ICU
MANAGEMENT & PRACTICE

CENTER-TBI - Haemoglobin Values, Transfusion Practices, Outcomes

Severe traumatic brain injury (TBI) can cause lasting cognitive, motor, and emotional issues. Despite advances in emergency care and neurosurgery, the long-term effects of TBI remain challenging for patients, caregivers, and healthcare providers.

Managing TBI focuses on preventing secondary brain injuries, which can develop hours to days after the initial trauma. Secondary factors like hypoxia, hypotension, cerebral oedema, and ischaemia can worsen primary brain damage and affect patient outcomes. Anaemia often coexists with TBI and is a critical determinant of outcomes, leading to cerebral hypoxia, compromised tissue perfusion, and increased susceptibility to secondary injuries. TBI patients with anaemia generally have worse neurological outcomes, longer hospital stays, and higher mortality rates.

Managing anaemia in TBI patients involves red blood cell (RBC) transfusions to improve oxygen delivery. However, this approach is controversial due to potential complications like transfusion-related acute lung injury (TRALI) and increased infection risks. Transfusion practices vary widely, indicating a need for large, multi-centre studies to better understand anaemia's role as a predictive factor.

The CENTER-TBI study examined the relationship between haemoglobin levels and long-term outcomes in critically ill TBI patients and RBC transfusion practices. The primary objective was to determine if haemoglobin levels, from admission to the first week of ICU stay, were independently associated with long-term functional outcomes in TBI patients. Secondary objectives included assessing the relationship between haemoglobin levels and mortality and examining transfusion practices across different countries.

The study was conducted across 65 centres in Europe and Israel. Study patients were 18 years or older, admitted to the ICU, and had at least one haemoglobin value recorded within 48 hours of hospital admission. The primary outcome of the study was the Glasgow Outcome Scale Extended (GOSE), an 8-point ordinal scale measured at six months. A GOSE score of less than 5 indicates an unfavourable neurological outcome. Secondary outcomes included mortality and the proportion of transfusions across different centres.

Haemoglobin values were recorded as the daily lowest measurement at ICU admission (day 1) and within the first seven days from ICU admission. Haemoglobin levels were considered a continuous variable or categorised into three groups: less than 7.5 g/dL, between 7.5 and 9.5 g/dL, and above 9.5 g/dL. Anaemia was defined as a haemoglobin level less than 9.5 g/dL. Transfusion practices were classified as restrictive (haemoglobin < 7.5 g/dL) or liberal (haemoglobin 7.5–9.5 g/dL) according to haemoglobin levels before transfusion.

Out of 1590 patients, 1231 had haemoglobin values available at admission. The mean Injury Severity Score (ISS) was 33, with 40.7% having isolated TBI and a mean haemoglobin value at ICU admission of 12.6 g/dL. 9.8% had haemoglobin levels less than 9.5 g/dL, including 15 with levels below 7.5 g/dL. Two hundred ninety-two patients received at least one RBC transfusion, with a median haemoglobin value before transfusion of 8.4 g/dL. There was considerable variation in transfusion thresholds among centres.

Study findings show that higher haemoglobin levels were independently associated with a decreased likelihood of unfavourable neurological outcomes. Patients with haemoglobin values below 7.5 g/dL and those between 7.5 and 9.5 g/dL had worse outcomes than those above 9.5 g/dL. These results were consistent when considering six-month mortality, with higher haemoglobin levels associated with decreased mortality and levels below 7.5 g/dL associated with increased mortality.

Overall, study findings show that anaemia was independently associated with long-term unfavourable neurological outcomes and increased

mortality in critically ill TBI patients.

Source: Critical Care

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