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Original Article

Transfusion Requirements in Cardiac Surgery III (TRICS III): Study Design of a Randomized Controlled Trial

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Objectives: To determine if a restrictive transfusion threshold is noninferior to a higher threshold as measured by a composite outcome of mortality and serious morbidity.
Design: Transfusion Requirements in Cardiac Surgery (TRICS) III was a multicenter, international, open-label randomized controlled trial of two commonly used transfusion strategies in patients having cardiac surgery using a noninferiority trial design (ClinicalTrials.gov number, NCT02042898).
Setting: Eligible patients were randomized prior to surgery in a 1:1 ratio.
Participants: Potential participants were 18 years or older undergoing planned cardiac surgery using cardiopulmonary bypass (CPB) with a preoperative European System for Cardiac Operative Risk Evaluation (EuroSCORE I) of 6 or more.
Interventions: Five thousand patients; those allocated to a restrictive transfusion group received a red blood cell (RBC) transfusion if the hemoglobin concentration (Hb) was less than 7.5 g/dL intraoperatively and/or postoperatively. Patients allocated to a liberal transfusion strategy received RBC transfusion if the Hb was less than 9.5 g/dL intraoperatively or postoperatively in the intensive care unit or less than 8.5 g/dL on the ward.
Measurements and Main Results: The primary outcome was a composite of all-cause mortality, myocardial infarction, stroke, or new onset renal dysfunction requiring dialysis at hospital discharge or day 28, whichever comes first. The primary outcome was analyzed as a per-protocol analysis. The trial monitored adherence closely as adherence to the transfusion triggers is important in ensuring that measured outcomes reflect the transfusion strategy.
Conclusion: By randomizing prior to surgery, the TRICS III trial captured the most acute reduction in hemoglobin during cardiopulmonary bypass.

Key Words: transfusion; cardiac surgery; randomized controlled trial

CARDIAC SURGERY is one of the most frequent surgical procedures, with approximately 300,000 surgeries conducted in the United States each year.[1] Anemia in these patients is common due to underlying conditions and hemodilution during cardiopulmonary bypass (CPB).[2] Perioperative anemia is associated with a significant increase in cardiac and noncardiac (renal failure and stroke) adverse events and mortality.[3,4] Patients undergoing cardiac surgery receive a high proportion of red cells (RBCs) to decrease the risks associated with anemia; but transfusion is costly, may also lead to considerable mortality and morbidity,[5] and has not been shown to be associated with improved outcomes. Ideally, the hemoglobin threshold that prevents tissue hypoxia should guide the transfusion of RBCs. Determining that specific threshold has proven difficult.

The Transfusion Requirements in Cardiac Surgery III (TRICS III) trial is the third of a series of randomized controlled trials (RCTs) to definitively determine whether a restrictive transfusion strategy is safe in cardiac surgery. The authors' first study was a single-center RCT at St. Michael's Hospital, a tertiary care center in Canada, which assessed enrollment and adherence rates (TRICS I).[6] This study demonstrated barriers to enrollment and adherence because of opposing views of optimum transfusion thresholds. These barriers were addressed, and the authors conducted a second multicenter pilot RCT of 208 patients (TRICS II).[7] The authors saw an improvement in enrollment and adherence rates attributed to the development of education modules and electronic data entry to facilitate data entry and to reduce

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