

## Original Article

# Profile of side Effects in Patients Receiving Blood Transfusion from the Perspective of Management Unit

Rafat Mohebbifar<sup>1</sup>, Sonia Khosravi<sup>1</sup>, Fatemeh Moghimi<sup>1</sup>, Mehdi Goudarzi<sup>2</sup>, Hoda Pourkarim<sup>3</sup>, Mehdi Azad<sup>4\*</sup>

<sup>1</sup> Department of Health Management, Qazvin University of Medical Sciences, Qazvin, Iran

<sup>2</sup> Department of Microbiology, School of Medicine, Shahid Beheshti University of Medical Science, Tehran, Iran

<sup>3</sup> Department of Hematology, Allied Medical School, Tehran University of Medical Sciences, Tehran, Iran

<sup>4</sup> Department of Medical Laboratory Sciences, Faculty of Allied Medicine, Qazvin University of Medical Sciences, Qazvin, Iran

## Abstract

**Background:** In spite of being vital to save the patients' life, blood transition may be dangerous and even fatal, too the aim of this study was to investigate the side effects (complications) of blood transfusion in the educational hospitals of Qazvin.

**Materials and Methods:** This is a descriptive cross sectional and practical study that was carried out in 2010. In this study, all the patients of four health training centers in Qazvin, that have had blood transfusion and complications, were considered as a part of the statistical community. The instrument for data collection was checklist which was filled through an interview with blood bank manager and some other responsible individuals and scrutinizing files of patients who had blood injection among the blood products consumption, request for the packed cells was the most and for fresh frozen plasma was the least.

**Results:** 75% of these people had only one blood injection and the maximum injection volume was 100cc which was done mostly in the evening. Most of the transfusion history belonged to 21-30 year olds in our statistical community. 56% of all Patients that had transfusion, possessed background of some disease such as heart problems (21.9%). More than half of them (2.56%) had a chill feeling complication transfusion and there was a significant relationship between the blood transfusion volume and itching complication.

**Conclusion:** Existence of a continuous association between blood transfusion organization and hospitals is indispensable. Therefore, it seems that Hemovigilance system or computer connected network to send reports, between hospital centers and blood transfusion organization of Iran, can be an appropriate solution.

**Keywords:** complication, blood transfusion, Hemovigilance, hospital

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\*Corresponding Author: Mehdi Azad, Department of Medical Laboratory Sciences, Faculty of Allied Medicine, Qazvin University of Medical Sciences, Qazvin, Iran.

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## Introduction

Blood transfusion in the early 20th century has been associated with many complications. But today, the

risks have been limited with the increasing awareness about blood compatibility, since incompatible blood transfusion is one of the main causes of mortality; therefore, it is important to be Aware of the potential

risks of blood transfusion<sup>1</sup>. Today, the blood products are used abundantly and blood transfusions are the main treatment for many patients. Providing adequate amount of safe blood and its product is difficult despite this; it has been possible by advances in blood screening methods, but still the dangers remain<sup>2,3</sup>.

Quality of clinical guidelines on blood transfusion organization is dependent on the designation of individuals<sup>4</sup>. Blood transfusion is a complex operation and without the use of special skills is very dangerous<sup>5</sup>. Complications and problems associated with blood transfusion include such items such as: circulatory overload, hemosiderosis, acute hemolytic reaction, septic and allergic reactions, febrile nonhemolytic reaction and transfusion-transmitted disease like Hepatitis, HIV, syphilis and malaria<sup>6,7</sup>. Signs and symptoms of transfusion reactions are varied, they include fever, respiratory distress, and pain in the lower back, nausea, pain at the site of catheter insertion, body tingling, numbness, tachycardia or bradycardia, cough, and increase or decrease in blood pressure<sup>6</sup>.

Blood or its product transfusion processes are beginning with the application prescribed by doctors. That may be associated with side effects and non-infectious risks<sup>8</sup>. What the physician or medical group must first and foremost consider is that what is the benefits of blood transfusion with a desired unit relative to its potential risks. The main risks include immune response and infections. Blood incompatibility is an immune response, which often show results in the form of fever, chills and hemolysis, but infection diseases show up in longer time and sometimes can be lethal<sup>9</sup>. Despite the surveys before and after blood collection, common transfusion-transmitted diseases include: Hepatitis B, AIDS, syphilis, Epstein-Barr virus, cytomegalovirus and malaria<sup>10</sup>.

For this reason, before Blood transmission and injection, some laboratory tests are required to study immunity destructive factors as well as infectious ones. More infection factors will be diagnosed depending on accuracy amount of the blood transfusion laboratory<sup>11</sup>. HIV transmission through blood is due to receiving whole blood or blood products such as packed cell, platelets and

leukocytes. Transmission through plasma has not been reported yet. The risk of infection through infected product is about 44%-66% that highly depends on its storage time<sup>12</sup>. Injection of each blood unit or blood product is associated with a risk of exposure to infection. Over the last few decades, a lot of progress has been achieved in the safe transfusion. Now the most serious known risks of incompatible blood transfusion from ABO's point of view is acute lung injury associated with blood and transfusion of viruses and bacteria<sup>13</sup>. Considering the Undeniable importance of immune blood transfusion and preventing its complications, the aim of this study is to evaluate the complications of blood transfusion in Health training Centers of Qazvin and Provide strategies to reduce the complications.

## Methods

The overall design of this study is descriptive-practical that is based on the available statistics from Blood Bank Unit of Health-training Centers of Qazvin in 2010. The participants in this study were all the patients who received blood transfusion in 4 Health-training Centers of Qazvin (Bu-Ali Sina, Qods, Shahid Rajaei and Kosar) that from this population, 32 cases had complications after transfusion. The only instrument used in this investigation was a checklist that consisted of 3 parts. One part was designed to collect the participants' demographic information and the other parts were specified to the patients' medical history before injections which included items such as: the reason of injection, the number of complications and etc. For gathering data we referred to the blood banks of all centers under this research and interviewed with all responsible individuals. The researchers filled up checklist by scrutinizing patients' medical files. SPSS18 software was used to analyze the collected data.

## Results

The age average of the subjects under this study was 36±20 with age range of 1 to 78 years old. 65.6% of them were female and 34.4% were male. Among blood consumption products, red cells had the most requests and fresh frozen plasma had the least consumption. By gathering data concerned to the

number of present injections and analyzing them, it was recognized that most of the individuals (71.9%) had blood injection just for one time. In evaluating the injection volume, the most injection (18.9%) had

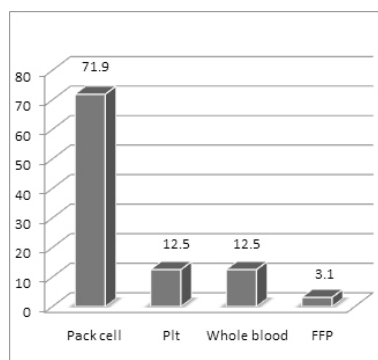


Figure 1. Distribution of the products used.

According to the criterion of non-hemolytic reactions with it was found that 21.9% of people have experienced the complication of fever, and 53.2% experienced symptoms of cold and shivering.

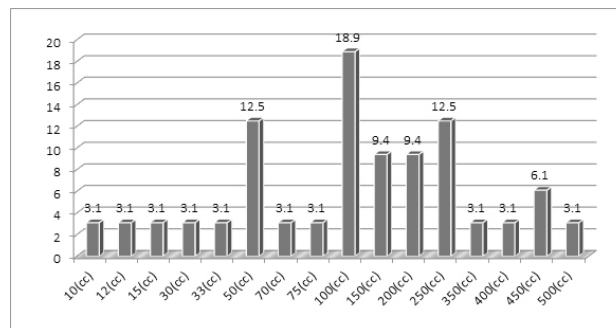


Figure 2. Distribution of the sample transfusion volume.

Table 1: Frequency of administration according to age groups.

Over 71 years	Between 61 and 70 years	Between 51 and 60 years	Between 41 and 50 years	Between 31 and 40 years	Between 21 and 30 years	Between 11 and 20 years	Under 10 years	A history of transfusion
3.1	6.3	21.9	9.4	18.8	25	3.1	12.5	yes
96.9	93.7	78.1	90.6	81.2	75	96.9	87.5	no
100	100	100	100	100	100	100	100	total

Table 2: Distribution of patient history (\*Anodal closure contraction).

Multiple Myeloma <sup>1)</sup>	(ACC)*	Thalassemia	Allergies	Pulmonary Disorders	Liver Disorders	Kidney disorders	Cardiovascular Disorders	Disease	History
3.1	3.1	12.5	12.5	3.1	3.1	12.5	21.9	56.3	yes
96.9	96.9	87.5	87.5	96.9	96.9	87.5	78.1	43.7	no
100	100	100	100	100	100	100	100	100	total

the volume of 100cc that was carried out in the evening (Figures 1, 2).

56.3% of Patients who have a history of blood transfusion had disease and the highest percentage (21.9%) is associated with to cardiovascular disorders (Table 2).

In the community of this investigation, the age group of 21-30 had the most injection background (25%) which is very outstanding (Table 1).

According to the allergic reaction criteria it was found that 15.6% of people suffered from skin redness, 9.4% had itching and 15.6% had hives.

Table 3 shows that the patients who had transfusion in 2010 in one of The Health-training centers of Qazvin, have experienced the post transfusion complications to different degrees. For example, more than half of them (53.2%), have experienced symptoms of cold and shivering after injection. there is no datum in this field

**Table 3:** Frequency of complications in privates.

Bradycardia	Back ache	Bone pain	Hypertension	Hypotension	Malaise	Acute pulmonary edema	Shock	Hot flashes	Palpitation	Shortness of breath	Nausea and vomiting	Chest pain	Hives	Itching	Rubefaction	Cold and chills	Discomfort	Lumbago	Fever	Complications
3.1	6. 3	3.1	3.1	6	6.3	3.1	3	9. 6	9. 4	18 .8	15 .6	9. 4	15 .6	9. 4	15 .6	53 .2	15 .6	3. 1	21 .9	<b>Yes</b>
96.9	93 .7	96. 9	96. 9	94	93. 7	96. 9	97	90 .4	90 .6	81 .2	84 .4	90 .6	84 .4	90 .6	84 .4	46 .8	84 .4	96 .9	78 .1	<b>No</b>
100	10 0	100	10 0	10 0	10 0	100	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	<b>Total</b>

because there were no complementary tests for diagnosis of infection.

By analyzing the statistical data according to gender and complication and K2 test, it was revealed that there is no significant relationship between them. But there was a significant correlation between the following complications and diseases: Complications of backache with allergy background (Pvalue-0.008), chill feeling with tularemia background (Pv-0.05), red skin with ACC background (P=0.05), itching with hepatitis (Pv-0.002) and ACC backgrounds (P=0.002). Urticaria with ACC (P=0.018), asthma with cardiovascular disorders and pneumonia background (P=0.003), heart throb with cardiovascular disorders (P=0.001), feeling hot with multiple myeloma background (P=0.002), acute pneumonia edema with allergy background (P=0.007), feeling disquiet with disorders of heart (P=0.006), liver (P=0.01) and kidney (0.01), backache with tularemia background (Pv-0.007), increasing blood pressure with kidney (P=0.007) and lung (P=0.01) disorders. According to data analysis carried out on the complications and disease background, there was no correlation between them. Among the complications the only significant correlation was between bradycardia and the number of present injections (P=0.01).

On the other hand, based on the data analysis, the only significant correlation between the volume of blood transfusion and complications were tingling.

There was no significant relationship between the other complication cases and the volume of blood transfusions.

## Discussion

Blood transfusions may be associated with side effects. Some of these reactions have been acute and they arise during transfusion or a few minutes later. There are some other groups that are delayed type reaction and may be occur after about 24 hours. In spite of medical examinations and testing and compliance with all standards of blood transfusion, Probable complications still remain Therefore, a patient should decide to do blood transfusion based on scrutinizer evaluation of its benefits and consequences. Also, a complete knowledge and proficiency is needed to realize and treat any kind of irreconcilable blood repercussion and its consequences. it not be claimed that the disease was transmitted from donors to recipients, but on the other hand the possibility of nosocomial infection transmission, Transmission of infection among patients through intravenous devices or by nursing staff involved in transfusion, are the other factors that should be considered<sup>14</sup>. According to the criterion of non-hemolytic reaction, it was found that 21.9% of individuals experienced symptoms of fever and 53.2 had chills. From the allergic reaction point of view, it is recognized that 15.6 percent of people had red skin, 9.4% had itching and 15.6% had rash that were in consistence with the results of the

study by Motamed N et al, in 2006 that was carried out in hospitals of Mazandaran province<sup>15</sup>. Since the fever was high and the packed cell was the most consumption product, to reduce the consequences, using washed RBC is suggested. Among the other complications, bradycardia was the only complication that was significantly associated with the number of new injections. The only complication that was significantly associated with the number injection ( $P=0.01$ ).

On the other hand, based on the data analysis, the only significant correlation was between the volume of blood transfusion and itching. Significant correlation between gender and a history of multiple blood transfusions for complications was observed (respectively  $P=0.04$  and  $P=0.044$ ).

There was a significant correlation between the allergic reaction with red blood cell transfusion and pulmonary reactions associated with long-term storage of platelets. Other findings indicated that the prevalence of complications and clinical outcomes in patients with malignancy, with patients with other studies, was consistent. There were more complication in Women and those with a history of multiple blood transfusions. Injection of packed red cells resulted in allergic reaction and increasing the living length of platelet led to pulmonary reaction.

This study indicates that given reports about the performance of Tehran hospital blood transfusion Committee in 2005 were unfavorable. The situation in private hospitals was worse in comparative with public ones. It seems that paying more attention to the reports of blood transfusion by this committee, is necessary. Considering the importance of cross-matched blood Rather than blood transfusion in the hospital performance paying more attention to the issue by these committees seems necessary. An investigation by Din G et al, in patients with thalassemia indicated the high prevalence of hepatitis C. Although, the statistical analysis performed between age and Anti-HCV positivity was significantly different. Likewise, significant differences have been reported between the number of transfusions and positive Ant-HCV Between<sup>16</sup>. Evaluation

of coronary bypass surgery patients by Sandoughdarn et al showed that whole blood consumption was more

than packed red blood cells. As well as the amount of blood in about 70% of patients was between 1-2 unit<sup>17</sup>.

Danger of blood transmission among women is more than men. Believe that the effect of gender on blood transmission in these patients is mostly because of the lower amount of blood volume in women rather than men. In a similar investigation, the amount of blood injection in man and woman was respectively, 17.6% and 64.2%, which was in consistence with the present study<sup>18,19</sup>.

According to the Food and Drug Administration of America (FDA) in 2003, the most common cause of death from blood transfusions are included hemolytic transfusion reaction, the transfusion-related acute lung injury and septic transfusion<sup>20</sup>. Through data analysis of blood in patients with Thalassemia in educational hospital in Hamedan that was conducted by Eshvandi et al., it was recognized that 6% of subjects under study have caught non-hemolytic reaction, but none of them suffer from allergic or hemolytic reaction and none of them was positive for HIV or B Hepatitis. Most of the subjects were A+ blood type (32%) and none of them Were A- or AB- blood type. dyspnea occurred in 8% and fever and chills in 6% of the subjects under the study. back pain and hypotension occurred in 2% of patients, but none of them were suffering from allergic reaction. The amount of allergic, acute hemolytic reactions and infectious diseases in the analyzed samples was zero<sup>21</sup>. previous studies in the United States have shown that the risk of a wrong blood transfusion has been 1 case per 12,000 units of blood. It was estimated that death danger following acute hemolytic transfusion reaction was 1 per 600000 to 800000<sup>22</sup>.

Since blood storage and transmission affects on its quality, suitable information and recording about keeping the cold continuum and blood transmission is available. Of course supervision system includes practical cases of transfusion and evaluation of quality systems of blood consumption that blood transmission of every hospital is responsible for this important issue. Based on the results of this investigation, there is a need to more reviews regarding the beneficial consumption of blood and products, standard laboratorial performance of blood bank of hospitals,

observing cold continuum and educating human resources.

Having given weak information, unawareness of some of the physicians and existence of financial problems for blood cleaning resulted in some perpetual complications in blood injection in Iran. According to the findings of domestic and international investigations, these complications are more prevalent after surgery operations. Probably, sometimes blood injection is inappropriate for the individuals under surgery operation. Incompatibility in these kinds of injections might lead to some problems in breathing and blood. Today, a lot of countries in the world carry out some specific blood cleaning operations to reduce the complications of blood transfusion to the least amount. By doing the mentioned cleanings, body defense becomes stronger before blood injections, blood infections won't be transmitted and the complications of incompatible bloods are turned out before injections. High costs of blood cleaning (about 60 and 70 dollar per each unit) led this operation not to be carried out in Iran. Prevalence of free blood injection in Iran can be dangerous.

Today, according to the advanced scientific findings, blood injection is unnecessary for young and healthy people whose red cells Hb are between 7 to 9. Of course this is based on some heart and other background diseases. While Iranian physicians inject blood for individuals whose red cells are less than 10 from the past days till now, this follow a lot of complications in it.

## Conclusion

Complications of blood injection and recording them precisely are two outstanding steps through the blood transfusion physic. They can play an important role in blood transfusion organization schematization. But, unfortunately there is no census about complications of blood injection in Iran. The available information is dispersed and they can be found in patients' medical files. Existence of a perpetual relationship between hospital centers and blood transfusion organization in Iran is indispensable to manage the complications regularly. Therefore, Hemovigilance system or computerized network connections and sending reports by this way,

between hospital centers and blood transfusion organization of Iran, can be an appropriate solution.

## Conflict of Interest

The authors have no financial interest in the products discussed in this article.

## References

1. Sullivan MT, Wallace EL. Blood collection and transfusion in the United States in 1999. *Transfusion*. 2005;45(2):141-8.
2. Clark P, Rennie I, Rawlinson S. Quality improvement report: Effect of a formal education programme on safety of transfusions. *Bmj*. 2001;323(7321):1118-20.
3. Kanemitsu Y. 24-hour system of the blood transfusion services at the university hospital. *Rinsho byori The Japanese journal of clinical pathology*. 2003;51(1):57-62.
4. Lagneau F, Chalhoub V, Courtois F, Peynaud-Debayle E, Nguyen L, Francois A, et al. [Organization of urgent blood transfusion in France: analysis of practice patterns in centers involved in care delivery to multiple trauma patients]. *Annales francaises d'anesthesie et de reanimation*. 2007;26(1):23-9.
5. Ward NS, Levy MM. Blood transfusion practice today. *Critical care clinics*. 2004;20(2):179-86.
6. Ittah-Desmeulles H, Nguyen L, Moreau C, Garrot H, Bourdillon F. Quality-assessment of the transfusion record in a Paris hospital in 2003. *Transfusion clinique et biologique : journal de la Societe francaise de transfusion sanguine*. 2004;11(4):192-8.
7. Harrison's principles of internal medicine. Choice: Current Reviews for Academic Libraries. 2008;46(1):138-.
8. Kimbrel EA, Lu SJ. Potential clinical applications for human pluripotent stem cell-derived blood components. *Stem cells international*. 2011;273076.
9. Sachdev S, Mittal K, Patidar G, Marwaha N, Sharma RR, Duseja AK, et al. Risk Factors for Transfusion Transmissible Infections Elicited on Post Donation Counselling in Blood Donors: Need to Strengthen Pre-donation Counselling. *Indian journal of hematology & blood transfusion : an official journal of Indian Society of Hematology and Blood Transfusion*. 2015;31(3):378-84.
10. Tan TW, Eslami M, Rybin D, Doros G, Zhang WW, Farber A. Blood transfusion is associated with increased risk of perioperative complications and prolonged hospital duration of stay among patients undergoing amputation. *Surgery*. 2015.
11. Shafiee A, Nazari S, Mogharreban M, Koupaei MT. Evaluating medical interns' knowledge of common blood transfusion complications. *Transfusion and apheresis science. Official Journal Of the European Society for Haemapheresis*. 2013;48(2):253-6.
12. Engelbrecht S, Wood EM, Cole-Sinclair MF. Clinical transfusion practice update: haemovigilance, complications, patient blood management and national standards. *The Medical journal of Australia*. 2013;199(6):397-401.
13. Wautier MP, Wautier JL. Respiratory and infectious complications of blood transfusion. *La Revue du praticien*. 2012;62(5):699-700.
14. Kubanek B, Cardoso M, Gluck D, Koerner K. [Risk of infection

transmission by blood components]. *Infusions therapy und Transfusionsmedizin*. 1993;20(1-2):54-9.

15. Motamed N, BabaMahmoodi F, Khalilian A, Peykanheirati M, Nozari M. Knowledge and practices of health care workers and medical students towards universal precautions in hospitals in Mazandaran Province. *Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit*. 2006;12(5):653-61.

16. Din G, Malik S, Ali I, Ahmed S, Dasti JI. Prevalence of hepatitis C virus infection among thalassemia patients: a perspective from a multi-ethnic population of Pakistan. *Asian Pacific journal of tropical medicine*. 2014;7S1:S127-33.

17. Sandoughdaran S, Sarzaem MR, Bagheri J, Jebelli M, Mandegar MH. Predictors of blood transfusion in patients undergoing coronary artery bypass grafting surgery. *International Cardiovascular Research Journal*. 2013;7(1):25-8.

18. Shimmer C, Hamouda K, Ozkur M, Sommer SP, Hain J, Aleksic I, et al. Influence of storage time and amount of red blood cell transfusion on postoperative renal function: an observational

cohort study. *Heart, lung and vessels*. 2013;5(3):148-57.

19. Timmouth A. Reducing the amount of blood transfused by changing clinicians' transfusion practices. *Transfusion*. 2007;47(2 Suppl):132-5.

20. Banbury MK, Brizzio ME, Rajeswaran J, Lytle BW, Blackstone EH. Transfusion increases the risk of postoperative infection after cardiovascular surgery. *Journal of the American College of Surgeons*. 2006;202(1):131-8.

21. Vichinsky E, Neumayr L, Trimble S, Giardina PJ, Cohen AR, Coates T, et al. Transfusion complications in thalassemia patients: a report from the Centers for Disease Control and Prevention (CME). *Transfusion*. 2014;54(4):972-81.

22. Dzik WH. Technology for enhanced transfusion safety. *Hematology/the Education Program of the American Society of Hematology American Society of Hematology Education Program*. 2005:476-82.