Single *versus* double-unit transfusion policy in hematology

We have read with great interest the article by Berger *et al.* entitled "Significant reduction of red blood cell transfusion requirements by changing from a double-unit to a single-unit transfusion policy in patients receiving intensive chemotherapy or stem cell transplantation".[1] We consider the work extremely stimulating, dealing with a subject that has barely been addressed: the possibility that a clinical intervention (other than the well-validated use of erythropoiesis-stimulating-agents[2,3]) can reduce transfusion need and, therefore, improve access to blood transfusion, in addition to strategies directed toward increasing blood product availability (e.g. increase in donor recruitment). However, we would like to provide what in our opinion are some interesting observations. Some of these are related to this study while others discuss the possibility of transferring the single-unit transfusion policy to chronically ill patients, especially in home care outpatient management.

Firstly, when compared with a conventional double-unit policy, the reduction in transfusion requirement with a single-unit transfusion policy should, in our opinion, be related to lowering the trigger hemoglobin (Hb), as reported by the authors.[1] When the time available to satisfy transfusion need is limited (as in surgery or chemotherapy-induced toxicity), changes in trigger Hb may effectively modify transfusion requirement which increases the shorter the duration of anemia.[4,5] Indeed, the authors state that the pre-transfusion Hb levels and those on discharge of single-unit patients were lower than those of double-unit patients. However, given that the authors have not adopted precise criteria for clinical anemia-related symptom assessment (such as a numerical rating scale measurement), it is not clear whether the lowering of trigger Hb was actually due to lower Hb fluctuations and better patient tolerance, as the authors suggest, or rather to a different approach on the part of the physician. In this sense, it would be detrimental to analyze the first transfusion trigger Hb value separately, since this would not be influenced by a difference in patient tolerance.

Secondly, the authors have not reported how day-to-day Hb levels varied. However, it is likely that Hb curves in the single-unit group were significantly lower (provided that trigger values are lower and post-transfusion increments halved) and, therefore, patients should have experienced much greater fatigue with an impact on related quality of life,[2,3] also considering the speed of the onset of anemia after chemotherapy.

Thirdly, the reduction in transfusion requirement, which is obtained in patients on active treatment (when there is little time available in which to transfuse), can not be transferred to chronically transfused patients who so far represent the bulk of transfusion-dependent patients with hematologic disease. In fact, while lowering the threshold effectively reduces red blood cell transfusions when anemia is temporary, this would not be observed when the time to transfusion is extended, as in chronic patients.

Lastly, to allow a precise comparison to be made between different policies, several different factors should be included in the cost assessment,[6] many of which, as is to be expected with a single-unit transfusion policy, increase along with transfusion events (*i.e.* blood tests, completing request procedures, submission and registration, venous access packaging, unit transport). Furthermore, in an outpatient setting, the additional weight of unit-to-patient (home care) or patient-to-center (day hospital) transport, medical staff and caregiver employment should be added for each transfusion event, so that a single-unit policy would result in a marked increase in cost and make transfusion management more complex, much more so than in hospitalized patients. This would limit patient access to transfusion.

In conclusion, we hope that the findings of Berger *et al.*, with perhaps some clarification, can be confirmed, and that evidence of an advantage in a single-unit policy could be strengthened sufficiently to modify blood transfusion policy recommendations in active treatment patients. This would result in a saving in the number of blood units used, as demonstrated. Meanwhile, other relevant topics (e.g. factors affecting transfusion requirements[7]) need to be explored and other clinical interventions identified, so that transfusion load can be reduced, even in chronic patients.

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References

1. Berger MD, Gerber B, Arn K, Senn O, Schanz U, Stussi G. Significant reduction of red blood cell transfusion requirements by changing from a double-unit to a single-unit transfusion policy in patients receiving intensive chemotherapy or stem cell transplantation. Haematologica. 2012;97(1):116-22.
2. Ross SD, Allen IE, Henry DH, Seaman C, Sercus B, Goodnough LT. Clinical benefits and risks associated with epoetin and darbepoetin in patients with chemotherapy-induced anemia: a systematic review of the literature. Clin Ther. 2006;28(6):801-31.
3. Wilson J, Yao GL, Raftery J, Bohlius J, Brunskill S, Sandercock J, et al. A systematic review and economic evaluation of epoetin alpha, epoetin beta and darbepoetin alpha in anaemia associated with cancer, especially that attributable to cancer treatment. Health Technol Assess. 2007;11(13):1-202, iii-iv.
4. Bracey AW, Radovancevic R, Riggs SA, Houston S, Cozart H, Vaughn WK, et al. Lowering the hemoglobin threshold for transfusion in coronary artery bypass procedures: effect on patient outcome. Transfusion. 1999;39(10):1070-7.
5. Jansen AJ, Caliouw MAA, Hop WCJ, van Rehenen DJ, Schipperus MR. Feasibility of a restrictive red-cell transfusion policy for patients treated with intensive chemotherapy for acute myeloid leukaemia. Transfus Med. 2004;14(1):33-8.
6. Shander A, Hofmann A, Ozawa S, Theusinger OM, Gombotz H, Spahn DR. Activity-based costs of blood transfusions in surgical patients at four hospitals. Transfusion. 2010;50(4):753-65.
7. Favre G, Fopp M, Gmür J, Tichelli A, Fey MF, Tobler A, et al. Factors associated with transfusion requirements during treatment for acute myelogenous leukemia. Ann Hematol. 1993;67(4):153-60.