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A Study on Blood and Blood Components Transfusion, Adverse Reaction at a Tertiary Care Teaching Hospital, Bangalore

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Abstract

Background: Blood transfusion is the transfer of whole blood or blood components (red blood cells only or blood plasma only) into the bloodstream directly or into the bone marrow. Blood transfusion is carried out between two identical blood groups only, which otherwise (incompatible blood transfusion) results in agglutination or clumping of the blood leading to haemolysis of RBC and releasing the haemoglobin to the blood plasma.

Blood and blood components: Blood is a liquid connective tissue that consists of blood plasma (liquid) and formed elements (red blood cells, white blood cells and platelets). Blood components are various parts of blood like Red Blood Cells, Granulocytes and plasma separated from one another by conventional blood bank method by centrifugation because of their different specific gravities.

The different cellular components are Red Blood cell (RBC) or Packed Red cells (PCV), Leucocyte depleted Red cells, Platelet concentrate, Platelet Apheresis and Leucocyte depleted Platelet concentrate. The different plasma components are Fresh Frozen Plasma, Cryo-precipitate and Cryo-poor Plasma.

Indications for blood and blood component transfusion: Some of the conditions that demand the transfusion of blood and blood components are red cell replacement in anemia, acute or chronic restoration of oxygen carrying capacity, IgA deficiency, Thrombocytopenia, loss of blood during surgery and delivery and clotting factor deficiency.

Common problems during blood transfusion: Blood transfusions are associated with adverse reactions during or after the transfusion.

The blood transfusion reactions are classified based on the onset of the reaction, acute–immediate and delayed–days to weeks to months. The reactions are as follows:

Acute transfusion reaction:

Mild (Category 1) – urticarial reaction.

Moderate (Category 2) – Severe hypersensitivity reaction, Febrile non-hemolytic reactions, Bacterial contamination, Pyrogens.

Severe (Category 3) – Acute intravascular haemolysis, Septic shock, Fluid Overload, Anaphylactic shock, TRAIL (transfusion-associated acute lung injury).

Delayed transfusion reaction: Transfusion Transmissible infections – HIV 1 and 2, Viral Hepatitis B and C, Syphilis, Malaria, HTL V 1and 2, Cytomegalovirus, Chagas Disease. Others - Delayed Haemolytical, Post Transfusion Purpura, GvHD, Iron overload. Thus, the blood transfusions are needed to be monitored carefully. The monitoring has to be done pre-transfusion, during transfusion and post-transfusion for the safety and benefits of the patient.

Haemovigilance

Haemovigilance is a continuous process of data collection and analysis of transfusion related adverse events and reactions [AR/AE] in order to investigate their causes and out comes, and prevent their occurrence or recurrence [1-3]. The system includes monitoring, identification, reporting, investigation and analysis of adverse reaction related to transfusion and manufacturing [4].

Haemovigilance is governed by National Institute of Biologicals, Ministry of Health and Family Welfare, Government of India [5].

Objectives

The objectives of the study were to study the extent, incidence and severity of transfusion reaction, to report the suspected transfusion reactions in a timely manner to facilitate effective risk management and to assess the causality of transfusion reaction.

A prospective observational study was carried out at St. Philomena's hospital, Bangalore. The study was carried out for a period of 9 months from 1st July 201–31st March 2015.

Ethical committee clearance was obtained from the Institutional Ethical committee of St. Philomena's hospital, Bangalore. All in-patients including pediatrics who received blood transfusion were included in the study. Patients with past history of transfusion adverse reaction and those who were not willing to participate in the study were excluded.

During the study patients' data were collected from - Transfusion reaction form, Case sheet of patients, Personal interview with patient or attender and history of patients.

The data of the patient prior to the transfusion were documented in the documentation form. Personal interview with the patient and the patient attender was carried out and all the essential parameters were documented. The suspected transfusion adverse reactions [fever, chills, hypotension, rigors, rashes, and respiratory discomfort] were investigated. Based on the onset of the reaction both immediate and delayed type were analyzed.

If any severe reaction occurs, with physician's consultation patient blood sample will be collected carefully in an EDTA vial and will be investigated for ABO, Rh grouping, Complete blood count (CBC), Direct Antiglobulin test and Antibody screening. The data were analyzed and documented. The causality assessment of the transfusion adverse reaction was done by following the IPC-NIB prescribed causality scale [5].

Results

During the study period, a total no. of 400 units of blood and blood components were transfused to 117 patients in various departments of St. Philomena's hospital. Out of which a total no. of 27 transfusion adverse reactions [transfusion AR's] were reported.

Among 117 patients enrolled in the study 63 (53.84%) were female and 54 (46.15%) were male patients and out of 400 units of blood and blood components that was transfused 209 (52.25%) units was transfused to female and 191 (47.75%) units to male patients.

The transfusions were more in the age group of 40-49 years 103 (25.75%), followed by 30-39 years 89 (22.25%). A 400 units of blood and blood components that was transfused 51 (12.75%) was fresh whole blood and 349 (87.25%) was blood components.

Out of 349 units of blood components 149 (37.25%) units were Packed red blood cells followed by 136 (34%) Platelet concentrate, 35 (8.75%) Single donor platelet and 29 (7.25%) Fresh frozen plasma.

The major reason for transfusion was found to be anaemia 197 (49.25%), followed by viral fever with thrombocytopenia [TCP] 56 (14%), dengue with TCP 44 (11%) and dengue fever 42 (11%). A total no. of 29 transfusions were carried out for the surgery patients and 6 units were transfused to newly delivered Mothers.

During the study a total no. of 27 transfusion ARs were reported among which 11 transfusion AR's were observed in male and 16 transfusion ARs were observed in female.

All the transfusion ARs were found to be immediate based on the onset of the reaction. Among 27 transfusion ARs itching 9 (33.33) was found to be predominant, followed hypotension 8 (29.62%), fever 4 (14.81%) and dry mouth 2 (7.40%).

According to IPC-NIB scale [5] 17 (62.96%) of transfusion adverse reaction were probable (likely), 7 (25.92%) were possible and 3 (11.11%) were definite (certain).

Majority of the transfusion ARs were attribute to 11 (40.74%) packed red blood cell transfusion followed by 7 (25.92%) due to single donor platelets, 5 (18.51%) due to platelet concentrate, 2 (7.40%) due to fresh whole blood transfusion.

TABLES

Gender	Number of transfusions	Percentage (%)
Female	218	52.25
Male	182	47.75
Total	400	100

Table 1: Gender distribution based on Number of transfusions [6].

TCP–Thrombocytopenia

Reason for transfusion	Number of transfusion	Percentage (%)
Anaemia	197	49.25
Viralfever+TCP	56	14
Dengue+TCP	44	11
Dengue fever	42	10.5
Surgery	39	9.75
Dengue haemorrhagic fever	8	2
Viral haemorrhagic fever	7	1.75
Delivery	6	1.5
Dialysis	1	0.25

Table 2: Distribution based on reason for transfusion and Number of transfusion [6].

Transfusion AR's	Number of reactions	Percentage (%)
Itching	9	33.33
Hypotension	8	29.62
Fever	4	14.81
Dry mouth	2	7.40
Chills	1	3.70
Giddiness	1	3.70
Rashes	1	3.70
Headache	1	3.70
Total	27	100

Table 3: Types and Number of transfusion ARs [7,8].

Score	Number of transfusion AR's	Percentage (%)
Definite(Certain)	3	11.11
Probable(Likely)	17	62.96
Possible	7	25.92
Unlikely(Doubtful)	-	-
Excluded	-	-
Total	27	100

Table 4: Assessment of the transfusion AR's based on the IPC–NIB Scale [5].

Drug	Number of transfusion AR's	Percentage (%)
Inj. Avil	2	6.25
Inj. Avil+Inj. Hydrocartizone	2	6.25
Inj. Avil+Tab. Levocet	1	3.12
Inj. Febrinil	1	3.12
Tab. Allegra	1	3.12
Total	27	100

Table 5: Management of transfusion AR's.

Note: Remaining 20 transfusion ARs were subsided by itself.

Table 5 is not mentioned with any reference as the table was prepared by us from the obtained in our study site.

Discussion

In our study, transfusions were found to predominant for female than in male. These gender based differences were coinciding with the observations of Venkatachalapathy TS [6].

The blood and blood components transfusion was more in the age group of 40–49 years. Among the male population, transfusions were more between the age group of 30–39 and among female population transfusions were more between 40 – 49 years.

Blood components transfusion was found to be predominant. Among these, packed cell transfusion was found to be more in number. These observations were found to be differing from the study conducted by Venkatachalapahy TS [6]. Their results showed whole blood transfusion was predominant.

During the study, O positive blood/blood component units was found to be predominant. These observations were found to be similar with the study conducted by Venkatachalapahy TS [6].

Among the total no. of patients who have undergone transfusions, the major reason for transfusion was found to be for anaemia, followed by viral fever+TCP, dengue+TCP and dengue fever.

In surgery department, transfusions post-surgery was found to be more followed by pre-surgery and intra surgery. This was coinciding with the study carried by Venkatachalapahy TS [6].

The transfusion adverse reactions were found to be acute/immediate type based on the onset of reaction. The observations showed that majority of the reactions were seen in females than males. This results were similar with the study conducted by Bhattacharya et al., [7] whereas differs from the study conducted by Praveen Kumar et al., [8].

Among these transfusion reactions, allergic reactions were found to be predominant. Allergic reactions include itching 9, rashes and chills. These observations were found to be similar with observations made by Bhattacharya et al., [7] and Praveen Kumar et al., [8] followed by hypotension, fever, dry mouth and giddiness.

Out of all the transfusion reactions reported the majority of the transfusion reactions were caused by the transfusion of packed cell transfusion. This results are coinciding with the observations made by Praveen Kumar et al., [8] followed by single donor platelet transfusion, platelet concentrate, fresh frozen plasma and fresh whole blood.

Causality assessment of the transfusion adverse reactions were done by using IPC–NIB prescribed scale. According to this scale, majority of the transfusion adverse reaction were probable (likely), followed by possible and definite (certain).

Some of the transfusion adverse was managed by using medications whereas remaining transfusion adverse reactions were subsided on its own.

Conclusion

Of these transfusions, majority of the transfusions were observed in Medicine ward. The reason for majority of transfusions was for anaemia followed by viral fever+TCP, dengue+TCP, dengue fever. Among the total no. of transfusion isolated blood components transfusion was predominant than whole blood transfusion. All the transfusion ARs were found to be mild and are acute in type based on the onset of the reaction.

Out of 27 transfusion ARs, itching was found to be predominant followed by hypotension, fever, dry mouth, chills.

The causality assessment was done based on the IPC-NIB scale, majority of the transfusion reactions were found to be probable (likely), followed by possible and definite (certain).

The results of the study show that transfusion ARs are needed to be monitored carefully. Though, the reactions were mild in nature and not fatal, they are all preventable, if there is a close monitoring of transfusions.

An effective haemovigilance system in a hospital setup will definitely minimize the incidence of transfusion ARs and improve blood safety.

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