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The Need for Red Cell Support During Non-Cardiac Surgery Is Associated to Pre-Transfusion Levels of FXIII and the Platelet Count

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Unexpected intraoperative bleeding is associated with a reduced availability of crosslinking capacity (provided through factor XIII [FXIII]) per unit of generated thrombin. Furthermore, FXIII deficiency and thrombocytopenia (but not fibrinogen deficiency) are the most prevalent modulators of clot firmness in the immediate postoperative setting. In this study, the authors evaluated whether levels of FXIII, fibrinogen or platelet count influenced the probability of intraoperative red cell transfusions in patients undergoing surgery. This retrospective study included 1,023 patients who needed blood products in the operating room and of whom 443 received red cell transfusions. Based on standard operating procedures, FXIII activity, fibrinogen concentrate, and platelet count were measured before transfusion took place, without influencing the decision to transfuse. FXIII deficiency was common (50%), as was thrombocytopenia (49%), but not fibrinogen deficiency (9%). FXIII deficiency was associated with a significantly increased probability to receive red cell transfusions (odds ratio [OR], 4.58; 95% confidence interval [CI], 3.46–6.05) as was thrombocytopenia (OR, 1.94; 95% CI, 1.47–2.56), but not fibrinogen deficiency (OR, 1.09; 95% CI, 0.67–1.76). Similar results were obtained with cut-off independent evaluations (receiver operating characteristics [ROC] curves using continuously distributed variables), where the area under the curve (AUC) of red cell transfusions for FXIII activity was 0.744 (95% CI, 0.716–0.770), for platelet count 0.632 (95% CI, 0.601–0.661) and for fibrinogen concentration 0.578 (95% CI, 0.547–0.609). All AUCs were significantly different from each other ($P < 0.0001$ and $P = 0.0106$, respectively), indicating that FXIII activity was a significantly better predictor of red blood cell transfusion than platelet count and fibrinogen concentration. These results suggest that pre-transfusion FXIII activity, and to a lesser extent platelet count, influence the probability of intraoperative red cell transfusion. Modifying FXIII activity and/or platelet count might influence the need for subsequent red cell transfusions, thus potentially reducing morbidity associated to transfusions. However, future studies are needed to confirm this.