

Anemia and blood transfusion in critically ill patients

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PURPOSE

Anemia is a common problem in critically ill patients admitted to intensive care units (ICUs).¹ This prospective observational study was designed to determine the frequency of blood drawing, to estimate the incidence of anemia, and the use of red blood cell (RBC) transfusions in critically ill patients, and to explore the potential benefits and risks associated with transfusion in the ICU.

MATERIALS AND METHODS

This study had two components: a blood sampling study and an anemia and blood transfusion component. Research was conducted at general medical and/or surgical ICUs in western Europe.

The blood sampling study measured the frequency of blood drawing and volume of blood lost for 1,136 patients from 145 ICUs for a 24-hour period one week prior to the anemia and blood transfusion study. Data was also collected for the Sequential Organ Failure Assessment (SOFA) score.

The anemia and blood transfusion study collected data from all patients (3,534) admitted to participating ICUs during a two-week period. Data was collected daily for a maximum of 28 days or until hospital discharge, transfer to another institution, or death. Main outcome measures included hemoglobin levels, transfusion rate, organ dysfunction, and mortality.

RESULTS

In the blood sampling study, the mean number of draws per patient was 4.6, and the mean volume per blood draw was 10.3 mL, with an average total volume of 41.1 mL during the 24-hour period.

In the anemia and blood transfusion study, the mean hemoglobin concentration at admission to ICU was 11.3 g/dL, with 29% having a concentration of less than 10 g/dL. The transfusion rate during the ICU period was 37.0%, and the post-ICU transfusion rate was 12.7%.

There was a positive correlation between organ dysfunction (as measured by the SOFA score) and the number of blood draws and total volume drawn. Older patients and those with a longer ICU length of stay were more commonly transfused. For similar degrees of organ dysfunction, patients who had a transfusion had a higher mortality rate.

Both ICU and overall mortality rates were significantly higher in patients who had received transfusions, compared to those who had not, as ICU mortality was 18.5% vs. 10.1% for patients who received no transfusions. Overall mortality rates were 29.0% with transfusion and 14.9% without.

There was a dose-response relationship between the number of RBC units transfused and mortality, with patients receiving the most units having the highest mortality rates (see Table 1).

TABLE 1: Difference in Mortality by Number of Units Transfused

Units Transfused	No.	Mortality, %		P Value*
		Survived (n=2422)	Died (n=614)	
0	1896	85.1	14.9] <0.1
1	157	84.1	15.9	
2	377	79.6	20.4	
3	157	70.7	29.3	
4	130	69.2	30.8	
>4	319	55.2	44.8	

*Numbers do not total 3534 because of missing data (some forms incomplete). $\chi^2 = 171.46$.

CONCLUSION

This multicenter epidemiologic study validated the common occurrence of anemia and the profuse use of blood transfusion in critically ill patients. In addition, this study provided evidence of an association between transfusions and diminished organ function as well as between low hemoglobin level, transfusion, and mortality.

Findings demonstrated that blood loss through blood sampling is considerable, averaging 41 mL per day. Methods to reduce blood sampling losses can include use of point-of-care testing² and microchemistry techniques, as well as the use of tubing that eliminates the need for discard.³

Summarized from the study originally published in the Journal of the American Medical Association (JAMA) in September 2002.

References

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