Editorial

A commentary on the optimal red blood cell transfusion threshold in acute leukemia patients

Akua Asante, Phuong-Lan Nguyen, Neil Blumberg



Pathology and Laboratory Medicine, Blood Bank and Transfusion Medicine, University of Rochester Medical Center, Rochester, NY, United States of America

Byun *et al*. wrote about a prospective pilot randomized trial evaluating ideal red blood cell (RBC) transfusion thresholds in patients with acute myeloid leukemia[1]. RBC transfusion thresholds used in clinical practice for this patient population remain highly variable between institutions. The evidence from several observational studies and randomized control trials shows no significant difference in morbidity and mortality when a more restrictive transfusion threshold of 7 g/dL is used in several clinical scenarios[2-3].

It is important to remember that the concept of a transfusion threshold beyond which transfusion is almost always beneficial is not evidence based. It is an historical expert opinion favoring liberal transfusion. The concept of a transfusion threshold depends on the unproven assumption that red cell transfusion is beneficial to most patients at some measurable laboratory data point. Indeed, for many years, it was feared that allowing severe anemia and withholding transfusion would predispose to cardiovascular adverse events such as myocardial infarction or stroke. To the contrary, observational data suggest that red cell transfusion is more likely to cause such complications than prevent them, presumably through changes in blood viscosity and the pro-inflammatory effects of allogeneic transfusion[4-5].

Patients with leukemia have pancytopenia as a result of their diagnosis and treatment, and therefore will often require RBC and platelet transfusions. Many clinicians opt to transfuse 2 units of RBCs rather than 1 unit of RBCs, despite patient blood management programs highlighting that 1 unit of RBCs can be just as effective as 2 units of RBCs. In this trial, the total number of transfusions required during the study period did not differ significantly among groups randomized to receive 1 unit of RBCs versus 2 units of RBCs. Additionally, clinicians must also consider the bleeding risk associated with anemia and thrombocytopenia[6]. This trial, along with a few other trials, have demonstrated no significant difference in bleeding complications between restrictive and liberal transfusion cohorts[1,6].

Adverse reactions during transfusion of blood product components were carefully monitored and of note, this study reported 14 allergic reactions occurring out of 257 RBC transfusion episodes[1]. It is not immediately clear if this institution uses an ABO identical approach to blood product component administration. For further studies, one might consider transfusing ABO identical blood components which could potentially reduce the rate of allergic reactions as well as significantly decrease the rate of alloimmunization[7].

This study and other pilot trials in leukemia patients have demonstrated similar findings (with the addition of more infectious, thrombotic and bleeding events in the liberal RBC

Correspondence: Akua Asante
e-mail: akua_asante@urmc.rochester.edu

Blood Transfus 2023; 21: 461-462 doi: 10.2450/BloodTransfus.594
© SIMTIPRO Srl

Published under a CC BY-NC-ND license

transfusion group) and shows that a larger randomized control trial evaluating the efficacy of transfusion practices in acute leukemia patients can be done successfully and will be informative[8]. A caveat is that there may be no transfusion threshold where the benefits exceed the risks, in which case, reverting to clinical judgement and conservative practices may prove to be superior to transfusion practices primarily driven by laboratory values such as hemoglobin and hematocrit.

Keywords: red blood cell transfusion threshold, leukemia, restrictive red cell transfusion, complications with red cell transfusion.

The Authors declare no conflicts of interest.

REFERENCES

1. Byun JM, Park W, Shin DY, Koh Y, Kim I, Yoon SS, et al. A pilot randomized study for optimal red cell transfusion in acute myeloid leukemia patients with intensive chemotherapy. Blood Transfus 2023; 21: 479-487. doi: 10.2450/BloodTransfus.482.
2. Lacroix J, Hebert P, Hutchison J, Hume HA, Tucci M, Ducruet T, et al. Transfusion Strategies for Patients in Pediatric Intensive Care Units. N Engl J Med 2007; 356: 1609-1619. doi: 10.1056/NEJMoa066240.
3. Tay J, Allan DS, Chatelain E, Coyle D, Elemary M, Fulford A, et al. Liberal versus restrictive red blood cell transfusion thresholds in hematopoietic cell transplantation: a randomized, open label, phase III, Noninferiority trial. J Clin Oncol 2020; 38: 1463-1473. doi: 10.1200/JCO.19.01836.
4. Yin Z, Yu B, Liu W, Lan K. Blood transfusion and mortality in myocardial infarction: an updated meta-analysis. Oncotarget 2017; 8: 102254-102262. doi: 10.18632/oncotarget.19208.
5. Chatterjee S, Wetterslev J, Sharma A, Lichstein E, Mukherjee D. Association of blood transfusion with increased mortality in myocardial infarction: a meta-analysis and diversity-adjusted study sequential analysis. JAMA Intern Med. 2013; 173: 132-139. doi: 10.1001/2013.jamainternmed.1001.
6. DeZern A, Williams K, Zahurak M, Hand W, Stephens RS, King K, et al. Red blood cell transfusion triggers in acute leukemia: a randomized pilot study. Transfusion 2016; 56: 1750-1757. doi: 10.1111/trf.13658.
7. Henrichs KF, Howk N, Masel DS, Thayer M, Refaai MA, Kirkley SA, et al. Providing ABO-Identical Platelets and Cryoprecipitate to (almost) all patients: approach, logistics, and associated decreases in transfusion reaction and red blood cell alloimmunization incidence. Transfus 2011; 52: 635-640. doi: 10.1111/j.1537-2995.2011.03329.x.
8. Morton S, Sekhar M, Smethurst H, Mora A, Hodge RL, Hudson CL, et al. Do liberal thresholds for red cell trasnfusion result in improved quality of life for patients undergoing intensive chemotherapy for acute myeloid leukemia? A randomized crossover feasibility study. Haematologica 2022; 107: 1474-1478. doi: 10.3324/haematol.2021.279867.

© SIMTIPRO Srl