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An audit of blood collection process at a blood donation centre of a tertiary care hospital in North India

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Abstract

The process of blood collection should be carried out by trained health care personnel so as to reduce the adverse effects on donors and improve the quality of blood components. This is also important in preventing laboratory errors and injury to the health care personnel. This study was carried out to observe nonconformities in the process of whole blood, apheresis and blood sample collection at our centre, so as to improvise the practices. The data was collected on 5000 whole blood donations, 100 apheresis procedures and 500 blood samplings for screening prior to apheresis. It was analyzed for the frequency of nonconformities. Several nonconformities were noticed in the processes of donor identification, phlebotomy procedure, implementation of biosafety measures and management of adverse donor reactions. The nonconformities were found more in whole blood donations when compared to apheresis screening and procedure. Through the results of this study, we were able to identify the areas that were most vulnerable for deviations and nonconformities. Thereafter, we framed a relevant and targeted competency training program which reinforced personnel's understanding of the importance of various steps in the process of blood collection. Subsequently, there was a substantial reduction in the nonconformities at our blood donation centre.

Key words: Blood collection process, blood donation centre, blood donation, deviation in blood sample, nonconformities in blood sample, phlebotomy procedure

Introduction

Blood donation can be divided into five processes that are directly related to the donor: recruitment, screening, physical examination, collection, and post-donation care.¹ Once a donor has been recruited, medical screening and physical examination is carried out to ensure that the donation process will be safe for the donor and that the collected blood will be safe for the recipient. The collection is done by trained personnel under the supervision of a physician. Each step in this process affects the quality of blood components. The implementation of standard practices systematically is important

in preventing laboratory errors and injury to the blood donor, whereas deviations may place the health care personnel at a risk of accidents. Also, correct procedure of blood sample collection for cell counting prevents many pre-analytical errors.

This study was carried out to observe the nonconformities from the standard practice as per AABB guidelines in the process of whole blood, apheresis and blood sample collection at our blood donation centre, so that relevant measures for improvement could be taken and the health care personnel working in this area are trained accordingly.

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Materials and Methods

This was an observational study carried out at a blood donation centre of a tertiary care hospital in North India, over a period of six months. The data was collected on 5000 whole blood donations, 100 apheresis procedures and 500 blood samplings for testing cell counts prior to apheresis. The

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phlebotomies for whole blood collection at our centre are carried out by trained nursing staff and junior residents whereas those for apheresis and pre-apheresis sample collection mostly by senior residents. The observation was done without alerting or informing the personnel and there were no punitive measures for any nonconformity. The proforma for incident reporting is as shown in Figure 1

Fig 1. Proforma for incident reporting

TRANSFUSION MEDICINE INCIDENT AND ERROR REPORTING

Report No.....

Reported by.....

Date and time of occurrence.....

Date and time of occurrence.....

Location.....

Personnel involved (Name & Designation).....

.....

Description of incident.....

.....

Action Taken.....

.....

Recommendations of faculty in charge.....

.....

Collected data was analyzed using SPSS 17.0 program. Frequencies and percentages were calculated for each event.

Results

The percentage and frequencies of all nonconformities for various events during whole blood donation, apheresis and pre-apheresis screening is shown in Table 1. As is evident, the nonconformities were more for whole blood donation when compared to apheresis screening and procedure.

Discussion

In order to reduce the adverse effects on blood donors and improve the quality of blood components, the health care personnel performing the blood collection should be well-trained and all the processes should be carried out as per the standard operating procedure. A previous study done at our centre to identify errors that take place in the phlebotomy area had shown that the trained regular staff working in the area accounted for all major events.² The study has emphasized the need for regular competency testing and an active system for the detection of these deviations. In the present study, we have tried to detect the key areas which are most vulnerable for such deviations and nonconformities so as to frame relevant and targeted competency training program for the staff.

Table 1: Frequencies and percentages of nonconformities during various blood collection procedures before and after training of personal

Event	Whole blood donation N= 5000		Apheresis N=100		Pre-apheresis screening N= 500	
	Pre-training	Post-training	Pre-training	Post-training	Pre-training	Post-training
No bedside verification of donor identity	233 (4.66%)	58 (1.16%)	1 (1%)	0	5 (1%)	2 (0.4%)
Inadequate prior information to donor	567 (11.34%)	37 (0.74%)	3 (3%)	1 (1%)	7 (1.4%)	2 (0.4%)
No inspection of blood bag/kit for defects	278 (5.56%)	120 (2.4%)	4 (4%)	0	--	--
Gloves not worn by staff	738 (14.76%)	265 (5.3%)	21 (21%)	8 (8%)	32 (6.4%)	10 (2%)
Improper cleaning of arm	654 (13.08%)	241 (4.82%)	7(7%)	2 (2%)	67 (13.4%)	12 (2.4%)
Area touched with finger after cleaning	1059 (21.18%)	336 (6.72 %)	5 (5%)	1 (1%)	28 (5.6%)	6 (1.2%)

Event	Whole blood donation N= 5000		Apheresis N=100		Pre-apheresis screening N= 500	
	Pre-training	Post-training	Pre-training	Post-training	Pre-training	Post-training
Application of inadequate/ excessive pressure	126 (2.52%)	30 (0.6%)	0	0	0	0
Double prick	238 (4.76%)	187 (3.74%)	4 (4%)	0	6 (1.2%)	3 (0.6%)
Recapping of needles	--	--	--	--	129 (25.8%)	55 (11%)
Donor left unattended during the process	351 (7.02%)	143 (2.86%)	6 (6%)	1 (1%)	--	--
Inadequate instructions after removal of needle	572 (11.44)	273 (5.46%)	13 (13%)	4 (4%)	25 (5%)	8 (1.6%)

The process of blood collection starts with accurate identification of the blood donor. It is of vital importance for phlebotomists to ensure that the same identification number is attached to the blood bags, tubes for donor samples and donor records. According to AABB³, identification errors can be reduced by attaching the numbers while the donor is present at the donor chair, rather than during the initial examination procedure. This holds special importance in large centres like ours where screening and phlebotomy are done in separate areas and by different staff. It is a practice at our centre to verify the identity of the blood donor, once he/she is seated on the couch. In certain cases, this verification step was omitted resulting in wrong identification number being attached to the blood bag, donor form and sample tubes. However, the rectification could be done in all such cases when the identity of other donors in the queue was verified against identification number by the staff members.

The potential donor is given pre-donation information, advice and counselling about the process of blood donation and is allowed to ask questions to alleviate fear and anxiety. We have observed that in few cases, the staff members did not communicate well with the donor due to paucity of time when there was heavy work load. It was seen that these donors were more apprehensive about needle prick and loss of blood from their body.

All efforts should be made towards detecting any deviation or defect in blood components and for

recognizing any potential health risk to the blood donor or recipient for ensuring good blood banking practices. It was found that the step of inspecting the blood bag and apheresis kits after unpacking was omitted by the health care personnel in the blood donation area. A previous study from our own department has revealed several nonconformities in blood bags and plateletpheresis kits, emphasizing that timely identification and documentation of these problems should be done so as to implement appropriate investigations and corrections.⁴

When collecting blood, health workers should wear well-fitting, nonsterile gloves and should also carry out hand hygiene before putting on gloves and after removing them.⁵ Phlebotomists should apply mild pressure over the upper arm (40-60 mm Hg), usually with a blood pressure cuff or tourniquet. The increased venous pressure engorges the veins in the ante-cubital fossa, making them easier to detect for phlebotomy. We have seen that the personnel inflated the cuff to over 80 mm Hg in most cases, leading to donor discomfort and increasing the chances of haematoma formation.

As per the AABB standards, the skin at the site of venipuncture must be free of any lesion. Both arms of the blood donor must be examined for multiple needle-puncture marks or sclerotic veins which are signs of drug abuse.³ Proper disinfection of skin at the site of venipuncture is crucial for every blood collection procedure, as it contributes to reducing bacterial contamination of blood.⁶ Once a

vein is selected, the area should be cleansed at least 4 cm in all directions in a concentric spiral fashion from the intended site of venipuncture with an antiseptic solution. This is followed by drying for a minimum of 30 seconds. Thereafter it is covered with dry, sterile gauze until the time of venipuncture. We had observed that many times, there were deviations in this practice at our centre where the health care worker just wiped across the venipuncture site once or twice.

After the skin is thoroughly disinfected, it is not touched again in order to prevent contamination of blood from the skin flora of the donor's arm. It is recommended that if the site is touched, disinfection should be repeated.⁹ We found that the personnel placed a finger over the vein to guide the shaft of the exposed needle even after the disinfection, especially in cases of difficult vein and continued with phlebotomy without disinfection.

In a study, it has been found that injuries most commonly occur between the use and disposal of a needle.⁷ Ways to minimize an accidental needle stick injury and exposure to blood among health workers include the use of safety devices, e.g., personal protective equipment, needle destroyer, abolishing the practice of needle recapping and immediate disposal of the sharps into a puncture-proof sharps container.⁸ In the present study, it was observed that needle recapping was a frequent practice and needle destroyer, although available, was used very infrequently by our staff, merely for the sake of convenience. The results of a previous study done in a tertiary care hospital in India have shown that the practice of recapping needles after use was prevalent among 66.3% health care workers.⁹ Fortunately, the recapping process did not result in any accidental needle stick injury at our centre.

The blood donor should be closely monitored for the entire duration of donation process and should not be left unattended at any time during or immediately after the process. The staff should observe the donor for sweating, pallor, uneasiness or haematoma formation. It has been found that there are certain factors which make blood donors more susceptible to vasovagal reactions. One study has reinforced the

importance for blood collection staff to recognize "at risk" donors, and to give them more attention.¹⁰ Another study has shown that blood donation can be made more event-free by following certain friendly, reassuring practices towards donors.¹¹ We have observed that a few times our staff overlooked the blood donors, resulting in progressive vasovagal reactions which may have been prevented at very early stage.

As per NACO guidelines¹², donors should be advised regarding post-phlebotomy care and cautioned about the possibility of adverse reactions. This should also be displayed in the blood collection and observation room. Key instructions include drinking more fluids in the next four hours, avoiding alcohol and smoking, raising the arm and applying pressure to the site if there is bleeding from the phlebotomy site, lying down if fainting or dizziness occurs and consulting a blood bank physician if symptoms persist. At our centre, a few donors left the donation area without receiving any advice and there were three cases of vasovagal reactions and subsequent injuries outside the blood donation centre.

The results of this study helped us to formulate a training program for the personnel collecting blood at our centre. Although, majority of our staff was already trained and there are standard operating procedures for each step, the training reinforced their understanding of the importance of donor identification, biosafety precautions and bacterial disinfection of the donor arm. They were also demonstrated the correct phlebotomy practice and steps for management of adverse donor reaction. We have also observed that nonconformities were more for whole blood collection which is being carried out mostly by the nursing staff and junior residents, so our training was designed keeping this target group in mind. Subsequently, there was a substantial reduction in the nonconformities seen in day to day practice of blood collection. To conclude, it is important to provide regular training and education to all personnel carrying out blood collection. The staff should have a basic understanding of human anatomy and physiology, awareness about the hazards from blood exposure, and the importance of correct donor identification. Step by step SOPs

for each procedure should be written and be readily accessible to health care workers. An incident reporting system for reporting all adverse events should be established in the set-up with accurate details of the causes and management of the incident. By establishing a systematic procedure for the collection of blood, many errors and donor related complications can be avoided.

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