PATIENT BLOOD MANAGEMENT & RECOVERED PLASMA VOLUMES IN THE UNITED STATES

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The term Patient Blood Management (PBM) was created two decades ago and is largely associated with bloodless surgery and transfusion avoidance. It is defined by the International Foundation of PBM as an "evidence-based bundle of care to optimize medical and surgical patient outcomes by clinically managing and preserving a patient's blood." While originally focused on red cell transfusions, today it also focuses on other transfused blood components such as platelets and plasma.

The impact on transfusion activity in the United States has been felt over the past decade. According to data published in AABB's National Blood Collection and Utilization Surveys from 2001 through 2015 and extrapolating using demand data provided by Blood Centers of America from 2016 through 2018, red cell transfusions peaked at just more than 15 million units in 2008 and dropped 30 percent to an estimated 10.5 million units by 2018.

Red cell demand drives blood collections. Red cells can be derived from manual whole blood collection or automated red cell apheresis procedures. Red cell apheresis permits the collection of two units per donation and is an effective tool for bolstering group O red cells supplies. Group O patients may only receive group O units, while group A, B, and AB patients can generally receive group O units without harm. In the emergency room and on ground and air emergency transport vehicles, group O red cells are stocked and available to be transfused to emergency victims during the interim before the patient has been blood typed. In the case of premenopausal women, Rh negative group O units are used. This places an additional demand on group O inventories. In recent years, approximately 14 percent of the blood supply has been provided by automated red cell collection. The balance has been provided by whole blood collection.

Whole blood is processed using centrifugation to separate red cells and plasma. A typical whole blood collection in a 500 ml blood bag will yield 280–330 ml of plasma. About 35 percent of whole blood-derived plasma is transfused for patient therapies. The balance is available for further manufacture in the form of recovered plasma. Volumes vary depending on whether platelets or cryoprecipitated Factor VIII has been derived from the unit. Freezing times vary accordingly. Automated plasma collection for transfusion is performed, and this is primarily directed at the collection of AB plasma, considered the universal type for plasma transfusion, the opposite of group O in red cells.

Recovered plasma is a unique product under the U.S. Food and Drug Administration lexicon. It is an unlicensed product and the responsibility for compliance with applicable regulations is transferred to the licensed manufacturer through a Short Supply Agreement, which establishes procedural and inspection requirements. Advantages with recovered plasma include higher total protein content due to the time frame required between blood donations. Disadvantages include the smaller volume per unit and increased post-donation notifications associated with voluntary blood donation.

PBM has had a direct and negative impact on the availability of recovered plasma. As the demand for red cell transfusion decreases, the amount of whole blood that is required to be collected decreases commensurately. There is a positive contribution to recovered plasma by PBM seen in the demand for plasma for transfusion. Since 2008 when plasma transfusions reached almost 4.5 million units, they have dropped 34 percent to an estimated 3 million units. The 1.5 million difference adds to recovered plasma availability.

In the accompanying chart, the combined impact of PBM on recovered plasma volumes can be seen. The volume of recovered plasma units has dropped from 10.8 million in 2008 to 6.4 million units in 2018. Using an average volume of 300 ml/unit, recovered plasma volume has dropped from 3.2 million liters to 1.9 million liters.

In the chart below, it appears that the rate of decrease in red cell demand is beginning to flatten. The current red cell transfusion rate in the U.S. is equivalent to approximately 32 units/1,000 population. When the red cell transfusion rate began to drop, many postulated that optimal demand in the U.S. should be 30 units/1,000 population. This was the best practice observed in other modern countries. Once red cell demand does ultimately flatten out, the volume of recovered plasma should stabilize and may even slowly grow as the United States population grows. ●

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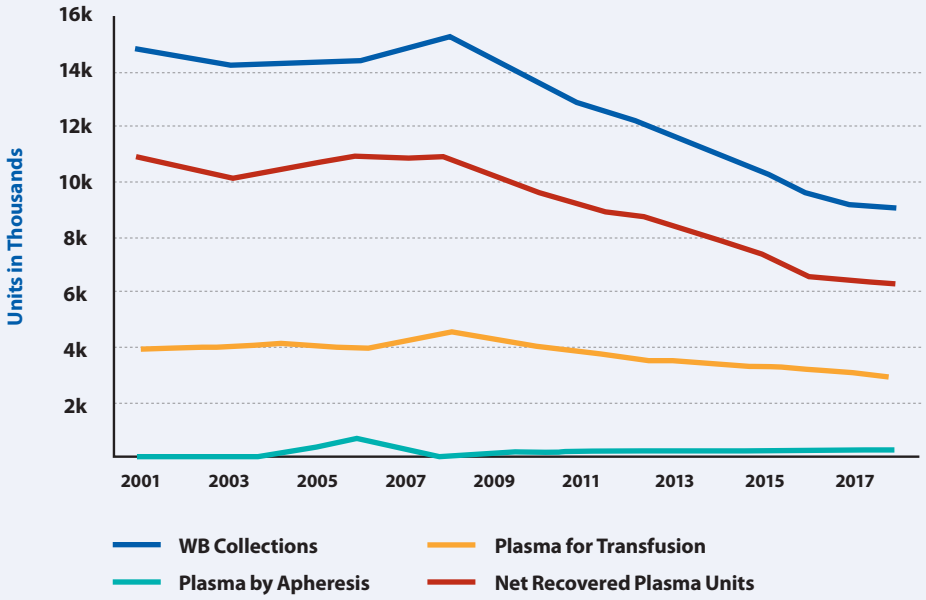
TRENDS IN WHOLE BLOOD COLLECTIONS

Use of Plasma for Transfusion and Resulting Recovered Plasma Units from 2001–2018



Data Sources: AABB National Blood Collection and Utilization Surveys (2001–2015) and Blood Centers of America (2016–2018)