Umbilical cord blood transfusions in low-income countries

Since 1988, umbilical cord blood has been used as a valuable source of haemopoietic stem cells for allogeneic transplantation.[1] A global network of cord blood banks has been established, with a common inventory of around 600 000 units cryopreserved and stored and about 30 000 units distributed worldwide to treat children and adults with severe malignant and non-malignant haematological diseases. Because of lymphocyte immaturity at birth, HLA mismatches between donor and recipient can be tolerated with use of umbilical cord blood; therefore, cord blood expands the donor pool, including to people from some ethnic groups that are under-represented in donor registries. The absence of ethical issues surrounding umbilical cord blood, and its abundant supply, accounts for the increasing interest in use of cord blood for stem-cell treatments.

Umbilical cord blood has a rich mix of fetal and adult haemoglobin and plasma filled with cytokines and growth factors, making it a potentially efficient and safe alternative to conventional blood transfusion for management of anaemia in urgent situations. Cord blood could be especially beneficial in countries with high rates of morbidity and mortality from haemoglobinopathies, a group of diseases in which blood enriched with fetal haemoglobin, with its high oxygen-carrying capacity, might be superior to adult blood.

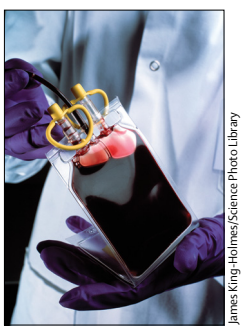
The possibility of using of umbilical cord blood as an alternative source of red blood cells for transfusion is especially important in low-income countries, where health resources are limited and blood supply does not meet the needs of the population. The prevalence of HIV/AIDS, malaria, and other infectious diseases in Africa is high, but efforts are growing to increase access to safe and effective blood transfusion. Implementation of such programmes to meet uniform standards and improve quality and safety, with appropriate infrastructure and effective donor education and recruitment, is costly and dependent on political will, support, and commitment from health authorities and appropriately trained and skilled staff.

In *The Lancet Haematology*, Oliver Hassall and colleagues describe a prospective clinical trial set in Kenya,[2] in which red blood cells from umbilical cord blood were used for transfusions in children with severe anaemia. Cord blood donations were screened for transfusion-transmitted infections and bacterial contamination. Red blood cells were recovered by sedimentation during refrigerated storage. Hassall and colleagues monitored adverse events and measured haemoglobin levels 24 h and 28 days after transfusion. Overall, the concentration of haemoglobin increased from pretransfusion levels, by a median of 26 g/L (IQR 21–31) 24 h after transfusion, and by 50 g/L (10–68) around 28 days after transfusion, with only a few severe adverse effects recorded, indicating the safety and efficacy of this innovative approach.

Use of red blood cells from umbilical cord blood has been reported previously.[3,4] Furthermore, in a study from India, more than 1000 cord blood transfusions were done in children and adults for various indications, in an apparently safe and efficient manner.[5] Although promising, further work needs to be done to ensure criteria for quality of blood transfusions in developed countries are fulfilled in developing regions.

Rules for collection and use of cord blood must follow standards developed by the Foundation for the Accreditation of Cellular Therapy (FACT) and the International NetCord Foundation with respect to informed consent, criteria for inclusion and exclusion, processing, screening of the mother and cord blood for infectious diseases, traceability, transportation, and recording of adverse events. Criteria for donor inclusion and exclusion is a concern in countries of low income, where prematurity, malnutrition, low birthweight, and anaemia are frequent. Furthermore, prolonged debate has taken place regarding the safety and development of the donor baby on early versus late clamping of the umbilical cord when the blood is collected; findings of a randomised study showed that delayed clamping did not affect iron status or neurodevelopment at age 12 months in a selected population of healthy infants born at term.[6] However, this clamping study was done in a developed country with good health facilities; therefore, validation of findings would be advisable in less-developed countries that plan to establish a cord blood collection programme.

Although parasitic and viral contamination of cord blood is theoretically diminished because of the



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mother–placental blood barrier, the same strict exclusion criteria for blood donors should be applied to cord blood donations, and infectious disease transmission is still a concern. In the study by Hassall and colleagues, the number of transfusion-related bacterial infections was low, not only because of rigorous selection and testing of donors but also because fieldworkers were trained to aseptic collection and handling of umbilical cord blood. However, maintaining the same strict standards outside of the research setting is challenging and demands supplementary resources. This procedure is especially difficult in places with few health-care personnel and a high work burden.

Additional studies are needed before the generalised use of cord blood for transfusion can be implemented. However, these early results are very promising for decreasing morbidity and mortality in Kenya and other less-developed countries.

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I declare no competing interests.

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