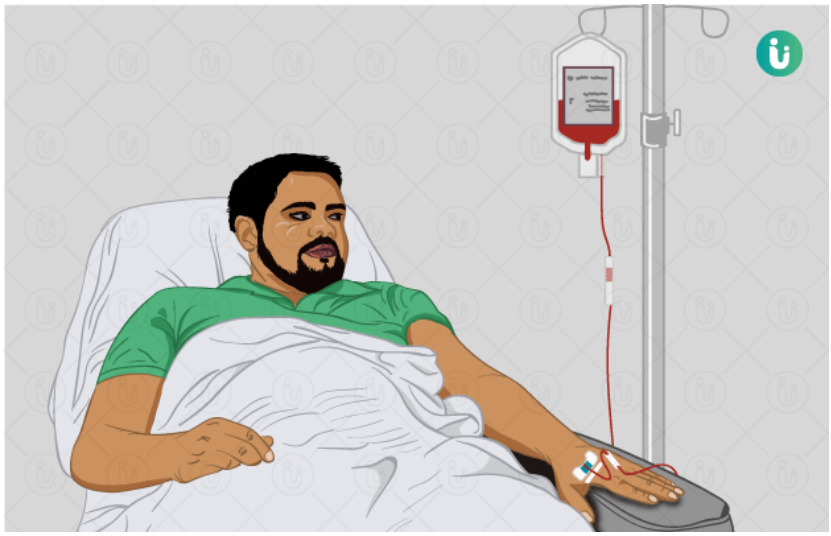
BLOOD TRANSFUSION



⁎ Collection and storage :

- Blood is collected into a **anticoagulant citrate dextrose** solution to preserve viability of RBCs during storage .
- Each blood bag contains **70-100** ml of citrate dextrose solution and **400-450** ml of blood
- Blood should be stored at **4^0C**

⁎ Indications & Types:

Type	Indication	Precautions	Storage life
Fresh whole blood	Coagulation defect & liver diseases	ABO & Rh	4-6 hours after donation
Stored whole blood	Class III & IV hemorrhage	ABO & Rh	21 days
Packed red cells	Severe anemia, children & cardiac patient.	ABO	21 days
Fresh frozen plasma	Coagulation defect & liver dysfunction	ABO	1 year at -40^0c
Platelet concentrates	Thrombocytopenia	ABO	24-72 hours
Cryoprecipitate (prepared from fresh frozen plasma)	Haemophilia A and hypofibrinogenaemia.	ABO	1 year at -40^0c
Factor VIII concentrates	haemophilia A		2 years
Factors IX concentrates	haemophilia B		2 years
Human albume 5% or 20%	Hypoalbuminaemia & liver dysfunction		4 years

* **Complications of Blood Transfusion:**

A) To the donor:

1. **Neurogenic shock** and collapse during withdrawal of blood.
2. **Haematoma** and **thrombophlebitis.**
3. **Anaemia:** Not more than 500 C.C. are taken from the donor every 6 months.

B) To the recipient:

I) Transmission of diseases: This is most serious complication

a) Viral hepatitis: Virus B or C hepatitis can be transmitted by whole blood or its products. (See medicine),

b) Human Immunodeficiency Viruses: (HIV types I & II) responsible for acquired immunodeficiency syndrome (AIDS) can be transmitted by whole blood or its products (See medicine).

c) Malaria, syphilis and brucellosis (see medicine).

d) Bacterial contamination: Due to faulty storage or warmth of blood many hours I before use → presents by septic shock (see shock).

II) Immunological complications :

- **Against RBCs → Acute haemolytic reaction .**
- **Against WBCs → Pyrogenic reaction .**
- **Against platelets → Purpura .**
- **Against plasma proteins → Allergic reaction .**

a) Acute haemolytic reactions:

- It is **due to** presence of antibodies in the recipient's blood against antigens of the donor's blood .

- Due to **incompatible** transfusion or blood is **haemolysed** by improper storage or over heat.
- Due to modern precautions, it is a **very rare** complication.
- Symptoms appear after transfusion of 25 - 50 ml.
- **Clinical picture :**
  1. The **initial symptoms** are sensation of heat & pain along recipient vein.
  2. **Rapid onset** of flushing of face, chills, fever, dyspnea, a sense of constriction & pain in the chest, loin pain, tachycardia and hypotension.
  3. In **anaesthetized patients**, the warning signs are abnormal bleeding and continued hypotension despite adequate replacement.
  4. **After few hours**: Mild tinge of jaundice appear and urine becomes dark brown with haemoglobinuria.
  5. **In severe cases**: Urticarial rash, anaphylaxis, marked jaundice and anuria due to acute tubular necrosis (see medicine).
- **Management:**
  1. **Stop** transfusion.
  2. Donors blood with new blood samples are sent to the **blood bank** for typing & matching.
  3. Urine & blood sample for **laboratory** exam.
  4. **Antihistaminics** I.M. & **Hydrocortisone** I.V.
  5. **Antishock measure & Lactate Ringer**.
  6. **Foley's catheter** is inserted to observe urine output .
  7. **Diuresis** by IV mannitol.

8. Alkaline the urine by **sodium bicarbonate I.V**.

9 .Proper management of **acute renal failure** if occur.

b) Pyrogenic reactions:

- Nowadays, this is the **commonest** complication of blood transfusion
- In patients receiving repealed transfusion (e.g. haemolytic anaemia) → presence of recipient antibodies against donor's white blood cells .
- **Clinical picture:** The patient develops chills , fever , headache , nausea and vomiting .
- **Management:** Stop transfusion, antihistaminics, corticosteroids , paracetamol & use of packed RBCs .

c) Post-transfusion purpura :

- In patients receiving repealed transfusion (e.g. haemolytic anaemia), they develop antibodies to donated platelets.

d) Allergic reaction :

- In patients receiving repealed transfusion, antibody in the recipient blood develops against protein in donor's plasma.
- **Clinical picture :**
  1. **Mi1d cases:** itching and urticaria.
  2. **Severe cases:** Anaphylactic shock, laryngeal oedema and collapse.
- **Management:** Stop transfusion, antihistaminics & corticosteroids.

III) Thrombophlebitis of the recipient vein due to prolonged transfusion.

IV) Air embolism

V) Transfusion related acute lung injury: (rare)

- **This is due to** incompatibility between donor's antibodies and recipient granulocytes.
- It gives a clinical picture similar to **adult respiratory distress syndrome.**

VI) Complications of massive transfusion: (More than 5 liters over 24 hours or 2.5 liters at one time).

1. Hypothermia: which may lead to cardiac arrest .

2. Acute congestive heart failure due to overloading of circulation due to **rapid** transfusion or **excessive** transfusion especially in **elderly or cardiac** patients .

- **C/P & Management:** (See medicine).

3. Hyperkalaemia: Due to transfusion of several units of aged blood → cardiac arrhythmia or arrest and may precipitate hepatic coma in cirrhotic patients.

4. Acidosis may occur in case of massive transfusion with stored blood.

5. Citrate intoxication: → precipitates ionized Ca → affecting heart contraction and blood coagulability .

- **Management:** 10 ml of 10% Ca gluconate I.V for each 2 unites of blood .

6. Hypocalcaemia.

7. Disturbance of blood coagulation: Due to **dilution** of clotting factors and platelets by massive transfusion of stored blood or disseminated intravascular coagulation (**DIC**) following incompatible transfusion. .

- **Management:** It is recommended to give one unit of fresh frozen plasma and platelets for every unit of stored blood.

* **Precautions to avoid complications of blood transfusion :**

1. Autotransfusion: is recommended to minimize the need for homologous blood transfusion. This is achieved by 2 different methods:

a. Intra-operative blood salvage: Patient's blood is collected during operation → filtration by special apparatus (cell - saver) → reinfused.

b. **Self donation:** Patient may donate blood before operation → stored → reinfused to the patient during or after operation.

2- Careful examination & selection of **blood donors .**

3- Testing of blood for the presence of any disease before transfusion.

4- Blood transfusion should be **strictly homologus** for ABO groups and for Rh group.

- However, **group O Rh -ve** can be used as a **universal donor** during emergency.

5- Sterilized apparatus & bags to **avoid bacterial contamination**.

6- Warm the blood by **special warming unit** to avoid hypothermia but do not over heat.

7- Do not leave blood out of the refrigerator for more than 30 minutes.

8- Blood should be **stored at 4°C** & not more than **21 days**.

9- **Avoid over transfusion** by continuous observation **CVP** and **urine output** during transfusion & the use of packed RBCs in elderly & cardiac pt.

10- Rate of transfusion:

- **In acute blood loss**: 100 ml/min. to rise BP. to 100mm Hg then 80 ml/min.
- In **chronic blood loss** 30 drop/min.