Transfusion triggers in the ICU: what do we know?

Anaemia is a commonly encountered clinical problem in the critically ill and is identified as a factor which increases perioperative morbidity and mortality. It is evident that 95% of critically ill patients suffer from anaemia and approximately 40% of them receive packed red blood cell (PRBC) transfusions.[1]

Even though blood is considered as the eventual fluid of choice for rapid improvement of haemoglobin insufficiency and to improve oxygen delivery, it can also give rise to unfavourable outcomes due to antigens, inflammatory mediators, free radicals, dead and fragmented cells, reactions triggered by other cells like white blood cells and plasma[1], and electrolyte imbalances. The risks of anaemia need to be balanced by the risks associated with transfusions, hence the debate on whether a restrictive strategy is better than a liberal strategy in surgical and critically ill patients is well-timed.

There is evidence in the published literature supporting the potential harm with the liberal strategy.[2] Those include the TRICC (Transfusion Requirements in Critical Care) trial which showed a significant increase in cardiac and pulmonary complications and increased mortality in the liberal transfusion group (i.e., those transfused at a threshold haemoglobin<10g/dL) versus <7g/dL for the restrictive group during intensive care stay. The CRIT(Anaemia and blood transfusion in the critically ill) study found that the number of blood transfusions were independently associated with length of stay, development of Acute Respiratory Distress Syndrome (ARDS) and mortality in ICU patients. Blood transfusion as a risk factor for death and the combined end point of death or MI in patients with non-ST-elevation acute coronary syndrome (ACS) was a finding of their search done by Yang et al.[3] A more recent trial done on patients over 50 years of age with a history of or risk factors for, cardiovascular disease undergoing hip replacement surgery to a liberal versus restrictive transfusion strategy (10g/dL vs 8g/dL) revealed that there were no statistically significant difference in outcomes and this trial suggests that a restrictive strategy is also reasonable in this patient population[4]. Another interesting study carried out on patients with STEMI and haemoglobin levels <12g/dL had shown improved outcomes when transfused. Conversely, patients with non-ST-elevation ACS were found to have worse outcomes if transfused, regardless of their haemoglobin level. A large observational study done by Wu et al, has shown a benefit of transfusing to a haemoglobin of 10g/dL. But, this study had several methodological issues including analysis based only on the admission haematocrit as opposed to the lowest haematocrit during the entire hospital stay.[5] Subsequent large observational studies using high-quality data have shown that transfusing at a haemoglobin >than 8g/dL appears to have little benefit and may cause harm.[6,7,8] Given the existing data, a transfusion threshold of 8g /dL appears reasonable for patients with active ischemia. Transfusion at higher haemoglobin levels may be indicated based on the clinical scenario; however, all studies, suggest no benefit and possible harm when transfusing above haemoglobin of 10g/dL. Based on the above, in the intensive care setup multiple randomized controlled trials and a recent meta-analysis support the use of restrictive transfusion strategies.[9]

In contrary, there is evidence to show that a higher haemoglobin concentration and receipt of blood transfusion were independently associated with a lower risk of in-hospital death[10], and randomized control studies are warranted to confirm the potential benefit of blood transfusions in these subpopulations.

It is not, therefore, possible to make a single haemoglobin value as a "transfusion trigger" and the clinical decision to transfuse blood should be based on clinical status rather than a predetermined haemoglobin values.[11]

Leuko reduced blood, haematinics, improved storage solutions, haemostatic agents and improved surgical techniques and procedures designed to decrease bleeding have been used[1] with the adoption of better transfusion practices. The improvement and use of auto transfusion techniques including cell salvage is currently an alternative strategy.

Evidence-based clinical trials have led to publishing clinical practice guidelines to best

transfusion practices. These include AABB (American Association of Blood Banks), ASA (American Society of Anaesthesiologists); CAP (College of American Pathologists) SCCM (Society of Critical Care Medicine), SIMTI(Italian Society of Transfusion Medicine and Immunohematology), STS(Society of Thoracic Surgeons), The institutions also can formulate its own practice guidelines streamlining the blood ordering.[12]

Considering the use of FFP and other blood products, a wide variation of the use can be observed with doubtful advantages. The need of strong evidence is warranted.[13,14] Coagulation abnormality could be multifactorial and the accurate diagnosis of the underlying cause can be used to plan the treatment options. The information can be gathered by the conventional laboratory tests which again has its own limitations. The point-of-care coagulation diagnostics including whole blood platelet function tests and viscoelastic tests (thrombo elastography), can be a smart option for prompt identification of the clotting abnormality, which yet does not carry much support from controlled studies for management of critically ill patients in the ICU.

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