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ORIGINAL RESEARCH / *ÖZGÜN ARAŞTIRMA*

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Anemia Development and Retrospective Evaluation of Blood Transfusions in Patients in Anesthesia Intensive Care Unit

Anestezi Yoğun Bakım Ünitesinde Yatan Hastalarda Anemi Gelişimi ve Kan Transfüzyonlarının Retrospektif Değerlendirilmesi

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ABSTRACT *Objective:* Anemia is a common problem of critically ill patients in intensive care units. This retrospective single-center study
we aimed to investigate the incidence of anemia and transfusions, transfusion-related risks, and clinical outcomes. We also investigated the contribution of the amount of blood taken for diagnosis and follow-up purposes to anemia.
Materials and Methods: In this retrospective single-center study (01.01.2015 - 31.12.2015), patients aged 18 years and older who were hospitalized for more than 24 hours were divided into two groups male (Group E) and female (Group K) and compared. The first 30-day Hb values, Hb values before and after transfusion, daily blood losses and fluid balance, indications for transfusion and related complications, and the number of erythrocyte suspensions used were recorded.
Results: Anemia was present in 60.7% and 83.9% of the patients on day 1 and day 3. Anaemia developed on the 3rd day in 55.6% of non-anemic patients. The mean Hb before transfusion was 7.5±1.3 g/dL and the mean Hb after transfusion was 6.9±1.1 g/dL. We found that the APACHE II score was higher in patients who received transfusion and mortality was higher in female patients. On the 1st day of hospitalization, a mean of 37.0±15.7 mL/person blood sample was taken; due to repeated blood samples (mean 147.2±117.1 mL), we found that Hb values decreased significantly to require blood transfusion.
Conclusion: It was found that the majority of the patients admitted to the intensive care unit were anaemic, Hb values continued to decrease over time, repeated blood sampling contributed to the development of anaemia, febrile reaction was the most common transfusion-related complication and it was concluded that practices in accordance with the current universal transfusion guidelines were performed.
Keywords: Anemia, blood transfusıon, intensıve care unit

ÖZ *Amaç:* Yoğun bakım hastalarında anemi gelişimi sık karşılaşılan bir problemdir. Yoğun bakım kritik hastalarında anemi ve transfüzyon insidansını, transfüzyon ilişkili risklerileri ve klinik sonuçları, tanı ve takip amaçlı alınan kan miktarının anemiye gelişimine katkısını retrospektif olarak araştırmayı amaçladık.
Gereç ve Yöntem: Retrospektif tek merkezli çalışmaya (01.01.2015 – 31.12.2015) 24 saatten uzun süreli yatan, 18 yaş ve üstü hastalar erkek (Grup E) ve kadın (Grup K) olarak iki gruba ayrılarak karşılaştırıldı. Transfüzyon yapılan ve yapılmayan hastaların ilk 30 günlük Hb değerleri, transfüzyon öncesi ve sonrası Hb değerleri, günlük kan kayıpları ve sıvı dengesi, transfüzyon endikasyonları ve ilişkili komplikasyonlar, kullanılan eritrosit süspansiyonu sayıları kaydedildi.
Bulgular: Hastaların yatışın 1. günü %60.7, 3. gününde %83.9'u anemikdi. Anemik olmayanların %55.6'sında 3. günde anemi geliştiği saptandı. Hastaların transfüzyon öncesi Hb ortalaması 7.5±1.3 g/dL, transfüzyon sonrası Hb ortalaması 6.9±1.1 g/dL idi. Transfüzyon yapılanlarda APACHE II skorunun daha yüksek olduğu ve bunlardan kadın hastaların mortalitelerinin daha yüksek olduğunu tespit ettik. Yatışın 1. günü ortalama 37,0±15.7 mL/kişi kan örneğinin alındığını; tekrarlayan kan örnekler (ortalama 147.2±117.1 mL) nedeniyle, Hb değerlerinin kan transfüzyonu gerektirecek şekilde anlamlı derecede düştüğünü tespit ettik.

Sonuç: Yoğun bakıma kabul edilen hastaların çoğunluğunun anemik olduğu,zaman içinde Hb değerlerinde düşüş devam ettiği; tekrarlayan kan örneklemlerinin anemi gelişimine katkısı olduğu; transfüzyon ilişkili komplikasyon olarak en sık febril reaksiyon görüldüğü tespit edildi ve mevcut evrensel transfüzyon rehberlerine uygun uygulamalar yapıldığı görüşüne varıldı.
Anahtar Kelimeler: Anemi, kan transfüzyonu, yoğun bakım

Introduction

Anemia, which is one of the most common hematological problems in society, can be defined as a decrease in the erythrocyte mass which causes insufficient oxygen delivery to the tissues.

The development of anemia in critically ill patients during intensive care unit follow-up and treatment is a common problem (1). Surgical procedures, coagulopathies, gastrointestinal system (GIS) loss, intravascular hemolysis, nutritional deficiencies, and recurrent blood intake are among the most common causes of anemia in the ICU (2). Taking blood from ICU patients for diagnosis and follow-up, diagnostic blood loss (CAC), and phlebotomy, are often some of the most important causes of anemia that are mostly neglected (3). In studies, because of the multiple causes of anemia, approximately one-third of ICU patients underwent transfusion without indication by clinicians, and the mortality rate in ED patients increased due to this high rate of transfusion (1, 4, 5). Transfusion of blood and blood products can be beneficial only in cases where morbidity or mortality cannot be prevented by all other treatment methods. However, blood transfusion can reduce morbidity and mortality when used correctly despite the risks (6, 7).

This study aimed to define the incidence of anemia and transfusion in patients undergoing follow-up and treatment, to determine the threshold Hb value used for transfusion, to identify the risks associated with transfusion, to evaluate the relationship between transfusion and clinical outcomes and to investigate retrospectively the contribution of the amount of blood taken for diagnostic and follow-up to anemia in the Intensive Care Unit of the Anesthesiology and Reanimation Department of Fırat University Hospital.

Materials and Methods

In our study, after obtaining approval from the Fırat University Hospital administration for reviewing patient records and the approval of the Fırat University Non-Interventional Research Ethics Committee, the hospital files of all patients who were followed up and treated in Fırat University Hospital Anesthesia Intensive Care Unit between 01.01.2015 - 12.31.2015 and the data recorded in ENLIL Hospital Information Management System of Fırat University Hospital were analyzed retrospectively.

Patients with a hospitalization time of less than 24 hours, patients younger than 18 years, patients with a history of bleeding diathesis and/or hematologic disease, patients with acute renal failure (0.5 mg / dL/day increase in serum creatinine (Cr) basal value and/or 24-hour urine volume < 400 mL) or chronic renal failure (Cr > 1.3 mg / dL in women, Cr > 1.5 mg / dL in men) and patients with sepsis having extreme values were excluded from the evaluation. Patients were divided into two groups male (Group E) and female (Group K) and their data were compared.

Age, Glasgow Coma Scale (GCS) values, hospitalization diagnoses and additional diagnoses during admission, presence of co-morbidities, APACHE II scores calculated in the first 24 hours, and Hb values measured at admission to anesthesia intensive care unit (AICU) were recorded. Daily Hb values, daily diagnostic blood loss and daily fluid balance in the first 30 days of hospitalization, Hb values before and after transfusion, indications for transfusion, number of erythrocyte suspension (ES) units used, complications associated with transfusion and length of stay in the ICU were recorded. Daily fluid balance (SD) was calculated using the difference between the total amount of enteral and parenterally administered fluid and total urine volume within 24 hours. TKC was calculated separately for each patient based on blood tests such as hemogram, biochemical analysis, arterial blood gas (ABG), etc. for each day in the ICU. The amount of blood taken was recorded as 2 mL for ABG, 5 mL for hemogram, 1 mL for erythrocyte sedimentation rate (ESR), 5 mL for biochemical analysis, 3 mL for coagulation tests, 30 mL for blood culture, 6 mL for human immunodeficiency virus (HIV) and hepatitis reagents, 5 mL for drug levels and 2 mL for standard excretion.

Statistical analysis of the data was performed by using the Statistical Package for the Social Sciences (SPSS) version 22.0. Data obtained from the census were evaluated by the Chi-Square test, Fisher's exact test if the expected value

was less than 5, and the Wilcoxon Rank Sum test, T-test, and Mann-Whitney-U test were used for the data obtained by measurement. p <0.05 was considered significant.

Results

A total of 413 patients were admitted to the AICU during the year between 01.01.2015 and 12.31.2105. Each admission of the patients who were admitted to the ICU more than once at different times in the same year,3 patients in Group E, and 10 patients in Group K, were included in the evaluation separately. Data from 184 patients were excluded. The data of 229 patients, 119 males, and 110 females, were evaluated. Since 90% of these patients had less than 30 days of stay in the intensive care unit, the data on the first 30 days of hospitalization were evaluated, since the data on hospitalization after 30 days could adversely affect the arithmetic mean as extreme values.

In general, the mean length of stay in the ICU was 12.2 ± 16.6 days (min: 2 days, max: 87 days). The duration of stay in the AICU of 90% of the patients included in the study was less than 30 days. Of these, 69.4% (n = 159) had less than 10 days of stay in the AICU.

The reasons for admission to the ICU were 31.4% postoperative follow-up, 10% trauma, and 58.6% medical diseases including respiratory system problems such as COPD, and pneumonia; neurological problems such as cerebrovascular disease, intracranial mass; cardiovascular system problems such as ischemic heart disease, myocardial infarction, etc., Table 1.

The median of Glasgow coma scale values was found to be 9 (Table 1). There was no statistically significant

Table 1a. Characteristics of patients

	Group E n (%)	Group K n (%)	Total	
Age Groups (year)				
<50	41 (34.5)	37 (33.6)	78 (34.1)	X^2=0.40
51-69	33 (27.7)	30 (27.3)	63(27.5)	
≥70	45 (37.8)	43 (39.1)	88 (38.4)	p=0.980
Surgical Intervention				
Yes (postoperative acceptance)	43 (36.1)	49 (44.5)	92 (40.2)	X^2=1.734
During their stay	15 (12.6)	13 (11.8)	28 (12.2)	
No	61 (51.3)	48 (43.6)	109 (47.6)	p=0.420
Admittance diagnosis				
Postoperative follow-up	35 (29.3)	37 (33.6)	72 (31.4)	
Respiratory system problems	31 (26.1)	31(28.2)	62 (27.1)	X^2=7.514
Neurological problems	21 (17.6)	20 (18.2)	41 (17.9)	
CVS system problems	5 (4.2)	5 (4.5)	10 (4.4)	
Trauma	18 (15.1)	5 (4.5)	23 (10.0)	p=0.185
Other	9 (7.6)	12 (10.9)	21 (9.2)	
Associated disease				
Single system disease	47 (39.5)	43 (39.1)	90 (39.3)	X^2=8.510
Two system disease	24 (20.2)	32 (29.1)	56 (24.5)	
More than two system disease	7 (5.9)	13 (11.8)	20 (8.7)	
No	41 (34.5)	22 (20.0)	63 (27.5)	p=0.037
GKS				
Coma (3)	11 (9.2)	12 (10.9)	23 (10.0)	
Precoma (4-7)	29 (24.4)	37 (33.6)	66 (28.8)	X^2=3.975
Stupor (8-12)	55 (46.2)	38 (34.5)	93 (40.6)	
Oriented (15)	5 (4.2)	6 (5.5)	11 (4.8)	p=0.409

difference between the two groups in terms of the reasons for admission to ICU, GCS values, length of stay in ICU, and exit from ICU (p> 0.05, Table 1).

The mean APACHE II scores were found to be 21.20 ± 6.9 (min: 6, max: 37),20.93 ± 6.68 in Group E and 21.50 ± 7.33 in Group K. Patients who underwent blood transfusion, 22.00 ± 4.51 in group E, 23.90 ± 6.21 in group K, had significantly higher APACHE II scores than who did not undergo blood transfusion, 20.59 ± 7.72 in group E, 20.64 ± 7.54 in group K. However, no statistically significant difference was detected between the groups (Table 2).

It was found that 60.7% of the patients, 62.2% in Group E and 59.1% in Group K, were anemic on the day of admission to the intensive care unit. It was observed that this rate increased to 83.9%, 81.9% in Group E, and 86.2% in Group K, on the 3rd day of hospitalization, and decreases in mean Hb values continued over the following days. Anemia developed on the 3rd day of hospitalization in 55.6%, 50% in Group E, and 63.2% in Group K, of patients who were not anemic on the day of admission to the intensive care unit. In terms of changes in hemoglobin values, although women had lower Hb values in all periods, there was no statistically significant difference between the two groups except for the 3rd and 20th days of hospitalization (p <0.05).

An equal number of 58 (25.3%) patients from both groups were transfused with erythrocyte suspension (ES) for indications such as anemia (41.4%), acute bleeding (24.1%), surgical intervention (12.1%) or hemodynamic instability (22.4%), (Table 3). Pre-transfusion Hb values of patients undergoing transfusion were below 7 g / dL in 24 patients, between 7-10 g / dL in 31 patients, and above 10 g / dL in 3 patients, and 3 patients with pre-transfusion Hb values over 10 g / dL underwent transfusion due to acute hemorrhage.

In our study, the mean pre-transfusion Hb value was 7.5 ± 1.3 g / dL (min: 4.7 g / dL, max: 10.5 g / dL), for transfusions with anemia indication, the mean pre-transfusion Hb values were 6.9 ± 1.1 g / dL (min: 4.7 g / dL, max: 9.2 g / dL). There was no statistically significant difference between the groups in terms of the reasons for transfusion patients' admission to the ICU (Table 4).

Table 1b.				
Admittance Hb (g/dL)				
≤7	0 (0.0)	3 (2.7)	3 (1.3)	X^2=3.851
7-10	33 (27.7)	25 (22.7)	58 (25.3)	p=0.146
≥10	86 (72.3)	82 (84.5)	168 (73.4)	
Transfusion status				
Yes	29 (24.4)	29 (26.4)	58 (25.3)	X^2=0.120
No	90 (75.6)	81 (73.6)	171 (74.7)	P=0.729
Exit status from ICU				
Discharged	75 (63.0)	68 (61.8)	143 (62.4)	X^2=0.036
Death	44 (37.0)	42 (38.2)	86 (37.6)	p=0.851

*p<0.05, In Group E according to Group K
Hb: Hemoglobin, ICU: Intensive care unit, GCS: Glasgow coma scale, CVS: Cardiovascular system

Table 2. Evaluation of APACHE II scores of patients			
	Number of patients	**Mean±SD**	**p**
Male	119	20.93±6.67	0.541
Female	110	21.50±7.33	
Underwent transfusion	58	22.95±5.47*	**0.028**
No transfusion	171	20.61±7.35	
Underwent transfusion			
Male	29	22.00±4.51	0.189
Female	29	23.90±6.21	

*p<0.05, people Underwent transfusion compared to who did not
SD: Standard deviation

18.9% of the transfused patients underwent transfusion within the first 24 hours of their stay in the ICU and approximately half (46.5%) were transfused within the first three days (Figure 1).

Complications developed in 17.2% (n = 10) of the transfused patients that were thought to be associated with transfusion (Table 5). The most common complication was febrile reaction (90%). An allergic reaction developed in one patient.

When we look at the exit status of patients from the intensive care unit, 17.5% of the discharged patients and 38.4% of the patients who died were transfused. Among transfused patients, the number of patients who died was higher in Group K, and this difference was statistically significant (p <0.05, Table 6).

Although the amount of diagnostic blood loss (DBL) per ICU day was higher in transfused patients than in non-transfused patients, it was statistically significantly higher in patients who underwent DBL transfusion per ICU day (p <0.05). There was no statistically significant difference between the groups in terms of total DBL and fluid balance (FB) amounts and mean values per intensive care day (p> 0.05, Table 7).

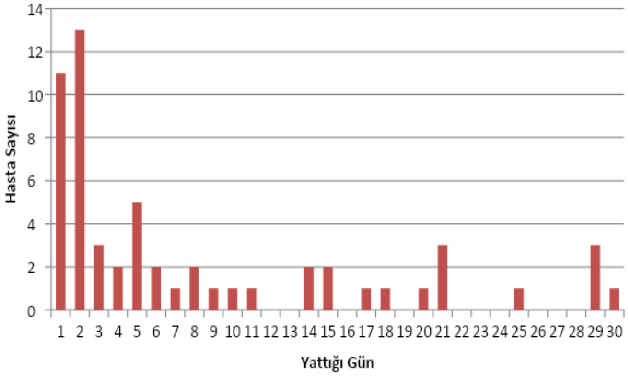

Figure 1. Distribition of transfused according to days in which transfusion implemented

Table 3. Distriution of transfusion indications by groups			
Firs transfusion reason	**Group E n (%)**	**Group K n (%)**	**Total**
Anemia	11 (37.9)	13 (44.8)	24 (41.4)
Acute hemorrhage	8 (27.7)	6 (20.7)	14 (24.1)
Surgery during follow-up	3 (10.3)	4 (13.8)	7 (12.1)
Hemodynamic instability	7 (24.1)	6 (20.7)	13 (22.4)
Total	29 (100)	29 (100)	58 (100)
X^2=0.672, p=0.880			

Table 4. Distriution of transfusion patients' resons for admission to intensive care unit			
Reasons for Admission to intensive care unit	**Group E n (%)**	**Group K n (%)**	**Total**
Postoperative follow-up	8 (27.6)	8 (27.6)	16 (27.6)
Respiratory system problems	6 (20.7)	10 (34.5)	16 (27.6)
Neurological problems	4 (13.8)	6 (20.7)	10 (17.3)
Cardiovascular system problems	0 (0.0)	2 (6.9)	2 (3.4)
Trauma	11 (37.9)	2 (6.9)	13 (22.4)
Other	0 (0.0)	1 (3.4)	1 (1.7)
X^2=10.631, p=0.059			

Table 5. Complications after transfusion			
Complications after transfusion	**Group E n (%)**	**Group K n (%)**	**Total**
Febrille reaction	6 (10.3)	3 (5.2)	9 (15.5)
Allergic reaction	1 (1.7)	0 (0.0)	1 (1.7)
None	22 (37.9)	26 (44.8)	48 (82.7)
X^2=2.333, p=0331			

Table 6. Exit status from intensive care unit by groups				
Exit Status from ICU		**Group E n (%)**	**Group K n (%)**	**Total**
Discharged transfusion	- Underwent	17 (68.0%)	8 (32.0%)	25 (100%)
	- No transfusion	58 (49.2%)	60 (50.8%)	118 (100%)
Death transfusion	- Underwent	12 (36.4%)	21 (63.6%)	33 (100%)
	- No transfusion	32 (60.4%)	21 (39.6%)	53 (%100)

Table 7. Distribution of mean of diagnostic bşood loos and fluid balance by groups			
	Group E n (%)	**Group K n (%)**	**Total**
DBL total			
Underwent transfusion	29 (133.82+101.84)	29 (165.79+140.22)	p=0.323
No transfusion	90 (134.80+8.86)	81 (22.85+11.28)	p=0.874
DBL, per ICU day			
Underwent transfusion	29 (29.34+15.97)	29 (24.44+14.01)	p=0.220
No transfusion	90 (21.84+8.86)	81 (22.85+11.28)	p=0.781
FB total			
Underwent transfusion	29 (5019.31+7281.94)	29 (5286.38+7212.88)	p=0.890
No transfusion	90 (5687.89+7281.94)	81 (5390.57+6583)	p=0.781
FB, per ICU day			
Underwent transfusion	29 (531.96+472.92)	29 (694.82+991.64)	p=0.428
No transfusion	90 (679.46+591.73)	81 (651.72+536.77)	p=0.750

* The mean values of the transfused patients until the day of transfusion
DBL: Diagnostic blood loss, FB: Fluid balance, Intensive care unit

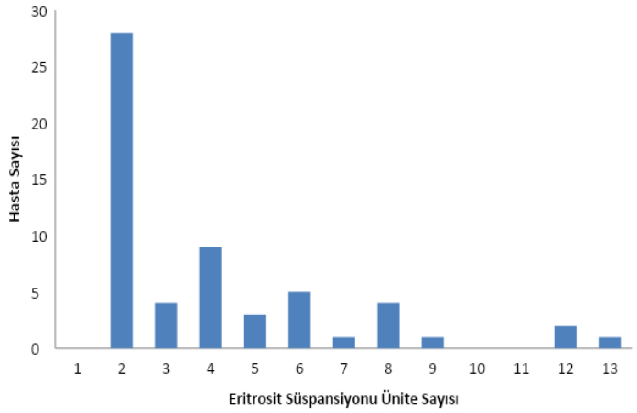

Figure 2. Unit numbers of transfused erytthrocyte suspension

Discussion

Anemia is either present or may develop in the early period in the majority of patients followed up in the intensive care unit. Anemia was reported to be detected in 95% of the patients 3 days after admission to the ICU (3, 8). Although the female patients had lower Hb values, in our study similar changes were observed in the Hb values of both male and female patients undergoing intensive care in our AICU. According to the definition of World Health Organization (WHO); Hb values Hb < 13 g / dL (Hct <39%) in adult men and Hb <12 g / dL (Hct <36%) in non-pregnant women are accepted as anemia (9). According to this definition, it was observed that 60.7% of the patients were anemic on the day they were admitted to the intensive care unit, this rate was 83.9% on the 3rd day of their hospitalization and the decrease in mean Hb values continued over time. Anemia developed on the third day of hospitalization in 55.6% of the patients who were not anemic at the time of their admission to the intensive care unit. These changes in Hb levels compared to the values at the time of admission were statistically significant.

Corwin et al. (4) showed that 50% of intensive care

patients underwent blood transfusion during hospitalization and this rate increased to 85% in patients with hospitalization longer than one week. Vincent et al. (3), similar to Corwin et al., reported that the majority of transfusions were performed in the first week of admission to intensive care units and that 73% of the patients in the ICU for more than one week were transfused. In the same study, they reported that 41% of patients underwent transfusion within 28 days. In our study, we observed that 25.3% of the patients underwent transfusion within 30 days, 39.8% of the patients hospitalized for more than one week underwent transfusion, and a statistically significant relationship between the duration of ICU stay and transfusion rates. There was no statistically significant difference between the groups in terms of length of stay in the ICU.

In blood transfusion practice, there may be different implementations depending on hospitals. Hebert et al. (10) observed many institutional changes in their study, including patients with similar age, arrival APACHE II scores, and similar conditions in four main categories; cardiovascular diseases, respiratory failure, major surgeries, and trauma. Vincent et al. (3) found that there were significant differences in the transfusion rates of ICUs, the highest (44.2%) in academic hospitals. The researchers attributed this difference between hospitals to the patient populations examined. Our hospital is a university hospital and is a tertiary health center that also serves the surrounding provinces. Therefore, patients with serious diseases can be treated in our hospital. Therefore, it can be expected that APACHE II scores of transfused patients will be higher than non-transfused patients. More invasive procedures are applied to patients with serious disease, different laboratory tests are required, and therefore the blood volume taken is higher, and as a result, these patients are more prone to anemia (11). Similarly, the high APACHE II score in our AICU was associated with a higher amount of blood samples for diagnostic purposes.

Threshold Hb level is one of the main determinants of transfusion decision (12). The threshold Hb value for blood transfusion varies between hospitals (7-12 g / dL) (10, 12-14). As a result of the multicenter ABC study involving 3534 patients, the transfusion threshold Hb value was found to be 8.4 g / dL (3). A similar threshold Hb value (8.6 g / dL) was found in the CRIT study (14). In the same study, many patients were able to tolerate hemoglobin values of 7 g / dL and below. According to the Cochrane group (15), the threshold for transfusion should be 7-9 g / dL in patients without severe cardiac disease. In our study, the mean pre-transfusion Hb value was generally 7.5 ± 1.3 g / dL (min: 4.7 g / dL, max: 10.5 g / dL), and in transfusions with anemia indication, it was found 6.9 ± 1.1 g / dL (min: 4.7 g / dL, max: 9.2 g / dL). Three patients with Hb values of 10 g / dL and over before transfusion were transfused for acute hemorrhage.

In a study by King et al. (16), a non-hemolytic febrile reaction was observed in 6.8% after ES transfusions used without reducing leukocyte content. Allergic reactions are common after transfusion of blood products and the severity of these reactions varies clinically (17). During our study complications, febrile in 9 cases, and allergic reaction in one case, developed after transfusion in 17.2% of the patients who underwent transfusion.

In a meta-analysis (18), the daily blood intake for laboratory tests was 377 mL/day in the cardiothoracic ICU and 240 mL/day in the general surgery ICU. Corwin et al. (4) reported that approximately 60-70 mL of blood samples were obtained from 49% of the patients undergoing blood transfusion and there was no reason requiring transfusion in 29%, and that blood draw was one of the most common causes of transfusion in patients who were followed up in the intensive care unit for a long time. Chant et al. (12) suggested that blood transfusion was correlated with the amount of blood taken in critically ill patients with a hospitalization duration of approximately 50 days. In the studies performed, it was reported that most blood samples were taken in the ICU in the first 24 hours and decreased gradually in the following days (19, 20). In the ABC study (3), the mean DBL was 41.1 ± 39.7 mL/day in the ICU and there was a positive correlation between organ dysfunction and

daily blood intake. A decrease in Hb concentration in ICU patients also contributes to increased blood loss and erythrocyte destruction during interventions such as central catheter placement, blood gas sampling as well and DBL (21). In addition, erythrocyte production decreases due to the direct inhibitory effects of inflammatory cytokines on erythropoietin production in critical patients (22-24). In some studies, it was emphasized that in about one-third of transfusion events, no indication was identified, and transfusions were usually performed due to daily DBL, and it was concluded that blood transfusions should be conservative and transfusion guidelines should be followed (1, 5, 7). There are also studies reporting that factors such as disease severity scores and mechanical ventilation therapy

have a positive correlation with high DBL (3, 25). In our study, although total and per intensive care day diagnostic blood loss (DBL) amounts during their hospitalization of patients who underwent transfusion (total DBL 149.76 mL; mean 26.89 mL/day) was found higher than in non-transfused patients (total DBL 136.25 mL; mean 22.32 mL/day), DBL was statistically significantly higher only in patients who underwent transfusion per ICU day. However, there was no statistically significant difference between the groups. The higher DBL means of transfused patients may be due to the higher APACHE II scores.

Conclusion

In conclusion, we found that most of the patients admitted to the intensive care unit had hemoglobin levels that could be accepted as anemic according to the definition of World Health Organization (WHO) and the decrease in mean Hb values continued over time in the following days, 55.6% of patients who were not anemic at the time of admittance (50% in Group E, 63.2% in Group K) had anemia on the 3rd day of hospitalization, the mean Hb value before transfusion in our ICU was 7.5 ± 1.3 g / dL (min: 4.7 g / dL, max: 10.5 g / dL), in transfusions with anemia indication, the mean pre-transfusion Hb values were 6.9 ± 1.1 g / dL (min: 4.7 g / dL, max: 9.2 g / dL), mean 37.0 ± 15.7 mL of blood sample per person was taken for diagnostic purposes on the first day of hospitalization, due to repeated blood samples (mean 147.2 ± 117.1 mL) over time, Hb values decreased significantly, requiring blood transfusion. In patients undergoing transfusion we determined that only few cases had febrile reactions and one patient had allergic reactions as transfusion-related complications; the mortality rate was higher than non-transfused patients, however, transfused patients had higher APACHE II scores and mortality rates were higher in female patients undergoing transfusion.

Ethics

Ethics Committee Approval: In our study, after obtaining approval from the Fırat University Hospital administration for reviewing patient records and the approval of the Fırat University Non-Interventional Research Ethics Committee, the hospital files of all patients who were followed up and treated in Fırat University Hospital Anesthesia Intensive Care Unit between 01.01.2015 - 12.31.2015 and the data recorded in ENLIL Hospital Information Management System of Fırat University Hospital were analyzed retrospectively.

Informed Consent: Retrospective study.

Authorship Contributions

Concept: O.K.B., S.B., R.A., İ.D., Design: O.K.B., A.B., S.B., E.B., İ.D., Data Collection and Process: O.K.B., S.B., E.B., R.A., Analysis or Interpretation: O.K.B., A.B., E.B., İ.D., Literature Search: O.K.B., S.B., R.A., Writing: O.K.B., A.B., S.B., İ.D.

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