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TRANSFUSION

LETTER TO THE EDITOR

Collaboration is key for national preparedness: The hospital's role in whole blood rotation models

Pre-hospital whole blood (PHWB) transfusion has rapidly expanded across the United States (US) over the last decade, with more than 300 agencies now carrying low-titer O positive whole blood (LTOpWB). These programs, spanning private, public, and hybrid systems, have markedly improved outcomes for patients with life-threatening hemorrhage.[1] However, those agencies with PHWB transfusion only correlate to roughly 1.3% of the nearly 23,000 Emergency Medical Services (EMS) agencies that exist in the US.[2]

Whole blood is a uniquely balanced resuscitation product that delivers red cells, plasma, and platelets in physiologic proportion. Programs using LTOpWB, particularly non-leukoreduced (non-LR) units stored in CPDA-1, can support both field and in-hospital transfusions with a shelf life of up to 35 days. However, the full potential of these systems is often limited by gaps between pre-hospital operations and hospital transfusion practices. When hospitals do not actively utilize LTOpWB, units not administered in the prehospital arena frequently expire or must be discarded, creating both logistical and stewardship challenges.[3] Furthermore, programs utilizing non-LR blood can not rely on spinning down LTOpWB units into packed red blood cells (pRBC), creating an additional challenge when working to reduce wastage.

Identifying all hospitalized patients suitable for LTOpWB transfusion and the adoption of wastage mitigation strategies are essential prerequisites for sustaining and scaling PHWB programs nationwide. The Southwest Texas Regional Advisory Council (STRAC) has pioneered a highly effective model that addresses this challenge. STRAC's whole blood rotation system seamlessly integrates hospital and pre-hospital LTOWB use through a closed-loop rotation system: Each LTOpWB unit has a 35-day life cycle when stored with CPDA-1 compared to a 21-day life cycle of LTOpWB stored with CPD or CP2D. Of note, the use of CPDA-1 instead of CPD for anticoagulation prevents the leukoreduction (LR) of LTOpWB since platelet-sparing LR kits are only approved for use with CPD. Although, LR does reduce Cytomegalovirus (CMV) transmission, Human Leukocyte Antigen (HLA) alloimmunization, and Febrile Non-hemolytic Transfusion Reactions (FNHTR), there is no evidence that LR improves clinical outcomes in patients with life-threatening bleeding. Furthermore, LR increases costs, decreases supply by slowing down collections due to the mandatory 8-h time period between collection and LR.[4] LTOpWB units are provided to EMS in the field for 14 days; then, if not used, EMS returns the unit to the blood provider who conducts a safety check then sends the unit to the Level I trauma center to be used in the remaining 21 days. By utilizing this method and ensuring that units returned to the hospital as the program expands do not exceed the inpatient utilization of LTOpWB, wastage is kept under 2%. There are numerous inpatient populations for whom LTOpWB is an appropriate, evidence-supported resuscitation option outside of the trauma bay. Women undergoing cesarean section for placenta accreta spectrum, patients requiring complex vascular or orthopedic surgery with expected significant blood loss, and those suffering from gastrointestinal hemorrhage—particularly when anticoagulated—all represent reasonable candidates.[5] Studies have demonstrated that LTOWB transfusion can be safely administered even in non–type O patients when properly selected, with minimal risk of hemolysis.[5]

Furthermore, a whole blood rotation system offers distinct advantages compared with static disaster

Abbreviations: CMV, cytomegalovirus; CP2D, citrate phosphate double dextrose; CPD, citrate phosphate dextrose; CPDA-1, citrate phosphate dextrose adenine-1-; EMS, Emergency Medical Services; FNHTR, febrile non-hemolytic transfusion reactions; HLA, human leukocyte antigen; LR, leukoreduced; LTOpWB, low-titer O positive whole blood; MTP, massive transusion protocol; non-LR, non-leukoreduced; PHWB, pre-hospital whole blood; pRBC, packed red blood cells; STRAC, Southwest Texas Regional Advisory Council.

stockpiles. Continuous rotation preserves product viability, minimizes expiration losses, and supports sustainability. Cost analyses also demonstrate measurable efficiencies. One Level I trauma center reported a 39 percent reduction in waste, yielding $3.4 million in savings when comparing LTOpWB to component therapy.[6] Another study found a 17% decrease in annual transfusion-related costs and more than $900,000 in savings associated with low-titer O-positive whole blood. The same study also demonstrated reductions in blood products prepared, volumes transfused, and massive transfusion protocol (MTP) activations which further decrease the economic burden on the system.[7]

Hospital integration of LTOWB use serves several mutually reinforcing goals: it improves outcomes across diverse clinical scenarios, reduces wastage through timely transfusion of returned units, and underpins the stability of regional blood supply networks. By committing to whole blood use, hospitals provide the essential demand signal that allows blood centers to produce, manage, and rotate sufficient LTOpWB inventories to support prehospital programs. In other words, increasing hospital utilization of whole blood is the key to expanding prehospital whole blood availability—both in the number of units and in the geographic reach of participating agencies.

Blood stewardship must be a shared mission—linking blood suppliers, hospital providers, transfusion services, and pre-hospital providers in a unified system of care. As the STRAC model has shown, hospitals play the pivotal role in this chain. Furthermore, it is imperative that clinicians and blood bank personnel advocate for the use of LTOpWB in hospitals to facilitate its availability in the prehospital setting. By expanding LTOpWB utilization within hospitals, we can strengthen the national capacity for balanced resuscitation, ensuring that every bleeding patient, whether in the field or in the hospital, has timely access to the right product.

CONFLICT OF INTEREST STATEMENT

Dr. Donald H Jenkins is an active member of the Southwest Texas Regional Advisory Council (STRAC) that is mentioned in this paper. Mr. Epley is the CEO of STRAC which is mentioned in this paper.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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