SPECIAL ARTICLE

Hazards and limitation of perioperative transfusion: need to adopt blood transfusion guidelines

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ABSTRACT

Blood transfusion is an important component of perioperative management of patients and in many instances can be lifesaving. Anesthesiologists are an important member of the multidisciplinary team involved regularly in requesting and administering blood components to the patients. Therefore, it is essential that anesthesiologists are familiar with indications and appropriate use of blood components and also with limitation and adverse effects associated with its use. Numbers of international guidelines regarding transfusion are available; however, these guidelines require local translation into policies, protocols and practice in order to deliver care to the patient. Institutions need to identify their local barriers and resources available and consult from the evidence based international guidelines to develop their own guidelines on blood transfusion. However, it must be remembered that it is a multidisciplinary engagement involving blood bank, laboratory, operating room and clinical staff; therefore, it is a challenging task which demands coordinated team work to translate guidelines into safe patient care.

Key Words: Blood transfusion; Policies; Blood transfusion guidelines; Hazards of blood transfusion; Inappropriate blood transfusion; Patient blood management

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INTRODUCTION

Blood transfusion can be lifesaving and its usage remains high in the perioperative period particularly in trauma, obstetric and cardiovascular surgery. However, in recent years there is a greater awareness related to transfusion related complications, resulting in increased scrutiny of the use of allogenic transfusion by medical professionals.[1] This has led to development of number of guidelines to improve transfusion practices.

This article will focus on rational use of blood in special relation to its utilization in Pakistan, indication and hazards of transfusion and international guidelines related to transfusion.

RATIONAL USE OF BLOOD PRODUCTS

Rational use of blood implies that right blood product is to be given to the patient only when needed and in the right amount.[2] Appropriate use of blood has shown to reduce the number of transfusion by 30%.[3]

Inappropriate rate of transfusion ranges from 18-57%.[4-12] According to World Health Organization (WHO) estimates, about 1.2-1.5 million units of blood are being transfused every year in Pakistan leading to a shortage of 40% in the availability of blood.[13,14] Studies conducted in Pakistan have shown a higher rate of transfusion in public sector hospital then private.[15,16] In the public hospital, appropriate use of blood was 54.1% as compared to the private hospital where the appropriate use of blood product was 69.4%.[15] In both public and private hospitals, clinicians were not using guidelines and there was no method of documentation or taking consent from the patients.[15,16]

In addition to inappropriate transfusion, many units of blood are routinely ordered and not utilized. This happens in situation where maximum surgical blood ordering schedule (MSBOS) is not implemented. MSBOS is evidence based estimates of average requirement in a particular procedure thus avoiding subjective anticipation of blood loss by clinicians and has shown 60% reduction of cost to the patient.[17]

HAZARDS AND LIMITATION OF TRANSFUSION

Transfusion of allogenic blood component is not without hazards and can lead to serious consequences and therefore requires careful consideration.[18] Allogenic transfusion is associated with transfusion reactions and both infectious and non-infectious complications. Infectious complication is caused by blood borne pathogens which includes cytomegalovirus, Human Immunodeficiency Virus (HIV) , hepatitis virus including B, C and E virus, Creutzfeldt-Jakob disease (CJD) and now more recently Ebola and Zika virus. Non-infectious risk of transfusion includes transfusion related acute lung injury (TRALI) and transfusion associated graft versus host disease, however, they can be reduced through introduction of leucodepletion and careful donor selection.[19]

Some studies have identified risk of immunosuppression with earlier recurrence and lower survival rates in patients with breast, colorectal and prostate cancer who received blood transfusion in the perioperative period ,[19,20] but other data have negated the association.[21] Increase rates of postoperative infections have also been associated with perioperative transfusion.[22-25]

Besides the risk of complication and safety concerns, there is an issue of rising cost with shortages of specialized blood components.[26,27] It is of paramount importance that the practice of blood transfusion is safe and based on current scientific evidence-based indications.

INDICATION OF BLOOD TRANSFUSION

The provision of readily available blood is not only lifesaving but has facilitated medical development by enabling number of complex surgical procedures which would not have been possible otherwise. The transfusion of red blood cells (RBC) and blood products like fresh frozen plasma (FFP), cryoprecipitate and platelets have the benefits to improve tissue oxygenation and control bleeding hence having potential of improving clinical outcomes.[28] However, controlled studies have not been performed to determine the haemoglobin concentration at which RBC transfusion improves clinical outcomes.[28]

Scientific indication for perioperative blood transfusion should base on two principal assumptions:

1) When a surgical patient is experiencing adverse outcome due to decreased oxygen carrying capacity.
2) These adverse outcomes can be prevented by RBC transfusion by enhancing oxygen carrying capacity.

Tissue oxygenation is well maintained at a haematocrit of 18-25% in healthy, normovolemic patients.[29,30] The heart does start releasing lactic acid until the haematocrit drops down to 15-20% and myocardial lactate flux is not affected until haemoglobin concentrations drops to 6 gm/dL.[29-31] In acute blood loss, reduction in arterial oxygen content is prevented because of compensatory increase in cardiac output and heart failure usually does not occur until the haematocrit reaches 10%.[32,33] Although, this compensatory increase in cardiac output in response to acute blood loss may be affected by several factors such as; left ventricular dysfunction and use of vasoactive medications (beta adrenergic or calcium channel blockade) requiring higher haemoglobin concentration for adequate oxygen delivery to tissues. Tolerance to acute blood loss is also affected by anesthetics, and some case reports have suggested that patients may tolerate lower haemoglobin under anesthesia due to reduction of oxygen consumption.[34] Yet no prospective randomized controlled trials have been done to support this statement.

Decisions regarding perioperative transfusion require clinical judgement and should not be based on a single transfusion trigger that fails to consider important physiological and surgical factor that affects oxygenation of tissues.

PATIENT BLOOD MANAGEMENT

This is patient based approach which focuses on the optimization of three perioperative factors: investigating and treatment of perioperative anaemia; reduction of perioperative blood loss and optimization of patient specific physiological reserve of anaemia.[35]

Process of Transfusion: This needs to be defined properly in every institution in order to avoid administering the wrong blood type in error. The following guidance is for manual checking process

at the bedside:[35]

1. All patients must be wearing an identity wrist band with their full names, date of birth and hospital identification number, which needs to be checked with the identification on the blood components immediately before transfusion.
2. The blood components in addition to patient identification need to be checked for blood group, donation number and expiry date and time.
3. Visually check for leakage, discoloration and clots.
4. Two people need to check and sign both on the form and blood component bag.
5. The date and time of start and end of transfusion required to be documented.

Monitoring of patients after the start of transfusion: Patients must be monitored for adverse transfusion reaction like any signs of tachycardia, rash, breathlessness hypotension and fever, which mandates stopping the transfusion and communication with the laboratory.[36] The immediate treatment of any transfusion reaction includes stopping any further transfusion and administration of antihistamines, steroids and use of adrenaline if it is life threatening .[37]

TRANSFUSION GUIDELINES

Anesthesiologist as part of team involved in the perioperative management of patients makes transfusion decisions and administers blood and blood components. In order to make the transfusion practice safe and to guide clinical practitioners, number of practice guidelines for blood component transfusion therapy have been issued; including a report by the American Society of Anesthesiologists task force on blood component therapy in 1996,[28] guidelines produced by the British Committee for Standards in Haematology (BCSH),[38] and National Institute for Health and Care Excellent (NICE) guidelines[39, 11] including NICE guidelines for trauma.[40]

The most recent Association of Anesthetists of Great Britain and Ireland (AAGBI) guidelines for the use of blood components and their alternatives from 2016 bring together three previous AAGBI guidelines: blood component therapy 2005; red cell transfusion 2008; and massive hemorrhage 2010.[41] These guidelines have focused on clinical indications, risk of transfusion, blood conservation and transfusion process. The recommendations of these guidelines are as follows: [41]

1. Preoperative hemoglobin level needs to be measured before major elective surgery.
2. WHO defines anemia as Hb level<13g/L for men and <12g/L for women.
3. According to AAGBI guidelines patients labeled anemic according to WHO definition needs to be investigated before elective surgery and non-urgent elective surgery other than caesarean section needs to defer.
4. Patient needs to be informed about the possibility of blood transfusion in cases where transfusion is anticipated and this should be properly documented in patients' file notes.
5. In cases where the bleeding is not ongoing and large deficit needs not be corrected, patient should be evaluated for further need of transfusion after every unit of red blood cell transfused.
6. When blood loss of more than 500 ml is anticipated provision of cell salvaged and use of tranexamic acid needs to be considered.
7. In pediatric population blood products should be prescribed by volume and not by number of units.
8. Massive blood transfusion protocol should be present in every institution, which should regularly be reviewed and audited.
9. Every institution should have an emergency supply of group O blood and mechanism of provision of group specific blood within 15-20 minutes of receiving correctly labeled samples and information of the emergency requirement of blood.
10. Preference should be given to transfusion of red blood cells and FPP over other intravenous fluids in case of major hemorrhage due to trauma and obstetric reasons.
11. In situations where patients continue to bleed, transfusion of blood products needs be gauged by regular laboratory tests for coagulation; FFP needs to be transfused if INR > 1.5, cryoprecipitate if fibrinogen is < 1.5 gm/L and platelets if platelets count is < 75x 10^9 /L.

CONCLUSION

To date number of international guidelines regarding transfusion is available. However, it must

be remembered that these guidelines require local translation into policies, protocols and practice in order to deliver care to the patient. Therefore, local barriers need to be identified and policies should be made according to local circumstances but international guidelines need to be consulted and followed. Education and training on blood transfusion guidelines, patient blood management, transfusion process and management of massive hemorrhage is required at the time of induction of health care staff and also at regular basis to reinforce already existing knowledge and training. As it is multidisciplinary engagement involving blood bank, laboratory, operating room and clinical staff, it is challenging and will require coordinated team work to translate guidelines into safe patient care.

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Author's contribution: SI is the sole author of this manuscript.

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