

Perioperative Red Blood Cell Transfusions and Postoperative Venous Thromboembolism in Surgical Patients

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DESCRIPTION

Venous Thromboembolism (VTE), encompassing both Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE), poses a significant threat to patients in the postoperative period. Despite considerable advancements in prophylactic strategies, VTE continues to be a leading cause of morbidity and mortality among individuals undergoing surgical procedures. Perioperative Red Blood Cell (RBC) transfusions are routinely administered to surgical patients with the primary objectives of addressing pre-existing anemia and optimizing tissue oxygenation. However, the potential association between perioperative RBC transfusions and the subsequent risk of developing postoperative VTE remains a contentious topic within the medical community. To address this ongoing debate, a meticulous meta-analysis was conducted in adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

The study entailed a thorough exploration of electronic databases including PubMed, Embase, and the Cochrane Library, spanning from the inception of these databases to the specified end date. Eligible studies included those that reported on the relationship between perioperative RBC transfusions and the occurrence of postoperative VTE in surgical patients. To ensure the rigor and reliability of the findings, two independent reviewers meticulously screened the studies, extracted pertinent data, and meticulously assessed the risk of bias according to pre-established criteria. Utilizing a random-effects meta-analysis approach, the collected data were synthesized to estimate pooled Odds Ratios (ORs) along with their corresponding 95% Confidence Intervals (CIs).

Furthermore, subgroup analyses were conducted to explore potential sources of heterogeneity, while sensitivity analyses were employed to evaluate the robustness of the results. This comprehensive methodology enabled a nuanced examination of the association between perioperative RBC transfusions and the risk of postoperative VTE, providing valuable insights into this clinically significant issue. The culmination of this meta-analysis

revealed a compelling and statistically significant association between perioperative RBC transfusions and an elevated risk of postoperative VTE. Notably, subgroup analyses consistently corroborated this finding across various surgical specialties, types of transfusions, and study designs. Furthermore, sensitivity analyses underscored the stability and reliability of the observed association, further reinforcing the validity of the findings.

The patients were included in the meta-analysis. The pooled analysis revealed a significant association between perioperative RBC transfusions and increased risk of postoperative VTE (OR, 95% CI). Subgroup analyses stratified by surgical specialty, type of transfusion, and study design consistently demonstrated a positive association between perioperative RBC transfusions and postoperative VTE risk. Sensitivity analyses confirmed the stability of the results. The findings of our meta-analysis suggest a significant association between perioperative RBC transfusions and heightened risk of postoperative VTE. Several mechanisms may underlie this association. Firstly, RBC transfusions can induce a prothrombotic state through alterations in blood viscosity, platelet function, and coagulation factors.

Secondly, transfusions may lead to endothelial injury and inflammation, promoting thrombus formation. Moreover, RBC transfusions may exacerbate preexisting conditions such as venous stasis and hypercoagulability, further increasing the risk of VTE. The implications of these findings for clinical practice are substantial. While RBC transfusions are vital for correcting perioperative anemia and improving tissue oxygenation, clinicians must carefully weigh the risks and benefits, particularly concerning the risk of postoperative VTE. Individualized risk assessment, based on patient factors such as age, comorbidities, and surgical complexity, should guide transfusion decisions. Furthermore, alternative strategies to manage perioperative anemia, such as iron supplementation, erythropoietin-stimulating agents, and restrictive transfusion protocols, should be considered to mitigate the risk of VTE while optimizing patient outcomes.

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CONCLUSION

In conclusion, our systematic review and meta-analysis provide compelling evidence of an association between perioperative RBC transfusions and increased risk of postoperative VTE among surgical patients. These findings underscore the importance of judicious transfusion practices and the need for

further research to elucidate the underlying mechanisms and explore strategies to mitigate this risk. Clinicians should remain vigilant for signs of VTE in surgical patients receiving RBC transfusions and implement appropriate prophylactic measures to minimize morbidity and mortality associated with this complication.