

## LESS BLOOD IS MORE

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There have been a significant number of papers published in the last two years questioning the benefits of liberal transfusion of red cells and coagulation products, but also indicating the place for a more systematic approach to their use. This talk will cover some of the more significant ones.

### Massive Haemorrhage

Despite widespread adoption of Massive Transfusion Protocols, there has been no randomised controlled trial proving their benefit. More importantly the "mixture" within them has not been validated. Holcomb et al reported a prospective study in 10 major trauma centres in the USA. They recruited patients who received greater than three units of red cells with major trauma and showed a 3-4 times reduction in 24 hour mortality. Further subgroup analysis confirmed the validity of a score to predict the benefit of initiating an MTP, using HR > 120/min, systolic BP < 90mmHg, positive FAST, BE < -6 and INR > 1.5. While the survivorship of initiating an MTP with a ratio of plasma to red cells greater than 1:2 is confirmed, the exact constituents of the mixture are still controversial. European trauma units, without access to FFP or cryoprecipitate have developed alternate MTPs using fibrinogen and prothrombin complex concentrates (Prothrombinex). They suggest better maintenance of fibrinogen, less bleeding, less need for platelets and improved survival compared to "conventional FFP based" MTPs. Generally the critical aspect seems to be the ability to maintain a fibrinogen above 2g/L through bleeding. For Australasian anaesthetists this means using more cryoprecipitate. Updated MTPs reflect this.

Following on from the CRASH-2 study, tranexamic acid use has increased in critical bleeding. Subgroup analysis of the trial indicates that the benefits of a 1g bolus are lost if the drug is given more than three hours after injury. There is a drive to give it early in trauma bleeding, and a study is commencing for its use in prehospital care. A parallel study is currently recruiting in obstetric bleeding.

A study by Morrison in combat casualties in Afghanistan used tranexamic acid with a massive protocol guided by ROTEM. It confirmed a greater likelihood of a patient being non-coagulopathic at the conclusion of surgery, but a slightly increased risk of thrombotic complications. This counters the negative finding of risk in the CRASH-2 study. It is important to consider this, and introduce postop DVT prophylaxis in trauma patients after bleeding has ceased. Overall however, it showed a reduced mortality in massive haemorrhage by using TXA.

### Limiting Red Cell Use

Many Western countries have seen a reduction in red cell use over the last five years. New Zealand and Australia are experiencing a sharp decline. In New Zealand a 9.2% reduction of sales occurred from NZBS since 2010, and the reduction shows no signs of stopping.

It is uncertain what the cause of this is, but effective blood management programs, a move to less open and more minimally invasive surgical procedures, more rational management of bleeding, and the use of medicines instead of red cells are certainly a major factor in the reduced demand.

Patients bleeding from gastrointestinal haemorrhage were studied by Callcut who showed a restrictive policy of transfusion improved outcome in patients, with a mortality of 9% at 45 days if transfusion was commenced at a Hb < 90g/L vs a mortality of 5% if the Hb was allowed to drop to 70g/L before transfusion. It follows recent analyses of the NQIP surgical database indicating Hb should be supported with a haematocrit of 0.28 if bleeding more than 1,500ml in the case, but 0.24 if there is less than 500ml blood loss. In most cases less transfusion is more.



Exceptions to this rule seem to be in Acute Coronary Syndrome. A recent small series by Carsons indicated increased mortality in patients with an acute MI having a Hb below 100g/L. This was underpowered to be definitive, but indicates caution in allowing severe anaemia to persist in a patient with chest pain. Similar trends are present in severe sepsis and acute stroke. These however are the exceptions to the general rule that a Hb > 70g/L in non-bleeding patients should not need red cell transfusion.

On-going controversy persists with the effect of older blood on outcome. Currently a move to 14 day old blood being disposed of would mean too little red cells being available for patient care. However, if the restrictive transfusion policies continue, 20-25 day expiry may be possible. Currently an ANZICS trial is looking at the effect of the age of blood.

## Management of Anaemia

A new and exciting area of interest is anaemia. Preoperative anaemia increases perioperative mortality and complication rates. One third of patients present with anaemia if using the WHO criteria (Hb < 130g/L if male, and 120g/L if female). Half of that population has iron deficiency (ferritin < 40g/L) and respond to oral or IV iron. Evidence suggests, with treatment, 80% will raise their Hb by 20g/L in 8 weeks if taking oral iron, or 22 days if given a single dose of IV iron.

If this algorithm is applied to a population that has a perioperative blood loss of 1,000mls or greater this reduces the likelihood of red cell transfusion by 40% (from 52% to 12% in TKJR). This is a logical response to dealing with patients with preoperative anaemia. There may be an increased risk of infection with iron given intraoperatively but this is controversial.

To work effectively preoperative anaemia must be diagnosed and investigated at least one month before surgery is planned. This creates difficulties with most patients only having it noted immediately preoperatively or often never at all. New systems are being developed to assist anaesthetists to manage patients presenting for blood loss surgery to reduce the likelihood of transfusion.

Currently in NZ, iron polymaltose is the only preparation available for total dose, one time IV infusion. It traditionally has been given over a three hour infusion. Faster rates seem safe. Iron carboxymaltose can be given as a single bolus, and may be available on the PML is costs can be justified.

## References

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