Intravenous albumin is not associated with improved outcomes in cardiac surgery patients

What is this research about?

Albumin is a human protein purified from the plasma of thousands of blood donors. Since the 1960's, it has been popular for fluid resuscitation in different patient groups, including cardiac surgical patients, who tend to require large volumes of fluid around the time they undergo surgery. Electrolyte solutions called crystalloids, which are not derived from blood, can also be used as part of a fluid management strategy but it is unclear if supplementation of crystalloids with albumin is beneficial in treating blood loss. This research examines whether there are advantages to albumin use in bleeding cardiac surgical patients, a group at high risk for serious complications who often receive blood products.

IN BRIEF: While many cardiac surgical patients receive human albumin solution during their care, supplementation of crystalloids with albumin does not appear to be associated with differences in outcomes compared to patients who received crystalloids and no albumin supplementation.

What did the researchers do?

The researchers conducted a post-hoc analysis of a large randomized controlled trial that was conducted in 11 Canadian hospitals (Effect of Fibrinogen Concentrate vs. Cryoprecipitate on Blood Component Transfusion After Cardiac Surgery or FIBRES trial). In their analysis, they examined the use of albumin supplementation in a high-risk group of patients experiencing significant bleeding after cardiac surgery.

- 735 patients were included in the primary analysis.
- Fluid management and transfusion practices were not altered from the care usually provided at each individual hospital.
- Multivariable statistical models were used to examine the impact of albumin use either in the operating room or in the first 24 hours after surgery on the risk of: (1) all-cause 28-day mortality, (2) acute kidney injury defined as a two-fold rise in serum creatinine or new requirement for dialysis in the 28 days after surgery, and (3) return to the operating room for serious bleeding. The analysis accounted for the impact of patient age, comorbidities, and surgical factors.

What did the researchers find?

Most patients (71%) across the different hospitals received albumin as part of their fluid resuscitation at least once during their surgical stay. However, the proportion of patients receiving at least one dose of albumin ranged from 4.8–97.4% among hospitals. During the first 24 hours of their surgical stay, patients were more likely to get albumin in the operating room or if they were female or already hospitalized before surgery. From 24 hours to 7 days after surgery, patients were more likely to get albumin if they already received albumin earlier, were older, female, had evidence of heart failure before or after surgery, had higher bleeding after surgery, and were admitted to hospital before their surgery. Albumin use during surgery or in the first 24 hours after surgery was found to provide no benefit for a variety of patient outcomes: 28-day all-cause mortality, the risk of kidney injury, risk of reoperation for bleeding, or the length of patient stay in hospital or in the intensive care unit.

How can you use this research?

This research suggests that albumin does not appear to offer any advantage to high-risk patients undergoing cardiac surgery in terms of improved clinical outcomes when used to supplement crystalloid resuscitation. The lack of benefit when comparing albumin and crystalloid fluids has also been seen in many other large studies involving ICU patients. This suggests that health care providers should re-examine their reasons for using albumin in cardiac surgery patients and try not to use it routinely as safe intravenous fluid options which are not blood products are readily available. The authors conclude that a large, definitive randomized controlled trial is warranted to clarify the role of albumin in the cardiac surgical population.

About the research team: This research was led by **Dr. Justyna Bartoszko**, **Dr. Ciara Hanley, Dr. Jeannie Callum** and **Dr. Keyvan Karkouti**. **Dr. Bartoszko** is a cardiac anesthesiologist and clinician investigator at the Toronto General Hospital and the University of Toronto. **Dr. Hanley** was a clinical fellow at the University of Toronto and is now an anesthesiologist at the University Hospital Galway, Ireland. **Dr. Callum** is a transfusion medicine specialist and hematologist at Kingston Health Sciences Centre and lead for the QUEST transfusion research program at the University of Toronto. **Dr. Karkouti** is professor of anesthesiology at the University of Toronto and chief of anesthesiology and pain management at University Health Network, Sinai Health System, and Women's College Hospital

This Research Unit is derived from the following publication: Hanley C, Callum J, McCluskey S, et al.. Albumin use in bleeding cardiac surgical patients and associated patient outcomes. Can J Anaesth. 2021 Oct;68(10):1514-1526. English. doi: 10.1007/s12630-021-02070-7. Epub 2021 Jul 26. PMID: 34312823.

Author: This Research Unit was written by Dr. Justyna Bartoszko.

Acknowledgements: The original FIBRES randomized trial received funding support from Canadian Blood Services (Transfusion Medicine Research Program Support Award), the federal government (Health Canada) and the provincial and territorial ministries of health. The views herein do not necessarily reflect the views of Canadian Blood Services or the federal, provincial or territorial governments of Canada.

Keywords: Albumin, cardiac surgery, resuscitation

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