

# The CRIT study: Anemia and blood transfusion in the critically ill—current clinical practice in the United States

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## PURPOSE

This study examined the incidence of anemia and red blood cell (RBC) transfusion practice in critically ill patients and investigated the impact of anemia and RBC transfusion to clinical outcomes. This study also assessed the impact of the increased scrutiny of transfusion practice catalyzed by debate over the risks of RBC transfusion.

## MATERIALS AND METHODS

The research utilized a prospective, multiple-center observational cohort study of intensive care unit (ICU) patients in the United States. Patients were enrolled within 48 hours of ICU admission, during a period from August 2000 to April 2001. Patients were evaluated for either 30 days or until hospital discharge or death. A total of 4,892 patients were enrolled in a total of 284 ICUs (medical, surgical, or medical-surgical) in 213 hospitals.

The primary end point of the study was to quantify the RBC transfusion practice in critically ill patients. The secondary end point was to examine the clinical outcomes and complications associated with anemia and RBC transfusions in these patients.

## RESULTS

### RBC Transfusion

Overall, 44% of patients received one or more units of RBC while in the ICU. The mean time to first transfusion was  $2.3 \pm 3.7$  days. More RBC transfusions were given in study week 1; however, in subsequent weeks, subjects received one to two RBC units per week while in the ICU. Longer ICU stays were associated with both a higher percentage of patients receiving transfusions and more RBC units transfused per patient. The mean pretransfusion hemoglobin level was  $8.6 \pm 1.7$  g/dL.

### Baseline Hemoglobin Levels

The mean hemoglobin level at baseline was  $11.0 \pm 2.4$  g/dL, and the hemoglobin level decreased throughout the duration of the study. Individuals with a lower baseline hemoglobin level were more likely to receive an RBC transfusion, as almost 90% of patients with a baseline hemoglobin level of  $\leq 8$  g/dL received a transfusion in contrast to only 20% of patients with a baseline hemoglobin of  $> 12$  g/dL.

### Multivariate Analyses

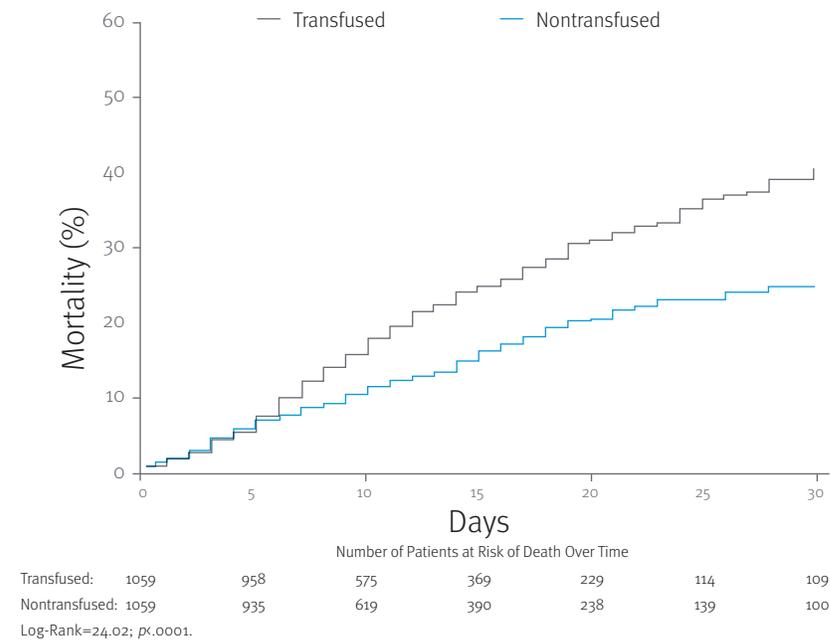
The number of RBC transfusions received by a patient during the study was independently associated with longer ICU and hospital lengths of stay. Also, RBC transfusion was independently associated with higher mortality rates. After adjusting for propensity for receiving a blood transfusion, RBC transfusion remained significantly associated with an increased risk for death. (See Figure 1.)

Patients who were transfused experienced more total complications and were more likely to experience a complication. Mortality was 10% for patients who received no transfusions and 25% among patients who received six or more RBC units.

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Baseline hemoglobin was related to the number of RBC transfusions, but it was not a statistically significant independent predictor of length of stay or mortality. However, a nadir hemoglobin level of < 9 g/dL was a predictor of increased mortality and length of stay.

FIGURE 1. RBC transfusion was associated with increased mortality for propensity-matched patients.



## CONCLUSION

Anemia is common in the critically ill patient and persists throughout the ICU and hospital stay. Despite increased scrutiny of transfusion practice, U.S. practice has changed little as compared with the previous decade.<sup>1,2,3</sup> Transfusion practice in the U.S. is also very similar to transfusion practice in Western Europe.<sup>4</sup> Current data regarding RBC transfusion thresholds and risks of RBC transfusion have not as of yet significantly altered practice patterns.<sup>5</sup> RBC transfusions seem to be associated with worse clinical outcomes.

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### References

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