The Role of Comprehensive Check at the Blood Bank Reception on Blood Requisitions in Detecting Potential Transfusion Errors

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Abstract Pre-transfusion testing includes proper requisitions, compatibility testing and pre-release checks. Proper labelling of samples and blood units and accurate patient details check helps to minimize the risk of errors in transfusion. This study was aimed to identify requisition errors before compatibility testing. The study was conducted in the blood bank of a tertiary care hospital in north India over a period of 3 months. The requisitions were screened at the reception counter and inside the pre-transfusion testing laboratory for errors. This included checking the Central Registration number (C.R. No.) and name of patient on the requisition form and the sample label; appropriateness of sample container and sample label; incomplete requisitions; blood group discrepancy. Out of the 17,148 blood requisitions, 474 (2.76 %) requisition errors were detected before the compatibility testing. There were 192 (1.11 %) requisitions where the C.R. No. on the form and the sample were not tallying and in 70 (0.40 %) requisitions patient's name on the requisition form and the sample were different. Highest number of requisitions errors were observed in those received from the Emergency and Trauma services (27.38 %) followed by Medical wards (15.82 %) and the lowest number (3.16 %) of requisition errors were observed from Hematology and Oncology

wards. C.R. No. error was the most common error observed in our study. Thus a careful check of the blood requisitions at the blood bank reception counter helps in identifying the potential transfusion errors.

Keywords Comprehensive check · Blood bank reception · Blood requisition · Transfusion errors

Introduction

Errors in transfusion are well documented in literature and are preventable, provided they are reported and properly analyzed at the earliest. Haemovigilance programs from around the world document that the greatest risk to recipients of blood transfusion is human error, resulting in transfusion of the incorrect blood component. Inadequate patient identification or sample labelling can result in mismatch transfusions (ABO-incompatible transfusions) [1]. Errors made in the collection of the patient sample for pre-transfusion compatibility testing are serious, because they are at the beginning of a complex chain of events in the process of clinical transfusion. There are three major 'zones of error' jeopardizing safe transfusion: (i) accurate patient identification and proper labelling of the pre-transfusion specimen; (ii) appropriate decision-making regarding the clinical use of blood components; and (iii) accurate bedside verification that the correct blood is to be given to the intended recipient [2]. Errors in medicine can be broadly categorized as either knowledge errors or slip errors. Knowledge errors in transfusion result in inappropriate decisions to administer blood. In contrast, slip errors result from distraction, fatigue, or inattention. Slip errors in transfusion practice result in mis-labelling of blood samples and in the administration of the wrong blood to an

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unintended recipient [2]. Slip errors caught in time or without harm are called ‘near-miss’ events. Transfusion of blood saves life. An error in blood transfusion, at the same time, takes life. The fatal acute hemolytic reactions to transfusion caused by ABO incompatibility have been attributed to administrative errors. The mismatch of blood units with that of the patient blood as a result of negligence is a serious cause of patient fatality. Therefore, proper labelling of samples and blood bags, accurate patient details check and re-check at the level of receiving of requisitions for blood or blood components, issuing and transfusing the units is needed to minimize the risk of errors in transfusion. This study was conducted with the aim to identify various requisition errors and to determine the speciality and area-wise distribution of these errors so as to take appropriate steps to minimize them before the pre-transfusion compatibility testing.

Materials and Methods

This study was conducted in the department of Transfusion Medicine which is a Regional Blood Transfusion Center and is a part of a tertiary care teaching hospital in north India. This was a prospective study where requisition errors were recorded over a period of 3 months. The standard process followed in our institute for sending a blood request for transfusing blood/blood components to a patient

is as follows- the patient’s blood sample for blood grouping and cross matching is drawn at the bedside by clinical resident, labeled and sent to the blood bank along with the requisition form containing patient identification details, diagnosis, indication for transfusion, requirement of blood components and details of previous transfusion(s), if any. The patient identification details include the name, the unique central registration number (C.R. No.) which is allotted to every patient at the time of admission to the hospital, age, sex and ward/bed number. The requisition form and blood sample are then received at the reception counter in the blood bank. Each sample bears a gum pasted paper label with name and C.R. No. of the patient written over it. After acceptance of the requisition the blood sample is then grouped (ABO and RhD) which is then documented on the requisition form and also in the requisition receipt register. In this study, all the requisitions were screened at the reception counter and inside the pre-transfusion testing laboratory according to the departmental protocol (Fig. 1) for the following issues:

1. Identical C.R. No. on the requisition form and the blood sample—any difference was categorized as ‘C.R. No. discrepancy’ (including cutting/overwriting);
2. Identical patient’s name on the requisition form and the blood sample;
3. Appropriateness of the sample container (only EDTA/plain vial samples are acceptable and others like drug vials are not acceptable);

Fig. 1 Protocol for screening of blood requisitions and patient samples

4. Appropriateness of the label of sample container (only gum pasted paper labels are acceptable and leucoplast pasted labels are not acceptable);
5. Requisitions received with incomplete patient details;
6. The blood group (ABO and Rh) mentioned on the requisition form and that found after testing the sample.

After screening all the requisition forms, the data collected over the requisition errors was recorded and analyzed. When a discrepancy or error was observed a repeat sample (and requisition form, wherever required) was asked for before further testing.

Results

Over the 3 month study period from 1st December 2011 to 29th February 2012, a total of 17,148 blood requisitions were received including 308 (1.80 %) requisitions of patients admitted outside our institute in other Government or Private hospitals and Nursing Homes in and around the city. Overall, the frequency and rate of requisition errors were 2.76 % (474) and 1 in 36 respectively (Table 1; Figs. 1, 2)

C. R. No. discrepancy was the most common (1.11 %) error observed in this study which included errors like C.R. No. on the vial not identical to the C. R. No. on the requisition form, cutting/overwriting of C.R. No. on the sample vial and/or the requisition form and the absence of CR No. either on the sample vial or the requisition form or both. Patient's name on the requisition form and the sample

were different in 0.40 % (70) cases. In 0.27 % (48) cases the blood group (ABO and RhD) mentioned on the requisition form was different from that observed after sample testing. In such instances the blood group mentioned on the form might have been written wrongly by the requesting clinician or the sample might have been taken from a wrong patient i.e. wrong blood in tube (WBIT). Collectively, the errors including the C. R. No. discrepancy (1.11 %), difference in patient's name on the requisition form and the sample (0.4 %), difference in blood group (ABO and RhD) from that mentioned on the form (0.27 %) and mixed errors (0.16 %) amounted to a frequency of 1.94 % in requisition errors and were the potential 'WBIT' errors. There was another category of mixed errors in 0.16 % (28) cases where there was a different patient's name and C.R. No. on both the requisition form and the sample. There were 94 (0.54 %) requisitions with incomplete patient details like missing diagnosis, age/sex, ward/bed no. or indication for transfusion. Finally, 0.24 % (42) of the requisitions were accompanied by samples in inappropriate vials or with inappropriate labels (drug vials, leucoplast labels, etc.).

Requisitions errors were also segregated on the basis of requisitions received from major specialities and areas of our institute and those from outside our institute (Table 2; Fig. 3).

Highest number of requisitions errors were observed in those received from the Emergency and Trauma services (27.38 %) which possibly reflects the heavy work load of these areas, followed by Medical wards (15.82 %), Pediatrics (13.71 %) and Surgical wards (12.65 %). Least number (3.16 %) of requisition errors were observed from

Table 1 Details of requisition errors observed in 17,148 requisitions

S. no.	Type of error	Requisition errors (=474)		Frequency (%) of requisitions errors ^a	Rate of requisition errors ^b (1 in <i>n</i> requisitions)
		Number	Percentage (%)		
1.	C.R. No. discrepancy	192	40.50	1.11	1/89
2.	Patient's name on the requisition form and the sample were different	70	14.76	0.40	1/244
3.	Inappropriate sample container/vials and/or samples with improper label	42	8.86	0.24	1/400
4.	Requisition forms with incomplete patient details	94	19.83	0.54	1/182
5.	Blood group mentioned on the requisition form was different from that observed after sample testing	48	10.12	0.27	1/357
6.	Mixed errors- like different patient's name and C.R. No. on the requisition and sample	28	5.9	0.16	1/612
	Total	474	100	2.76	1/36

^a Frequency (%) of requisitions errors was calculated as: (No. of requisition errors in each category divided by the total no. of requisitions) × 100

^b The rate of requisition errors was expressed as 1 in *n* (i.e. 1/*n*), where *n* is calculated as the total of requisitions divided by the number of errors in each category

Fig. 2 Types of requisition errors **Table 2** Specialitywise and areawise distribution of requisition errors

S. no.	Name of speciality/area	No. of errors	Percent of total requisition errors (%)
1.	Emergency (EMG) services and trauma services	130	27.38
2.	Medical wards	75	15.82
3.	Pediatrics	65	13.71
4.	Surgical wards	60	12.65
5.	Obstetrics and gynecology (OBG)	50	10.54
6.	Intensive care units (ICUs)	45	9.49
7.	Hematology including bone marrow transplant (BMT) and oncology	15	3.16
8.	Hospitals and nursing homes outside the institute	34	7.17
	Total	474	100

Hematology and Oncology wards. The requisitions from Obstetrics and Gynecology and the Intensive Care Units had an error rate of 10.54 and 9.49 % respectively.

Discussion

Errors have occurred in blood transfusions since the technique began to be used. In 1972, the United States Food and Drugs Administration (FDA) assumed inspection and licensing control over the various groups involved in

transfusion medicine [3]. Accurate sample collection and labelling are critical steps in the process of blood transfusion. Errors in patient identification, sample collection, or sample labelling have been demonstrated to be an important cause of serious patient morbidity and mortality [4]. As per the study conducted by Porras et al. [5] the frequency of inappropriately labelled samples was 6.45 %. In their study the error category 'Name, medical record number or date of birth missing' was observed in 0.7 % samples. In our study, the 'C.R. No. discrepancy' between the requisition and the sample vial label was the most common (1.11 %) requisition error. Lumadue et al. [6] in their study concluded that strict adherence to the labelling requirements results in a significant decrease in erroneous blood grouping. In an earlier published data from our institute by Sharma et al. [7] a total of 123 errors were observed over the period from May 1998 to April 1999 in relation to requisitions and samples. Of these, the bedside errors were 80 %, whereas those from inside the blood bank were 13 %. The commonest was the labelling error (73 out of 123), which still is one of the major problems as reflected in our study.

In 0.27 % requisitions the blood group (ABO and RhD) mentioned on the requisition form was different from that observed after sample testing. These type of requisition errors along with the 'C.R. No. discrepancy', labeling errors and 'Mixed errors' could contribute to the 'WBIT' errors. The 'WBIT' is a very dangerous error as it reflects that the blood is collected from one patient and labeled as that of the other and sent with the requisition. The blood group historical records can detect these errors to a large extent. In

Fig. 3 Speciality and area-wise frequency of requisition errors. (EMG emergency services, ATC advanced trauma centre representing the trauma services)

earlier studies by Porras et al. [5] and Dzik et al. [4] the frequency of WBIT was 0.06 and 0.05 % respectively. These errors occur probably due to a common practice of labelling too many samples from the patients in a ward or unit within a very limited time frame, failure to identify the patient correctly and labelling the samples away from the patient's bedside at the nursing station in the ward. In a study by Varey et al. [8] out of the 34 incidents in which a cause of WBIT incident was identified by the reporter, 15 (44 %) were associated with the practice of labelling away from the patient's side, usually at the nurses' station.

In our study, the highest number of requisitions errors (18.98 %) was observed from the Emergency Wards followed by the Medical Wards (15.82 %). It was probably due to heavy work load in Emergency wards and also because of frequent shifting of patients from these wards to other speciality wards and ICUs of the hospital. Similar observations were made in the study by Lundy et al.: other than the general ward areas (including haematology/oncology units) where the majority of transfusion activity took place, the accident and emergency (A&E) department and the transfusion laboratory were the two departments where significant near-miss events occurred [9]. Hence, in order to minimize the requisition errors, the hospitals must have policies for sending blood transfusion requests and for the collection of blood samples to be sent for pre-transfusion testing. According to the British Committee for Standards in Haematology (BCSH) Guidelines [10] for pre-transfusion compatibility procedures in blood transfusion laboratories, the sample vial must be labelled immediately after drawing the sample by the same person, it must not be pre-labelled and the labelling should at least include the name and registration no. of the patient. The request form

must contain full patient identification details i.e. name, age, gender of the patient, patient registration number, ward, diagnosis, type of component required and past transfusion history and the full signature of the requesting clinician. In case of any cutting on the sample vial or the requisition form, it should be corrected clearly and signed by the person sending the request or fresh requisition form and sample should be asked to avoid any dangerous error. Regular training of medical and paramedical staff in emergency areas could be an important measure in minimizing the requisition errors.

The lowest frequency (3.16 %) of requisition errors was observed from the Hematology and Oncology specialties inspite of high number of transfusion recipients in these areas. It is probably due to the fact that most of the transfusions occur in day care setting like thalassemia major, hemophilia and leukemia patients. Moreover, the bed occupancy rates of these areas are quite optimal as compared to the other specialties, especially the Emergency and Trauma services. Also, the transfusions for the patients in these areas are planned and it also reflects that the staff in these areas is more sensitized to bedside transfusion practices.

In a study by Murphy et al. [11] a total of 445,726 requisitions and samples were received and 14,114 (3.16 %) of them were rejected because of various reasons (Table 3). The two major reasons were incomplete or missing information (49.51 %) and mismatched information on tube or form (22.42 %) which together accounted for about 72 % of total reasons for sample rejections. Similar findings were there in our study where about 75 % of the total requisition errors were contributed by the categories of C.R. No. discrepancy (40.5 %), patient's name different on form and sample vial (14.76 %), incomplete

Table 3 Comparison with study by Murphy et al. [11] on performance of patient sample collection in the UK

Type of requisition errors	Present study	Murphy et al.
Incomplete or missing information	94 (19.83 %)	6,988 (49.51 %)
Mismatched information on tube or form	262 (55.22 %)	3,164 (22.42 %)
Others	28 (5.9 %)	2,080 (14.72 %)
Improper label on sample vials	22 (4.64 %)	892 (6.32 %)
Unlabelled samples	20 (4.2 %)	471 (3.34 %)
Blood group mentioned on the requisition form and the tested sample were different	48 (10.12 %)	–
Incorrect information	–	209 (1.48 %)
Illegible or unreadable	–	170 (1.2 %)
Unsigned	–	133 (0.94 %)
Labeled by two people	–	7 (0.05 %)
Total	474 (2.76 %)	14,114 (3.16 %)

patient information (19.83 %). The rejections imply that a potential error which has already occurred in the beginning of the transfusion process can reduce the risk of translating it into an actual error.

It has been documented widely in literature that errors have been reported in all hospitals/countries and in most cases the errors were made when collecting patient samples. The vast majority of these were detected in time because of discrepancies with results of previous blood grouping [12]. The goal of error management should be to increase error detection and the reporting rate by regular documentation of errors, making policies regarding acceptance and rejection of samples, awareness and regular updating of clinical staffs through continuing medical education and lectures.

Conclusion

From our study we concluded that a comprehensive check of all the requisitions at the point of receiving can be an important tool to detect requisition errors. The Emergency wards/areas in a hospital have a higher frequency of requisition errors. Thus, there is a need for continuous sensitization and training of staff to increase the compliance regarding sending appropriate blood requisitions and samples which can help in minimizing the potential errors and strengthen safe transfusion practices.

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