Assessment of Impact of Training in Improving Knowledge of Blood Transfusion among Clinicians

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Keywords

Blood safety · Blood transfusion · Knowledge, training and awareness

Summary

Background: Blood is a precious resource that needs to be prescribed, handled, stored and transfused as per guidelines to ensure recipient safety. The present study aims to assess the basic knowledge of clinicians pertaining to safe transfusion practice, impart relevant training, and assess the impact of such training programs. **Methods:** A total of 25 fresh bachelor of medicine and bachelor of surgery graduates were enrolled for the study. The participants were given a pre-assessment questionnaire related to the entire transfusion chain followed by interactive training of the participants and post-training re-assessment. **Results:** The mean score in the pre-training assessment was 51% while in the post-training assessment the mean score was 85.4%; the difference was statistically significant. There were significant differences in knowledge pertaining to storage temperature, shelf life of red cells and platelets, alternate group choice for fresh frozen plasma, and documentation of transfusion reaction. The participants had inadequate knowledge pertaining to cross-match procedure and management of transfusion reactions. **Conclusion:** The study assessed the knowledge and awareness of clinicians regarding blood transfusion practice. Mandatory training and inclusion of transfusion medicine as a subject at undergraduate level can help in improving transfusion practice and ensuring recipient safety.

Introduction

Blood transfusion is of vital importance in patient care all over the world. With advances in technology, transfusion medicine is gradually entering the clinicians' arena. This necessitates close collaboration with the clinicians to ensure proper and optimal utilization of blood transfusion services. Lack of knowledge of safe transfusion practices among clinicians can lead to unfavorable consequences in the transfusion recipients. Mark Friedman [1] has stated that lack of knowledge regarding transfusion medicine among clinicians is possibly the major obstacle in making transfusion practices more consistent. He proposed education of end users to close the gap in medical education pertaining to transfusion medicine. The hospital transfusion committee should have authority within the hospital for determining hospital transfusion policy and resolving problems [2]. Although hospital transfusion committee makes policies, education and audit are significant in changing transfusion practices [3]. Various studies have been conducted to assess knowledge and practice of blood transfusion among medical and nursing staff [4–8], but there is paucity of information on knowledge of clinicians involved in sending requisitions and initiating transfusion in patients.

The present study aims to evaluate the basic knowledge of safe transfusion practices among interns involved in requisition and transfusion of blood, to educate them about the right practice and assess the post-training knowledge. Transfusion medicine teaching is limited during the undergraduate years. Hence, it is important to ensure that the budding clinicians are comfortable with the use of blood and blood components and management of transfusion-related adverse events. The study will throw light on these issues and assess the effectiveness of conducting regular interactive training of personnel involved in requisition, handling, storage, and transfusion of blood and its components.

Material and Methods

A symposium was organized by the department of Transfusion Medicine to sensitize the new batch of fresh bachelor of medicine and bachelor of surgery (MBBS) graduates who had joined 1 year compulsory rotatory internship. A total of 25 interns registered for the training program which was of 1 day duration. A brief overview of the program was given to the participants. In order to assess the basic knowledge of the participants pertaining to blood requisition and transfusion, a pre-assessment questionnaire was distributed to the participants. The questionnaire was designed so as to include the major issues pertaining to safe blood transfusion. The questionnaire comprised of 20 multiple choice questions which were further categorized into indications and choice of components (four questions), cross-match procedure (three questions), storage temperature and shelf life of blood components (four questions), bedside transfusion practice (six questions) and transfusion reactions and management (three questions).

The participants were asked not to write their names, were ensured anonymity, and were only supposed to mark the correct answers on the sheet. The total score was 20 (one point for each correct answer, no point for incorrect or not attempted question). After this, the faculty of the department deliberated on topics such as requisition, handling and storage of blood and blood components, blood component therapy as well as transfusion reactions and their management. This was followed by an orientation of various areas and equipment of the blood bank. They were apprised of the storage conditions of blood components and the importance of storing components at the requisite temperature and in appropriate equipment. In the end, a round of spots was held in which various day-to-day issues were included such as proper patient identification at the time of sampling, correct labeling of samples and filling of requisition forms, visual inspection of blood and blood components before transfusion, pre-transfusion bedside check list, and transfusion reaction management. After the spot round, a post-training assessment questionnaire was distributed to the participants with the same 20 questions and same method of scoring. The training concluded with open house discussion of the correct answers to the questions and spots. The participants were distributed pocket handouts containing brief description of hospital transfusion guidelines. The data generated on evaluation of pre- and post-assessment questionnaires was analyzed statistically to determine the significance of training. A p value was calculated using Fisher's exact test, and $p < 0.05$ was considered statistically significant.

Results

A total of 25 interns registered and participated in the training program out of which 10 (40%) were males and 15 (60%) were females. The participants were 23–26 years old. Fresh MBBS graduates who had just joined internship were enrolled for the symposium. All 25 subjects completed the pre-training assessment questionnaire prior to the start of the symposium. The mean score of the participants in the pre-training assessment was 10.2 (51%), with the scores ranging between 5 and 14. The mean score in the post-training assessment was 17.08 (85.4%), ranging from 12 to 19. None of the participants scored the maximum score of 20 in both sessions. The difference between the mean scores in the pre- and post-assessment questionnaire was statistically significant (two-tailed p value < 0.0001).

On evaluation of the responses of the participants pertaining to indications and choice of blood components (table 1) it was observed that only 20% of participants were aware of the alternate group choice for fresh frozen plasma which increased to 100% after the training; the difference was statistically significant. The majority of the participants gave correct responses to questions pertaining to indications for red cells and alternate choice in Rh-negative pregnancy. The correct response to indications for fresh frozen plasma was given by 60% and 96% in the pre- and post-assessment group, respectively; this difference was not statistically significant.

The responses pertaining to cross-match procedure are shown in table 2. The difference among the two groups was statistically significant for all three questions in this category pertaining to emergency release of blood by spin technique, duration of cross-match procedure, and issue of group-specific components. Question responses in the category of storage temperature and shelf life of blood components are shown in table 3. There was a significant difference in knowledge per-

Table 1. Indications and choice of components

Question	Pre-training assessment		Post-training assessment		p value
	correct	incorrect	correct	incorrect	
Indications for fresh frozen plasma	15 (60%)	10 (40%)	24 (96%)	1 (4%)	NS
Indications for packed red cells	20 (80%)	5 (20%)	24 (96%)	1 (4%)	NS
Alternate group choice for fresh frozen plasma	5 (20%)	20 (80%)	25 (100%)	0 (0%)	0.0001
Alternate group choice of blood in Rh-negative pregnancy	20 (80%)	5 (20%)	24 (96%)	1 (4%)	NS

NS = Not significant.

Table 2. Cross-match procedure

Question	Pre-training assessment		Post-training assessment		p value
	correct	incorrect	correct	incorrect	
Emergency release by spin technique	5 (20%)	20 (80%)	22 (88%)	3 (12%)	0.0001
Duration of cross match procedure	8 (32%)	17 (68%)	19 (76%)	6 (24%)	0.004
Cross-match and group specific red cell components	11 (44%)	14 (56%)	20 (80%)	5 (20%)	0.0186

Table 3. Storage temperature and shelf life of blood components

Question	Pre-training assessment		Post-training assessment		p value
	correct (%)	incorrect (%)	correct (%)	incorrect (%)	
Storage temperature of packed red blood cells	10 (40%)	15 (60%)	24 (96%)	1 (4%)	0.0001
Storage temperature of platelet concentrates	2 (8%)	23 (92%)	24 (96%)	1 (4%)	0.0001
Storage of platelets in interval between issue and transfusion	5 (20%)	20 (80%)	18 (72%)	7 (28%)	0.0005
Shelf life of platelets	11 (44%)	14 (56%)	20 (80%)	5 (20%)	0.0186

Table 4. Bedside transfusion practice

Question	Pre-training assessment		Post-training assessment		p value
	correct	incorrect	correct	incorrect	
Time of start of transfusion after issue of blood	15 (60%)	10 (40%)	19 (76%)	6 (24%)	NS
Storage conditions during interval period from issue to transfusion	23 (92%)	2 (8%)	24 (96%)	1 (8%)	NS
Course of action if unit not transfused	9 (36%)	16 (64%)	24 (96%)	1 (4%)	0.0001
Appropriate set for transfusion	23 (92%)	2 (8%)	25 (100%)	0 (0%)	NS
Pre-transfusion check list	23 (92%)	2 (8%)	25 (100%)	0 (0%)	NS
Documentation of transfusion	4 (16%)	21 (84%)	14 (56%)	11 (44%)	0.007
NS = Not significant.					

Table 5. Transfusion reactions and management

Question	Pre-training assessment		Post-training assessment		p value
	correct	incorrect	correct	incorrect	
First line of action in the event of a suspected transfusion reaction	25 (100%)	0 (0%)	25 (100%)	0 (0%)	NS
Protocol in the event of a suspected transfusion reaction	9 (36%)	16 (64%)	25 (100%)	0 (0%)	0.0001
First sign of hemolytic transfusion reaction in an anesthetized patient	10 (40%)	15 (60%)	21 (84%)	4 (16%)	0.003
NS = Not significant.					

taining to storage temperature and shelf life of red blood cells and platelets.

The responses to questions related to bedside transfusion practice are shown in table 4. Only 36% of the participants were aware of the course of action to be taken if a unit is not transfused. In the post-assessment, 96% of the participants gave the correct answer; the difference was statistically significant. Documentation of transfusion in the patient record was correctly answered by 16% in the pre-assessment group which increased to 56% in the post-assessment group; the difference was statistically significant. There was no significant difference among the two groups pertaining to time of start of transfusion, interval period storage, use of appropriate set for transfusion, and pre-transfusion checklist.

Knowledge regarding transfusion reactions and their management is shown in table 5. With the exception of awareness about the first line of action to be taken in the event of a transfusion reaction in which all the 25 participants in both groups gave the correct response, the questions pertaining to protocol

to be followed in transfusion reaction and sign of hemolytic transfusion reaction in an anesthetized patient yielded statistically significant difference among both the groups.

Discussion

Adequate knowledge of the indications, requisition, handling, storage, and transfusion of blood components is a prerequisite to ensure safe transfusion in the recipient. The present study was aimed to assess basic knowledge of interns about safe transfusion practices, to educate them, and to assess the effectiveness of such training programs. Lack of knowledge of blood transfusion among health care personnel remains a potential threat to patient safety. Lapses in patient identification, pre-transfusion checklists and bedside compatibility checks can contribute to mis-transfusion [9]. Very few studies have assessed the knowledge of interns involved in blood transfusion; however, data is available for nurses.

A descriptive study was conducted to identify blood transfusion practice and knowledge of 100 nurses in which nurse's knowledge and practice related to blood transfusion was measured against a total score of 100. None of the participating nurses achieved a score of 100, and only few had scores higher than 50 [10]. A study from Iran assessed the knowledge of health workers about proper methods of blood transfusion and how to promote their knowledge for proper performance. The study showed that 26.2% of health care workers had low-level knowledge, 22.1% moderate, and 51.6% acceptable knowledge which strongly emphasized the need for curriculum to promote knowledge of health care workers about blood transfusion [5]. Another study by Aslani et al. [8] also investigated average knowledge of blood and its components among nurses. A study among Jordanian nurses that used a routine blood transfusion knowledge questionnaire demonstrated a mean knowledge score of 51.3% [7] which was comparable with the pre-training score of our study.

Bedside administration issues are an important part of blood transfusion and need improvement as quoted by Dzik et al. [11]. In a French study in a setting of hospitalized care, the authors found poor knowledge and practice among nurses concerning mainly the bedside blood compatibility test, pretransfusion compatibility check when receiving blood units, delay between screening of red cell antibodies and transfusion, delay in presentation of blood unit in the ward, and recognition of abnormal reactions after transfusion [4]. Hijji et al. [7] showed that the majority of the nurses in their study lacked knowledge pertaining to proper patient identification. The authors recommended mandatory ongoing blood transfusion training for nurses to ensure patient safety. In the present study, only 36% of the participants were aware of the course of action to be taken if a unit is not transfused. In the post-assessment, 96% of the participants gave the correct answer. Documentation of transfusion in the patient record was correctly answered by 16% in the pre-assessment group which increased to 56% in the post-assessment group. There was no significant difference among the two groups pertaining to time of start of transfusion, interval period storage, use of appropriate set for transfusion and pretransfusion checklist. Similar findings have been reported in literature in which 81.2% of the nurses were unaware of the appropriate time to start transfusion after receipt of blood units from the blood bank [8].

In our study, the questions pertaining to protocol to be followed in case of transfusion reaction and signs of hemolytic transfusion reaction in an anesthetized patient yielded statistically significant differences pre- and post-assessment. An observational study was conducted on physicians, paramedics, nurses, medical students, and nursing students to assess the relation between adverse transfusion reactions resulting in morbidity and death of patients who receive a blood transfusion. It was found that guidelines for blood transfusion were not easily available. Moreover, documentation of blood transfusion in patient files was lacking. The study concluded that the poor blood transfusion practice is likely to play a role in the morbidity and mortality of patients who receive a blood transfusion [12] and that there is a need for a blood transfusion policy and current practical guidelines.

A descriptive study was conducted among staff of 14 state-run hospitals in France to assess the knowledge in blood transfusion among medical staff. The rate of correct answers (RCA) ranged from 14 to 89%. The mean weighted score was 62% [13]. In a questionnaire-based survey on evaluation of health care workers' knowledge in north India, the authors found that knowledge of those having more experience, working at urban blood centers, and received additional training was significantly higher [14]. Our study participants also showed inadequate knowledge due to lack of experience in the subject.

In our study, there was a significant difference in knowledge pertaining to storage temperature and shelf life of red blood cells and platelets. This finding has not been reported by other authors. Our study throws light on the fact that there is gross disparity in the knowledge of end users involved in transfusion practice. Transfusion medicine has evolved rapidly over the years, and inclusion of the subject as a part of the undergraduate curriculum along with ongoing continuous education of clinicians can help in improving patient safety. We recommend regular mandatory training of interns, resident doctors, and nurses for proficiency in clinical transfusion practice.

Disclosure Statement

The authors provided no conflict of interest statement.

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