

Unnecessary blood and blood products transfusion: Single institute study of the expected harmful effect of unneeded transfusion

Abdulaziz Wannas ABD¹, Akeel Kamil ABD²

¹Hematology Department, College of Medicine, Al-Qadisiyah University, Diwanyah, Iraq

²Pediatrics Department, Maternity and Children Teaching Hospital, Al-Diwanyah Health Directorate, Diwanyah, Iraq

ABSTRACT

Background. Blood and blood products such as packed RBCs, whole blood or other types of blood transfusions are some of the most common daily medical procedures performed all over the world. However, the doctor decisions to transfuse blood are not easy in clinical practice.

Method. It was used a descriptive prospective study including 136 children who received blood and blood products transfusions in Al-Diwanyah Maternity and Children Teaching Hospital, Iraq, from 15 January to 15 November 2023.

Result. The gender distribution among patients was of 56 males (41.17%) and 80 females (58.82%), all of them exposed to unnecessary blood transfusion. There was no significant difference in gender between high and low level of the hemoglobin groups. Presence of underlying chronic disease was higher in the group with Hb level less than 8 compared to the group with Hb level above 8 (55.65% vs.44.11 %), and the difference was significant ($p = 0.042$).

Provisional diagnosis before transfusion was more effective in lower hemoglobin level subjects than in those with higher hemoglobin level ($p = 0.019$). About 70 % of these unneeded transfusions were performed due to lack of doctor awareness regarding the indications and the time when the blood and blood products transfusions were necessary.

Conclusion and recommendations. All the new strategies of the hospital should be focused on avoiding the harmful effect of any procedure like blood transfusions, weighting their balance of benefits and harms. It is no need to perform a blood transfusion as an initial treatment if the affection can be treated by other means, excepting the life saving emergency situations after trauma or life threatening hemorrhage. In some patients who are asymptomatic and/or where specific therapy is available, lower threshold levels may be acceptable. Continuous medical educational and increased doctor's knowledge might help decrease unnecessary transfusions. Prior to surgery, multidisciplinary teams and discussions about transfusion should be engaged between pediatrician and surgeon. Safe blood and blood products as well as the cost of blood transfusion services should be considered before any decision.

Keywords: blood transfusion, harmful effect

INTRODUCTION

Blood and blood products such as packed RBCs, whole blood or other types of blood transfusions are some of

the most common daily medical procedures performed all over the world. However, the doctor decisions to transfuse blood are not easy in clinical practice [1].

Corresponding author:
Abdulaziz Wannas Abd
E-mail: abdulazizwannas@yahoo.com, abdulaziz.abd@qu.edu.iq

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Most of the medical institutes depend on certain clinical guidelines issued by professional organizations, and many doctors attend the practical formation on specific guidelines regarding blood and blood products transfusion. All these guidelines are meant to support and to give optimal effect to patients' outcomes, allowing the correct use of resources. The health authorities should support the use of clinical guidelines in transfusion of blood and blood products by creating IT data bases with entry data and detailed statistical information [2]. Blood transfusion is urgently indicated for patients' profuse bleeding, according to clinical evaluations and laboratory results. The optimal resuscitation of patients with bleeding problems is still in debate in many medical centers, and it should be apprehended. Anyway, a certain study on transfusion to patients with severe gastrointestinal bleeding revealed a good result if blood transfusion guideline of hemoglobin was below seven gram per deciliter [3]. The strategy of platelet transfusion developed in the last 20 years of the previous century, and it was based on many articles and studies available at that time [4]. Plasma transfusion is associated with dangerous complications such as severe allergic reactions, fluid overload, severe acute lung insult, and infection since plasma transmits many viruses and bacteria [5].

METHOD

The method we used it was a descriptive prospective study including 136 children who received blood and blood products transfusions in Al-Diwanyah Maternity and Children Teaching Hospital, Iraq, from 15 January to 15 November 2023. The information was collected from patients' families and discussions with other doctors involved; while the tool used was a questionnaire with data about age, gender, disease, causes of blood transfusions, as well as medical and nutritional history recorded in the patients' letters of discharge from hospital. Blood investigation included CBC (complete blood count), especially the hemoglobin level (Hb), and it was done for all patients, as well as other related tests according to each particular case. Data statistical analysis was performed by statistical package for social science version 23.

RESULTS

Out of 136 patients in our hospital, 56 were males (41.17%) and 80 were females (58.82%). All of them

were exposed to unnecessary blood and blood products transfusions. There was no significant differences between genders regarding the high and the low level of hemoglobin groups. Presence of underlying chronic disease was higher in the group with Hb level less than 8 compared to the group with Hb level above 8 (55.65% vs.44.11 %), and the difference was quite significant ($p = 0.042$). Provisional diagnosis before transfusion was more effective in lower hemoglobin level subjects than in higher hemoglobin level subjects ($p = 0.019$) (Table 1). About 70 % of the unneeded transfusion were performed due to lack of doctor a awareness about the indications and the time when the blood and blood products transfusions wew necessary (Figure 1).

TABLE 1. Frequency distribution of possible risk factors for unnecessary blood and other blood products transfusions according to presence of chronic disease, operations or procedure and provisional diagnosis

Characteristics	Values	Hb Level of less than 8	Hb Level above 8	P Value
Gender	Male	44 (32.35 %)	32 (23.52 %)	0.308
	Female	32(23.52%)	28(20.58 %)	
Chronic disease	Yes	32(23.30 %)	16(11.76 %)	0.042
	No	44(32.35 %)	44(32.35%)	
Procedure	Before	40(29.41%)	44(32.35 %)	0.003
	After	40(29.41%)	12 (8.82%)	
Transfusion character	Packed RBCs	68 (50 %)	48(35.29 %)	0.048
	Other blood products	0(0.00 %)	20(14.70 %)	
Provisional diagnosis	Yes	12(8.82 %)	4(2.29 %)	0.019
	No	18(52.29 %)	16(11.76 %)	
	Not yet	16(11.76 %)	16(11.76 %)	

DISCUSSION

Unlike others medical societies, our hospital did not involve any specific guideline for RBC or other blood product transfusions in hemodynamically stable children [6]. The AABB (the Association for Advancement of Blood and Biotherapy, formerly known as the American Association of Blood Banks recommends adhering to a restrictive transfusion strategy in stable patients. It suggests that transfusion decisions should be influenced by symptoms as well as hemoglobin concentration in level 7 to 8 g/dL. Some other guidelines use a cutoff of hemoglobin level of 7 g/dl [7]. Guidelines from three different institutes discussing the blood transfusion for surgical patient formed a vague and unclear opinion. Those studies

MAIN CAUSES OF UNECESSARY BLOOD TRANSFUSION
BLUE – THE LACK OF DOCTORS' AWARENESS, BROWN – ABSCENCE OF MDT, GRAY – WRONG ID

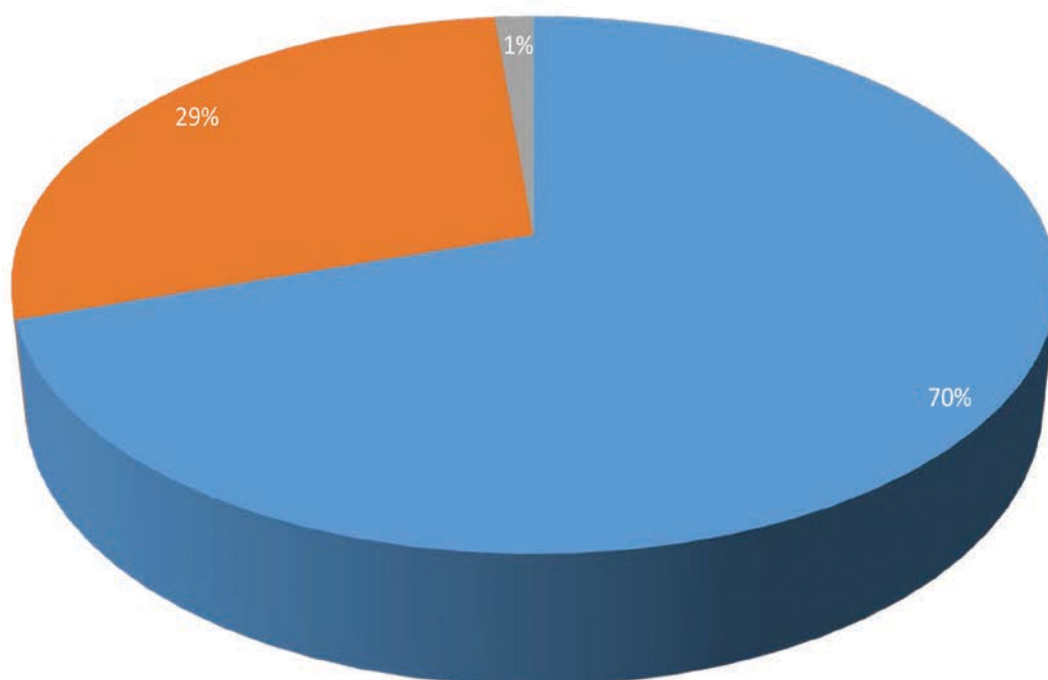


FIGURE 1. *The main causes of the unnecessary blood transfusions*

declare that if patient's hemoglobin level falls below 6 or 7 g/dl, it will benefit from a transfusion, while if the levels are above 10, it is no indications for urgent transfusion of blood. But when the level grows from 7 to 10, there arises a major debate about giving or not a blood transfusion, according to the patient's clinical stability. Current research focuses on establishing the adequate transfusion rules for patients. Current transfusion practice is not known for pediatric population, but surveys and clinical studies suggest that striking variability exists in perioperative pediatric RBC transfusion practice [8]. The recent studies reveal that physicians can safely wait until hemoglobin levels fall to 7 or 8 g/dl before transfusing, even in some of the sickest patients [9]. Blood transfusion implies the transplant of a foreign substance into the body which leads to many complex immune reactions. Most of the patients develop antibodies to transfused red blood cells making it more difficult to find a match, if future transfusions are needed, as well as the risk of complication like infections. Blood transfusion safety continues to improve in the last years, and blood banks are focused on testing the donor units. Certainly, there is no laboratory result to reach to non-zero regarding the risk of bacterial growth of blood or blood products, and presence of window periods in virus infection,

unless the lack of advanced laboratory resources in poor countries [10]. The costs of the blood in some countries goes above USD 270, while in our medical societies reaches from USD 150 to USD 250. The tests, storage and transportation produce an added cost effect to the medical institutions [11]. Other studies show an average cost of EUR 877.69/ 2 units of blood transfusion [12] for a certain population.

Although the studied patients panel represents only a small sample of unneeded blood transfusions, the lack of consistent guidelines for ordering blood affects the patients as it was revealed by similar studies performed in hospitals and medical centers from all over the world [13]. 70% of the children who underwent blood transfusion suffered due to lack of doctors' awareness regarding the real indication and mandatory causes for blood transfusion, and the transfusion depended in some cases only on the clinical appearance of the patient [14]. To identify exactly the time a blood transfusion is needed is impossible, but is better for any patient to avoid transfusions whenever possible. The problems of transfusion are the same in medical centers from developed countries, only in USA studies revealing a percentage reaching nearly 40%. Medical error is the most famous and common cause of death in developed countries, where most of the medical errors occurred

due to systems failures leading to health practitioner's mistakes. In developing countries, the incidence of concomitant error was high due to loss of continuous medical education. The practitioners should be focused on the effort to avoid the harm as soon as possible both produced by computerized and by human error [15].

CONCLUSION AND RECOMMENDATIONS

All the new strategies of the hospital should be concentrated on avoiding the harmful effect of any procedure like blood transfusions by weighting the balance of benefits and harms of such a procedure. It is

generally no need to give blood transfusion as initial treatment, especially if the disease can be treated by other mean, excepting the rare clinical cases of life saving measure in a sudden major injury or a big trauma with bleeding. In some asymptomatic patients and/or where specific therapy is available, lower threshold levels may be acceptable. Continuous medical educational and increased doctor's knowledge might help decrease unnecessary transfusions. Prior to surgery, multidisciplinary teams and discussions about transfusion should be engaged between pediatrician or hematologist and surgeon. Safe blood and blood product as well as the cost of blood transfusion services should be considered before any decision.

Patients consent:

As this is a retrospective study, no potential harm was conducted. All patients were informed about the purpose of the study and informed that their data archiving was used for the purpose of the study.

Conflict of interest: none declared

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