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Overview of the actual blood transfusion practice at Al-Kut City Hospitals, Wasit Province, Iraq

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Abstract
Introduction: Blood transfusion is an essential procedure that replaces blood loss to injury or surgery, it can also help treat certain medical conditions. There are many obstacles and malpractice that affect the transfusion.
Objective: To evaluate the practice of blood transfusion at Al-Kut city hospitals.
Materials and Methods: Cross-sectional hospital-based study targeted a convenience sample of patients who have blood transfusion attended to Al-Karama teaching hospital and Al-Zahraa teaching hospital and al kut teaching hospital, the study was carried out in 98 patients collected from people for a period of 6 months, Data was collected using questionnaire consisting of 14 questions.
Results: This study included Ninety-eight (98) patients having blood transfusion. Forty-three (43.9%) of the patients were less than 18 years of age. The transfusions done mostly at the morning call for (66.3%) of patients. Decisions of transfusion mainly were made by the senior doctor for (96.9%) of patients. The blood transfusion was highest in medical departments (22.4 %), followed by pediatric departments and Genetic blood diseases center (18.4%) for each of them. The most frequent blood groups were group A in 31 of patients (28 Rh+ and 3 Rh-) and group O in 31 of them (29 Rh+ and 2 Rh-). Beta thalassemia major was the most frequent diagnosis presented in (17.3%) of patients, the second most frequent diagnosis was chronic kidney disease (CKD) for (13.3%) of patients. Most of the transfusions were Packed Red Blood Cells (PRBC) transfusions for (76.5%) of patients followed by Fresh frozen Plasma (FFP) for (12.2%) patients. The duration of transfusion lasted less than 2 hours for (55.1%) of patients. The hemoglobin level were > 7 g/dl for 37 (44.57%) of PRBC and Whole blood transfusions patients, the mean was 7.191 and the minimum and maximum were 2.9 and 12.3 respectively. Fifty-nine (71%) of PRBC and whole blood transfusions were warmed. Fifty (60.2%) of patients with PRBC and whole blood transfusions received 1 unit only. The immediate complications occurred in (22.4%) of the patients, and mostly fever and skin rash.
Conclusion: The study demonstrated inappropriate use of blood transfusion, that's make it not comply with the current international guidelines.

Keywords: Blood transfusion, Al-kut, whole blood, Packed RBC, Wasit

Introduction

Blood and blood products transfusions are an essential procedure, every physician has to be knowledgeable with specific blood products and their indications for transfusion. [1]

Blood loss resulting from an injury or surgery can be replaced by blood transfusions, Blood transfusions are another treatment option for some medical disorders, like hematological diseases, kidney diseases, liver diseases and Cancer [2]. Fresh whole blood has traditionally been considered the gold standard for transfusions, but advances in medicine have made it possible to use a variety of components, including packed red blood cells (PRBCs), individual factor concentrates, fresh frozen plasma (FFP), platelet concentrates, and cryoprecipitate, in an effective manner. [3]

In the last several hundred years, medicine has achieved major advancements in its understanding of circulation. Bloodletting was a common treatment method throughout the "four humors" era of medicine, which lasted for millennia. William Harvey gave a demonstration of the circulatory system's organization in the 1600s. Soon after, researchers developed an interest in transfusions and began transferring animal blood into people.

The first human blood transfusion was performed in 1795 by Dr. Philip Syng Physick, and Dr. James Blundell performed the first human blood transfusion for hemorrhage treatment in England in 1818. Since the early 1900s, significant progress has been made in our understanding of blood components, blood storage, and blood type. A branch of medicine called transfusion medicine has grown out of this. Medical professionals from a variety of specialties, including pathology, hematology, anesthesia, and pediatrics, contribute to the field of transfusion medicine. [3]

Red blood cell transfusions are becoming a very regular practice. Around 15 million units are transfused annually in the United States, whereas 85 million units are transfused annually worldwide [3]. In high-income nations, the average donation rate is 32.1/1000 people, while low-income nations, where nearly 80% of the world's population lives, only have access to 20% of the world's safe blood supply, have an average donation rate of 4.6/1000 people [4]. Today, blood transfusions are a necessary component of many medical and surgical treatments. Blood and its constituent parts are used to temporarily replace any lost or unproduced materials that could occur prior to, during, or following the onset of a disease and/or its treatment. With all the modern precautions to choose donors, test blood, and guarantee that compatible blood is transfused to the correct patient, the benefits of transfusion today much outweigh their minute (but real) hazards. [5]

The aim of study

Is to evaluate the current practice of transfusion including the indication and the environment of it in a different wards at three of Al-kut city hospitals.

Materials and Method

Study design and sampling technique

A cross-sectional hospital-based study targeted a convenience sample of patients who had blood transfusion attended to Al-Karama teaching hospital and Al-Zahraa teaching hospital and Al-Kut teaching hospital.

Data collection

The researcher collected the data from patients who had blood transfusion through frequent visits in Emergency department, Medical department, Surgical department, Pediatric department, Gynecological department, Burn center, Thalassemia center, Intensive care unit, Gynecology and Obstetrics (G&O) department and Dialysis center. Data was collected using questionnaire consisting of 14 questions listed below. The participants are evaluated by history ,physical examination, CBC test to identify the type of blood group and level of hemoglobin. The study was carried out in 98 samples collected from people from December 2021 to May 2022. The consent was gained from each patient individually and from each hospital (Al-Karama teaching hospital and Al-Zahraa teaching hospital and al kut teaching hospital).

Questionnaire

1. Age (below 18) (18-60), (above 60)
2. Gender (Male / Female)
3. Residence
4. Time of admission (Morning call, Pre night call, Night call)
5. Indication of blood transfusion
6. Site of transfusion process (Emergency department, medical department, Surgical department, Pediatric department, Gynecological department, Burn center, Thalassemia Centre, Intensive care unit, G&O department, Dialysis Centre)
7. Who make the decision of transfusion (Junior doctor, House officer, Senior doctor)
8. Blood group (A, B, AB, O), (Rh+/Rh)
9. Hemoglobin level
10. Type of transfusion (Whole blood, Packed Red Blood Cells (PRBC), Fresh frozen plasma (FFP), Platelet, others)
11. Blood temperature (warmed, not warmed)
12. Duration of transfusion (<2 hours, 2-4 hours, > 4 hours)
13. Amount of the transfused blood (≤ 1 unit, 2 units, 3 units, 4 units, 5 units, ≥ 6 units)
14. Immediate complications

Statistical analysis

Data were organized and analyzed by using Statically Package for the Social Sciences (SPSS) version 26. Descriptive and analytical statistics were used

Results

Ninety-eight (98) patients from a different ward suffering from a variety of medical and surgical problems were included in this study.

Forty three (43.9%) of the patients were less than 18 years of age, 32 (32.7%) were between 18-60 years and 23 (23.5%) more than 60 years. [Table 1].

About the gender, 51 (52%) of them were male and 47 (48 %) were female. [Table 1].

The transfusions done mostly at the morning call (8am-4pm) for 65 (66.3 %) patients, 21 (21.4 %) patients at the night call (12am-8am) and the least number of transfusions done at the pr night call (4pm-12am). [Table 1].

The transfusion decisions mainly were made by the senior doctor for 95 (96.9%) of patients while 3 (3.1%) by the house officer doctor on duty. [Table 1].

Table 1: Demographic data of the patients

Item	No.	Percent
Age in years		
Less than 18	43	43.9
18-60	32	32.7
More than 60	23	23.5
Gender		
Male	51	52.0
Female	47	48.0
Time of transfusion		
Morning call	65	66.3
Night call	21	21.4
Prenight call	12	12.2
Person in charge of transfusion		
Senior	95	96.9
House officer	3	3.1
Total	98	100

The patients were admitted to many wards for the transfusion at the hospitals which included in the study, 22 (22.4 %) of them admitted to the medical departments, 18 (18.4%) for each of pediatric departments and Genetic blood diseases Centre, 13 (13.3%) to the surgical departments, 10 (10.2%) to the Intensive care unit 9 (9.2%) to the Gynecology and Obstetrics (G&O) departments, 4 (4.1%) to

the dialysis centre, 3 (3.1%) to the burn Centre and 1 (1%) to the emergency departments. [Table 2].

Table 2: Site of transfusion

Site of transfusion	Frequency	Percent
Medical department	22	22.4
Pediatric department	18	18.4
Genetic blood diseases Center	18	18.4
Surgical department	13	13.3
Intensive care unit	10	10.2
G&O department	9	9.2
Dialysis center	4	4.1
Burn Center	3	3.1
Emergency department	1	1.0
Total	98	100.0

The blood groups of the patients included in the study were 31 of them group A (28 Rh+ and 3 Rh-), 29 of them group B (22 Rh+ and 7 Rh-), 7 of them AB (all of them Rh+) and 31 of them group O (29 Rh+ and 2 Rh-). [Paragraph 1].

Paragraph No 1: Blood groups

Beta thalassemia major was the most frequent diagnosis presented in 17 (17.3%) of patients. The second most frequent diagnosis was chronic kidney disease (CKD) for 13 (13.3%) of patients. Ten (10.2%) of patients were diagnosed with Glucose 6-phosphate dehydrogenase (G6PD) deficiency. Nine (9.1%) of them were diagnosed with different types of cancer and the side effects of chemotherapy use. Seven (7.1%) of them were diagnosed with gastrointestinal (GI) bleeding. Six of them underwent to transfusion as preparation for surgery. 5 (5.1%) of patients were diagnosed with each of internal bleeding due to trauma and liver diseases. [Table 3]. Beta thalassemia major (12 patients) was the most frequent diagnosis in patients below 18 years of age followed by hemolysis due to G6PD deficiency (10 patients). CKD, Vaginal bleeding, and beta thalassemia major (4 patients for each of them) were the most frequent in patients 18-60 years of age. CKD (8 patients) was the most frequent diagnosis in patients above 60 years of age followed by cancer (4 patients).

Table 3: Cause of transfusion

Presumptive diagnosis	Frequency	Percent
Beta thalassemia major	17	17.3
Chronic kidney disease	13	13.3
Hemolysis due to G6PD deficiency	10	10.2
Cancer and chemotherapy related	9	9.1
GI bleeding	7	7.1
Preparation for surgery	6	6.1
Internal bleeding due to trauma	5	5.1
Liver disease	5	5.1
Vaginal bleeding	4	4.1
Burn injury	3	3.1
Postoperative anemia	3	3.1
Sepsis	3	3.1
Femoral fracture	2	2.0
Hemolytic anemia	2	2.0
Intraoperative bleeding	2	2.0
Postpartum hemorrhage	2	2.0
Others	5	5.1
Total	98	100.0

Regarding the type of the transfusion, the majority of the transfusions were Packed Red Blood Cells (PRBC) transfusion for 75 (76.5%) of patients followed by Fresh frozen Plasma (FFP) for 12 (12.2%) patients, Whole blood for 8 (8.2%) patients, Platelet for 2 patients and Cryoprecipitate for 1 patient. [Table 4].

About the duration of transfusion, it lasted less than 2 hours for 54 (55.1%) of patients, between 2-4 hours for 39 (39.8%) of patients and more than 4 hours for 5 (5.1%) of patients. [Table 4].

Regarding the Hemoglobin level for PRBC and Whole blood transfusions patients who were 83 patients, 46 (55.42%) of them were Hemoglobin level ≤ 7 g/dl while 37 (44.57%) of them were > 7 g/dl. [Table 4].

The mean of Hemoglobin level for PRBC and Whole blood transfusions patients was 7.191 and the minimum and maximum were 2.9 and 12.3 respectively. Warming condition of PRBC and whole blood transfusions which are 83 cases, 59 (71%) of them were warmed while 24 (29%) of them were not warmed.

[Table 4] All of the warmed cases of PRBC and whole blood transfusions were warmed by direct contact to human skin.

All of Fresh Frozen Plasma transfusions (12 cases), Platelet transfusions (2 cases) and Cryoprecipitate transfusion (1 case) were warmed by a water bath warmer.

Table 4: Details of blood and blood products transfusion

Item	No.	Frequency
Type of transfusion		
Packed RBC	75	76.5
Fresh frozen plasma	12	12.2
Whole blood	8	8.2
Platelet	2	2.0
Cryoprecipitate	1	1.0
Duration of transfusion		
< 2 hours	54	55.1
2-4 hours	39	39.8
> 4 hours	5	5.1
Level of Hb at time of whole blood and PRBC transfusion (83)		
≤ 7 g/dl	46	55.42
> 7 g/dl	37	44.57
Warming of whole blood and PRBC transfusion (83)		
Yes	59	71.0
No	24	29.0
PRBC: Packed Red Blood Cells		

Regarding the amount of the transfused blood and blood products

For the transfusions of PRBC and Whole blood (83 patients), 14 (16.8%) of them received less than 1 unit, 50 (60.2%) of them received 1 unit, 11 (13.3%) received 2 units, 5 (6%) received 3 units, 2 (2.4%) received 4 units and only one received ≥ 6 units. [Table 5].

For Fresh Frozen Plasma (FFP) transfusions (12 patients), 6 (50%) of them received 1 unit, 2 (16.7%) received 2 units, 1 (8.3%) received 3 units, 1 (8.3%) received 4 units and 2 (16.7%) received 5 units. [Table 5].

For Platelets transfusion (2 patients), one of them received 1 unit (1 unit: 50-70 ml) and the other one received 2 units

For Cryoprecipitate transfusion, only one patient who received 1 unit (1 unit: 10-15 ml).

Table 5: Frequency of blood and blood products transfusion

Amount	Frequency	Percent
For PRBC and Whole blood		
Less than 1 unit	14	16.8
1 unit	50	60.2
2 units	11	13.3
3 units	5	6.0
4 units	2	2.4
≥ 6 units	1	1.2
Total	83	100.0
For Fresh Frozen Plasma (FFP)		
1 unit	6	50.0
2 units	2	16.7
3 units	1	8.3
4 units	1	8.3
5 units	2	16.7
Total	12	100.0

The volume of 1 unit for each of these blood and blood products
Whole blood: 450 ml
PRBC: 250-300 ml
FFP: 200-250 ml
PRBC: Packed Red Blood Cells

From 98 patients, seventy six (77.6%) of them didn't develop any complications while 22 (22.4%) of them developed a variety of complications which were, fever in 8 (8.2%) of patients, skin rash in 6 (6.1%) of them, skin rash and fever in 5 (5.1%), respiratory distress and skin rash in 2 (2%) and itching and edema in 1 (1%) of them. [Table 6].

Table 6: Immediate complication of blood and blood products transfusion.

Complication	Frequency	Percent
No	76	77.6
Fever	8	8.2
Skin rash	6	6.1
Skin rash and fever	5	5.1
Respiratory distress and skin rash	2	2.0
Itching and edema	1	1.0
Total	98	100.0

Discussion

As blood and blood products transfusions are an essential process in many aspects of clinical practice and liable to malpractice by many levels, a study was done to evaluate the current practice of transfusion including the indication and the environment of it in a different ward at three of Al-kut city hospitals.

The study demonstrated that the patients less than 18 years of age who included in the study had the higher percentage which account for 43 (43.9%), may be this is because of the fact that around 50% of our country population are less than 19 years, or the duration of data collection coincided with spring when Hemolysis due to G6PD deficiency more common which is more prominent in children [6, 7].

The study indicated that majority of the transfusions in the morning call (8am-4pm) that's because of, in Iraqi hospitals the senior doctors check on hospitalized patients at early time of the morning so if the doctor decide to transfuse the process of transfusion can be done during morning call and this finding similar to finding of a previous study conducted in Baghdad but with lesser proportion than the current study [8].

The decision of blood transfusion was made by senior doctors with different specialties according to the ward where the transfusion occurred for 96.9% of cases while in the rest of cases it was made by the house officer, this is due to followed policies in Iraqi hospitals which correspond somehow with the rule that the decision of transfusion should be made by the most senior doctor [9].

Blood groups were A and O for 31% of patients for each of them, B for 29% of patients and AB for 7% of them, from all of these 88% were Rh+ and 12% Rh-, although there is some differences in compare with previous studies which mostly due to difference in the samples sizes, in general this finding is in line with the findings of these studies [10, 11].

Beta thalassemia major was the most frequent diagnosis in all patients included in the study and in patients below 18 years, that's may be because this study included a Genetic blood diseases center which most of its patients diagnosed with Beta thalassemia major, a previous study indicated that Hemolysis due to G6PD deficiency was the most frequent cause of transfusion in children while in the current study it was the second most frequent cause this difference due to the sample of that study collected from emergency departments so logically Hemolysis due to G6PD deficiency as acute condition encountered more frequently [10].

Whole blood transfusion indicated for 8 of patients, according to the current guidelines there is no indication for whole blood except in some cases of life-threatening hemorrhage in a settings outside of the hospital like in combat situations and as these situations not included in the current study all these transfusions contradictory with the current guidelines [12]. A previous study indicated a higher percentage of whole blood use in compare to the current study, this is may be a sign of knowledge improvement and compliance to the international guidelines [13].

Most of the transfusions in the current study were done within 4 hours from the onset and this is correspondent with World Health Organization (WHO) guidelines, while 5% of them exceeded 4 hours and that's illogical [14].

The level of hemoglobin at time of administration for patients with whole blood and PRBC transfusions were ≤ 7 g/dl for 55.4 of them while the rest above 7 g/dl, most of the current guidelines recommend to follow restrictive transfusion strategy with Hb ≤ 7 g/dl as a threshold for transfusion while some trials suggest Hb ≤ 8 g/dL if associated with some diseases so according to this strategy many of the transfusions included in the study were illogical [15].

Blood warming is a complex process and has a limited indications, there are many techniques for it but many of it not have the safety measures of temperature control to prevent hemolysis caused by excessive heat and sepsis prevention, the current study indicated that 71% of whole blood and PRBC transfusions were warmed, in majority of them even there was no indication for warming and all of them warmed by inappropriate, that's may be not due to senior doctor instructions but due to the mentors of transfusion process who are nurses in general [16, 17].

Blood and blood products transfusions have a risk for many complications that differ in severity, in the current study 22.4% of patients developed immediate complications most of them characterized by fever and skin rash and this finding slightly differ from a finding of previous study conducted in Baghdad [18, 8].

Limitations

In our study there is some limitations such as the number of the sample is not equally distributed through the age groups and the wards of the hospitals that may affect the cause, the

type and the amount of the transfusion frequencies, the other one the clinical presentation of the patients didn't include in this study and that may affect the decision of transfusion.

Conclusion

There is inappropriate use of transfusion demonstrated in this study as there was whole blood use in some patients without indication, the Hb level at time of administration was above 7 g/dl for 44.6% of patients, 71% of blood transfusions were warmed without indication and inappropriately and all these not comply with current international guidelines.

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