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Original Research Article

Knowledge, attitude and practice of hemovigilance among health care professionals and hemovigilance study in a tertiary care hospital

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ABSTRACT

Background: Clinical staff's wisely varying transfusion techniques result in the misuse of blood products and endanger patient safety. Hemovigilance seeks to improve the quality and safety of blood transfusions. This study aimed in order to find out the knowledge, attitude and practice of hemovigilance among HCP's and to know the incidence and prevalence of ATR in a tertiary care hospital.
Methods: An observational study of 120 HCP's is planned to be conducted at Hospital. Pre-validated KAP questionnaire were issued. The frequency of ATR was recorded in TRRF form. At end of the study through collected data, we will subject it to statistical analysis.
Results: From the view of 120 HCP, only 40 % had knowledge on the hemovigilance, and a whopping 74% is not practicing Hemovigilance safety measures. But we are happy to see that 71% have a positive attitude. Out of 40 transfusion reactions, a majority of patients had encountered FNHTR and allergic reaction, that is of 30%. Followed by delayed haemolytic reaction, TACO, TAD of 10%. And 5% did get hypotensive reaction and TRALI. Coming to type of blood component administered PRBC (60%), whole blood and FFP 20% each were seen. Out of 40 ,30 female patients (75%) and 10 (25%) reported ATR.
Conclusions: Even though The HCP have positive attitude towards blood safety, the knowledge and practice of HCP is proven to be poor. The frequency of ATR showed although they are less severe if no strict monitory actions are not taken, they may turn life threatening.

Keywords: Febrile-non haemolytic reactions, Health care professional, Transfusion associated circulatory overload, Transfusion associated dyspnoea, Transfusion reaction reporting form, Transfusion related acute lung injury

INTRODUCTION

Hemovigilance

The circulatory system is essential for transporting food, oxygen, and other substances within the body. Blood transfusions are a critical emergency treatment that saves countless lives, often needed for surgeries, trauma, severe haemorrhage, or obstetric complications. Since the 1940 Drugs and Cosmetics Act, blood has been classified as a "drug" under the oversight of the Ministry of Family and Health Affairs.[1-3]

India, with a population of over 1.3 billion, has 2,760 licensed blood centres, of which 77% (1,919) are hospital-based, 1% (23) are lab-associated, and the remaining 22% (551) are independent blood banks. Given this large population, ensuring the safety of blood and its components is crucial for effective blood planning, promoting anonymous donations, training personnel, and conducting quality-focused blood tests. This necessity has led to the establishment of the term "Hemovigilance".[4-6]

Hemovigilance refers to the methods used to monitor the entire blood transfusion process, from blood acquisition to recipient follow-up. Blood transfusions must be conducted carefully, as they can occasionally lead to fatal complications.[7,8]

Blood transfusion reactions

Toxic occurrences linked to the transfusion of entire blood or one of its elements are referred to as transfusion reactions.

Commonly seen types

Acute haemolytic, delayed haemolytic, febrile non-haemolytic, septic, transfusion-related acute lung injury, transfusion-associated circulatory overload, transfusion-associated graft-versus-host disease, post transfusion purpura, transfusion transmitted parasitic infection (malaria).[9-11]

Symptoms

Urticaria: Itching may signal a minor reaction or a severe anaphylactic event. Stop blood supply and monitor symptoms closely. Fever/Chills: Often linked to febrile, non-haemolytic reactions, but may indicate severe responses like haemolysis, TRALI, or sepsis. Halt transfusion if temperature rises by 1°C+.Hypotension: Can result from haemolytic, septic, or allergic reactions, and TRALI. Investigate if it occurs without other transfusion signs. Hypothermia: Large volumes of chilled blood products can cause hypothermia. Simply warm the blood. Lung Complications: Symptoms like wheezing, cough, and dyspnoea are concerning, linked to anaphylaxis, TRALI, and TACO. Caused by donor antibodies interacting with recipient WBCs, leading to airway inflammation. Renal Tests: RBC destruction may cause reddish urine, haemoglobinuria, or haematuria. In renal insufficiency, it may lead to oliguria.[12-14]

Causes

Immune-mediated transfusion reactions often arise from incompatibilities between the recipient and the transfused blood. These reactions involve both alloantibodies, produced in response to foreign antigens, and naturally occurring antibodies (such as anti-A and anti-B) that can lead to acute haemolytic transfusion episodes. Lung injury associated with blood transfusions is thought to be triggered by these antibodies.

Non-immunological reactions are typically caused by the physical effects of blood components. Septic transfusion reactions result from bacterial contamination or endotoxin exposure, which may occur due to inadequate sanitation of the donor's arm, the presence of bacteria in the donor's bloodstream, or improper storage and handling of the blood product after collection.[15-17]

Immunological haemolysis

The primary barrier to successful blood transfusion is the immune response to differing cell surface molecules among individuals. The ABO system is the most critical alloantigen system in transfusions. Individuals lacking specific ABO antigens produce natural IgM antibodies (and, less commonly, IgG antibodies) against those antigens, which activate complement. This leads to the formation of terminal membrane attack complexes (MAC) from components C5 to C9, creating pores in transfused red blood cell membranes and initiating intravascular haemolysis.[18,19]

Coombs test

The Coombs test, previously called the anti-globulin test, is performed in an immunology lab to detect antibodies against circulating red blood cells that can cause haemolysis. There are two types: the direct Coombs test, which detects antibodies attached to RBCs, and the indirect Coombs test, which identifies antibodies in the plasma that are not bound to red blood cells. ABO grouping typing in: To reduce the likelihood of contributor rejection during blood donation, indirect Anti-globulin testing can be done to detect the RBC morphology.[20,21]

The routinely used blood transfusion products are COVID-19 convalescent plasma, whole blood, Packed Red Blood Cells (PRBC), buffy coat depleted PRBC, Leucofiltered PRBC, random donor platelets/pooled, apheresis platelets, cryoprecipitates and fresh frozen plasma.[22]

METHODS

An observational pre-validated questionnaire study of 120 sample size is planned to be conducted by distributing KAP questionnaires to the department of blood transfusion, OBG, general medicine, surgery, emergency ward in MVJ Medical College and Research Hospital, Bangalore, South India from March, 2024 to September, 2024. The study is to be conducted on gaining approval from the institutional ethical committee [REF: MVJ MC&RH/IEC-78/2023]. Who had met the inclusion criteria were enrolled in the study. The initial patient detail, transfusion reaction details, transfusion product details, nature of adverse reaction is noted in TRRF form.

(6 months). According to data obtained the KAP assessment and ATR assessment will be done. At the end of the study, the collected data will be compiled systematically and will be subjected to statistical analysis. The study was conducted on participants who fit inclusion criteria; Data is collected by questionnaires manually and also on web based through online Google forms. For ATR, TRRF (Transfusion reaction reporting form from National Institute of Biologicals) is employed.

Inclusion criteria

Health care professionals who gave consent to participate in the study and all the patients of either sex and of flexible age group who are receiving blood transfusion (surgery, accident, anaemia etc.,) were included.

Exclusion criteria

Health care professionals who are not willing to participate in the study and the patients who were not indicated for blood transfusions were excluded.

Data collection

Transfusion reaction reporting form

The TRRF form starts with sections of patient's information (with primary diagnosis), transfusion reaction details (on symptoms seen), later on transfusion product given (type of blood component), clinical investigations performed, nature of Adverse reaction (The subtypes).

Statistical analysis

The questions under knowledge were done via binomial response, the attitude using Likert Scale and Practice via same binomial response. The interpretation of results was performed MS. EXCEL.

RESULTS

We posed questions to health care professionals to assess their knowledge, attitude and practise on hemovigilance (the results are shown in detail in Table 1, Table 2 and Table 3).

Table 1: Knowledge assessment.

Knowledge assessment questions	Yes (%)	No (%)
Do you know that blood transfusion reactions can be stopped?	92 (76.7)	28 (23.3)
Can blood transfusion reactions be reported?	111 (92.5)	9 (7.5)
Are you aware to whom and how can blood transfusion reactions be reported?	56 (46.7)	64 (53.3)
Do you have an idea about Hemovigilance program?	16 (13.3)	104 (86.7)
Do you know any toll-free number reporting blood transfusion reaction?	14 (11.7)	106 (88.3)
Do you know full form of TRRF Form?	30 (25)	90 (75)
Do you have knowledge about Haem-vigil and donor-vigil software's?	13 (10.8)	107 (79.2)

Table 2: Attitude assessment.

Attitude assessment questions	Strongly disagree (-2) (%)	Disagree (-1) (%)	Neutral (0) (%)	Agree (+1) (%)	Strongly agree (+2) (%)
Every hospital should enrol under Hemovigilance program	1 (0.83)	2 (1.6)	17 (14.16)	50 (41.6)	50 (41.6)
One Hemovigilance centre is enough for a city	16 (13.33)	43 (35.83)	23 (19.16)	24 (20)	14 (11.6)
Reporting each and every blood transfusion reaction is important	2 (1.6)	1 (0.83)	6 (5)	53 (44.1)	58 (48.3)
Hemovigilance should be included in the UG program	2 (1.6)	4 (3.3)	24 (20)	65 (54.1)	25 (20.83)

Table 3: Practice assessment.

Practice assessment questions	Yes	No
Have you reported any blood transfusion reactions to Hemovigilance centre?	16 (13.3)	104 (86.7)
Were you a part of any CMEs, workshops, seminars on the topic Hemovigilance?	9 (7.5)	111 (92.5)
Did you observe more than one transfusion reaction in a month at hospital?	68 (56.7)	52 (43.3)

Gender

Out of 100% (as shown in Figure 1), 75% female patients are exposed to transfusion reaction whereas only 25% men patients are exposed for the same.

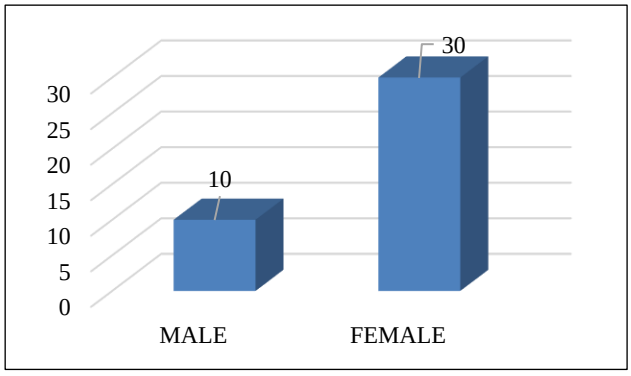

Figure 1: Prevalence of ATR based on gender.

Transfusion products given

Among 40 patients (100 %), 60% patients were intended with packed red blood cells (PRBC), 20% patients each were intended with whole blood and fresh frozen plasma respectively (as shown in Figure 2).

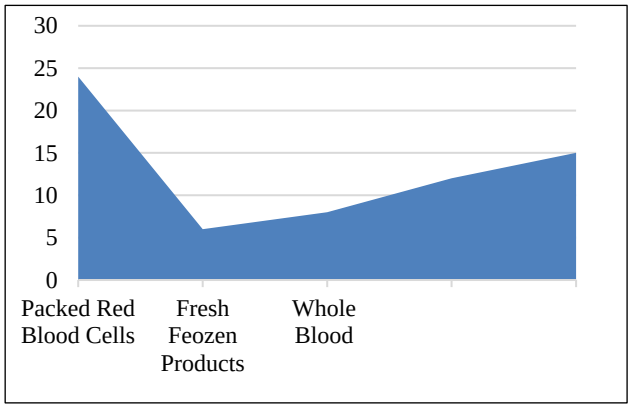

Figure 2: Types of transfusion products given.

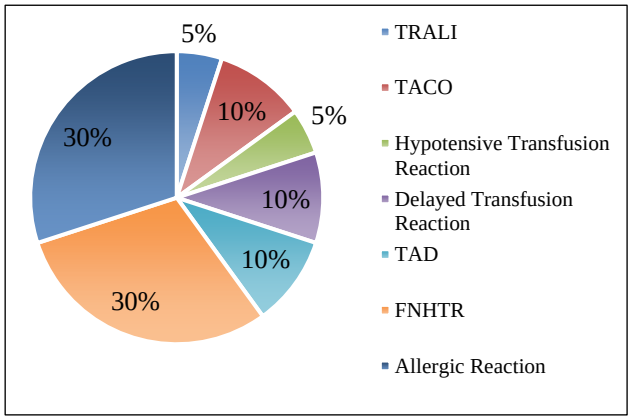

Figure 3: Nature of adverse transfusion reaction.

Nature of adverse transfusion reactions

Out of 100%, 12 patients were experiencing with one of the common ATR that is febrile non haemolytic reactions (FNHTR). Similar to FNHTR, 12 patients were experiencing with one more common ATR, that is Allergic reaction. 4 each were experiencing Delayed haemolytic reactions, transfusion associated circulatory over load (TACO) and transfusion associated dyspnoea (TAD). 2 each were experiencing hypotensive transfusion reaction and transfusion related acute lung injury (TRALI) (as shown in Figure 3).

Immunological haemolysis

Among 4 patients who experienced haemolysis the nature of error was attributable from labelling error by 3 of them and grouping error by one (as shown in Figure 4).

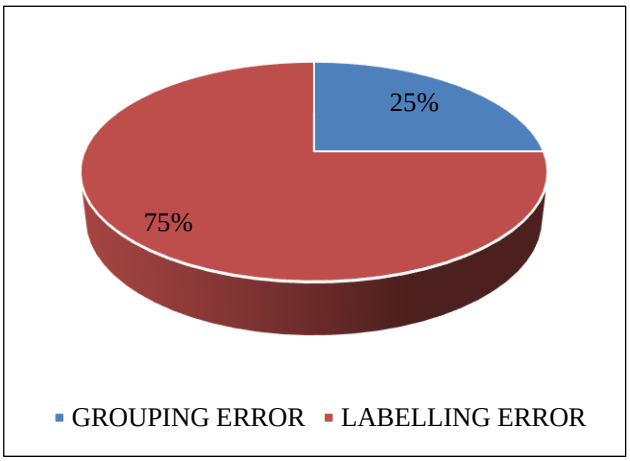

Figure 4: Reason for immunological haemolysis.

DISCUSSION

A repository of blood and a medical professional have to cooperate together to report adverse events. It mostly hinges on comprehension of blood transfusion techniques, problems connected with using blood, prompt detection of a blood transfusion-related incident, clinical care of the event, and extra blood bank inquiry.

In our analysis, there were 40 transfusion episodes, or 0.8% (out of 4998). The incidence of unfavorable transfusion responses was 0.18% in another Indian study by Bhattacharya et al. (105 reactions out of 56,503 transfused units of blood and blood component).[23] The most frequent side effect of blood transfusion is FNHTR. These rates agree with the research by Kumar et al. Because of the interaction between the leukocytes in the transfused component and the white cell antibodies in the recipient's plasma. It was followed by allergic reaction of same 30%.[24] In our investigation, there were 2 TRALI instances and 1 case of each hypotensive reaction. TRALI ranged from 0.001% to 0.008% as reported in several research in western literature. Due to its excellent

mimicry of other clinical illnesses that result in acute lung injury as well as the lack of investigations to match TRALI, it is frequently underdiagnosed. Four patients experienced a delayed hemolytic transfusion response. A major ABO-mismatched blood transfusion event and grouping and labeling mistakes were to blame for it.

The most frequent transfusion error, incorrect transfusion of ABO-incompatible blood, nearly usually reflects a preventable breakdown un transfusion policy and SOP. Female patients are more attributed to transfusion reaction than males due to higher affinity with Anemia. Nearly all of the HCP in the current study were conscious that transfusion reactions should be reported, however only 46.7 percent of them knew how to proceed and who can complain. The outcomes are comparable to those of the Bindu et al, 2020 KAP study.[25]

Figure 5: A e-poster creating awareness to HCP.

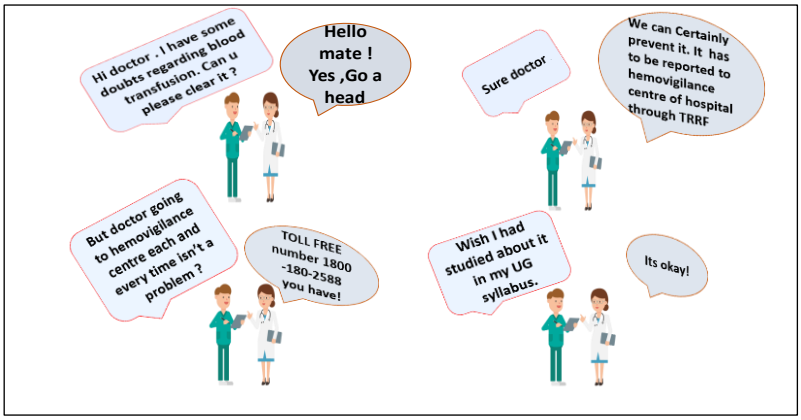

Figure 6: A e-poster conveying safe handling of blood.

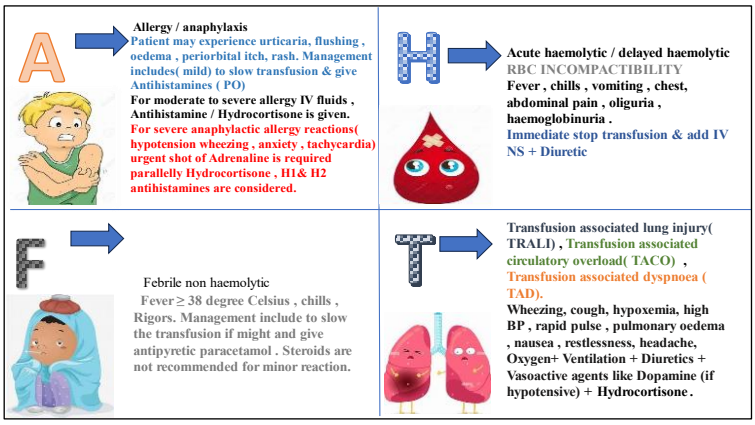

Figure 7: A e-poster giving flash idea on ATRs.

In addition to assessing the knowledge, attitudes, and practices (KAP) of healthcare professionals (HCPs), we took an extra step to raise awareness by distributing e-posters and conducting a brief seminar on the topic. This initiative aimed to prevent future errors related to adverse transfusion reactions (as shown in Figure 5-7).

The character of the transfusion reaction, fear of the repercussions, a lack of training, a lack of a clearly defined hemovigilance structure and protocol, a lack of computing, a lack of knowledge on software (hemo- vigil and donor vigil types) are some of the reasons why hemovigilance is used seldom.

CONCLUSION

Adopting cutting-edge methods should be prioritized in order to move blood transfusion toward a risk-free transfusion. A robust hospital transfusion committee, reporting of all adverse events, and ongoing medical education for medical and paramedical workers will all contribute to a stronger hemovigilance system. The HCP participants' knowledge, attitudes, and practices were subpar, particularly when it came to the scope and voluntary non-punitive framework of the hemovigilance system. Clinicians should be made acquainted with the paperwork linked to hemovigilance and should have wider access to programs for continuing medical education by reducing their burden and appointing professionally competent PharmD graduates here.

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