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Determination of conditions that may prevent the effective use of blood in blood transfusion

Seyma Kilinc[1], Cigdem Kockar[*1]

Abstract

Objective: This study was conducted to determine conditions that may prevent the effective use of blood in blood transfusion.

Methods: The study's universe consisted of transplanted and wasted blood and blood products (n=309) in a university research hospital orthopedics and traumatology, neurosurgery, pediatric hematology and pediatric intensive care clinics. Between 10.12.2014 and 20.04.2015, in the mentioned clinics, the data about blood waste and reasons was collected. The rates of use and waste of blood according to clinics, the rates of use and waste of blood according to the age of patients and the rates of use and waste of blood according to blood groups were analyzed by using independent t test.

Results: When the blood ratios used and wasted according to the clinics were examined, the mean blood amount used in the neonatal intensive care clinic was 27,79 ml, while the amount of blood wasted was 472,43ml (Due to 500 ml Blood bags). The mean amount of blood used in the pediatric hematology clinic was 189.62 ml, and the amount of blood wasted at the same clinic was 310.38 ml. When the reasons of blood waste were examined, it was concluded that the rate of not using pediatric blood bags was 40.1% and the rate of unnecessary request was 59.9%.

Conclusion: As a result, despite the fact that there is still not enough blood donations nowadays, it seems that blood is wasted because of preventable causes and not being used effectively.

Keywords: Blood transfusion, Blood waste

Introduction

Blood has been regarded as the basic symbol of health and life and has been known as “a unique means of treatment, whose source is human, and which has no other alternative to obtain” yet (1). Each of the individuals in society needs transfusion of blood and blood products for themselves, their families or their immediate surroundings at different times due to various diseases during their lifetime (1). The therapeutic use of blood, which is characterized as red liquid tissue circulation which performs many vital functions in multicellular organisms and circulates continuously in the cardiovascular system (2), is based on ancient histories. Blood transfusion studies, defined as the delivery of blood or blood products directly to the circulatory system of the individual (3, 4) started in the 15th century and still continue (5, 6). Today, studies on blood have reached to work on artificial and oxygen carriers. However, in this regard, a series of production has not yet been passed and these materials have not been used as a treatment option anywhere in the world (7, 8).

Because it cannot be produced in the laboratory environment, vital blood must be provided from healthy individuals (3). The increase in the average life span in most countries has increased the need for blood and blood products, the sole source of which is human, as a result, it has become important to provide blood (4). For this reason, blood services are carried out systematically in the world.

It has been reported that over 10 million blood donations have been made annually in the United States. In Germany, a total of 4.2 million units of blood are provided from the 3.6 million blood donors and 200 thousand blood donors volunteers.

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1 Dept of Nursing, Hasan Kalyoncu University, Gaziantep, TR
*** Corresponding Author:** Cigdem Kockar **E-mail:** cigdem.kockar@hku.edu.tr **Phone:** +90 342 211 80 80

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Approximately 4 million blood donations are collected each year in Japan. According to WHO data, 81 million blood donations per year are made in the world, 82,2% of them are taken from volunteer donors in developed countries and they are used by conducting all screening tests. Turkey is far behind in terms of blood donation compared to developed countries (4). As of the end of 2013, the Turkish Red Crescent has reached 1 million 640 thousand 881 units of blood donations (9, 10).

One of the main problems in health in our country is the lack of blood and blood products if needed and the inadequacy of voluntary blood donation. In developed countries, the proportion of blood donation to population is 5%, while in Turkey this rate is 1.5-2%. In our country, the fact that blood donation habits are not fully established constitutes a resource limitation in terms of blood and blood products (1).

Because blood transfusion therapy affects the lives of patients, careful applications is required. Nurses are responsible for ensuring the transfusion of blood and blood products in accordance with national and international standards and in a safe manner (11).

At this point, it is important for nurses to identify and manage individual-socio-economic resources in order to preserve, develop or improve health of the individual / family, alongside their roles as caregiver, decision maker, rehabilitator, educator and counselor; in this context, it is also necessary to ensure effective use of important resources such as blood, which does not have an alternative in patient treatment (12-14).

Material and method

Research Design

This research was planned and conducted in a descriptive research model.

The Universe of Research and Sampling

The study's universe consisted of transplanted and wasted blood and blood products in a university research hospital orthopedics and traumatology, neurosurgery, pediatric hematology and pediatric intensive care clinics. Since the research was planned with a cross-sectional method, no sampling method was used and the entire universe was sampled during the period of the research. All blood transfusions (309) performed at the clinics between the dates specified constituted the data of the study.

Data Collection Tools and Data Collection

All the clinics in the research hospital of university were visited before starting to research, and the clinics of Orthopedics and Traumatology, Neurosurgery, Pediatric Hematology and Pediatric Intensive Care Clinics in which the most frequent blood transfusion were made based on the past data were included in the study and the other clinics were excluded. Between 10.12.2014 and 20.04.2015, in the mentioned clinics, the data about blood waste and reasons was collected.

Blood waste and causes form consisting of 9 items investigating the material used, the clinic where the blood used, the amount of the blood used, wasted amount of blood and reasons of wasting etc. was prepared by the researcher in the light of the literature (2, 15).

Data Analysis

The coding and statistical analyzes of the data were performed using the Statistical Package for the Social Sciences for Windows (SPSS) 10.0 program. In the analysis of the data, number and percentage tests were used to assess data on blood transfusion and blood wasting reasons. The rates of use and waste of blood according to clinics, the rates of use and waste of blood according to the age of patients and the rates of use and waste of blood according to blood groups were analyzed by using independent t test. For statistical significance, $p<0.05$ value was accepted.

Ethical Principles of the Study

The information form containing the purpose and scope of the research was submitted to University Research Hospital Head Hospital and official permission was obtained. The study was approved by the appropriate ethics committee (2015/1) and was therefore carried out in accordance with the ethical standards set out in the Declarations of Helsinki. Oral approval was obtained from the patients to use their personal information in the research.

Limitations of the Study

Since the research is carried out on a single institution and the city there is a limitation on generalizability.

Results

According to the information about the blood products used (Table 1), it was found that the highest blood product used was erythrocyte (62.7%), the most used blood group was A Rh (+) (54%). Also, the highest number of transfused blood (49.6%) was found to be used in brain surgery.

When the amount of blood used according to age and weight in blood transfused individuals is examined (Table-2), the amount of blood transfusion applied to patients aged 40 years and over is higher than other age groups (32.8%) and those with a weight of 11 kg or more (66.3%) were found.

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Table 1. Information on Blood Product

Blood Transfusion Information	Number	Percentage*
Material Used		
Erythrocyte	194	62.7
Platelets	58	18.8
Plasma	54	17.5
Full Blood	3	1
Clinic in which the blood is used		
Brain surgeon	153	49,6
Newborn	103	33,3
Orthopedics	40	12,9
Pediatric Hematology	13	4,2
Blood Group Used		
A Rh +	167	54
A Rh-	39	12,6
0 Rh+	33	10,7
B Rh+	32	10,4
AB Rh+	23	7,4
B Rh-	7	2,3
AB Rh-	5	1,6
0 Rh-	3	1

* Percentage of line was taken

Table 2. Age and Weight Characteristics of Patients used Blood and Blood Products

Age of Patients used Blood and Blood Products	Number	%
0 years	58	18,8
1-19 years	65	21,1
20-39 years	84	27,3
40 and over	101	32,8
Weight of Patients Given Blood		
1-5 Kilo	104	33.7
6-10 Kilo	0	0
11 and up	205	66.3

Table 3. Information on the Average Blood Usage and Waste per Unit (500 ml Blood Bags) According to by Clinics

Clinics where blood is used	Used Blood Amount (ml) X ±SD	Wasted Blood Amount (ml) X ±SD
Newborn	27,79±36,2	472,43±36,1
Pediatric	189,62±78,4	310,38±78,4
Hematology	282,75±113,1	204,25±107,4
Orthopedics	246,47±148,0	252,22±148,6
Brain surgeon		

When the amount of blood used according to age and weight in blood transfused individuals is examined (Table 2), the amount of blood transfusion applied to patients aged 40 years and over is higher than other age groups (32.8%) and those with a weight of 11 kg or more (66.3%) were found.

When the blood ratios used and wasted according to the clinics were examined (Table 3), the mean blood amount used in the neonatal intensive care clinic was 27,79, while the amount of blood wasted was 472,43. The mean amount of blood used in the pediatric hematology clinic was 189.62, and the amount of blood wasted at the same clinic was 310,38.

When the blood mean values used and wasted according to blood groups were compared (Table-4), it was found that the highest average rate of use of blood and blood products was in the group of AB Rh (-) and the lowest average was in the group of A Rh (-); when the wasted blood amount means were compared, the highest mean was found in the group A Rh(-) and the lowest mean was in AB Rh(-).

When the reasons of blood waste were examined, it was concluded that the rate of not using pediatric blood bags was 40.1% and the rate of unnecessary request was 59.9%.

Table 4. Information on Blood Average Used and Wasted by Blood Groups

Blood Groups	Used Blood Amount (ml) X±SD	WastedBlood Amount (ml) X±SD
A Rh +	181,66±157,7	314,87±159,6
0 Rh+	136,73±148,0	360,24±151,4
B Rh+	222,19±154,7	277,81±154,8
AB Rh+	262,30±141,7	241,17±139,4
A Rh-	68,08±102,6	431,97±102,6
0 Rh-	300,00±104,4	200,00±104,4
B Rh-	161,43±162,6	324,29±171,7
AB Rh-	334,00±34,4	166,00±34,4

Table 5. Reasons for the Blood Waste

Reasons of Waste	Number	%
Not using pediatric blood bag	124	40,1
Unnecessary request	185	59,9

Discussion

Developing technology, changing living conditions, the emergence of different diseases, increased number of patients treated in surgical and trauma units has caused and increase in need for blood, whose sole source is human and which has no alternative despite all researches, therefore providing the necessary blood to meet this need has gained importance (16).

Since this has caused obtaining blood donations with the lowest risk (16), it has resulted in the regulation of campaigns to increase volunteer blood donation and the work in this area has accelerated. Accelerating blood donation studies have led academics in health care to conduct research that includes inaccurate information about blood donation, beliefs, attitudes and behaviors, and have provided training on informing the community correctly about blood donations in the light of the results of these researches (1, 16, 17). Another factor that is as important as blood donation to ensure this delicate balance between blood stocks supported by blood donation and blood demand, is the effective use of blood taken from the donor, prepared by passing through many procedures and tests. After the detailed literature search for our research, we found two studies on the effective use of blood in the World (18, 19). Although the belief and attitude researches in blood donation in our country were carried out, no research was conducted on the effective use of blood.

Of the 309 blood transfusions performed in the clinics where the research data were collected, 194 (62.7%) were found to be erythrocyte suspensions (Table 1). According to the results of a study by Portugal et al. (2014) in Brazil, "Transfusion Studies at the Neonatal Intensive Care Unit", 85% of premature babies are receiving at least one eirtrocy transfusion during their hospital stay (20). The fact that 33.3% of the transfusions we included in our study were done in the newborn clinic can be shown as the reason why the transfusion of erythrocyte suspension is so high.

Among the clinics within the scope of the study, it was the brain surgery clinic where the highest number of blood transfusions were made (49,6%) (Table-1). The high rate of trauma patient operations, the long duration of operations, and the high blood loss during the surgery can be the reason why the rate of blood transfusion in the clinic is so high.

When the blood group rates in the blood transfusion performed in the clinics are examined, it is seen that the A Rh (+) blood group has the highest blood transfusion ratio (Table 1). As a known fact, the most common group of blood is A Rh (+) in Turks According to the findings of Akin and Dostbil (2005) "Blood Group Studies in Turkey", A Rh + blood group is the most seen blood group in our country with 39.99% (21).

The ages of blood transfused patients are given in Table 2. According to the results obtained, it is seen that the age group with the highest blood transfusion is 40 years and over (32,8%).The necessity of surgical operations due to functional disorders in tissues and organs (2) due to age progression can be shown as a cause of blood transfusion in older age compared to early ages

When the use and waste averages of blood according to clinics are examined (Table-3), it is seen that the highest rate of use belongs orthopedics and traumatology clinics (282,75 ± 113,06). The high number of patients with trauma and the incidence of incisions covering large body surfaces frequently in surgical operations in this area can be attributed to the fact that the average blood usage is higher than the others in this clinic. On the other hand, the highest waste rate is found in the newborn clinic (472,43 ± 36,06). When the blood use and waste rates according to the average age of the patients were examined (Table 4), it was found that the highest average use was in the 20-39 age groups (277.38 ± 131.47) and the difference between the groups was significant ($p<0,001$). It is seen that the age group with the highest number of waste blood is 0- age group and the difference between the groups is significant ($p<0,001$).

Blood to be transfused is used as packed in average 500 cc with additives in the hospital study was conducted regardless of the clinical and necessity difference. The blood required for the treatment of a low birth weight baby does not often exceed a few cc, and the remaining amount of storage is sent to the disposal as storage conditions deteriorate and opened blood. The use of blood bags that do not contain the proper size and quantity in the clinics where the age and weight of the patients are low can be considered as a reason for the high rate of waste in clinics and small age groups.

According to the findings obtained, unnecessary demand (40.1%) and absence of pediatric bags (59.9%) are among the factors causing blood waste. According to the blood usage policy of the hospital, the nurses stated that the blood is prompted by the surgeon who will perform the surgery preoperatively in the clinics but most of the time the requested blood is kept waiting for more than 4 hours and is sent to the disposal when it is not needed in the operation. In the National Blood Center and Transfusion Course notes, Pelit (2009) noted that one of the most important tasks of the hospital transfusion team is the reduction of unnecessary blood use and the extermination of the blood, and this team's effective study will improve the quality of transfusion applications and decrease improper use, cost and complications (22). Cevizci et al. (2010) emphasized the importance of training of health staff and volunteers in order to ensure the blood balance that is stored and demanded and the effective use of the blood obtained (23).

In Iran, the study titled "Determination of Waste Rates and Reasons for Blood and Blood Products in Iran Hospital" has found a number of reasons for blood wastage, including not being used despite surgical or other clinic requests, filling the shelf life, hemolysis and various other causes. This data supports the results of our research (18).

Manmohan Singhal et al. conducted a study called "A Research Analysis on the Usage and Waste of Blood Components in the Blood Bank and the Blood

Component" and they have addressed to the use of more advanced materials to prevent blood waste (19). This finding supports the necessity of using a pediatric bag, one of the causes of blood waste resulting from our research (2013).

Conclusion

As a result, despite the fact that, there is still not enough blood donation nowadays, it seems that blood is wasted because of preventable causes and not being used effectively. Especially pediatric blood bag usage should be encourage for blood centers to pediatric patients. In addition that, there is not a blood donor data center for low rate blood group donors such as A Rh (-) in Turkey. Authorities should create a donor data center to respond demands for indicated low rate blood groups in this research.

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Ethical issues: All Authors declare that Originality of research/article etc... and ethical approval of research, and responsibilities of research against local ethics commission are under the Authors responsibilities. The study was conducted due to defined rules by the Local Ethics Commission guidelines and audits.

References

1. Hablemitoglu S, Ozkan Y, Yıldırım F. Blood donation as a sacrifice example. Journal of Family and Society 2010;11(5): 67-77.
2. Yavuz M. Burns. In: Karadakovan A, Aslan F.E (eds). Medical Surgical Nursing. Ankara: Akademisyen Bookstore, 2014. 1019-1048 p.
3. Okuroglu K.G, Bahcecik N, Alpar S.E. Philosophy and nursing ethic. Cilicia Journal of Philosophy 2014;1:53-61.
4. Katrancı N. Factor affecting blood donation status and blood donation continuity in Turkey. Journal of Fırat Health Services 2014; 7(21): 39-45.
5. Hillman R. S, Helbig S, Howes S, Hayes J, Meyer D.M, Mcarthur J.R. The effect of an educational program on transfusion practices in a regional blood program. Transfussion 1979;19(2):153-157.
6. Sıhbaraklıoglu H, Kıyak M, İncedere L. Attitudes and behaviors of the community towards blood donation in Kayseri Province 8. Health and Hospital Administration Congress Book, Girne/KKTC 2014; 523-528.
7. Sarkar S. Artifical Blood. Indian J Crit Care Med 2008;12(3):140-144.
8. Moradi S, Jahanian-Najafabadi A, Roudkenar M.H. Artifical blood susbstitutes: First steps on the long route to clinical utility. Clinical Medicine Insights: Blood Disoders 2016;9:33-41.
9. Yıldız C, Emekdas G, Kanık A, Tiftik N, Solaz N, Aslan G, Tezcan S. et al. Why do not we donate blood? Overview of blood donation in Mersin Province: survey study. Turkish Journal of Infection 2006;20(1): 41-55.
10. http://www.kizilay.org.tr/Haber/KurumsalHaberDetay/1083 Accessed 25 March 2017.
11. Right O.J. Patient, rightblood, right care: safe transfusion practice. British Journal of Nursing 2013;18(5):312- 20
12. Taylan S, Alan S, Kadıoglu S. Nursing roles and autonomy. Journal Research and Development in Nursing 2011;2:66-74.
13. Ozpulat F. Opinions of university students regarding blood and organ donation. HSP 2016;4(2):71-79.
14. Lindeboom G.A. The story of blood transfusion to a pope. Oxford Jornual, J Hist Med. Sci 1994;11(4): 455-459.
15. World Health Organization, Global Database On Blood Safety 2011, http://who.int/bloodsafety Accessed 25 March 2017.
16. Tore O, Uluhan R, Karakoç E, Altunay H, Kılıç B. Transfusion-transmitted infection problem in Turkey. Journal of Clinic 2005;65:109-120.
17. Özbeser E, Bayrak S, Bozdogan B, Genc A, Ugur K. Information, attitude and behavior measurement survey study on blood donation. XV. Student Symposium Working Group Reports, Ankara 2013;1-5.
18. Far R.M, Rad F.S, Abdolazimi Z, Kohan M.M.D. Determination of rate and causes of wastage of blood and blood products in Iranian hospitals. Turk Journal of Hematology 2014;31:161-167.
19. Singhal M, Patel M, Kapoor D, Mittal D. A research analysis on blood component usage and wastage in blood. Bank and Blood Component Center. 2013;4(2):23-28.
20. Portugal A.A.C. at all. Transfusion practices in a neonatal ıntensive care unit in a city in Brazil. Rev Bras Hematol Hemoter 2014;36(4):245-249.
21. Akın G, Dostbil N. Blood group researches in Turkey. Journal Of Ankara University Language and History-Geography Faculty 2005;45(2): 1-15.
22. Pelit N.B. Transfusion Team and Hospital Transfussion Committes. National Blood Centers and Transfusion Medicine Course XII Course Book 2009;187-191.
23. Cevizci S, Erginoz E, Yuceokur A. Factor affecting voluntary donation and blood donation behavior. J Cardiovasc Sci 2010;22(1):85-92.