What are the appropriate triggers for red cell transfusion?

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To transfuse or not to transfuse when the haemoglobin (Hb) level falls – this is a hotly debated subject at present for a number of reasons. There are serious risks associated with blood transfusion (Williamson et al, 1999) including acute haemolytic reactions, immunomodulation, infections and possibly new variant Creutzfeldt–Jakob disease (vCJD). The National Blood Transfusion service expects that the introduction of a test for vCJD-contaminated blood (currently being developed) will reduce the availability of blood and is anticipating serious shortage. The cost of blood, which is already around £100 per unit, is expected to rise.

The Department of Health have set out a programme of action for the NHS that includes setting up a hospital transfusion team, improving the safety of the blood transfusion process, avoiding unnecessary use of blood in clinical practice and providing better information to patients and the public about blood transfusion and alternatives.

Surgical patients receive more than half of the transfused allogeneic blood in the UK ($>10^6$ units, National Blood Service Internal Audit). Anaesthetists are involved in the prescription and administration of much of this blood. In situations associated with massive blood loss, transfusion of blood is life saving. However, in the majority of patients having surgery, reducing unnecessary exposure to blood components is important and requires attention to detail and planning during all the three phases of patient care. In the preoperative phase pre-existing anaemia must be diagnosed and treated, drugs that may increase bleeding (e.g. antiplatelet drugs) should be rationalized and the use of autologous blood pre-deposition or erythropoietin should be considered.

Intraoperatively it is important to carefully assess individual transfusion requirements, and to consider the feasibility of acute normovolaemic haemodilution or intra- and postoperative cell salvage. Anaesthetic and surgical techniques to reduce bleeding should also be considered (e.g. tourniquet, antifibrinolytics). Postoperatively regular monitoring of Hb level, small volume transfusions (1 unit) to exceed transfusion trigger only, prolonged postoperative oxygen therapy (72 hours) and the use of antifibrinolysis, erythropoietin, desmopressin and artificial Hb solutions may all have a role in minimizing blood transfusions.

Clinical experience suggests that blood loss of up to 30% can be treated with crystalloid or colloid solutions alone. There are several studies suggesting that the optimum Hb level is around 8 g/dl. A large retrospective observational study showed no increase in mortality when the Hb concentration was kept above 8 g/dl, even in an elderly population (Carson et al, 1998).

In a large randomized controlled trial of intensive care patients, there was no detriment in restricting transfusion at Hb concentrations of 7–9 g/dl compared to a more liberal transfusion policy (Hebert et al, 1999). In fact the liberal transfusion group appeared to have a worse outcome. However, there were a number of significant patient groups excluded from this study including those known to have or be at high risk of having ischaemic cardiac disease. In young healthy volunteers undergoing isovolaemic haemodilution Hb concentrations can fall to <5 g/dl without any obvious adverse effects (Coursin and Monk, 2001). The risks are greater with compromised coronary blood flow, and these patients appear to need an Hb value of at least 6–7 g/dl. The Association of Anaesthetists of Great Britain and Ireland (2001) has published guidelines recommending transfusion when the Hb falls below 7 g/dl or when patients become symptomatic from a low Hb (i.e. shortness of breath, angina or poor exercise tolerance).

Minimizing use of transfused blood requires effective teamwork between anaesthetists, surgeons and haematologists (hospital transfusion practitioners), use of local approved protocols based on national guidelines for the appropriate use of blood, and regular audit and monitoring of transfusion practice. An appropriate transfusion trigger is a key component of this package and in the absence of symptomatic anaemia or risk factors for ischaemic cardiac disease an Hb of 7 g/dl is now the recommended level at which to transfuse. HM

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