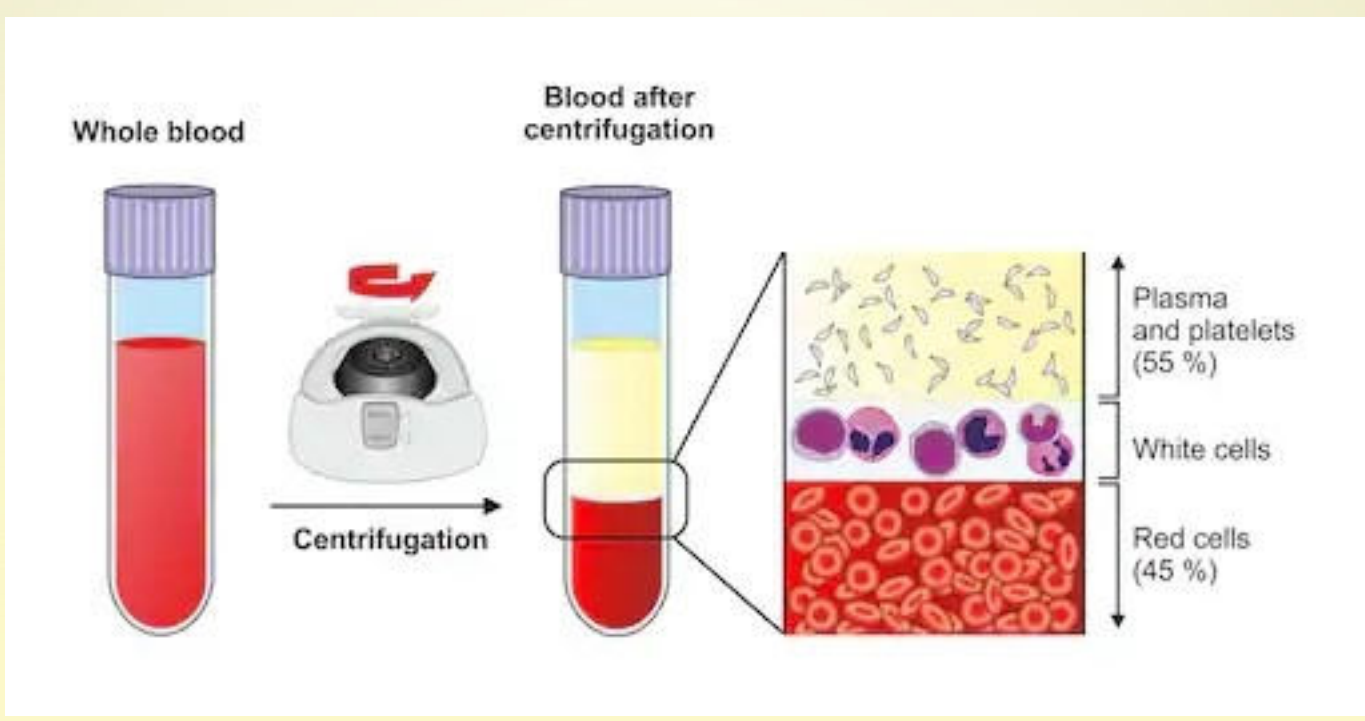
RATIONAL USE OF BLOOD & BLOOD ADMINISTRATION

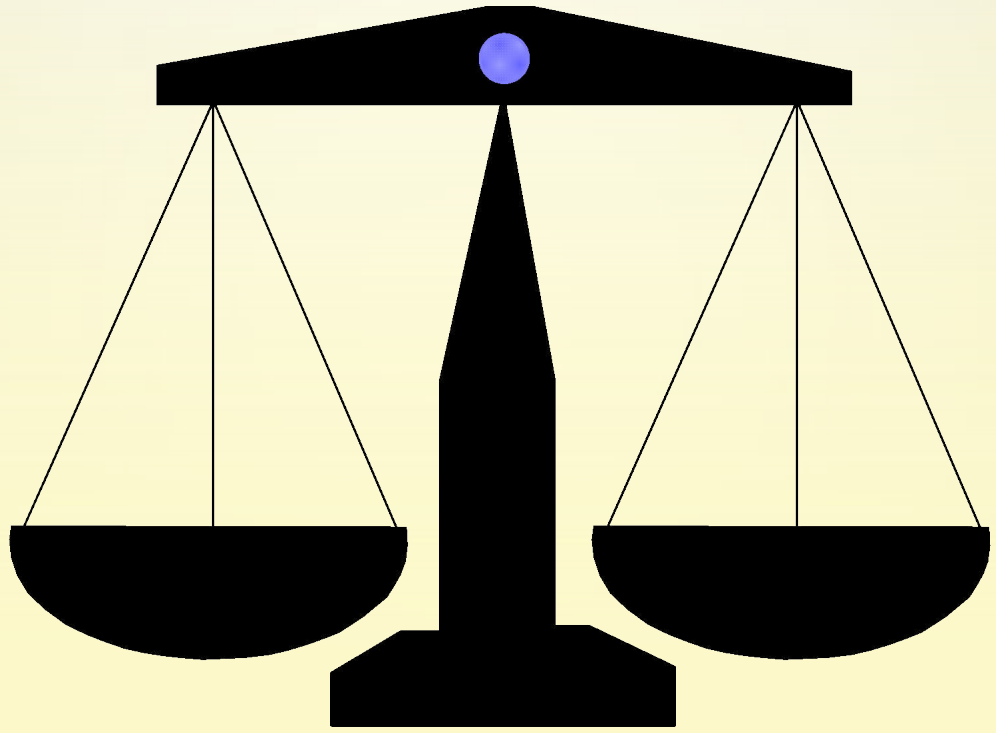
Blood Components



The Appropriate Use Of Blood And Blood Products

- Essential part of modern health care
- Transfusion can save life and improve health.
- However, it always carries potential risks for the recipient
- Should be prescribed only for conditions with significant potential for morbidity or mortality that cannot be prevented or managed effectively by other means.

Indication Vs Clinical Benefit



Why Rational use of blood?

- Economy -*Scarcity of resource*
  1 in 4 get blood component
- Safety - *Inherent risks involved in transfusion therapy*
  1 in 2 million gets HIV
- Scientifically appropriate
  Haematinic in nutritional anemia

1. Give only what is needed

Red cells O_2 carrying capacity (Anemia)

Platelets Thrombocytopenia

FFP Multiple clotting factor deficiency

CRYO Hemophilia A

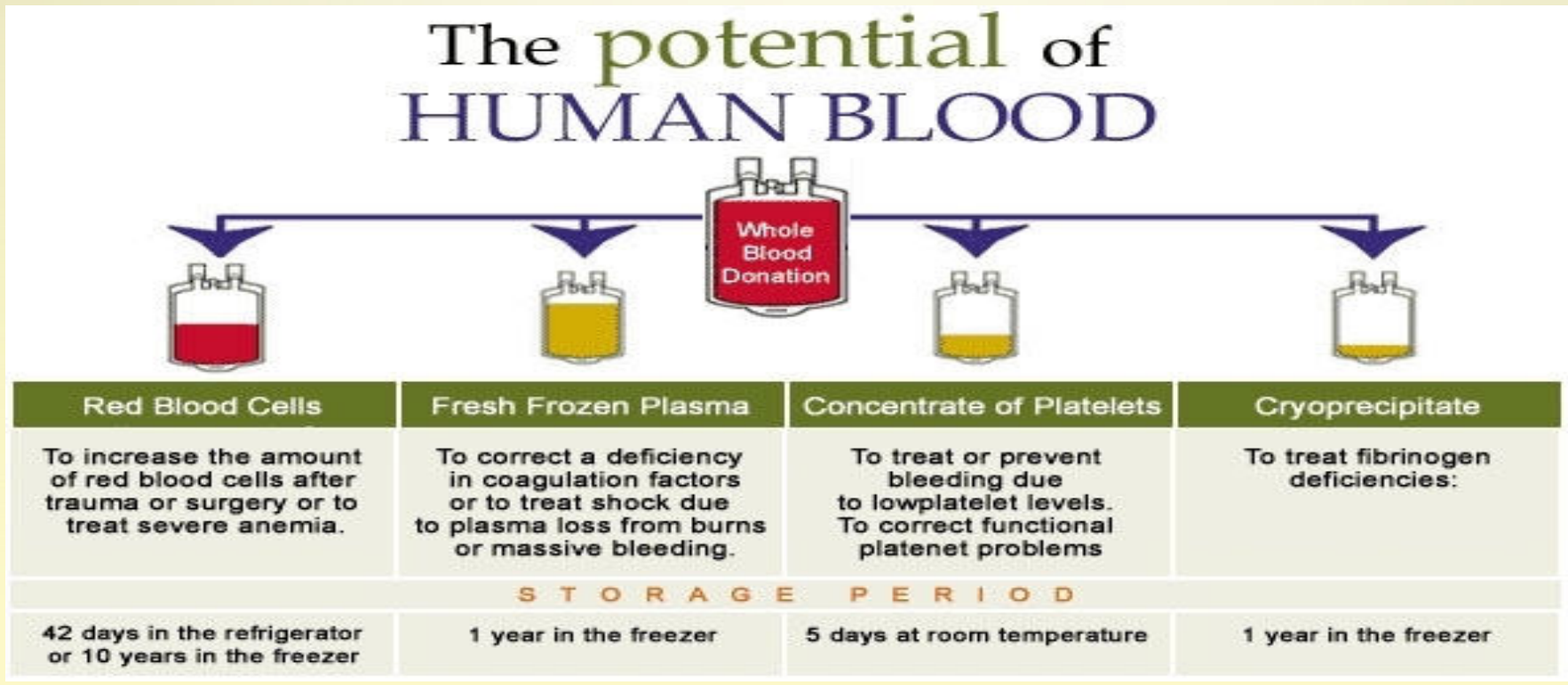
2. DIFFERENT STORAGE CONDITIONS

Component	Temperature	Shelf Life
Red Cells	2 -6^0 C	42 days
Platelets	20-24^0 C	5 days
Fresh Frozen Plasma	-30^0 C	1 year
Cryoprecipitates	-40^0 C	1 year

3. CONSERVATION OF SCARCE RESOURCE

- Separation of whole blood in 3-4 components
- Benefits more than one patient at a time.

One Unit Can Save Three To Four Lives



Why 'Whole Blood' is ***Not Rational***

❖ **Better patient management**

- concentrated dose of required component
- avoid circulatory overload
- minimize reactions

eg. Requirement of platelets to raise count from 30 to 50,000/ul

• Fresh whole blood	5 units	1750 ml
• Random platelets	5 units	350-450 ml
• Apheresis platelets	1 unit	200-300 ml

❖ **Decreased cost of management**

- except for the cost of bag, other expenses remain same

Whole Blood Vs Packed Red Cells

Parameter	Whole blood	Packed red cells
Volume	350 – 450 ml	200 – 240 ml
Increment in Hb	1 -1.5 gm/dl	1 -1.5 gm/dl
Red cell mass /ml	Same as PRBC	Same as WB
Viable platelets	No	No
Labile factors	No	No
Plasma citrate	++++	+
Allergic reactions	++++	+
FNHTR	++++	+
Risk of TTI	++++	+
Waste of components	Yes	No

Fresh Blood" – A Misconception

- **What is "fresh blood"?**
  - ❖ unit kept at 4°C for 4 hours is no longer "fresh"
  - ❖ storage lesions in different constituents due to storage temp
- **Increased risk of disease transmission**
  - ❖ intracellular pathogens (CMV, HTLV) survive in leukocyte in fresh blood
  - ❖ syphilis transmission (*Treponema* can not survive > 96 hours in stored blood)
  - ❖ malaria transmission (malarial parasite can not survive > 72 hrs in stored blood)

Prescribing Blood: A Checklist For Clinicians

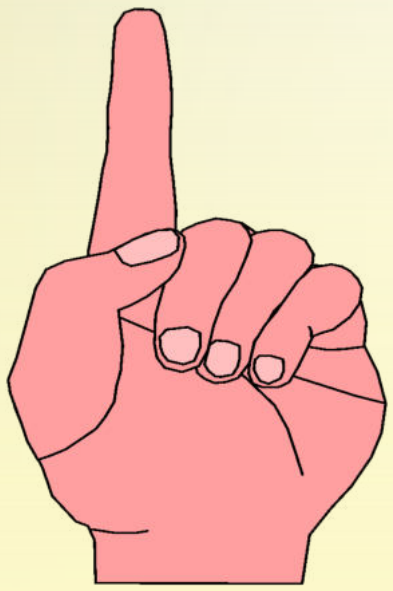
Always ask yourself the following questions before prescribing blood or blood products for a patient

- What improvement in the patient's clinical condition am I aiming to achieve?
- Can I minimize blood loss to reduce this patient's need for transfusion?
- Are there any other treatments I should give before making the decision to transfuse, such as intravenous replacement fluids or oxygen?
- What are the specific clinical or laboratory indications for transfusion for this patient?
- What are the risks of transmitting HIV, hepatitis, syphilis or other infectious agents through the blood products that are available for this patient?
- Do the benefits of transfusion outweigh the risks for this particular patient?
- What other options are there if no blood is available in time?
- Will a trained person monitor this patient and respond immediately if any acute transfusion reactions occur?
- Have I recorded my decision and reasons for transfusion on the patient's chart and the blood request form?

Finally, if in doubt, ask yourself the following question.

- If this blood was for myself or my child, would I accept the transfusion in these circumstances?

RATIONAL USE OF BLOOD



- **Right product**
- **Right dose**
- **Right time**
- **Right reasons**

CHOICE FOR ABO BLOOD GROUPS

Patient type	Donor PRBC	Donor FFP	Donor PC
O Positive	O	O,B,A,AB	O,B,A,AB
A Positive	A,O	A,AB	A,AB,O,B
B Positive	B,O	B,AB	B,AB,O,A
AB Positive	AB,B,A,O	AB	AB,B,A,O
RhD Positive	RhD Positive RhD Negative	-	-
RhD Negative	RhD Negative	-	-

Cross matching: Special Circumstances

Clinical urgency

Immediate

Group O RhD neg Packed RBCs

Minutes

ABO & RhD type

- **Group specific blood (5-10 min)**
- **Immediate spin crossmatch (15-20) min)**

Within an hour

ABO & RhD type

Complete crossmatch

If units are issued without X match – written consent of physician to be taken,
-complete X match protocols followed after issue

NACO NBTC

BLOOD ADMINISTRATION

BLOOD REQUEST FORM

When blood is required for transfusion, the prescribing clinician should complete and sign a blood request form that is designed to provide all necessary information. All details requested on the blood request form must be completed accurately and legibly.

- The blood request form should always be accompanied by the patient's blood sample. The sample is placed in a sample tube that is correctly labelled and is uniquely identifiable with the patient.
- The blood sample shall not be submitted in a syringe, as this could lead to errors when transferring to a test tube for grouping and compatibility testing. It may also cause haemolysis.

- For a routine case, the sample and request form should be submitted to the transfusion department at least 24 hours before required, to make sure of the availability of blood.
- Physicians may request those, who accompany the patient, to consider becoming blood donors if they are healthy and lead a healthy lifestyle

BLOOD SAMPLES

- The taking of a blood sample from the patient needs supervision. If the patient is conscious at the time of taking the sample, ask him/her to identify himself/herself by given name and all other appropriate information.
- A 5 mL blood sample should be collected into a dry test tube and then correctly and clearly labelled with the patient's details, and submitted to the blood centre for testing. The specimen label must include the following information:

❖ Patient's full name, age and sex.

❖ Registration number.

❖ Ward/bed number.

❖ Date and time specimen taken.

❖ Phlebotomist's signature/initials

- Use positive patient identification to identify the patient.
- NEVER pre - label the sample tube before phlebotomy.

– Use the blood product request form, write legibly and fill in all appropriate details.

– When taking a blood sample for cross match, complete the whole procedure before any other task is undertaken

– It is important that there are no interruptions during the process.

– The signature of the individual who took the sample must appear on the specimen label.

RETENTION OF BLOOD SAMPLES:

- Blood samples from recipient and donor(s) must be retained for 7 days at +2°C to +8°C after each transfusion.
- Should another transfusion be necessary 72 hours after the earlier transfusion, a fresh sample shall be requested for cross match. Collection of a second 5 mL blood sample is required for re - checking and further cross matching and must be retained in case of investigation of transfusion reaction.

RED CELL COMPATIBILITY TESTING

- The laboratory performs:

  ABO and RhD grouping on patient and donors.

  Antibody screening on patient.

  Cross matching between serum of patient and red cells of donor

These procedures normally take about an hour or more to complete. Shortened procedures are possible in case of emergency, but may fail to detect some incompatibilities.

COLLECTION AND RECEIPT OF BLOOD

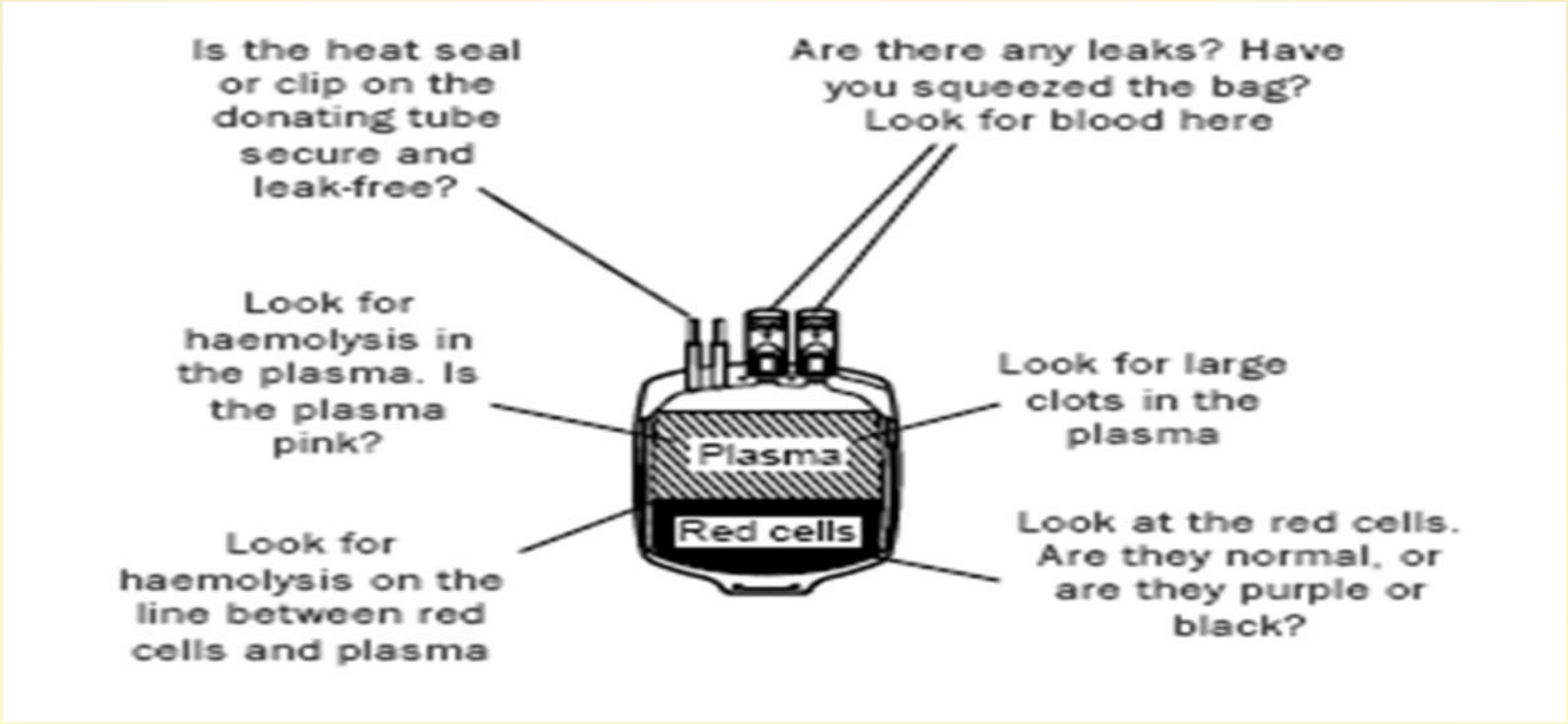
- ALWAYS take a completed patient documentation label to the issue room of the blood trans - fusion department when collecting the first unit of blood.
- MATCH the details on the blood request form against the blood compatibility label (tag), the bag unit number and the patient documentation label.
- If everything matches, sign out the unit with the date and time
- If there is any discrepancy, DO NOT sign out the unit; contact the staff member of the blood transfusion department immediately.
- When receiving the unit of blood in the clinical area, check that it is the right unit for the right patient.

- Always check patient/component compatibility/identity. Inspect pack and contents for signs of deterioration or damage.

Blood Bag Should Be Checked For:

- Any sign of haemolysis in the plasma indicating that the blood has been contaminated, allowed to freeze or to warm.
- Any sign of haemolysis on the line between the red cells and plasma during storage.
- Any sign of contamination, such as a change of colour in the red cells, which often look darker/ purple/ black when contaminated.
- Any clot, which may mean that the blood was not mixed properly with the anticoagulant when it was collected or might also indicate bacterial contamination due to the utilization of citrate by proliferating bacteria.
- Any sign that there is a leak in the bag or that it has already been opened

Checking For Signs Of Deterioration



Normal / Haemolyzed

Clots

Discarding Blood

The blood unit must be discarded if:

- It has been out of the refrigerator for longer than 30 minutes, or
- The seal is broken, or
- There is any sign of haemolysis, clotting or contamination.

Blood Transfusion Set

- Blood should be administered only through blood transfusion sets with filter size of 170- 200 µm.
- Must be sterile and must never be reused.
- Never add medication to a unit of blood. Should not be administered with any i.v. solution containing calcium, dextrose or ringer' solution.

Compatible Solutions With Blood

- Only Isotonic saline is recommended to be used with blood components
- Do Not prime the administration set with 5% Dextrose or Ringer Lactate solutions
- Dextrose will cause hemolysis of the red cells and calcium in Ringer Lactate will cause clot formation
- Before administering blood completely flush all the incompatible IV fluids and drugs or preferably Change the set

Recording of Transfusion

Consent from patient and/or relatives- Valid informed consent for blood transfusion should be obtained and documented in the patient's clinical record.

Pre-administration checks :

STEP 1- Patient's Identification

- Badges, Wrist bands with Bar code labels
- Cross check the patient's identification against the compatibility report and the blood bag label.

STEP-2- : Check the patient's notes for

- The component prescribed
- Any special requirements- leucodepletion, irradiation

STEP-3 Check the details on compatibility report and the blood bag labels-

- Blood Group
- Unit registration number
- Expiry date
- Type of component
- Any instructions for transfusion from blood bank

COLOUR CODED LABELS

- Blue – O blood group
- Yellow – A blood group
- Pink – B blood group
- White – AB blood group

YELLOW – 'A' BLOOD GROUP

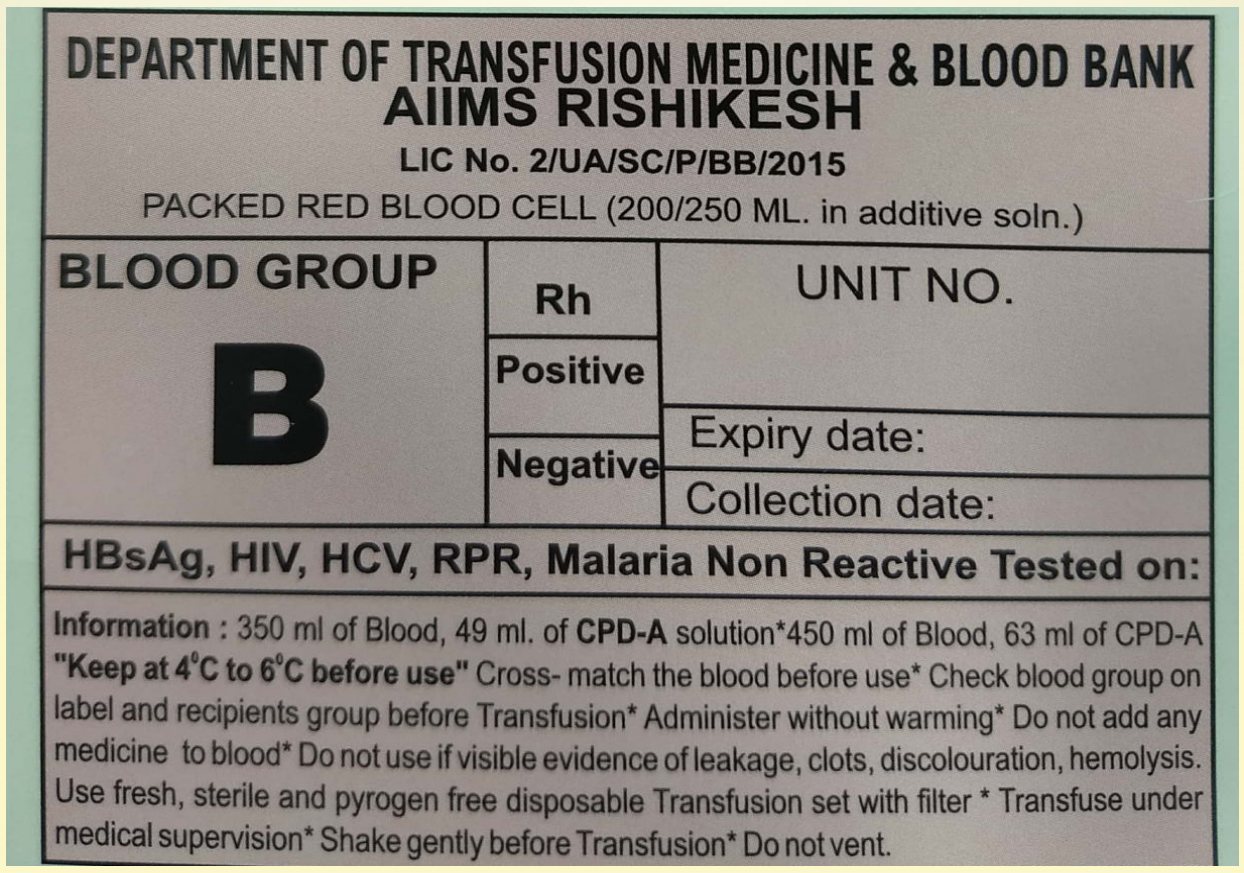
DEPARTMENT OF TRANSFUSION MEDICINE & BLOOD BANK
AIIMS RISHIKESH
LIC No. 2/UA/SC/P/BB/2015
PACKED RED BLOOD CELL (200/250 ML. in additive soln.)

BLOOD GROUP	Rh	UNIT NO.
A	**Positive**	
	Negative	Expiry date:
		Collection date:

HBsAg, HIV, HCV, RPR, Malaria Non Reactive Tested on:

Information : 350 ml of Blood, 49 ml. of **CPD-A** solution*450 ml of Blood, 63 ml of CPD-A **"Keep at 4°C to 6°C before use"** Cross- match the blood before use* Check blood group on label and recipients group before Transfusion* Administer without warming* Do not add any medicine to blood* Do not use if visible evidence of leakage, clots, discolouration, hemolysis. Use fresh, sterile and pyrogen free disposable Transfusion set with filter * Transfuse under medical supervision* Shake gently before Transfusion* Do not vent.

PINK – 'B' BLOOD GROUP


DEPARTMENT OF TRANSFUSION MEDICINE & BLOOD BANK
AIIMS RISHIKESH
LIC No. 2/UA/SC/P/BB/2015
PACKED RED BLOOD CELL (200/250 ML. in additive soln.)

BLOOD GROUP
B

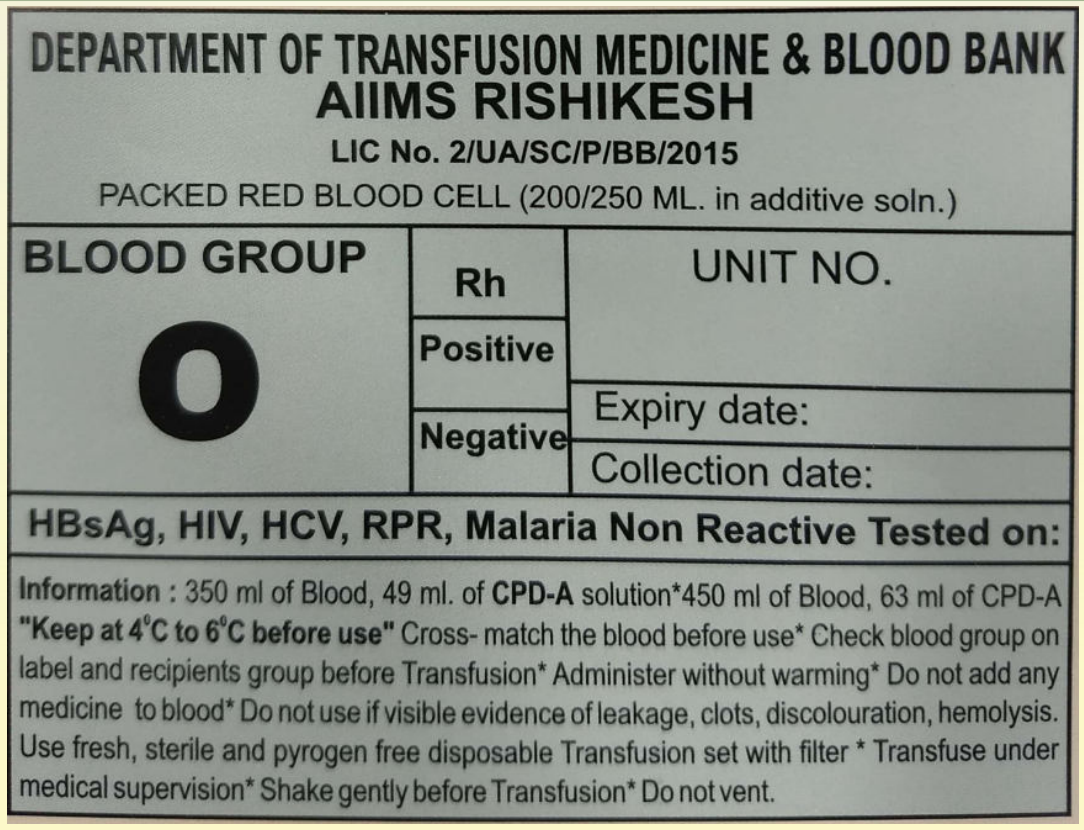
Rh
Positive
Negative

UNIT NO.
Expiry date:
Collection date:

HBsAg, HIV, HCV, RPR, Malaria Non Reactive Tested on:

Information : 350 ml of Blood, 49 ml. of **CPD-A** solution*450 ml of Blood, 63 ml of CPD-A **"Keep at 4°C to 6°C before use"** Cross- match the blood before use* Check blood group on label and recipients group before Transfusion* Administer without warming* Do not add any medicine to blood* Do not use if visible evidence of leakage, clots, discolouration, hemolysis. Use fresh, sterile and pyrogen free disposable Transfusion set with filter * Transfuse under medical supervision* Shake gently before Transfusion* Do not vent.

BLUE – 'O' BLOOD GROUP


DEPARTMENT OF TRANSFUSION MEDICINE & BLOOD BANK
AIIMS RISHIKESH
LIC No. 2/UA/SC/P/BB/2015
PACKED RED BLOOD CELL (200/250 ML. in additive soln.)

BLOOD GROUP
O

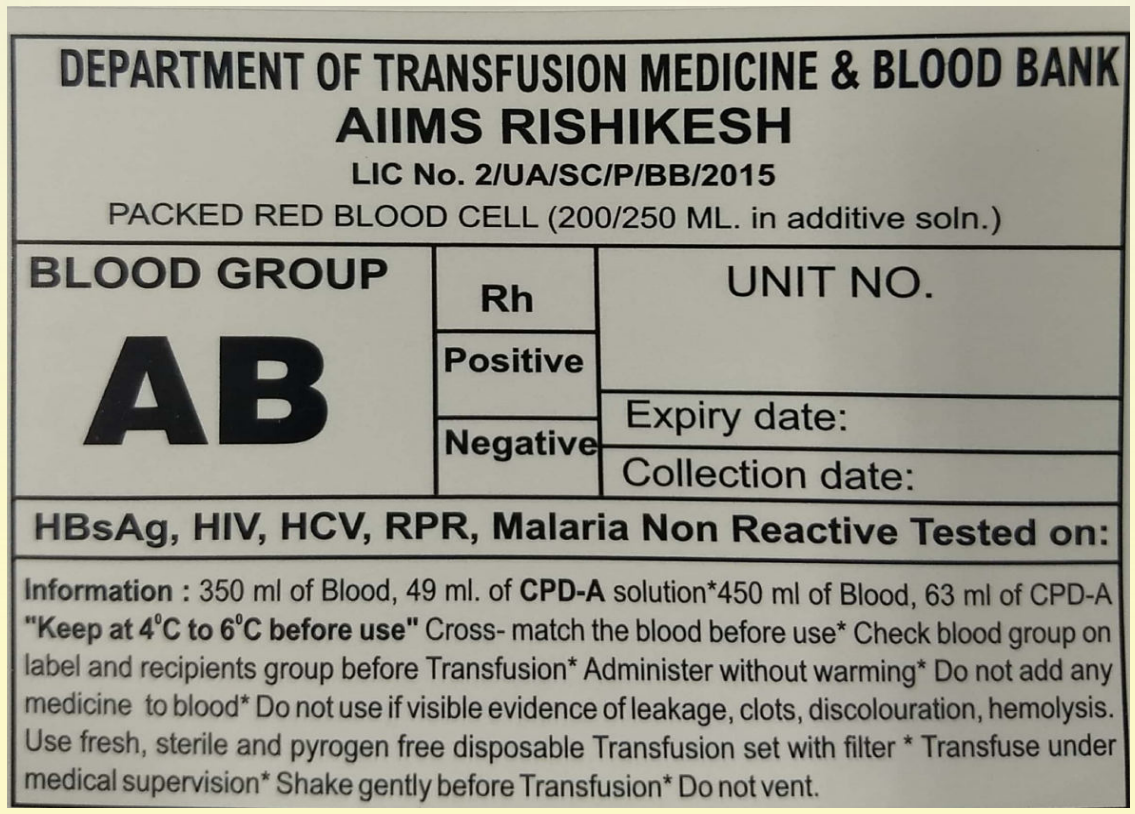
Rh
Positive
Negative

UNIT NO.
Expiry date:
Collection date:

HBsAg, HIV, HCV, RPR, Malaria Non Reactive Tested on:

Information : 350 ml of Blood, 49 ml. of **CPD-A** solution*450 ml of Blood, 63 ml of CPD-A **"Keep at 4°C to 6°C before use"** Cross- match the blood before use* Check blood group on label and recipients group before Transfusion* Administer without warming* Do not add any medicine to blood* Do not use if visible evidence of leakage, clots, discolouration, hemolysis. Use fresh, sterile and pyrogen free disposable Transfusion set with filter * Transfuse under medical supervision* Shake gently before Transfusion* Do not vent.

WHITE – 'AB' BLOOD GROUP



DEPARTMENT OF TRANSFUSION MEDICINE & BLOOD BANK
AIIMS RISHIKESH
LIC No. 2/UA/SC/P/BB/2015
PACKED RED BLOOD CELL (200/250 ML. in additive soln.)

BLOOD GROUP
AB

Rh
Positive
Negative

UNIT NO.
Expiry date:
Collection date:

HBsAg, HIV, HCV, RPR, Malaria Non Reactive Tested on:

Information : 350 ml of Blood, 49 ml. of **CPD-A** solution*450 ml of Blood, 63 ml of CPD-A **"Keep at 4°C to 6°C before use"** Cross- match the blood before use* Check blood group on label and recipients group before Transfusion* Administer without warming* Do not add any medicine to blood* Do not use if visible evidence of leakage, clots, discolouration, hemolysis. Use fresh, sterile and pyrogen free disposable Transfusion set with filter * Transfuse under medical supervision* Shake gently before Transfusion* Do not vent.

IN THE WARDS/ OT

PRBC

- ✓Get the component issued only when the need for transfusion arises.
- ✓Transfusion should be started within 30 min of issue.
- ✓Transfusion should be completed in 4 hours.
- ✓If any delay in transfusion is there, unit should be sent to blood bank for storage

Platelets

- ✓Should never be placed in refrigerator
- ✓Should be transfused as soon as possible after issue
- ✓Transfusion should be completed in 20-30 min

Fresh frozen plasma

- ✓Should be transfused as soon as possible after issue.
- ✓Transfusion should be completed in 20-30 min

Monitoring Of The Patient

Before starting transfusion:

- Record baseline vital signs and assessment before starting each unit
- Temperature
- Blood pressure
- Pulse
- Respiratory rate
- Oxygen saturation if available
- Auscultation for patients at risk for overload (elderly, paediatric, cardiovascular disease)

After Starting Blood:

For the first 15 minutes:

- Start initially with a slow rate (1-2ml/min or 60-120 ml/hr) unless transfusion is extremely urgent.
- Monitor your patient closely.

After the first 15 minutes:

- Reassess your patient and repeat vital signs.
- Increase flow to prescribed rate (2-4ml/min or 120-240 ml/hr) if no reaction observed.

Monitor the patient

- At least every hour during transfusion
- On completion of the transfusion
- 4 hours after completing the transfusion

Patient's Blood Transfusion Notes

When blood is transfused, it is important to keep detailed records including the following in the patient's notes:

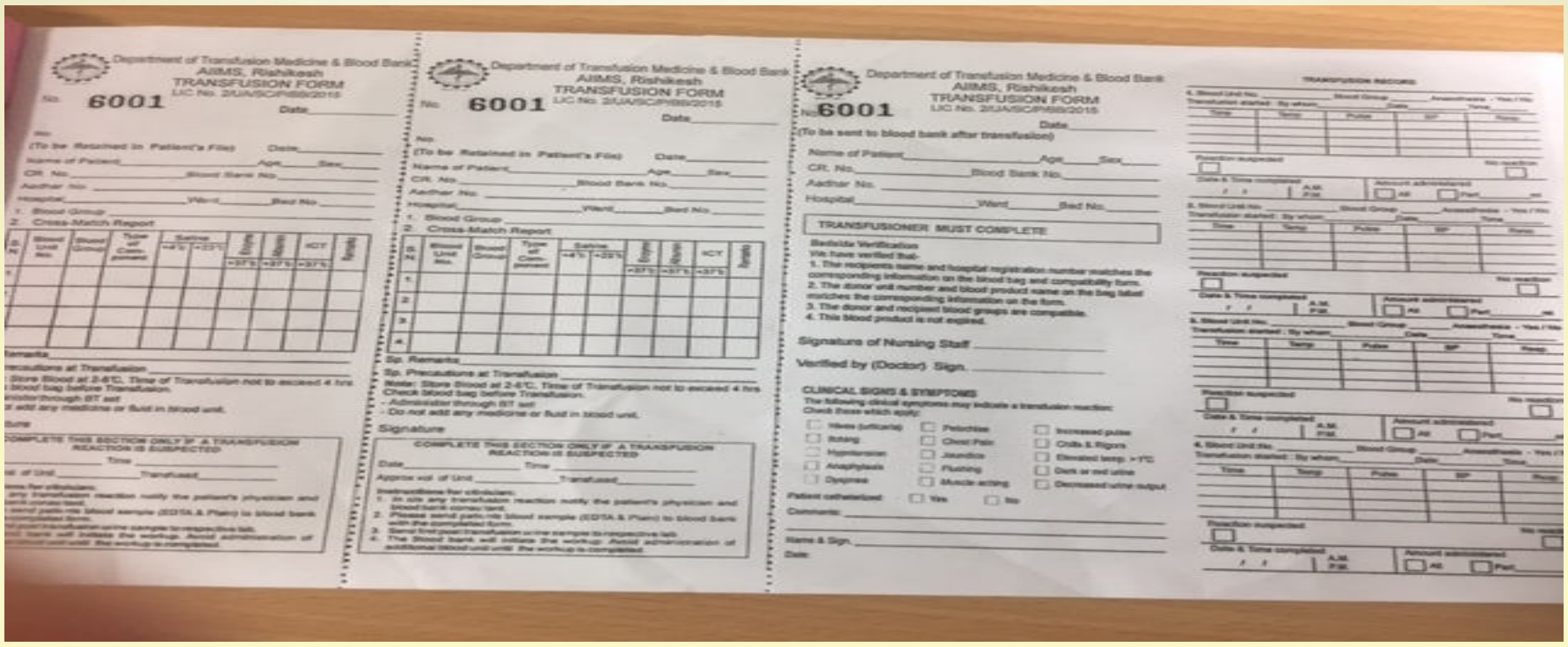
- **Type and volume of each unit transfused.**
- **Unique donation number of each unit transfused.**
- **Blood group of each unit transfused.**
- **Time at which the transfusion of each unit commenced.**
- **Signature of the individual responsible for administration of the blood.**

Patient's Blood Transfusion Notes

- ❖ Monitor the patient before, during and on completion of the transfusion.
- ❖ Record the time of completion of the transfusion.
- ❖ Identify and respond immediately to any adverse effect, by stopping the transfusion.
- ❖ Record the details of any transfusion reaction.

- *Any transfusion reaction should be documented*
- *Return the transfusion form to the blood bank*

Compatibility/ Reaction Form


Department of Transfusion Medicine & Blood Bank
AIIMS, Rishikesh
TRANSFUSION FORM
No. 6001
Date
(To be Retained in Patient's File)
Name of Patient
Age Sex
CR. No.
Blood Bank No.
Aadhar No.
Hospital
Ward Bed No.
1. Blood Group
2. Cross-Match Report
Sp. Remarks
Sp. Precautions at Transfusion
Signature
COMPLETE THIS SECTION ONLY IF A TRANSFUSION REACTION IS SUSPECTED
(To be sent to blood bank after transfusion)
TRANSFUSIONER MUST COMPLETE
Bedside Verification
We have verified that-
1. The recipients name and hospital registration number matches the corresponding information on the blood bag and compatibility form.
2. The donor unit number and blood product name on the bag label matches the corresponding information on the form.
3. The donor and recipient blood groups are compatible.
4. This blood product is not expired.
Signature of Nursing Staff
Verified by (Doctor) Sign.
CLINICAL SIGNS & SYMPTOMS
Patient catheterized
Comments
Name & Sign.
Date
TRANSFUSION RECORD

WARMING BLOOD

- There is no evidence that warming blood is beneficial to the patient when transfusion is slow.
- At transfusion rates of greater than 100 mL/minute, cold blood may be a contributing factor in cardiac arrest.
- However, keeping the patient warm is probably more important than warming the blood.

Indications

Warmed blood is most commonly required in:

1. **Large volume rapid transfusions:**

- Adults: more than 50 mL/kg/hour.
- Children: more than 15 mL/kg/hour.

2. **Exchange transfusion in infants.**

3. **Patients with clinically significant cold agglutinins.**

- Blood should only be warmed in a blood warmer. Blood warmers should have a visible thermometer and an audible warning alarm and should be properly maintained.
- Blood should never be warmed in a bowl of hot water as this could lead to haemolysis of the red cells which could be life - threatening when transfused.

References

1. THE APPROPRIATE CLINICAL USE OF BLOOD AND BLOOD PRODUCTS. Information Sheet for Clinicians. Blood Transfusion Safety Department of Essential Health Technologies World Health Organization, 2006.
2. Technical Manual, AABB. 18th edition

“DONATE BLOOD SAVE LIVES”

Thank you