

## Beyond Blood Safety

Diana Teo,<sup>1</sup> MBBS, MSc (Lond), FRCPath (UK)

World Blood Donor Day takes place on 14 June each year. Established in 2005 by the World Health Assembly, it aims to raise global awareness of the need for safe blood and blood products for transfusion and of the critical contribution made by voluntary unpaid blood donors to national health systems.<sup>1</sup> The focus for World Blood Donor Day 2010 will be on young donors – our “New Blood for the World”.

14 June happens to be the birthday of Karl Landsteiner, whose observation in 1900 that sera of some individuals agglutinated the red cells of others led to the identification of the blood groups A, B and C (later renamed group O). The discovery of the ABO and other blood group systems enabled blood to be safely transfused without fatal haemolytic transfusion reactions caused by the infusion of incompatible blood. Thus began the first steps towards transfusion safety.

Fears of disease transmission have dominated transfusion safety worldwide. The first description of post-transfusion hepatitis by Beeson in 1943 was followed by decades of exhaustive efforts by blood banks and transfusion physicians to make blood as safe as practically possible. The outbreak of AIDS in the 1980s accentuated public demand for a zero-risk blood supply and this, combined with political pressure and liability concerns, would lead to blood safety decisions based on avoidance of all possible risks and religious adherence to the precautionary principle.

The blood supply today is protected by multiple layers of safety from donor selection to blood testing. Increasingly sensitive serological and nucleic acid tests for HIV, HBV and HCV have been introduced, enabling a dramatic reduction in the transmission of these viruses through blood transfusion. Transfusion-associated sepsis from bacterial contamination of blood products remains the main infective risk associated with blood transfusion in developed countries, but has decreased in frequency following the implementation of bacteriological testing of platelets. The greatest infectious threat today comes from emerging agents of zoonotic origin, such as human variant Creutzfeldt-Jakob disease, dengue viruses and Babesia,<sup>2</sup> and the threat of a completely new pathogen – the “next new virus”.

Pathogen reduction (PR) systems should add another layer of safety, by complementing existing tests and reducing the

risk of new or poorly understood infectious diseases that may be transmitted by transfusion. Although several PR systems for plasma and platelets are licensed for clinical use in Europe, widespread implementation has been hampered by the inability to handle high viral load, insufficient kill of some non-enveloped agents and bacterial spores, lack of data concerning potential long-term toxicity, decreased product yield, anticipated high cost, and lack of a system that can be applied to all blood products.<sup>3</sup> It is likely that wider use will occur once PR systems for red cells or whole blood become available.

The reduction in infectious risks associated with blood transfusion does not come without significant cost. Any incremental benefit gained becomes successively smaller with each additional layer of safety, and it should come as no surprise that the cost of blood has steadily increased internationally. In Singapore, the cost of collecting, processing and distributing one unit of whole blood now approximates S\$200. Collecting sufficient safe blood has also become more difficult. With increasingly stringent criteria being introduced to select “safe” donors, more donors are excluded from donating and giving blood becomes harder. As has been observed, “in an age of increasing stringent exclusion criteria stemming from fears about blood safety, blood is a rare type of gift in that it is one that may routinely be refused”.<sup>4</sup>

Blood safety is at a high level in the developed world, and at a high cost. But transfusion safety is not just about blood safety. Non-infectious risks such as transfusion-related acute lung injury (TRALI) and ABO-mismatched transfusions are now the leading causes of transfusion-related morbidity and mortality in developed countries. Future efforts will need to concentrate on areas beyond blood safety: pre-transfusion testing, medical decision to transfuse, administration of the blood, and monitoring and evaluation of the patient.

Why do we pay so much attention to making blood safe, and yet put such little effort into transfusing it safely? ABO-mismatched transfusions continue to occur with unfortunate regularity. Most of them occur as a result of erroneous collection of pre-transfusion blood specimens and the transfusion of wrong units. Various administrative systems involving physical barriers, identification wrist bands, bar

<sup>1</sup> Blood Services Group, Health Sciences Authority, Singapore

Address for Correspondence: Dr Diana Teo, Blood Services Group, Health Sciences Authority, 11 Outram Road, Singapore 169078.

Email: diana\_teo@hsa.gov.sg

codes, and point-of-transfusion devices are now available to supplement proper patient identification procedures, and yet few hospitals have adopted them.

The medical decision to transfuse is critical in providing patients with the best possible transfusion outcomes. In a recent review of blood transfusion-related mortality, the avoidance of unnecessary transfusion through enforcement of evidence-based transfusion guidelines was identified as the only strategy that could reduce the risk of all currently established blood transfusion related complications.<sup>5</sup> Evidence-based guidelines for transfusing blood components have been regularly published by various professional bodies, but have yet to be universally practised. Hopefully, the introduction of evidence-based national clinical guidelines later this year will help to guide transfusion decisions.

Despite the best efforts to ensure maximum blood safety, blood transfusion will continue to involve a minimum irreducible risk. The benefits and risks of every blood transfusion must always be carefully considered before the decision to transfuse, and clearly communicated to the patient to allow an informed consent to be made. Informed consent processes and practices vary widely, and perhaps

the time has come for standardised documented informed consent to become a required standard of practice across all hospitals.

World Blood Donor Day celebrates the millions of blood donors worldwide who voluntarily donate the Gift of Life in response to the increasing need for blood. Last year, 62,116 blood donors came forward to meet our nation's needs. They expect no less from the medical community that this gift be used wisely and well.

#### REFERENCES

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