also improved with their experience. In This study Gynecology and obstetrics unit has the highest mean practice, and highest mean attitude. ICU nurses have the highest knowledge. Units with more Frequent transfusions have high scores, Similar results can be seen in several studies as

well(Bediako, Ofosu-Poku and Druye, 2021b). (Panchawagh, Melinkeri and Panchawagh, 2020)Another study revealed that low training and low transfusion activities are the main reasons for poor scores.(Saillour-GléniSSon et al., 2002) Transfusion practices were assessed using a modified version of RBTKQ in this study and it is not the ideal way to assess practices. Observational studies have been performed throughout the world.(Hijji, Parahoo, Hossain, et al.,2010; Hijji et al., 2010; Sapkota et al., 2018) The RBTKQ has been used to measure knowledge and practices in several studies in different settings. In this study, results revealed nurses' transfusion practices are satisfactory. Above the mean practice score percentage is 55 % and 63.1% of nurses have having satisfactory level (50-74%) of practice. An observational study revealed more than 75% of nurses below 50% score in the Emirates,(Hijji et al., 2010) observational study performed in Nepal also showed a very low level of practice,(Sapkota et al., 2018) KAP study also revealed very low practice and knowledge levels in all aspects. (Kabinda et al., 2014)

Considering knowledge 58.4% is above the mean knowledge score. The good knowledge category possesses 69% of the sample. Similar result to this study has been observed in several studies worldwide. ((Kaur et al., 2014b; Panchawagh, Melinkeri and Panchawagh, 2020)(Bediako, Ofosu-Poku and Druye, 2021) In contrast some studies revealed poor to moderate blood transfusion knowledge scores in general (Encan and Akin, 2019)(Yami et al., 2021) On the other hand some research studies show adequate knowledge in this regard. (Beyazpınar Kavaklıođlu, 2017)(Hijji, Oweis and Dabbour, 2012)

However, looking at single items helps to pinpoint specific defects. Hence, a few major points are further discussed. Correct patient identification and sample labelling lead to a minimal chance for WBIT errors. WBIT is the common reason for major transfusion reactions and according to the SHOT report, the reason for about 50% of near misses Study results revealed that 87.9% of nurses have correct practice in sample collection. This is a very safe level even though electronic identification methods are not available in our system.(Cottrell et al., 2013) The study showed 89.1% of N/O s do the correct practice in pre-transfusion checking. In contrast, 66.7% of nurses didn't know the correct way of checking the blood packet in another study.(Encan and Akin, 2019).The study revealed more than 58% do the correct practice in the pre-transfusion phase while past research shows only 35.1% have the correct practice (Encan and Akin, 2019).

Most nurses who participated in the study have good knowledge of the instructions given before starting a transfusion. Studies in India also revealed the same(Panchawagh, Melinkeri and Panchawagh, 2020). The study revealed that 84% of nurses have good knowledge and correct practice in patient monitoring throughout transfusion. In contrast, the observational study revealed that 65% of nurses left the patient within five minutes of starting the transfusion. (Hijji et al., 2010) The study revealed more than 80% of nurses have the correct knowledge and correct practice related to transfusion events. In contrast, several studies revealed nurse knowledge of signs and symptoms and management of transfusion-related adverse events is not adequate.(Saillour-GléniSSon et al., 2002; Beyazpınar Kavaklıođlu, 2017) Only 29.3 % of N/O s in Csth are aware of the local policy of discarding unused blood/ components whereas global studies also have similar results. (36%)(Kaur et al., 2014)

Table 1

	21-30 n=168	31-40 n=157	41-50 n=60	51-60 n=15	>60 n=4	f value	df	P value
	mean	mean	mean	mean	mean			
Total practice score	22.5	22.4	22.53	23.1	24.25	0.756	4	0.648
Total knowledge score	26.54	27.1	26.92	26.8	30	1.969	4	0.098

Table shows that , sample is having mean practice score of 22.54 (n=404,)with SD of 2.672 . 55% of nurses have practice score above mean.Mean knowledge score is 26.85 (n=404,)with SD of 2.910 . 58.4% of nurses have knowledge score above mean.

The study shows no difference between mean scores of knowledge and practice scores with in-service training. Similar results were observed in a study using RBTKQ Ghana. as well (Bediako, Ofosu-Poku and Druye, 2021), a study on the impact of training in improving transfusion knowledge revealed a significant difference in pre-training and post-training scores. (Kaur et al., 2014) Nurses' safe transfusion Practices, and knowledge, depend on the working unit and their nursing experience. A similar study in India also found the same association. (Panchawagh, Melinkeri and Panchawagh, 2020)eg: theatre, ICU, ETU. Nurses who work in wards with more frequent transfusions have scored more. The study confirms the significant relationship between N/O practices and knowledge which was revealed during the literature review.

Qualitative component reveals that staffing levels were adequate except some units where very high patient turnover is happening. But all unit in charges are in view of that the transfusion safety is not affected by staff levels, as they give priority for blood transfusions, and awareness on transfusion safety is very good. They pay extra attention on transfusions. The transfusion nurse is not distracted for any other works. Nurses do long shifts and fatigue is frequent in heavy units including ETU, Accident Service ,surgical wards. Most of the in charges are satisfied on training on transfusions. But all suggested to have more opportunities for training specially for newly appointed nurses. Safe transfusion lecture has been included to all in service training programmes organized by hospital. No practical demonstrations performed as a training programme.

Transfusion Guideline for clinical transfusions is only available in the hospital blood bank. SOPs for sample collection, transfusion, sample containers are not displayed in wards. The usual practice is to contact the blood bank and clarify their queries. No transfusion safety checklists are used in wards. Pre transfusion checking is performed using a check list in the BHT stamped by the blood bank issue counter. Printed format of transfusion safety check list is not available in our settings.

All wards have adequate facilities for bed side transfusion practices. Adequate number of cool boxes are available, blood

bank stickers are adequate in number, all stationary items and transfusion sets are adequate in all wards. There is a well-functioning telephone system in hospital to have good communication with local blood bank. Acute cubicle bed is not available for all transfusions all the time. Patient monitoring facilities in all wards are at satisfactory level. There are adequate facilities including emergency drugs to manage acute transfusion reaction. If needed ICU bed also available for the management in most of the instances. So, reactions are identified and managed urgently, with maximum care in all the wards of the hospital.

All in charge nurses are aware of hemovigilance system in NBTS. All are aware that it is non punitive. Majority of reactions are informed, and post transfusion reaction investigations performed. But only minority of near misses informed. Awareness on HTC among in charge nurses is not adequate. Only one in charge was aware.

According to in charges perceptions verbal communication among staff members are at satisfactory level Nursing officers, doctors and health care assistance are working with very friendly manner. Written communication also shows satisfactory except few wards' doctors handwriting are not eligible. Name of All admission sheets are in printed form. Unclear written instructions which lead to transfusions related events are very rare. Documentation of nursing officers are usually clear and traceable. Supervision during sample collection is done by nursing officers. House officer starts the transfusion and monitoring by nursing officers. Not much of a supervision from any other officer usually happen during this transfusion process and if any reaction happened all team members attend on it immediately. Almost all highlighted breaching of safety barriers during nighttime transfusions.

Limitations of the study

Self-assessed practices were obtained from participants. A more comprehensive picture of nurses' practices would be taken if the research were designed with few transfusion procedure observations. Considering the time factor and the COVID-19 situation that happened during the research data collection period the researcher did not observe any transfusion procedures. Errors happening at BB level/laboratory level were not considered in the study. Transfusion events due to other categories were not considered in the study. Ward-wise stratification is not done. Therefore, cannot compare ward-wise variations which may be important in planning safety improvement programmes. The situation in other government hospitals of different categories and private hospitals may be different. So, findings can't be generalized. Patient-related factors, task factors, and organizational factors are not considered in the study.

Conclusion

Considering mean scores of practices and knowledge the study revealed current nursing practices and knowledge towards transfusion safety are satisfactory. Most nurses are willing to improve their knowledge of safe transfusions. According to their responses to the quantitative component as well as KII with in charge sisters, the study revealed Nursing officers' training needs have not been addressed adequately. Nurses' safe transfusion Practices, knowledge, and attitude scores show a significant relationship in their working unit. Total Knowledge, and practice score show statistically significant relationship among each other. According to information gathered during KII, Work environment factors and team factors are more favorable towards safe transfusions. Even with limited new technological facilities, nursing officers are highly concerned about safe transfusions. No individual employed in the health sector comes to work to harm a patient. Achieving safe transfusion is a multidisciplinary goal. As a country, we have achieved a satisfactory level of blood safety. The NBTS, the focal point paved the path to safe transfusions. It is a timely need to improve nurses' knowledge practices, and attitudes to ensure safe transfusions.

Recommendations and suggestions

1. Strengthen and regularize existing in-service training programmes on safe transfusions with the support of the Local Blood Bank.
2. Identify strategies and implement programmes to improve nursing officer's attitudes towards patient safety.
3. Display relevant Standard Operating Procedures in all working units.
4. Distribute clinical transfusion guidelines to all units.
5. Strengthening of Hospital Transfusion Committee (HTC) with the support of hospital administration and Blood bank staff.

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