TRANSFUSION MEDICINE
Official Journal of the British Blood Transfusion Society
British Blood Transfusion Society
Transfusion Medicine | EDITORIAL

Expanding access to *Transfusion Medicine* and improving practice: guidelines, patient blood management, protocols and products

D. J. Roberts
National Health Service Blood and Transplant, University of Oxford, John Radcliffe Hospital, Oxford, UK

We live in an era of increasing open access to academic journals, and many major funders now insist on open access to published work arising from charitable or publicly funded work (RCUK, 2017; Wellcome Trust, 2017). Articles can be made immediately open access with freedom to distribute the final, accepted and published version of a paper usually on payment of a publication charge (also known as 'gold access') (Elsevier, 2017; Wiley, 2017a). Alternatively, most journals will allow the author to archive the submitted version of the paper on personal websites and share the accepted version with colleagues and personal research groups immediately, with archival of the accepted version of the paper on personal or institutional websites after a 12-month embargo, sometimes known as 'green' access (for example of detailed guidance, see Wiley, 2017b).

However, many other papers, reviews and opinion pieces will not qualify or require immediate open access, and the majority of articles in *Transfusion Medicine* fall into this category. We already have more than 100 000 downloads of our articles each year, a remarkable figure. To enhance access to recent work published in *Transfusion Medicine,* we are making sets of topical papers freely available to download in a series of virtual issues. Articles will be available for 3 months and will be free to download for personal use during this time. For our first virtual issue, we have grouped articles into themes covering several areas of practice and will release two virtual issues a year. The articles for the first virtual issue cover guidelines, patient blood management, donors and blood supply and products.

In clinical transfusion practice, no papers are read and downloaded more than guidelines, and last year, we published guidelines on the use of apheresis procedures the for treatment and collection of products (Cho & Douglas, 2015; Howell *et al.,* 2015) and blood grouping and testing for red cell antibodies in pregnancy that lie at the heart of transfusion laboratory (White *et al.,* 2016). Such guidelines are essential for everyday practice. However, the overall strategy of clinical transfusion medicine continues to be shaped by patient blood management and ably summarised by the Choosing Wisely Campaign (Murphy, 2015). Protocols of PBM require not just the application of general principles but also protocols for specific areas of practice that help, for example, the application of a pre-transfusion checklist to reduce transfusion (van Gammeren *et al.,* 2016); protocols for specific areas of the hospital, such as the intensive care unit (Borgert *et al.,* 2016); scenarios such as gastrointestinal haemorrhage (Jairath & Desborough, 2015); trauma (Horst *et al.,* 2016); and use of tranexamic acid or blood conservations in an increasing number of surgical settings (Wei & Liu, 2015; Sargant *et al.,* 2016). However, there is still no consensus about a definitive place for the different forms of near-patient tests for assessment of acute trauma (George *et al.,* 2017).

The broad guidelines of transfusion triggers have greatly simplified transfusion guidelines and clinical decision-making. However, it is likely that a more personalised approach could yield both greater benefits and less potential for harm, for example, measuring physiological parameters such as muscle oxygenations may help guide appropriate interventions and transfusion (Schenkman *et al.,* 2017).

Replacement of iron by intravenous infusion has become increasingly popular in the management of iron deficiency before or after operations. The modern preparations of parenteral iron cause fewer allergic or anaphylactic reactions than older iron-dextran preparations. However, iron infusions have long been known to cause pro-inflammatory responses or exacerbation of immune disorders (Roberts & Davies, 1987), and iron infusions were reported to exacerbate myasthenia gravis (Mkhikian & Tran, 2016).

Ensuring the quality of red blood cells when new procedures are introduced, such as prion reduction filters and pathogen reduction, are essential to maintain and improve the quality of existing products (Wiltshire *et al.,* 2016). A wide variety of changes is observed in stored red blood cells, including haemolysis and exposure of phosphatidylethanolamine and phosphatidylserine (Larson *et al.,* 2017).

Several trials examining the effect of the duration of storage of red cells on clinical outcomes have not shown that increased storage time has an adverse effect of clinical outcomes

Correspondence: David J. Roberts, National Health Service Blood and Transplant, University of Oxford, John Radcliffe Hospital, Oxford OX3 9BQ, UK.
Tel.: +44 1865 387913
e-mail: david.roberts@ndcls.ox.ac.uk

doi: 10.1111/tme.12484

(Chin-Yee *et al.,* 2015; Triulzi, 2015). In terms of clinical transfusion practice, one question with potentially significant consequences for product supply is whether whole blood may be beneficial for transfusion in acute trauma (Bahr *et al.,* 2016). More attention has been focused on the clinical practice surrounding platelet transfusion (Kaufman, 2016; Sekhar *et al.,* 2016) or other blood products such as IvIG (Shih *et al.,* 2017), sourcing whole blood-derived platelets (Seheult *et al.,* 2016) and storage and handling of platelets (Thomas, 2016; van der Meer, 2016).

In the setting of haematopoietic stem cell transplantation (HSCT), further evidence of the safety of leucodepleted CMV-unselected transplants continues to accumulate (Hall *et al.,* 2015). However, the passive transfer of CMV antibodies from a CMV-positive donor to a recipient who has never been infected with CMV may give rise to false-positive CMV antibody tests in the recipient, which could cause selection of inappropriate blood products (Morton *et al.,* 2015). There is a continuing search for adjunctive therapy that may improve the outcome of HSCT. The thrombopoietin mimetic Eltrombopag has been used to enhance graft function and stimulate platelet production after allogeneic HSCT (Dyba *et al.,* 2016).

Products and PBM dominate the daily life of transfusion specialists, but the complexity of basic cell biology has been expanded by several articles, including a review of the BBTS Special Interest Group for Red Cells and a review of Tim Satchwell of recent findings of novel red cell blood group antigen receptors for the malaria parasite *Plasmodium falciparum* (Satchwell, 2016). Understanding fundamental mechanisms may translate into new approaches to prevent and treat malaria.

Human error remains the major cause of morbidity and mortality associated with transfusion of blood products (Bolton-Maggs, 2016). Training in the principles of transfusion medicine is essential to maintain and improve clinical practice (Morris *et al.,* 2016). Targeted interventions are also effective to improve safety. Both administrative and clinical errors can be reduced by adhering to checklist protocols (Tseng *et al.,* 2016).

Demand for whole blood has gone down recently, although data reporting transfusion rates is often subject to systematic errors (Howard *et al.,* 2016). However, there has been a well-described increase in the proportion of O-negative units requested and used. New options to increase the supply of blood from donors with specific blood types are likely to be of increased relevance in the next decades (Beckman *et al.,* 2016). Blood donation could be an opportunity for public health interventions and education of donors (Hao *et al.,* 2016).

In compiling this list of articles for our virtual issue of *Transfusion Medicine*, it is apparent that many editorials, commentaries and articles have outlined the process from experiments or observation through clinical studies to guidelines. This sequence of gathering, evaluating and implementing evidence-based practice will propel improvements in practice in the years ahead. The abstracts of work recently presented at the BBTS annual conference held in Glasgow in September 2017 are now freely available online either via the BBTS website (https://www.bbts.org.uk) for BBTS members or in ***Transfusion Medicine*** (http://onlinelibrary.wiley.com/doi/10.1111/tme.2017.27.issue-S2/issuetoc). In the future, we will also be commenting and reporting on trials and studies that change practice across transfusion medicine.

ACKNOWLEDGMENTS

I thank Claire Dowbekin, Senior Journals Publishing Manager at Wiley; Marie Davie, our Editorial Assistant; and Janelle Eusebio, our Production Editor, for facilitating the compilation of the virtual and printed journals and Wendy Slack for continuous secretarial support.

REFERENCES

Bahr, M.P., Yazer, M.H., Triulzi, D.J. & Collins, R.A. (2016) Whole blood for the acutely haemorrhaging civilian trauma patient: a novel idea or rediscovery? *Transfusion Medicine*, **26**, 406–414.

Beckman, N., Yazer, M., Land, K., Chesneau, S. & Caulfield, J. (2016) Blood banks meet the paradox of Gabriel's horn: what are the options to maintain supply as demand decreases? *Transfusion Medicine*, **26**, 170–176.

Bolton-Maggs, P.H. (2016) SHOT conference report 2016: serious hazards of transfusion – human factors continue to cause most transfusion-related incidents. *Transfusion Medicine*, **26**, 401–405.

Borgert, M., Binnekade, J., Paulus, F., Vroom, M., Vlaar, A., Goossens, A. & Dongelmans, D. (2016) Implementation of a transfusion bundle reduces inappropriate red blood cell transfusions in intensive care – a before and after study. *Transfusion Medicine*, **26**, 432–439.

Chin-Yee, I.H., Chin-Yee, B.H. & Pereira, A. (2015) Clinical trials and the age of blood: ABLE but still wanting. *Transfusion Medicine*, **25**, 349–350.

Cho, G. & Douglas, K. (2015) BCSH guideline on the clinical use of apheresis procedures: new changes and future directions. *Transfusion Medicine*, **25**, 55–56.

Dyba, J., Tinmouth, A., Bredeson, C., Matthews, J. & Allan, D.S. (2016) Eltrombopag after allogeneic haematopoietic cell transplantation in a case of poor graft function and systematic review of the literature. *Transfusion Medicine*, **26**, 202–207.

Elsevier. (2017) *Open Access Policy*. URL https://www.elsevier.com/about/open-science/open-access (Accessed 9/10/17).

van, Gammeren, A.J., Haneveer, M.M. & Slappendel, R. (2016) Reduction of red blood cell transfusions by implementation of a concise pretransfusion checklist. *Transfusion Medicine*, **26**, 99–103.

George, M.J., Burchfield, J., MacFarlane, B., Wang, Y.-W.W., Cardenas, J.C., White, N.J., Gill, B.S. & Wade, C.E. (2017) Multiplate and TEG platelet mapping in a population of severely injured trauma patients. *Transfusion Medicine*. https://doi.org/10.1111/tme.12473

Hall, S., Danby, R., Osman, H., Peniket, A., Rocha, V., Craddock, C., Murphy, M. & Chaganti, S. (2015) Transfusion in CMV seronegative T-depleted allogeneic stem cell transplant recipients with CMV-unselected blood components results in zero CMV transmissions in the era of universal leukocyte reduction: a U.K. dual centre

experience. *Transfusion Medicine*, **25**, 418–423.

Hao, J., McAvoy, J., Wickberg, L. *et al.* (2016) Is blood donation an opportunity for hypertension awareness? *Transfusion Medicine*, **26**, 89–98.

Horst, J., Leonard, J.C., Vogel, A., Jacobs, R. & Spinella, P.C. (2016) A survey of US and Canadian hospitals' paediatric massive transfusion protocol policies. *Transfusion Medicine*, **26**, 49–56.

Howard, D.H., Karcz, A. & Roback, J.D. (2016) The accuracy of claims data for measuring transfusion rates. *Transfusion Medicine*, **26**, 457–459.

Howell, C., Douglas, K., Cho, G., El-Ghariani, K., Taylor, P., Potok, D., Rintala, T. & Watkins, S. (2015) Guideline on the clinical use of apheresis procedures for the treatment of patients and collection of cellular therapy products – British Committee for Standards in Haematology. *Transfusion Medicine*, **25**, 57–78.

Jairath, V. & Desborough, M.J. (2015) Modern-day management of upper gastrointestinal haemorrhage. *Transfusion Medicine*, **25**, 351–357.

Kaufman, R.M. (2016) Platelet transfusions: where do we go from here? Platelet transfusions: where do we go from here? *Transfusion Medicine*, **26**, 5–7.

Larson, M.C., Karafin, M.S., Hillery, C.A. & Hogg, N. (2017) Phosphatidylethanolamine is progressively exposed in RBCs during storage. *Transfusion Medicine*, **27**, 136–141.

van der, Meer, P.F. (2016) PAS or plasma for storage of platelets? A concise review. *Transfusion Medicine*, **26**, 339–342.

Mkhikian, H. & Tran, M.-H. (2016) Exacerbation of myasthenia symptoms following intravenous iron administration. *Transfusion Medicine*, **26**, 81–382.

Morris, S., Yudin, M.H., Callum, J., Alam, A., Herold, J. & Lin, Y. (2016) Obstetrical transfusion medicine knowledge among faculty and trainee obstetricians: a prospective knowledge assessment study. *Transfusion Medicine*, **26**, 440–447.

Morton, S., Danby, R., Rocha, V., Peniket, A. & Murphy, M. (2015) Transfusion of CMV-unselected blood components may lead to inappropriate donor selection for patients subsequently undergoing allogeneic stem cell transplant. *Transfusion Medicine*, **25**, 411–413.

Murphy, M.F. (2015) The choosing wisely campaign to reduce harmful medical overuse: its close association with patient blood management initiatives. *Transfusion Medicine*, **25**, 2872–2892.

RCUK (Research Councils UK). (2017) *Open Access Policy*. URL http://www.rcuk.ac.uk/research/openaccess/ (Accessed 9/10/17).

Roberts, D.J. & Davies, J.M. (1987) Exacerbation of rheumatoid synovitis by iron-dextran infusion. *Lancet*, **1**, 391.

Sargant, N., Roy, A., Simpson, S. *et al.* (2016) A protocol for management of blood loss in surgical treatment of peritoneal malignancy by cytoreductive surgery and hyperthermic intraperitoneal chemotherapy. *Transfusion Medicine*, **26**, 118–122.

Satchwell, T.J. (2016) Erythrocyte invasion receptors for plasmodium falciparum: new and old. *Transfusion Medicine*, **26**, 77–88.

Schenkman, K.A., Hawkins, D.S., Ciesielski, W.A., Delaney, M. & Arakaki, L.S.L. (2017) Non-invasive assessment of muscle oxygenation may aid in optimising transfusion threshold decisions in ambulatory paediatric patients. *Transfusion Medicine*, **27**, 25–29.

Seheult, J.N., Triulzi, D.J. & Yazer, M.H. (2016) I am the 9%: making the case for whole-blood platelets. *Transfusion Medicine*, **26**, 177–185.

Seheult, J.N., Triulzi, D.J., Alarcon, L.H., Sperry, J.L., Murdock, A. & Yazer, M.H. (2017) Measurement of haemolysis markers following transfusion of uncrossmatched, low-titre, group O+ whole blood in civilian trauma patients: initial experience at a level 1 trauma centre. *Transfusion Medicine*, **27**, 30–35.

Sekhar, M., Clark, S., Atugonza, R., Li, A. & Chaudhry, Z. (2016) Effective implementation of a patient blood management programme for platelets. *Transfusion Medicine*, **26**, 422–431.

Shih, A.W., Jamula, E., Diep, C. *et al.* (2017) Audit of provincial IVIG request forms and efficacy documentation in four Ontario tertiary care centres. *Transfusion Medicine*, **27**, 122–131.

Thomas, S. (2016) Platelets: handle with care. *Transfusion Medicine*, **26**, 330–338.

Triulzi, D.J. (2015) A trial is a trial is a trial: the need for an evidence-based clinical approach for evaluation of stored red cell. *Transfusion Medicine*, **25**, 293–294.

Tseng, E., Spradbrow, J., Cao, X., Callum, J. & Lin, Y. (2016) An order set and checklist improve physician transfusion-ordering practices to mitigate the risk of transfusion-associated circulatory overload. *Transfusion Medicine*, **26**, 104–110.

Wei, Z. & Liu, M. (2015) The effectiveness and safety of tranexamic acid in total hip or knee arthroplasty: a meta-analysis of 2720 cases. *Transfusion Medicine*, **25**, 151–162.

Wellcome Trust. (2017) *Open Access Policy*. URL https://wellcome.ac.uk/funding/managing-grant/open-access-policy (Accessed 9/10/17).

White, J., Qureshi, H., Massey, E., Needs, M., Byrne, G., Daniels, G. & Allard, S. (2016) British Committee for Standards in Haematology. Guideline for blood grouping and red cell antibody testing in pregnancy. *Transfusion Medicine*, **26**, 246–263.

Wiley. (2017a) *Open Access Policy*. URL https://authorservices.wiley.com/author-resources/Journal-Authors/licensing-open-access/open-access/index.html (Accessed 9/10/17).

Wiley. (2017b) *Article Sharing Policy*. URL http://olabout.wiley.com/WileyCDA/Section/id-826716.html (Accessed 11/10/17).

Wiltshire, M., Meli, A., Schott, M.A., Erickson, A., Mufti, N., Thomas, S. & Cardigan, R. (2016) Quality of red cells after combination of prion reduction and treatment with the intercept system for pathogen inactivation. *Transfusion Medicine*, **26**, 208–214.