

## Clinical pathology selected abstracts

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### **Intraoperative red blood cell transfusion and mortality after cardiac surgery**

December 2019—Patients with underlying cardiac disease are at risk for myocardial ischemia if they have untreated anemia at the time of cardiac surgery. During surgery, ongoing blood loss and hemodilution as a result of cardiopulmonary bypass (CPB) cause low hemoglobin levels. The optimal transfusion trigger for cardiac surgery patients continues to be debated. A more restrictive RBC transfusion strategy is used in patients with stable cardiovascular disease and is considered safe. However, coronary surgery patients may have a higher risk of anemia and adverse events because of a fixed coronary stenosis. The authors conducted a study to examine the association between intraoperative transfusion and mortality in patients undergoing cardiac surgery. They retrospectively studied 2,933 adult patients at a hospital in the Netherlands who underwent coronary surgery with or without aortic valve replacement from June 2011 until September 2014. A propensity score based on logistic regression analysis was calculated to estimate the odds ratio for mortality in patients receiving intraoperative transfusion. The authors found that this type of transfusion was associated with a more than three-fold increased risk of 30-day mortality. Patients in the highest quartile of probability of transfusion were older and had a higher Euro-SCORE and lower preoperative hemoglobin levels. They also had combined surgery more often and a longer duration of surgery. The adjusted risk factor (odds ratio, 2.6) continued to show an association between intraoperative transfusion and mortality. The authors demonstrated that intraoperative transfusion of red blood cells is associated with increased mortality in adults undergoing cardiac surgery. They suggested that future work focus on optimizing preoperative cardiac care by treating anemia before surgery.

Vlot EA, Verwijmeren L, van de Garde, EMW, et al. Intra-operative red blood cell transfusion and mortality after cardiac surgery. *BMC Anesthesiol.* 2019;19(65). <https://doi.org/10.1186/s12871-019-0738-2>.

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### **Blood transfusion for deep space exploration**

Astronauts on exploration missions in space are at risk for traumatic injury during launch, landing, docking, and extravehicular activities. Even fall and crush injuries on planetary surfaces are a possibility. To assess austere conditions during spaceflight and available resources for acute blood loss, the authors conducted a review of alternative blood product administration and walking blood banks in austere terrestrial environments. Only 4 L of normal saline is available in the International Space Station. Methods to generate crystalloid solutions in flight are under investigation. Therefore, the authors examined treatment for acute blood loss in such austere settings as Antarctica, military units, and ships at sea to provide insight into establishing protocols for transfusion during spaceflights. They performed a literature review using PubMed and Google Scholar and identified 27 articles on this topic, which encompassed three controlled trials, six retrospective cohort analyses, 15 reviews, one case report, and two experimental studies. Alternatives to blood transfusion in austere settings included lyophilized blood products, hemoglobin-based oxygen carriers, and fresh whole blood. Walking blood banks provided methods to screen and activate donors and transfuse and monitor for adverse reactions. Other factors identified as barriers to transfusion in space were microgravity, difficulty in reconstituting lyophilized products, baseline physiologic changes, risk of air emboli, equipment constraints, and limited escape and surgical options. The authors proposed an algorithm for activating a floating blood bank that includes directions that consider spaceflight requirements that are mission and microgravity specific. The algorithm provides steps for medical decision-making, prepping donor and patient, blood donation, and blood transfusion. The authors concluded that medical planning for space exploration should include risk mitigation for acute blood loss. They noted that the value of floating blood banks

would depend on such factors as the number of people per mission, length of the mission, and speed of planetary surface operations.

Nowak ES, Reyes DP, Bryant BJ, et al. Blood transfusion for deep space exploration. *Transfusion*. 2019. doi:10.1111/trf.15493.

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