Conference Abstract

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450 mL vs 500 mL Blood Collection Bags: Determining the Ideal Volume for Donor Safety

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Blood donation practices vary globally, with collection volumes often tailored to optimize donor safety while ensuring sufficient blood for transfusion purposes. One of the ongoing debates within transfusion medicine is whether 450 mL or 500 mL blood collection bags are ideal for maintaining donor safety and operational efficiency. Blood collection bags typically contain an anticoagulant solution to preserve the donated blood. In 450 ml collection bags, 63 mL of CPDA-1 is used, while 500 mL bags contain 70 mL of CPDA-1. The European Union's 20th edition (2020) *Guide to the Preparation, Use, and Quality Assurance of Blood Components* states that the standard volume for donation is 450 mL ± 10%. This range can extend up to 500 mL based on donor suitability. The AABB standards emphasize adjusting collection volumes based on the average donor weight, which can vary due to genetics or socioeconomic factors. For donors weighing 50 kg or more, the permissible volume-to-weight ratio is 10.5 mL/kg. Exceeding a 10% total blood volume collection can increase the risk of adverse reactions (ARs), and a theoretical threshold of ≥13% can significantly elevate this risk. Men weighing ≥50 kg can generally donate up to 500 ml safely, while for women, 450 mL is often recommended due to potential differences in physiology. This raises the question of whether separate collection bags should be used for men and women to ensure optimal safety and adherence to international guidelines.

Taking the example of Japan, the standard practice for blood donation generally involves the collection of 400 mL of blood. The choice of 400 mL as a standard volume aligns with national health regulations and practices, taking into consideration the average donor's body weight, overall health status, and risk of adverse reactions. This volume is slightly lower than the 450 mL or 500 mL collection practices seen in other countries, emphasizing Japan's cautious approach to balancing donor well-being with blood supply needs.

In China, blood donation volumes vary, with approximately half of all whole blood donations consisting of 400 mL per session. The remaining donations are typically 200 mL or 300 mL. This distribution reflects the country's efforts to balance donor safety with the need to maintain an adequate blood supply for clinical use.

A recent retrospective cohort study conducted from September to December 2023 at the Peshawar Regional Blood Centre in Pakistan analyzed two groups of whole blood donors. Group 1 utilized 500 mL collection bags (70 mL CPDA-1), while Group 2 used 450 mL bags (63 ml CPDA-1). The overall incidence of adverse reactions was documented at 1.85%, with higher rates observed in certain subgroups: (1) First-time donors (3.16% vs 1.08%; $p < 0.0001$); (2) Family replacement donors (1.89% vs 0.97%; $p = 0.002$); and (3) Donors in Group 1 (2.32%) compared to those in Group 2 (1.49%). These findings suggested that larger collection volumes may be associated with increased donor reactions, particularly for first-time and specific categories of donors. The choice between 450 mL and 500 mL collection bags should consider donor weight, gender, and frequency of donation. While both volumes are viable under appropriate conditions, evidence supports a tailored approach that prioritizes donor safety, especially in countries with lower average donor weights. Future studies and standardization efforts should continue to refine these guidelines, balancing collection efficacy with minimal adverse reactions.

Disclosure

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