

EVALUATION OF KNOWLEDGE OF POSTGRADUATE TRAINEES IN TRANSFUSION MEDICINE: A CROSS-SECTIONAL SURVEY

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ABSTRACT

Objective: The objective of study was to assess postgraduate trainees' knowledge of transfusion medicine.

Study Design: It was a descriptive, quantitative cross-sectional study

Place and Duration of study: The study was conducted at Fauji Foundation Hospital Rawalpindi in department of Hematology. Duration of study was from 15 Sep 2023 to 15 Nov 2023.

Participants and Methods: Total 177 postgraduate trainees of different departments of a Fauji Foundation Hospital, Rawalpindi, in different years of training were included in study. The sampling technique used was a Non probability Convenience sampling technique. Trainees were evaluated by a questionnaire. A data collection sheet that was peer-reviewed was used to score the final performance.

Results: Of 177 participants, 173 participants responded to the online questionnaire survey. Overall, 52.46% of participants across all specialties and training years correctly answered the questions. The mean score for the Medicine ($M = .59$, $SD = .15$) specialty group was statistically different from Medicine and Allied ($M = .49$, $SD = .16$, $P = < .001$), Surgery and Allied ($M = .50$, $SD = .13$, $P = .008$), and Surgery ($M = .48$, $SD = .12$, $P = .032$).

Conclusions: Significant gaps in knowledge were observed in transfusion medicine. Medical colleges and training institutes might be more likely to contribute to transfusion medicine teaching if the study's findings could be replicated at other training facilities.

Keywords: Blood, Blood Component Transfusion, Blood transfusion, Transfusion Medicine

INTRODUCTION

Knowledge of postgraduate trainees and treating physicians about blood products in context of their preparation, storage, indications, dosage calculation and administration, has a profound impact on patient care.¹ Due to resource limitation, less faculty, lack of proper curricula related to transfusion medicine there is lack of adequate knowledge in transfusion medicine and wrong transfusion practices which may jeopardize their safety. Decisions regarding transfusion are usually taken by residents and clinicians without adequate formal

training.² There is marked difference between clinical practice in context of blood components ordering and transfusion as compare to evidence-based knowledge.³ Despite the critical nature of this field, there is a noticeable gap in research and discourse regarding the depth of knowledge among postgraduate trainees in Rawalpindi, Pakistan.⁴ By highlighting this gap, we can improve the quality of our healthcare delivery and also contribute globally on transfusion medicine education.

The knowledge of transfusion medicine among postgraduate trainees is important for numerous reasons. Primarily, understanding the existing state of knowledge will shed light on important areas for improvement in the training curriculum. Secondly, it will help identify any existing misconceptions that may compromise patient safety.⁵ Lastly, the findings may reveal the ways for targeted interventions and educational initiatives to foster the transfusion medicine expertise of postgraduate trainees, ultimately strengthening the healthcare system in Rawalpindi and beyond. There is scarcity in research highlighting the

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educational strategies and level of knowledge of post graduate students on blood transfusion practices in undergraduate and postgraduate medical curriculum in Pakistan. Lack of correct knowledge of transfusion medicine can be life threatening. Identifications of these gaps and bridging these gaps is the need of the hour.

PARTICIPANTS & METHODS

The objective of the study was to evaluate the knowledge of transfusion medicine among Postgraduate trainees for effective use of blood bank resources, as well as to facilitate safe blood transfusion practices to the patients. Ethical approval was acquired from the ethical review committee of the respective institution (vide letter no. 725/RC/FFH/RWP dated 21-08-2023).

This study was descriptive cross-sectional research conducted within 3 months (15 Sep 2023 to 15 Nov 2023). The sampling technique used was a Non probability Convenience sampling technique. Participants from 22 specialties were included, which were then categorized into four primary specialties, including Medicine, Medicine and Allied, Surgery and Surgery and Allied. A total of 177 postgraduate trainees in different years of training from various departments participated in the study. Data collection was carried out using a self-developed, validated questionnaire (closed-ended), consisting of 25 items on 3 3-point Likert scale showing agree, disagree, and I don't know. These questions were formulated considering the main areas of transfusion medicine, such as basic knowledge about donor selection, demand and doses of blood components, administration of blood components,

interpretation of laboratory results, transfusion reactions and transfusion transmitted infections.

The demographic section included age, gender, specialty, and years of training. A pilot study of this questionnaire was performed by consulting on post-internship doctors working in the Department of Pathology and medicine at our institution. They agreed that the questions were relevant and understandable. Confidentiality and anonymity were assured. Informed consent was taken from all participants. After submission of the questionnaire, every participant was provided with the correct answers so they could update their knowledge. Data were analyzed using SPSS software, version 22 (SPSS, Inc).

RESULTS

In total, 177 participants responded to the online questionnaire survey. Participants from 22 various specialties were then categorized into four primary specialties: Medicine, Medicine and Allied (Radiology, Pediatrics, Pulmonology, Cardiology, Hematology, Nephrology, Neurology, Oncology, Psychiatry, Dermatology, Emergency Medicine), Surgery and Surgery and Allied (Gynae and Obstetrics, Pediatric Surgery, Orthopedics, Urology, Cardiac Surgery, Anesthesia, Plastic Surgery, Ophthalmology, ENT). Among various respondents, the highest percentage was found from Medicine and allied, followed by Medicine, Surgery and Allied and a smaller percentage from Surgery, Fig (1a). The training duration required for general specialties is four years, while subspecialties require five years of training. Therefore, the years of

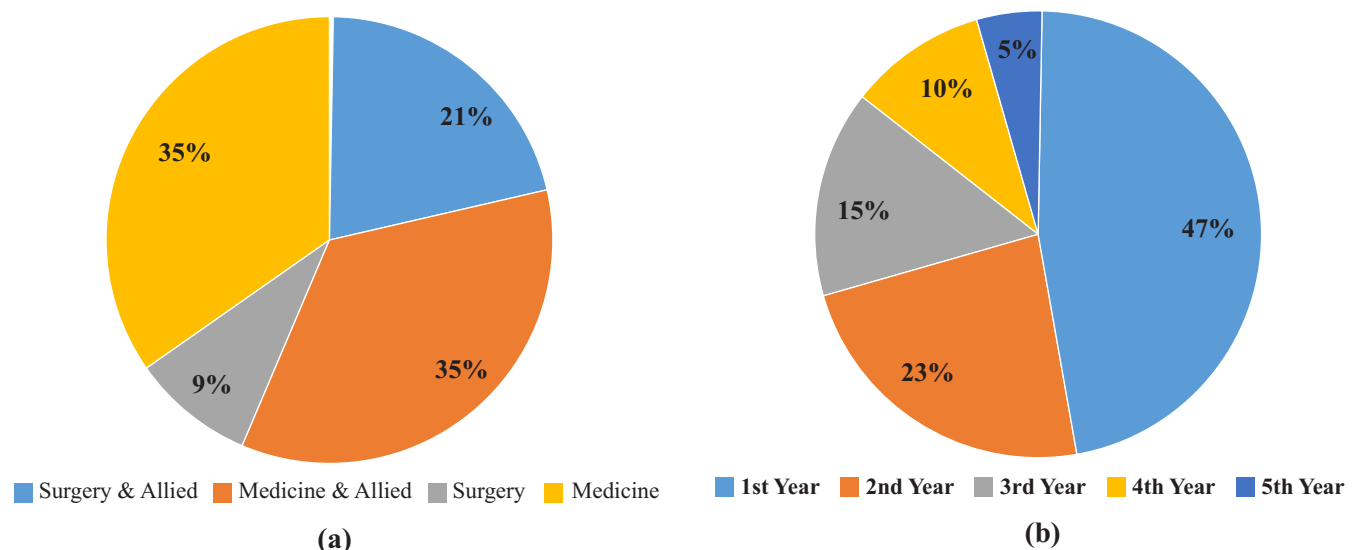


Figure 1: Distribution of Participants by Specialties (left side) and Year of Training (right side)

training were classified ranging from 1 to 5, shown in Figure 1 (b).

The overall correct scores of postgraduate trainees from different specialties are presented in Table I. The findings were statistically assessed using analysis of variance (ANOVA), and the total correct score difference between these primary specialties was found to be statistically significant (Table II). Overall, 52.46% of participants across all specialties and training years correctly answered the questions. Participants from Medicine had the highest accuracy rate, reflecting a strong understanding of the material, while those from Surgery & Allied followed closely behind. While participants from Medicine and Surgery and Allied specialties showed slightly lower percentages of correct answers, respectively. Further post-hoc analysis was conducted to assess the significance of the difference between the four primary specialty groups using Tukey. The test indicated that the mean score for the Medicine (M =.59, SD =.15) specialty group was statistically different from Medicine and Allied (M =.49, SD =.16, $P = <.001$), Surgery and Allied (M =.50, SD =.13, $P = .008$), and Surgery (M =.48, SD =.12, $P = .032$).

Table I: Accuracy rate across primary specialties

Variable	Surgery & Allied	Medicine & Allied	Surgery	Medicine	Overall
Accuracy Rate (%)	49.73	48.57	47.93	59.22	52.46
Mean	0.50	0.49	0.48	0.59	0.52
SD	0.13	0.16	0.12	0.13	0.15

Table II shows the percentage of correct scores for participants based on their training year. The "accuracy rate," as mentioned above, indicating the percentage of correctly answered questions, shows the highest accuracy rate among participants in the 2nd year of training, followed closely by the 1st year of training. Surprisingly, after the second year of training, as the training year's progress, the accuracy rates started gradually decreasing. But upon the statistical analysis conducted by employing ANOVA, no statistical differences were observed between the groups based on the number of years of training (Table III).

Table II: Accuracy rate across years of training

Variable	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
Accuracy Rate (%)	54.20	55.38	48.12	47.29	45.13
Mean	0.54	0.55	0.48	0.47	0.45
SD	0.14	0.14	0.16	0.16	0.14

Furthermore, based on the knowledge assessments, the 26 total questions were divided into four main

Table III: ANOVA- Comparison of accuracy rates between years of Training

Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.20	4.00	0.05	2.29	0.062
Within Groups	3.60	168.00	0.02		

components of transfusion medicine. The first component included five questions related to assessing knowledge about donor selection and deferral criteria (DSD). The second component comprised nine questions related to assessing knowledge of blood product preparation, screening and storage (BPPSS). The third group included nine questions related to blood components indications and administration (BIA). The final group included three questions related to transfusion reaction (TR). The percentage of correct answers within each area of knowledge for both overall and each specialty is shown in the figure. The percentage of overall correct answers for Donor Selections and Deferrals (DSD) was the highest among all four areas of knowledge as well as the highest in each specialty. The overall correct answer for the area of transfusion knowledge titled Transfusion Reaction (TR) was the lowest at 42.97% (Surgery & Allied 41.44%; Medicine & Allied 46.45%; Surgery 35.56%; and Medicine 42.22%). (Figure 2).

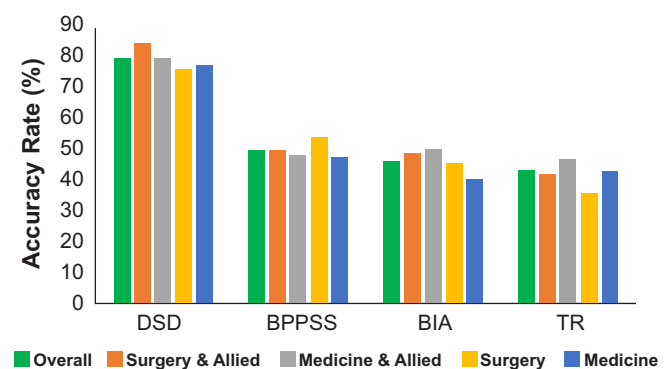


Figure 2: Accuracy Rate in Four Key Transfusion Areas across Four Primary Specialties

DISCUSSION

Transfusion medicine is an emergency mostly in acute lifesaving procedures. There is dire need of formal education and training of post graduate trainees and all medical staff for implementation of safe transfusion practices.⁶

According to the SHOT report, 2019, the major cause of

incorrect transfusion of blood component was due to wrong ordering of blood products which was found to be approximately 30.7%.⁷

According to results of our study, 56.4% of participants have given correct answers. In contrast to our study, interns have alarmingly poor knowledge about various aspects of blood transfusion services. According to study conducted by Gopal et al 41.5% residents out of total had inadequate knowledge about transfusion medicine.⁸ In one study conducted by Hussel W there was marked deficiency of adequate knowledge related to use of blood warmers, exchange transfusion and massive transfusion protocols.⁹

Our study reflected the highest accuracy rate among participants in the 2nd year of training at 55.38%, followed closely by the 1st year with an accuracy rate of 54.20%. Surprisingly, after the second year of training, as the training year's progress, the accuracy rates gradually decrease, with a rate of 48.12% for participants in the third year, 47.29% for participants in the fourth year, and 45.13% for participants in the fifth year of their post-graduation training.

Knowledge of transfusion medicine in postgraduate trainees and clinicians was assessed by Poh Ky et al.¹⁰ Total doctors assessed were 184, having a mean score of correct answers of 40.1% (SD 12.7%). The difference between our study and this study was that it included both clinicians and postgraduate trainees. Physicians from specialties including hematology, internal medicine, reflected notable higher scores (51%, 47.4%, and 46.4% respectively, $p < 0.05$). This is following our study in which participants from Medicine stand out with the highest accuracy rate at 59.22%, indicating a commendable percentage of correctly answered questions. Participants from Surgery & Allied closely followed with an accuracy rate of 49.73%, while participants from Medicine and Surgery and Allied specialties showed slightly lower rates of accuracy at 48.57% and 47.93%, respectively. According to the results of our study, the overall correct answer for the area of transfusion knowledge titled Transfusion Reaction (TR) was the lowest. Similarly, in this study postgraduate trainees have been found to have deficient knowledge in areas of transfusion related acute lung injury (TRALI) and transfusion reactions.¹⁰ In another study conducted by Vaena M et al in Brazil, showed the overall mean of correct answers to the questionnaire was 43.5%. An inadequacy of knowledge of transfusion medicine was found according to the results of this

study.¹¹

In contrast to our study, maximum correct answers were related to the thresholds for transfusion of platelets, indication of different blood products (80%), and finally the diagnosis and management of transfusion reactions (87%).¹¹ However according to the results of our study best knowledge was observed in area of donor selection and deferral, blood products preparation screening and storage, blood indications and administration but poor knowledge in area of transfusion reactions.

Ngo A et al also observed that there is dire need of formal education programs in transfusion medicine.¹²

A cross-sectional study was conducted by Bouchrim AA on total fifty 1st year residents of first year medical and surgical specialty. According to the results major gaps identified in knowledge of transfusion medicine were in blood ordering, handling of blood products in wards, identification of responsibilities of residents in transfusion of blood products to the patients. Also they had inadequate knowledge about managing blood complications.¹³ In a research conducted by VUK PT et al it was concluded that both Hemovigilance and transfusion medicine is not included in the educational curriculum of medical schools and at post graduate level which van tremendously effect the safe transfusion practice.¹⁴ It has been suggested by Lin Y et al that Blood Transfusion Camps can improve postgraduate trainees knowledge and attitude towards transfusion medicine and can positively impact safe transfusion practices.¹⁵

CONCLUSION

It is concluded that postgraduate trainees lack fundamental theoretical and practical understanding of transfusion medicine.

The knowledge gap identified by this study can be addressed by scheduling educational seminars, visits, frequent lectures, workshops for clinical postgraduate residents. The situation will be much improved by a range of educational measures, including one-on-one conversations, prospective audits and participation conferences, continuous medical education on hemovigilance, and the engagement of transfusion medicine physicians in clinical rounds. These steps will undoubtedly improve the relationship between our future clinician and transfusion medicine and, in the end, lead to better patient care.

Limitations

One limitation of this study is the unequal distribution of

participants across training years, specialties, and gender, which may affect the generalizability of the findings. This imbalance resulted from the use of a non-probability convenience sampling technique and voluntary participation.

Recommendations: Future research should consider employing a probability-based sampling strategy with a more balanced representation across specialties and

demographic groups to enhance the robustness and external validity of the results.

Authors' Contribution

Madeeha Rehan: Conception of study / Designing / Planning

Nazia Nijat: Data Analysis, Statistical Analysis

Attika Khalid: Manuscript Writing, Critical Review

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