Transfusing Wisely: Clinical Decision Support Improves Blood Transfusion Practices

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Background: The cost and risks of red blood cell (RBC) transfusions, along with evidence of overuse, suggest that improving transfusion practices is a key opportunity for health systems to improve both the quality and value of patient care. Previous work, which included a BestPractice Advisory (BPA), was adapted in a quality improvement project designed to reduce both exposure to unnecessary blood products and costs.

Methods: A prospective, pre-post study was conducted at an academic medical center with a diverse patient population. All noninfant inpatients without gastrointestinal bleeding who were not within 12 hours of surgical procedures were included. The interventions were education, a BPA, and other enhancements to the computerized provider order entry system.

Results: The percentage of multiunit (≥ 2 units) RBC transfusions decreased from 59.9% to 41.7% during the intervention period and to 19.7% postintervention (p < 0.0001). The percentage of inpatient RBC transfusion units administered for hemoglobin (Hb) ≥ 7 g/dL declined from 72.3% to 57.8% during the intervention period and to 38.0% for the postintervention period (p < 0.0001). The overall rate of inpatient RBC transfusion (units administered per 1,000 patient-days without exclusions) decreased from 89.8 to 78.1 during the intervention period and to 72.7 during the postintervention period (p < 0.0001). The estimated annual cost savings was $1,050,750.

Conclusion: The interventions reduced multiunit transfusions (by 67.1%) and transfusions for Hb ≥ 7 g/dL (by 47.4%). The improvement in the overall transfusion rate (19.0%) was less marked, limited by better baseline performance relative to other centers.

Red blood cell (RBC) transfusion, which has been identified as the most frequently performed hospital procedure in the United States, increased by 134% from 1997 to 2011. However, 50% or more of RBC transfusions may be unnecessary, and the rate of RBC transfusion of RBCs in other developed countries, including Canada, the United Kingdom, and the Netherlands, is more than 25% lower than in the United States.

A number of clinical trials have shown that restrictive RBC transfusion strategies are either noninferior to or have advantages compared with liberal transfusion strategies in patients with critical illness, septic shock, closed head injury, cardiac surgery, orthopedic surgery, and gastrointestinal bleeding. Meta-analyses have suggested in-hospital or overall mortality advantages with restrictive transfusion strategies, as well as superior or equal outcomes with regard to heart failure, rebleeding, infections, and myocardial infarction. These benefits likely relate to the known risks of blood transfusion, which include hemolytic reactions, circulatory overload, acute lung injury, transmission of infection, and a predisposition to hospital-acquired infections of disparate types.

The cost and risks of RBC transfusions, along with evidence of overuse, suggest that improving transfusion practices is a key opportunity for health systems to improve both the quality and value of patient care. Excessive transfusions have been identified as an improvement priority in the Choosing Wisely lists of wasteful practices by six professional organizations, including obstetric, hematology, critical care, and anesthesiology societies, and the Society of Hospital Medicine (SHM), and reducing excessive transfusion is the subject of an SHM–Society for the Advancement of Blood Management improvement guide. The Joint Commission, the AABB, and the US Department of Health and Human Services have recognized the importance of improving blood management.

Previous transfusion improvement efforts have shown both benefits and limitations. Some used labor-intensive interventions or were limited to the critical care setting. One effort that focused on education plus audit was associated with a 25% reduction in blood utilization but required intensive chart review and provider contacts. Another site achieved a 19% reduction in blood utilization with extensive education, but the mean posttransfusion hemoglobin (Hb) was still > 10 g/dL, indicating high baseline use and insufficient improvement. By requiring approval for nonemergency blood transfusion by a transfusion safety officer, one hospital reduced RBC transfusions by 38%; the hospital also reduced transfusion of plasma and platelets, saving more than $2 million. However, this method requires additional staff and may be politically unfeasible.

More improvement efforts have focused on computerized provider order entry (CPOE) enhancements, which have