INTRODUCTION

Blood component therapy can be in many cases an important and even life saving aspect of patient care in any field of medicine or surgery. However, it is in its judicious use that lays its real benefit. This topic gains importance in a culture where blood donations are few and far between, still entirely dependent on voluntary, non-remunerated donors and where myths and inhibition are rampant.

The judicious use starts right from assessing the need of transfusion, using the appropriate components, avoiding unnecessary transfusions, to reprimanding single unit blood transfusion. Expectedly a wide chasm exists between blood donation and utilization; hence in the interest of our community the right patient should get the right component at the right time (judicious blood use).

That transfusion of whole blood is passé needs to be emphasized and use of components should be encouraged. Whole blood transfusion is a phenomenal waste of blood components (from one whole blood donated we can make platelets, fresh frozen plasma and packed red cells). This ensures that only the required component is transfused to the patient. Of note is the fact that the continuous worldwide efforts in looking for alternative sources like artificial blood have met with limited success.

Hence it would appear that the most important component of blood transfusion is our ability to think judiciously! It should not be the fear of transfusion to transmit infections but the fear that the patient could have done without the transfusion!

Hit the nail on the head- How can we be judicious?

1. Assess the underlying cause of the low or altered blood component needing replacement rather than just blindly replacing the same.
2. Deferring surgical events that can be conserved till sorted out can prevent unnecessary transfusions.
3. Use of antifibrinolytic agents, preoperative autologous blood deposit , acute normovolemic haemodilution (ANH), intra-operative and post operative blood salvage
4. Use of erythropoietin, iron and Vitamin B12 replacement to increase hemoglobin.
5. Use of vitamin K rather than FFP to correct altered PT.
6. Discourage single transfusion of packed red cells.
7. Clinical decision for transfusion rather than following numbers

Hit the nail on the head- harder- Advantages of such an approach are:

1. Avoid transfusion transmitted disease (your own blood is the safest blood).
2. Promote autologous blood donation (risk reduction) where possible
3. Reduce any risk of hemolytic and non-hemolytic transfusion reactions
Judicious Use of Blood Components in Clinical Practice

4. Ensure blood will be available for patients who genuinely need the same.

5. Avoid “quick-fix hematology”.

An important advance has been the insistence of a formal consent for transfusion in many hospitals as part of the accreditation, a professional duty to make sure the patient knows if and why a transfusion is required, including the risks and benefits of receiving blood or not receiving it. The indication for transfusion and the outcome of transfusion must be recorded in the patient’s notes.

Transfusion Safety Points:

• Anti-pyretics, antihistaminics and / or steroids shall NOT be used as premedication for transfusion on a routine basis, unless specifically indicated as in cases of documented episodes of prior transfusion reactions.

• Where appropriate, leuco-reduction (sets shall be used for Packed Red Blood Cells (PRBC) as separate from Platelets) or irradiation should be recommended by the treating physician.

• Plasma products do not need irradiation or specific filters.

• ABO and Rh(D) specific components cross matched shall be used for Red Cells transfusion.

• Rh(D) Negative Packed Red Blood Cells (PRBC) or Whole Blood can be safely transfused to Rh(D) Positive patients but not vice versa. In a patient with severe bleeding with a risk to life, O Rh(D) Negative blood is preferred if O Rh(D) Positive Packed Red Blood Cells (PRBC) are not available. This should be with the written consent of both the treating physician and the patient’s relative / patient.

Indications of Whole Blood: Preferably discourage whole blood:

• Active bleeding

• Intrauterine transfusion

• Exchange transfusion in neonates

Packed red cells are preferred for raising haemoglobin where needed.

BCSH (British Committee) Guidelines for packed red cells transfusions:

1. Do not transfuse if Hb > 10 gm/dl
2. Transfusion indicated if Hb < 7 gm/dl
3. Transfusion essential if Hb < 5 gm/dl
4. Hb 8-10 gm/dl safe even if cardioresp probs

5. Symptomatic patients should be transfused.

NOTE: Wound healing and O2 delivery not compromised unless PCV < 18%. Avoid whole blood

Do not transfuse red blood cells for volume expansion, as a haematinic, to enhance wound healing or to improve general “well-being.

For Platelets transfusions:

Any group platelets may be transfused if group specific concentrates are not available. However, same group donor would be needed for a single donor platelet transfusion (SDP).

• If Rh(D) Positive platelets need to be transfused to a Rh (D) Negative female patient in child bearing age group, anti-D prophylaxis should be considered.

• Platelets are not cross matched routinely unless refractory.

• There is no advantage of single donor apheresis platelets (SDP equal to about 6 random platelets, contains 3.0-4.5 x 10^11 platelets plus 300 ml of plasma, expires after 5 days and raises the platelet count 30,000/cumm) over random platelets unless they are to be given often. Then SDP is better as it will reduce incidence of alloimmunisation/ refractoriness.

Indications for platelet transfusions:

• Severe thrombocytopenia (less than 5000-10,000/cumm)

• DIC with bleeding

• Haematological malignancies

• Supportive during chemotherapy

• Platelet dysfunction

Platelet transfusions are not indicated in the following:

ITP (unless bleeding)

TTP / HUS

Drug induced

Cardiac bypass associated thrombocytopenia

Asymptomatic thrombocytopenia

Fresh Frozen Plasma (FFP) ABO specific or ABO compatible FFP shall be used. Rh(D) is NOT significant for FFP. FFP are not cross matched.

Indications for FFP are:

• Warfarin immediate reversal

• DIC coagulopathy

• Coagulopathy going for surgery

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Post surgical consumption (bypass/ liver disease)
For factor replacement if factor not available or unaffordable
Massive transfusion protocol

FFP is not indicated in the following:
- Hypovolemia
- Immunodeficiency state
- Volume expansion
- Nutritional supplement

Cryoprecipitate (A white precipitate that forms when FFP is thawed to 4°C, volume is 30 to 50 ml, contains high molecular weight factors such as FVIII, vWAg, TPA, FXIII, Fibrinogen)

- Any group Cryoprecipitate irrespective of ABO and Rh(D) can be used. No need for cross matching.

Indications for cryoprecipitate:
- Hypofibrinogenemia
- DIC
- Trauma
- Renal related bleeding

Where appropriate, use blood products that can avoid transfusions
- Immunoglobulins (IVIg)
- Specific Immunoglobulins
- Albumin
- AT III concentrates
- Factor VIII, IX and FVII concentrates
- Fibrin Glue

However, these are expensive and out of the common man’s reach.

Practical aspects of transfusions
- There should be no more than 30 minutes between removing the component from the temperature controlled environment and starting the transfusion
- The Handbook of Transfusion Medicine (4th Edition) recommends that all blood component transfusions are completed within 4 hours of removal from a controlled temperature environment. This limit is designed to reduce the risk of bacterial growth and transfusion-transmitted infection and is based on data relating to the ‘lag phase’ before bacteria begin to proliferate after removal from refrigeration.
- Pre-transfusion pulse, blood pressure, temperature and respiratory rate 60 minutes before the start of the transfusion.
- Pulse, blood pressure and temperature should be taken 15 minutes after the start of each component transfused. If these measurements have altered significantly from the baseline values, then respiratory rate should also be measured.
- If the patient develops signs or symptoms suggestive of a transfusion reaction, record the events and initiate appropriate action.
- Post-transfusion pulse, blood pressure and temperature should be taken and recorded not more than 60 minutes after the end of the component transfusion.
- If blood is unused or delay in use, it should be returned to the Blood Bank due to the risk of bacterial growth.
- Blood transfusions must not take place unless medical person is available on site at the commencement of each unit.
- Blood transfusions should be avoided at late hours unless urgent or supervised by a doctor.
  - Packed / Semi packed Red Cells:
    - The duration for the administration of a unit of red cells is usually 2-3 hours if no IHD or 4 hours depending on cardiac status.
    - Platelets: Never put platelets in the refrigerator. Start transfusion as soon as the pack is received. Transfuse each unit over 15-30 minutes.
    - Plasma: Once thawed, the transfusion should be completed over 30 mins in 4 hours, and not more than 6 hours even if stored at 2˚-6C.
    - Cryoprecipitate: Once thawed, the transfusion should be completed as early as possible, and not to stored for more than 6 hours even if stored at 1˚-6°C.

Never add other medications to blood or blood components.

No other infusion solutions or drugs should be added to any blood component.

Use at least 20ml of Normal Saline (0.9%) to flush lines and 3-ways before or after blood components when other drugs or fluids are to be administered.

Do not use 5% Dextrose via the same administration set as blood since this will cause lysis of red cells

EMERGENCY TRANSFUSIONS:
Following are the essential ingredients:
Identifying the source of haemorrhage and taking the necessary
actions, including prompt surgical intervention

Preserving haemostasis and correcting coagulopathy

Early rather than late introduction of blood components (Major Transfusion Protocol MTP at a 1:1:1 ratio of components)

Maintaining an adequate Hb level (TRICC study Hb 7 gm% for non-IHD patients 8-10 gm% for IHD patients)

Normothermia and correction of acidosis

Monitoring the complete blood count, coagulation profile (prothrombin time, activated partial thromboplastin time, plasma fibrinogen) at admission and at regular intervals

The targets of coagulation are to achieve

- PT/ APTT < 1.5 × reference value
- Fibrinogen: > 1.0 g/L
- Platelets: > 50 × 10⁹/L, but for neuro or deep bleeds > 100 x10⁹/l

**Leucodepletion**

Red cells leucodepletion is recommended in the following situations:

- Patients who require multiple transfusions to reduce the rate of human leucocyte antigen (HLA) alloimmunisation
- Non-hepatic solid transplant organ candidates to reduce the rate of HLA alloimmunisation
- Patients experiencing two or more non-haemolytic febrile transfusion reactions
- As a means of reducing cytomegalovirus (CMV) transmission and CMV disease in immunocompromised patients

**Irradiated blood components**

Required in the following situations:

- Blood components from 1st and 2nd degree relatives
- HLA-compatible blood components
- Intra-uterine transfusions
- Neonatal exchange transfusions subsequent to intra-uterine transfusions
- Congenital T-cell immunodeficiency defects
- Autologous or allogeneic stem cell transplant patients
- Patients treated with fludarabine or related purine analogue
- All granulocyte products

Possibly

- Neonatal exchange transfusions (no prior intra-uterine transfusion)
- Hodgkin’s disease patients

**Adverse Transfusion events that a physician must know:**

The most common immediate adverse reactions to transfusion are fever, chills and urticaria. The most potentially significant reactions include acute and delayed haemolytic transfusion reactions and bacterial contamination of blood products. During the early stages of a reaction it may be difficult to ascertain the cause.

**Immediate Corrective action**

1. stop the transfusion
2. provide immediate patient care
3. re-perform the pre-transfusion checklist, document & observations
4. contact the concerned consultant

If the transfusion is to be stopped and the reaction investigated, disconnect pack from patient

1. Complete Transfusion Reaction Report Form
2. Obtain blood / urine samples as directed

Delayed and long term Adverse Effects of Transfusion that can occur are:

1. Delayed haemolysis
2. Allo immunization
3. Platelet refractoriness
4. Transfusion associated graft versus host disease
5. Immunomodulatory effects
6. Iron accumulation
7. Infection disease transmission

**BLOOD WARMERS**

Blood warmers should only be used at the discretion of the doctor prescribing the blood. The use of a blood warmer may be justified for

- Adults receiving infusion of blood at rates greater than 50ml/kg/hour.
- Infants undergoing exchange transfusions.
- Transfusing a patient who has clinically significant cold antibodies
- Transfusing in OTs where ambient temperature 18°C is
below.

Blood components must NOT be warmed by methods such as putting the pack into hot water or in microwave oven etc.

**TRANSFUSION AUDITS**

In order to ensure these guidelines are effective, an audit tool can be developed. Results from this audit can then be used by the Hospital Transfusion Committee to recommend or implement any changes in transfusion practices in the hospital, or to add further training to the care providers. Any recommendations for changes shall be reflected in these guidelines. The whole process should be dynamic.

**HOSPITAL TRANSFUSION COMMITTEE (HTC)**

An effective and well-led Hospital Transfusion Committee (HTC) or a body with equivalent functions is widely held to be essential for improvement of clinical transfusion practice. The primary aim should be to promote a high standard of care for patients at risk of transfusion (i.e. those who must be transfused, and also those who, with good clinical management, may avoid the need for transfusion). The HTC should have a clear line of accountability to an appropriate post at a senior management level in the institution. The HTC should have the authority to determine hospital policy in relation to blood transfusion and must have an effective means of disseminating it to all relevant staff and to patients where appropriate.

They should

- Promote the dissemination and the use of national or local guidelines that apply to the clinical transfusion process
- Regularly review and update the hospital’s documentation for blood transfusion
- Carry out audits that evaluate the hospital’s clinical blood transfusion process against the relevant guidelines and benchmark the use of blood components against best practice
- Promote the education and training of clinical, laboratory and support staff involved in the clinical transfusion process
- Report serious adverse reactions and events to the national haemovigilance programme
- Ensure that incidents are analysed and the information is used to help improve practice and prevent a repetition

**CONCLUSION:**

Our community and ethical demand is that we are aware of the judicious use of blood component transfusions. Assessing the quantity and quality of blood cells, coagulation parameters and underlying pathophysiology are the most important component of component therapy! In short AVOID “QUICK FIX HAEMATOLOGY”!

Before blood transfusion, use the following check list!

- Transfusion is only one element of patient’s management
- Minimise blood loss
- Hb level is not the only deciding factor for transfusion
- Clinician should be aware of risks of transfusion
- Transfuse only if clinical benefit
- Justify transfusion need on paper
- Monitor transfusion appropriately

Take Home Message: Strategies for effective blood transfusion (Conserve a limited source)

Develop guidelines for rational use of blood along with internal audit

Organize clinician awareness training programs and hospital transfusion committees (HTC)

Ensure availability of blood or plasma substitutes.

Promote blood component therapy rather than whole blood.

Encourage autologous transfusions

Patients should be given blood transfusion only for valid indications.

The use of a single unit of blood should therefore be strongly discouraged.

**REFERENCES**

1. BCSH (British Committee for Standards in Haematology) Guidelines - The administration of blood components 2009 to be reviewed in 2012.
2. Canadian Study of Transfusion in ICU (TRICC study) 2008
3. AABB manual
4. German Medical Association, 2009 Guidelines of the
7. Paul E. Marik and Howard L. Corwin