



## Evaluating the Anemia and Blood Transfusion Prevalence in the Intensive Care Unit and its Impact on Mortality of Patients

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### ABSTRACT

Anemia is regarded as one of the most common findings in ICU, resulting in extensive blood transfusions in this unit. Several factors are involved in increased patients' hospitalization in hospital and increased mortality. Thus, the current research was carried out to evaluate the anemia and blood transfusion in ICU and its impact on the mortality of patients in educational hospitals of Urmia University of Medical Sciences. The present study has been conducted based on prospective observations in intensive care units of educational hospitals of Urmia University of Medical Sciences. Demographic information of the 100 patients, blood transfusion, and hemoglobin level of patients were recorded at admission time since the seventh day to the 30th day of hospitalization in the intensive care units. Logrank test was used to determine the survival time. Among the patients who had more than one week of hospitalization, 100 patients met the inclusion criteria of study, and 54 (54%) were male and 46 (46%) were female. The mean age of patients was  $64.24 \pm 16.69$ . The mean survival time was 27.5 days for males and 26 days for females. The survival time for people received blood was reported to be 26.83 days, and for those did not receive blood, it was reported to be 26.81 days. It was reported to be 29.44 days for patients with anemia at the time of admission and 25.11 days for those without anemia. The survival time for two groups was not significantly different in terms of sex (male and female) and receiving the blood (received or not), and the hemoglobin of admission time of patients between two anemia and non-anemia groups were among the variables, which had a significant difference ( $p < 0.008$ ) between two groups and findings revealed that non-anemia patients had a higher survival rate at the admission time compared to anemic patients. The variable of sex and receiving the blood and respiratory status during hospitalization time in ICU had no impact, while having or not having an anemia is considered an effective index during hospitalization time in ICU. Non-anemia people showed more survival rate than anemia patients.

**Key words:** Anemia, Blood Transfusion, Mortality, Intensive Care Unit (ICU)

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### INTRODUCTION

Anemia is regarded as one of the most common findings in ICU [1]. This disease prevalence in the ICU has been reported to be 95-98% [1, 2]. Several factors result in anemia in ICU. Some of the factors include blood loss caused by bleeding or inserting invasive catheters, reduced longevity of red blood

cells, disorder in production of erythropoietin and repeated phlebotomies [3-5]. Chronic diseases are one of the factors, which due to leading to inflammatory factors, lead into reduced production of erythropoietin, and thus, reduced production of red cells [6]. Blood transfusion is among the common therapeutic methods to treat anemia in the ICU [3]. Transfusion level in the ICU is relatively high compared to that in other parts, so that in the study conducted by Entezari et al, 40% of total hospital injections were related to the

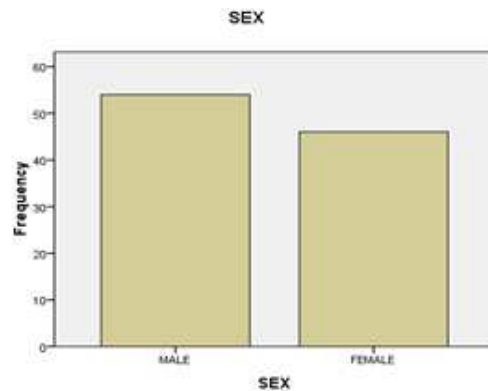
ICU [7]. In another research, it was found that 50% of patients admitted to the ICU receive blood during their hospitalization. Findings of the research conducted by Chant et al suggest that in long-term hospitalization in ICU, only 17% of the blood transfusions were related to bleeding and 40% were related to reduced hemoglobin and anemia and patients received more blood with a longer hospitalization [8-17]. While blood transfusion saved the patients in some conditions, it might increase mortality and morbidity in some cases [9-22]. Thus, considering the prevalence of anemia and its complications, blood transfusion and its associated problems, we aim to evaluate the prevalence of anemia and blood transfusion in patients hospitalized in ICU of the educational and therapeutic centers of Urmia University of Medical Sciences and its impact on the mortality rate of patients and their hospitalization duration.

### MATERIALS AND METHODS

This is a prospective descriptive and cross-sectional type of study in which patients were selected among the intensive care units of Imam Khomeini and Taleghani educational of educational hospitals of Urmia University of Medical Sciences during 6 months. All patients with more than one week of hospitalization in ICU, aged over 18 years and hospitalized due to chronic disease, were included into study. Patients, who underwent dialysis or had acute bleeding, were excluded from the study. In total, information of 100 patients was recorded from patients' medical files. In this research, patients' demographic information, patients' hemoglobin level at admission time, hemoglobin before blood transfusion, and hemoglobin during hospitalization were recorded. Hemoglobin was considered less than 12 g/dl for females and less than 13 g/dl for anemic males. Logrank test was used to found survival time of patients and the impact of blood transfusion and anemia on survival time were obtained. To analyze the data, SPSS16 software was used.

### RESULTS

Research findings revealed that out of 100 patients participated in the research, 54 were male and 46 were female (Chart 1). The mean age of the patients for hospitalization was 64.24 ± 16.69.



**Chart 1: Sex distribution in studied samples**

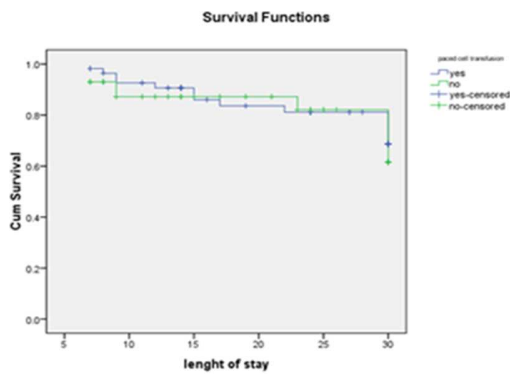
The mean hemoglobin level of patients at hospitalization time was  $11.38 \pm 2.01$ , which it reached to  $9.02 \pm 1.26$  after 30 days (Table 1).

**Table 1: hemoglobin level of patients**

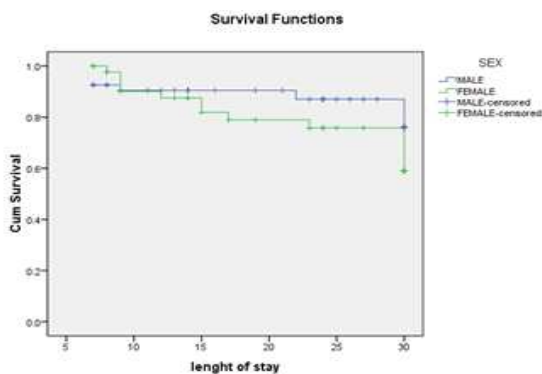
Variable	total (mean ± SD)
Hemoglobin at the time of admission (g/dl)	11.38±2.01
Mean hemoglobin at first week (g/dl)	10.92±1.83
Mean hemoglobin after 30 days (g/dl)	9.02±1.26

In addition, 61% of patients were anemic at time of admission to ICU in this research, and 30 days after hospitalization, nearly 97% of the patients were anemic. Following the anomy of patients, transfusion prevalence in ICU was 57% and the mean hemoglobin level for onset of blood transfusion was  $8.38 \pm 1.17$  g/dl. The survival time for group received the blood was  $26.83 \pm 1.01$  days and it was  $26.81 \pm 1.30$  days for the group did not receive the blood, which no significant difference was seen between the two groups in terms of survival time ( $p < 0.7$ ) (Chart 2). No difference was also found between males and females in terms of survival time ( $p < 0.22$ ) (Chart 3) and survival length was  $25.98 \pm 1.25$  for females and  $27.57 \pm 1$  males. The survival time for the group received the blood was  $26.83 \pm 1.01$  days and it was  $26.83 \pm 1.01$  days for the group did not receive the blood, which no significant difference was seen between the two groups in terms of survival time ( $p < 0.7$ ) (Chart 2), and no difference was found between males and females in terms of survival time ( $p < 0.22$ ) (Chart 3) and survival time was reported to be  $25.98 \pm 1.25$  days for females and  $27.57 \pm 1$  days for males. The anemia of patients at admission time to ICU was among the variables that affected survival time, so that survival time was  $25.11 \pm 1.8$  days for anemic patients and  $29.44 \pm 0.66$  days for non-anemic patients. This difference was statistically

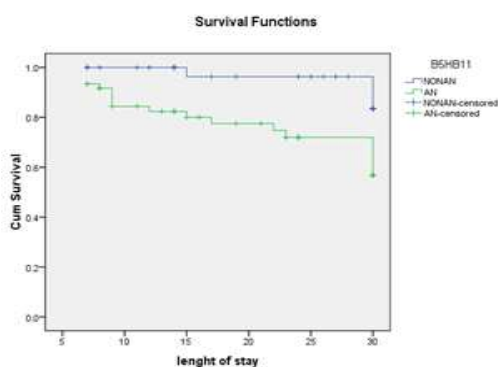
significant ( $p < 0.008$ ) (Chart 4). The hospitalization duration of the patients received the blood was  $22.26 \pm 8.69$  days and it was  $17.39 \pm 8.77$  days for patients without receiving the blood, which was statistically significant ( $p < 0.01$ ).



**Chart 2: survival time for patients with and without receiving the blood**



**Chart 3: survival time for males and females**



**Chart 4: survival time for anemic and non-anemic patients**

was 11.38 g / dl and 61% of patients at admission time to ICU were anemic. In the research conducted by Vincent, 63% of patients at time of admission to ICU had hemoglobin less than 12g/dl [23]. Additionally, in the research conducted by Korvine, 4892 patients in ICUs were examined and hemoglobin of patients was measured 11.10 g/dl [24]. Findings of these two studies were in line with the initial findings of our research. In our research, after one week of hospitalization, about 72% of the patients were anemic, and after 30 days, about 97% of the patients are anemic, while many studies suggest that after one week of hospitalization, about 95-97% of patients were anemic in these days up to one week after hospitalization [24-26]. Transfusion prevalence in our study for patients with more than one week of hospitalization to 30th day was 57%, which it is more than that in the study conducted by Vincent [23]. In the research conducted by Vincent, the level of blood transfusion for the 28-day period of patients' hospitalization in ICU is 42% and the mean hemoglobin before blood transfusion was 8.4 g/dl, which it was similar to hemoglobin before the blood transfusion. In the current research, no significant difference was found between the two groups in terms of mortality and blood transfusion had no impact on mortality of patients in the ICU. The research conducted by Vincent in 2008 also revealed that blood transfusion had no impact on morbidity of patients [27]. However, in two other studies conducted on the relationship between blood transfusion and mortality of patients in ICU, analyzing the data revealed a significant relationship between transfusion and mortality in patients [23, 24]. Another research examined the mortality rate of patients in the two groups, which had mean difference of hemoglobin before blood transfusion and its findings revealed that mortality rate of patients with restriction of blood transfusion (mean hemoglobin level of 8.5g/dl) was lower than that of patients with free blood transfusion (mean hemoglobin level of 10.7 g/dl). In our research, patients with hemoglobin under 12 g/dl showed lower survival time compared to other patients. In the research conducted by Wang *et al*, anemic patients (hemoglobin under 10 g/dl) had a lower survival time compared to non-anemic patients [28].

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**DISCUSSION**

Findings of our research revealed that the mean level of hemoglobin of patients at admission time

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