Blood Product Administration in the Critical Care and Perioperative Settings

Sofie Louise Rygård, MD[a], Lars Broksø Holst, MD, PhD[a], Anders Perner, MD, PhD[a,b,*]

KEYWORDS

• Critical care • ICU • Perioperative • Plasma • Platelets • Thrombocytes • Anemia • Red blood cells

KEY POINTS

- Anemia, bleeding, and coagulopathy are frequent in the critical care and perioperative settings.
- Identification of cause is essential for optimal management.
- An imperative restrictive transfusion policy is preferable for all blood products.
- A restrictive hemoglobin level as the threshold for transfusion in all nonbleeding critically ill patients and perioperative patients—with the exception of patients with ongoing myocardial ischemia and patients with traumatic brain injury.
- Only use prophylactic platelet transfusion when total platelet count is below 20×10^9/L.
- The use of plasma to correct coagulation abnormalities without bleeding is likely of limited benefit.

INTRODUCTION

To enable transfusion of patients, whole blood is collected from healthy volunteers and separated into blood products—plasma, platelets, and red blood cells (RBCs) (Fig. 1). The blood is often filtered to reduce the number of immune cells, which may induce adverse effects and transfer DNA from donor to recipient. When transfusing blood products to a patient, weighing the risks and benefits is needed. The final decision should be based on the best available evidence for transfusion of the specific blood product in the specific clinical setting.

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[a] Department of Intensive Care, Copenhagen University Hospital, Rigshospitalet, Inge Lehmansvej 5, Opg. 3, 3. sal, 4131, Copenhagen Ø 2100, Denmark; [b] Centre for Research in Intensive Care (CRIC), Tagensvej 22, 2200 Copenhagen N, Denmark
* Corresponding author. Department of Intensive Care, Copenhagen University Hospital, Rigshospitalet, Inge Lehmansvej 5, Opg. 3, 3. sal, 4131, Copenhagen Ø 2100, Denmark.
E-mail address: anders.perner@regionh.dk

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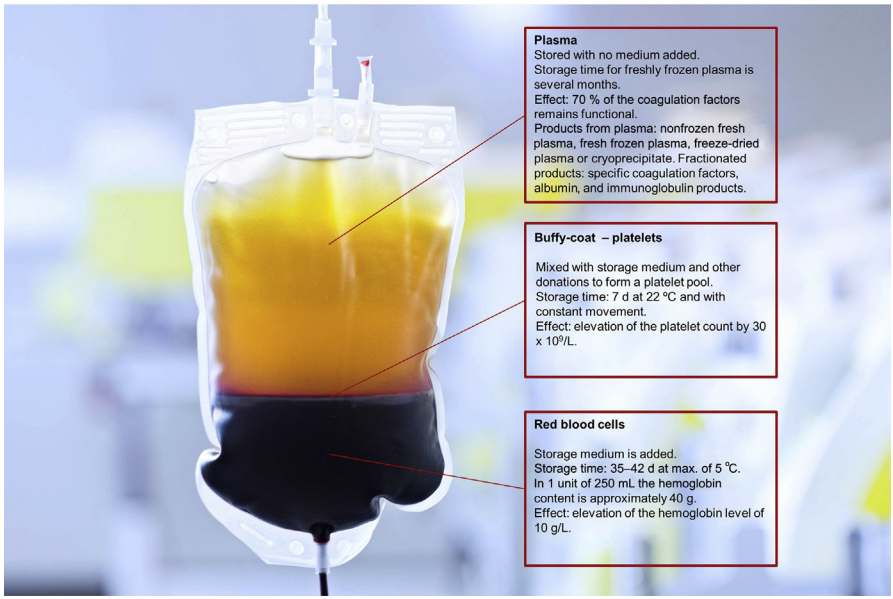

Fig. 1. Blood products. (*Courtesy of* Tomas Bertelsen, Blood donors, Denmark.)

Blood products are scarce resources and a significant expenditure for health care systems worldwide. Even though developments in the screening of blood donors and donated blood have resulted in a very low risk of transfusion-transmitted infections, there are still residual risks of adverse reactions when transfusing blood products; the reactions can be mild, moderate, severe, or even life-threatening. Transfusion-related circulatory overload and acute hemolytic transfusion reactions are the main causes of transfusion-related deaths,[1] and a majority of these events are due to human errors and are preventable when correct evaluation of the prescription and checking is performed before transfusion. The risk of serious transfusion-related harm is approximately 1 in 15,000 transfusion events and the risk of death related to transfusion events is estimated at 1 in 100,000.[1]

During storage, the RBC changes shape and function, and substances are leaked from the cell into the storage medium—changes that combined are called the "storage lesion."[2] In vitro studies have shown the changes to compromise the functionality of the RBC,[3] and several observational studies and randomized clinical trials (RCTs) have investigated the in vivo effect of storage on clinical outcomes.

The donation of blood by millions of healthy volunteers daily is also associated with complications. Up to one-third of donors may experience adverse effects, for example, iron deficiency, vasovagal reactions, and local symptoms, although the majority is of mild character.[4]

Regarding blood donors putting themselves at risk, the expensive and limited resource of blood products, and the known and hidden adverse effects of transfusion, an imperative non-overtransfusion policy is preferable for all blood products.

The critical care and perioperative settings are high consumers of blood products, with multiple units and different products often given to an individual patient. Packed RBCs are the most frequent product used in ICUs and in the perioperative setting[5]; the