

# Knowledge of Transfusion Medicine Among Resident Doctors in Clinical Specialities: A Cross-Sectional Study from a Tertiary Care Centre

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**Abstract** Knowledge of transfusion medicine (TM) has profound impact on transfusion outcomes. Variations from the standards in practices of TM may jeopardize patient care. We assessed the awareness of TM in resident doctors. Our aims was to assess the essential knowledge of TM among resident doctors. The study was carried in a tertiary care hospital. It was a descriptive cross-sectional study using a self-administered, questionnaire comprising of 35 items which was developed to assess the essential knowledge of TM for resident doctors. A total of 85 residents responded from various clinical specialities. Statistical analysis used: Results of correct response were put as Mean  $\pm$  SD using SPSS. Survey revealed an overall mean score of 48.53 % for correct responses. Lowest knowledge score of 32.94 % was found for blood bank procedures. The differences between the knowledge of residents from various specialities were not statistically significant. Our study shows that majority of resident doctors have inadequate knowledge of TM. More studies are required from different parts of the country to create data on this issue. The implementation of two weeks training for all residents from clinical specialties in TM department will improve the situation and help to connect our clinician to TM better.

**Keywords** Resident doctors · Questionnaire · Transfusion medicine · Knowledge deficit

## Introduction

Blood transfusion is a highly effective and potentially life-saving treatment, and an essential component of modern health care. Transfusion medicine (TM) has been recognized as a basic speciality, and post graduate courses are being conducted at various teaching hospitals. However, in the undergraduate curriculum, not much emphasis is given on the training in TM. Clinician's knowledge about blood products and their preparation, storage, demands, doses and administration, may have profound impact on patient care and transfusion outcomes. Wide variation in transfusion practice and inappropriate transfusion may jeopardize their safety [1]. The advancements in TM will not bear fruit if the same is not executed at bed side by our clinician colleagues. Over-utilization of blood components, and, transfusion reactions resulting from inappropriate use, adds unnecessary costs. Furthermore, blood components are scarce resources and so their appropriate usage is vital. An optimal utilization of blood is vital to minimize alloimmunization and spread of transfusion transmitted infections. The majority of transfusion decisions are made by physicians and surgeons without formal training in TM. Their practices are based on individual clinical experiences and they are unaware of the best methods of practice and recent developments in the literature [2]. The majority of blood banking training barring TM post graduate programme, is given in pathology residency programs. Unfortunately, these pathology residents are not the bedside providers of blood transfusions and do not observe the outcome during or after the transfusion [3]. Resident

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doctors from clinical specialities have an active role in blood transfusion. The resident doctors from clinical specialities should have adequate knowledge of TM to provide high quality care and to teach their subordinates. It is expected from the residents that they have a basic understanding to demand the right components for the right indications and they will practice its appropriate use. No data exists in our country to assess knowledge and awareness of TM amongst resident doctors. In the present study, we aim to assess residents' baseline essential knowledge of TM and find out the areas of deficit. To elaborate further, the aim would be to assess the knowledge of basic blood bank work flow, various blood component available for therapeutic use and their correct doses, administration and their adverse effects. Our objective would be to suggest ways to improve the residents' knowledge, in order to connect clinician better with TM.

## Materials and Methods

This was a descriptive cross-sectional survey using a self administered questionnaire. This study was conducted in a tertiary care center which is supported by a zonal blood bank in western India. Our blood bank provides state of the art blood services to all speciality and super-speciality wards. We included resident doctors from those specialities, where blood transfusion events are common like obstetrics and gynaecology, surgery, medicine, paediatrics, orthopaedic and Anaesthesiology. We did not include residents from pathology and allied speciality who receive TM training as their curriculum and who would have responded significantly better than others. Participation of residents was voluntary. Anonymity and confidentiality were assured. The questions were set by experienced TM specialists at our department and reviewed by specialists of other departments for its content and clarity. While preparing the questionnaire, various factors were taken into account including experience of resident doctors and spectrum of illnesses they encounter which require blood transfusion. A pilot test of the questionnaire was undertaken in hospital using a random sample of residents who responded that the items were clear, important and understandable. All residents in our study had 5–7 years of experience as general medical officer in peripheral hospitals. Those who had no work experience after MBBS were excluded from study. Residents who had completed at least 6 month of residency, and had enough exposure for blood transfusion, were included. Results were reported as mean  $\pm$  standard deviation. The survey consisted of 35 questions which were designed to address residents' basic knowledge in TM and clinical use of blood components. The questionnaire was offered to as many residents as

possible in the above mentioned departments without disturbing the routine. Survey was conducted only once in every department. All participants from one department were assessed simultaneously. 30 min time was given for answering under strict vigil of TM specialist. Questionnaire was collected immediately after completion. Whole survey in all the above mentioned departments was conducted in three days in no particular order. The questionnaire had four questions related to basic general knowledge of TM, seven questions related to blood bank blood bank procedures, seven questions related to doses and demand of blood components, five questions related to transfusion transmitted infections, seven related to administration of blood components and five questions were related to management of transfusion reactions. Multiple-choice questions were used in this study to avoid the problems associated with scoring open-ended responses. Each question included an answer choice 'I don't know' to minimize guessing. The maximum possible score for the individual was 35 as each correct response was awarded one point. At the end we asked respondents to provide feedback for TM training. The data were entered in SPSS and analyzed.

## Results

All 85 residents who participated, completed the survey—out of which 18 (21.17 %) were medicine residents followed by 16 (18.82 %), 17 (20 %), 13 (15.29 %), 6 (7 %) and 15 (17.64 %) residents from surgery, obstetrics and gynecology, pediatrics, orthopedics and anesthesiology respectively. Our expectation of minimum score for satisfactory response indicating mandatory basic minimum knowledge was 60 %. Residents performed best in the section of basic knowledge with correct responses of 59.41 %. In this section Surgery residents scored maximum of 64 % correct responses, followed by medicine (63.7 %), obstetrics and gynaecology (61.7 %), pediatrics (59.5 %) orthopedics (54 %) and anesthesia (51 %). Residents' correct score in the section of blood bank procedures was 32.94 %. In this section, Surgery residents scored maximum with 35.7 % correct responses, followed by obs and gyn. (34.4 %), pediatrics (32.8 %), medicine (32.4 %), anesthesia (30.4 %) and orthopedics (28.5 %).

Residents' correct score in the section of demands and doses of blood component was 49.41 %. Anaesthesia residents scored maximum in this parameter with 53.2 % correct responses, followed by medicine (51.5 %), pediatrics (49.2 %), surgery (49 %), obstetrics and gynaecology (48.7 %) and orthopedics (35.7 %). Residents score in the section of transfusion transmitted infections was 46.35 %. In this section pediatrics and anesthesia residents scored maximum with 49.2 % correct responses each,

**Table 1** Response of residents to questionnaire (Mean  $\pm$  SD)

Speciality	Basic knowledge (4 questions)	Blood bank procedure (7 questions)	Demands and doses (7 questions)	TTIs (5 questions)	Administration of blood (7 questions)	Transfusion reactions (5 questions)	Overall performance (%)
Medicine (n = 18)	2.55 $\pm$ 0.85	2.27 $\pm$ 0.46	3.61 $\pm$ 1.33	2.27 $\pm$ 0.89	4.38 $\pm$ 1.24	2.61 $\pm$ 0.97	59.07
Surgery (n = 16)	2.56 $\pm$ 0.72	2.5 $\pm$ 0.51	3.43 $\pm$ 1.20	2.37 $\pm$ 0.71	3.68 $\pm$ 1.13	3.06 $\pm$ 0.77	50.35
Obstetrics and gynaecology (n = 17)	2.47 $\pm$ 0.79	2.41 $\pm$ 0.50	3.41 $\pm$ 0.79	2.17 $\pm$ 0.63	3.76 $\pm$ 1.2	2.88 $\pm$ 0.85	57.07
Pediatrics (n = 13)	2.38 $\pm$ 0.92	2.3 $\pm$ 0.63	3.45 $\pm$ 1.50	2.46 $\pm$ 0.66	3 $\pm$ 1.52	2.38 $\pm$ 0.86	53.23
Orthopaedics (n = 6)	2.16 $\pm$ 0.75	2 $\pm$ 0.89	2.5 $\pm$ 1.04	2 $\pm$ 0.89	2.5 $\pm$ 1.04	2.16 $\pm$ 0.75	38.09
Anaesthesiology (n = 15)	2.06 $\pm$ 0.79	2.13 $\pm$ 0.35	3.73 $\pm$ 0.88	2.46 $\pm$ 0.63	4.53 $\pm$ 1.06	2.8 $\pm$ 0.86	59.11

followed by surgery (47.4 %), medicine (45.4 %), obs and gyn (43.4 %) and Orthopedics (40 %). The correct responses in the section of administration of blood components were found to be 54.45 %. In this section Anesthesia residents scored maximum with 64.7 % correct responses, followed by medicine (62.5 %), obstetrics and gynaecology (53.7 %), surgery (52.5 %), pediatrics (42.8 %) and orthopedics (35.7 %). The section of management of transfusion reactions received 54.35 % correct responses. Surgery residents scored maximum with 61.2 % correct responses, followed by obstetrics and gynaecology (57.6 %), anesthesia (56 %), medicine (52.2 %), pediatrics (47.6 %) and orthopedics (43.2 %). The differences between the knowledge of the various specialities in the different parameters were not statistically significant ( $\chi^2$  test  $p > 0.05$ ). Table 1 shows overall response of residents to the questionnaire. Overall mean score for correct response was 48.53 %. The majority of resident 72 (84.7 %) reported that they had never received any in-service training on blood transfusion, with 70 (82.35 %) of them perceiving a need for training in TM.

## Discussion

One of the key points determining the efficiency of any blood service is the knowledge level of its physicians [4]. We conducted a cross-sectional study in our center assessing knowledge of TM among resident doctors in clinical specialities and found some important observations in our study. To take a few examples, only 29 (34.11 %) of residents showed correct awareness about irradiation and its indications. Only 25 (29.41 %) residents correctly responded that leucoreduction procedure prevents febrile non haemolytic transfusion reactions and HLA alloimmunization. 26 (30.5 %) residents had awareness of correct anticoagulant used in blood collection and shelf life of whole blood/pack red cell concentrate to be 35 days. 32 (37.64 %) of the residents could not answer that one bag of PRBC contains 200 mg of iron. Only 34 (40 %) residents knew the correct flow rate to initiate the blood transfusion.

Every resident should be aware that most severe reactions occur during the first 15 min of setting up a transfusion and the severity of a reaction is proportional to the amount of blood infused except for allergic reactions which may be elicited immediately and with minimal volume. Physician should be able to recognize signs and symptoms of acute haemolytic transfusion reaction and be able to intervene properly if any of these are noted. In modern transfusion practice, acute haemolytic transfusion reaction is rare because of modern blood banking practices [5]. Wrong interpretation will create unnecessary panic. This may also quite wrongly put the blame on the blood bank for providing mismatched blood. 35 (41.17 %) residents failed to define acute transfusion reaction and that the patients should be observed for first 24 h for acute transfusion reactions. One study from Iran showed that the awareness rates of general practitioners, blood consumer specialists and other specialists are not significantly different and all were considered to be low [6].

Insufficient knowledge was attributed to deficiency in orientation or training in various areas of blood transfusion. Salem-Schatz et al. demonstrated that improved knowledge of TM correlated with improved decision-making, resulting in better patient care [7]. This knowledge deficit could be even worse in places where teaching facility does not exist, and, clinical practice of blood transfusion is simply based on individual experiences. In one study regarding on-call physician experience in blood bank, it was found during analysis of calls that, overall, 85.3 % of the calls were related to physician education issues and the appropriateness of blood component orders placed by the physician [1]. In a study of Mitchell et al. it was felt that additional TM training was needed by physicians in all levels of training [8].

Drawback of our study was that all of the participants were from a single teaching medical centre introducing selection bias and complicating interpretation of these results in a non-academic setting. In a first of its kind study in India, our study assessed the knowledge and awareness of TM among resident doctors. Our study shows that

majority of resident doctors have inadequate knowledge in several day to day aspects of blood transfusion which would directly affect patient care and safety. This could seriously compromise blood/blood component order schedule and administration of blood products. Education in TM continues to lag behind and there will be a little impact on overall blood utilization if we continue to fail to educate the end users. The gap explored in this study can be addressed by periodic capsules, visits, seminars, lecture series for clinical post graduate residents etc. A variety of educational interventions including one-to-one discussions, conferences, CMEs on hemovigilance, prospective audits and participation of TM physician in clinical rounds will go a long way to improve the situation. Empowering the knowledge to treating physicians will take patient safety to new heights. These measures will definitely connect our future clinician to TM better, and ultimately result in improved patient care.

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