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IFTM University, Moradabad, Uttar Pradesh

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# E-Content

# IFTM University, Moradabad

# Topic: Blood bank – basic requirements and functions

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# What is Blood Bank?

- Blood is collected, stored, tested, & separated for use in transfusions and other medical operations in a blood bank.

- Generally speaking, a "blood bank" is a section of a hospital where blood products are stored and appropriate testing is carried out (to lower the risk of transfusion associated adverse events).

- However, some hospitals also carry out collecting, and it can also refer to a collection facility.

- **The following tasks are included in blood banking:**

1. Blood collection;
2. Processing;
3. Testing;
4. Separation and
5. Storage.

# What is Blood?

- The fluid called blood flows throughout the body, delivering nutrients & oxygen to cells & organs while also eliminating waste.
- A red fluid that permeates every part of our body.

- Life is not possible without blood. Our blood flows throughout our body, supplying the cells with vital elements like oxygen & nourishment.

- Additionally, it moves waste products from metabolism out of those same cells.

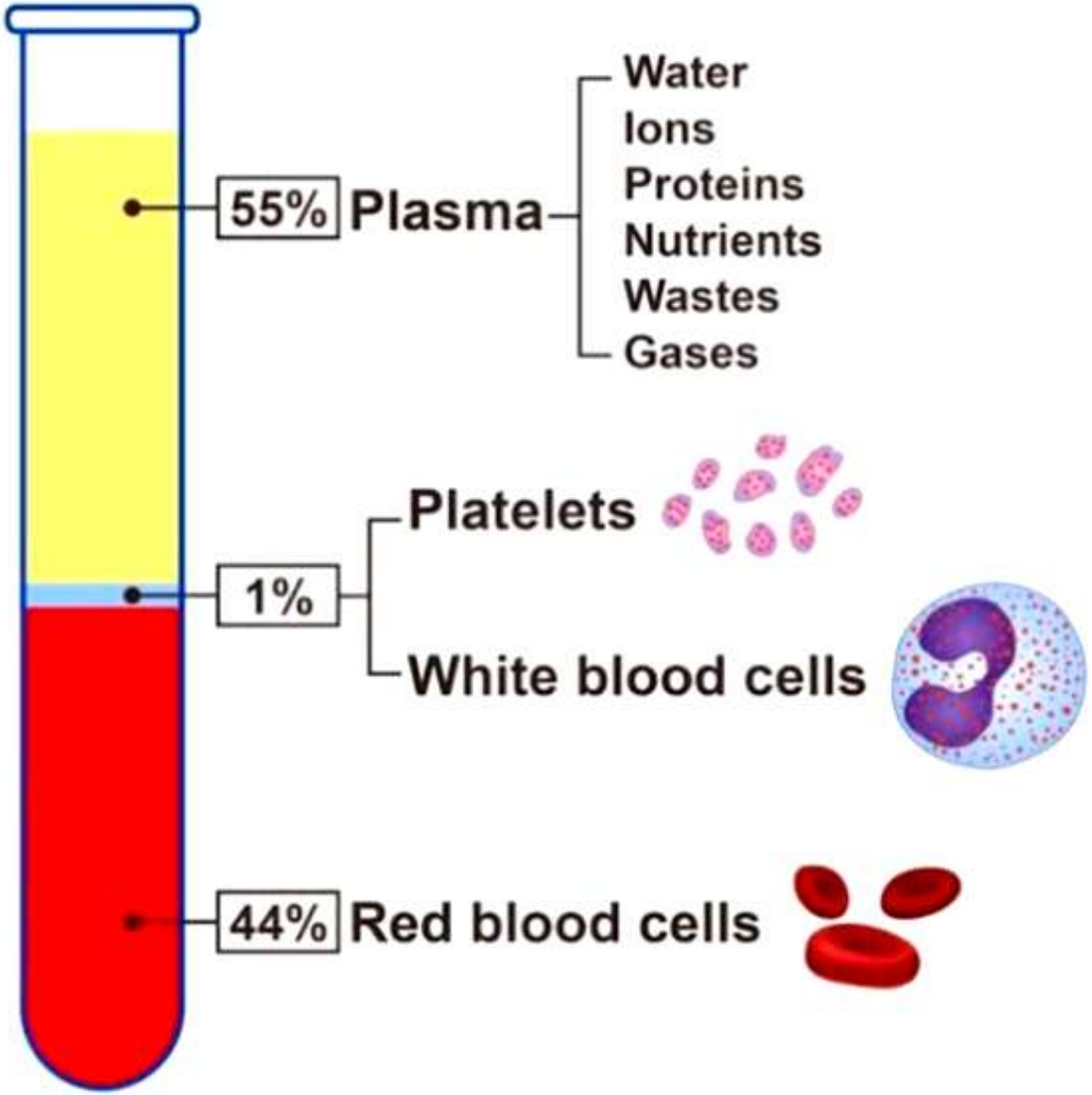
- There is no alternative to blood. It cannot be manufactured or produced.

- The sole supply of blood available to people in need of a transfusion is generous blood donors.

# BLOOD COMPONENTS

There are four basic components that comprise human blood:

1. Plasma
2. Red blood cells
3. White blood cells and
4. Platelets.


55%
Plasma
Water
Ions
Proteins
Nutrients
Wastes
Gases
1%
Platelets
White blood cells
44%
Red blood cells

## 1. Plasma

- Your blood's liquid component is also known as plasma.

- Plasma is primarily composed of water and has a yellowish hue. However, it also contains salts, proteins, carbohydrates, & hormones.

- It delivers nutrients & water to the tissues in your body.

## 2. Red blood cells

- These cells are frequently employed to treat anemia because they transport oxygen to the body's tissues.

- Between 40 & 45 % of your blood volume is made up of red blood cells.

- Your bone marrow produces them at a pace of four to five billion each hour.

- Their life's in the body is approximately 120 days.

## 3. White blood cells

- These cells support the immune system and combat illness.
- Despite making up only around 1% of your blood, WBC, or leukocytes, are crucial.
- Good health and defense against sickness and illness depend on white blood cells.
- Your bone marrow is continuously producing them, just like RCB.
- They assault foreign substances like bacteria & viruses as they circulate through the circulation.
- To spread the battle into tissue, they can even exit the circulation.

## 4. Platelets

- Your blood's platelets are an incredible component.
- In their inactive state, platelets, the tiniest of our blood cells, resemble tiny plates.
- Bleeding is controlled by platelets.
- The blood vessel will send out a signal wherever there is a cut.
- After getting that signal, platelets move to the location and change into their "active" state, developing extended tentacles to attach to the vessel and clustering to seal the wound until it heals.
- They are used to treat leukemia and other types of cancer and aid in blood coagulation.

# TYPES OF BLOOD GROUP

| | |
|---|---|
| O Rh-Positive | O Rh -Negative |
| A Rh-Positive | A Rh-Negative |
| B Rh-Positive | B Rh-Negative |
| AB Rh-Positive | AB Rh-Negative |

# TYPES OF BLOOD GROUP

- The ABO blood group system was discovered in 1900 by the Austrian scientist **Karl Landsteiner.**

- Who mixed blood types in his experiments and observed that the plasma from some blood types produced agglutinates or formed clusters, which were caused by the absence of molecules on red blood cells (RBC) & resulted in antibodies to defeat that molecule.

- After noting the agglutination, he separated the blood types into four categories.

- He received the Nobel Prize for discovering the ABO blood group.

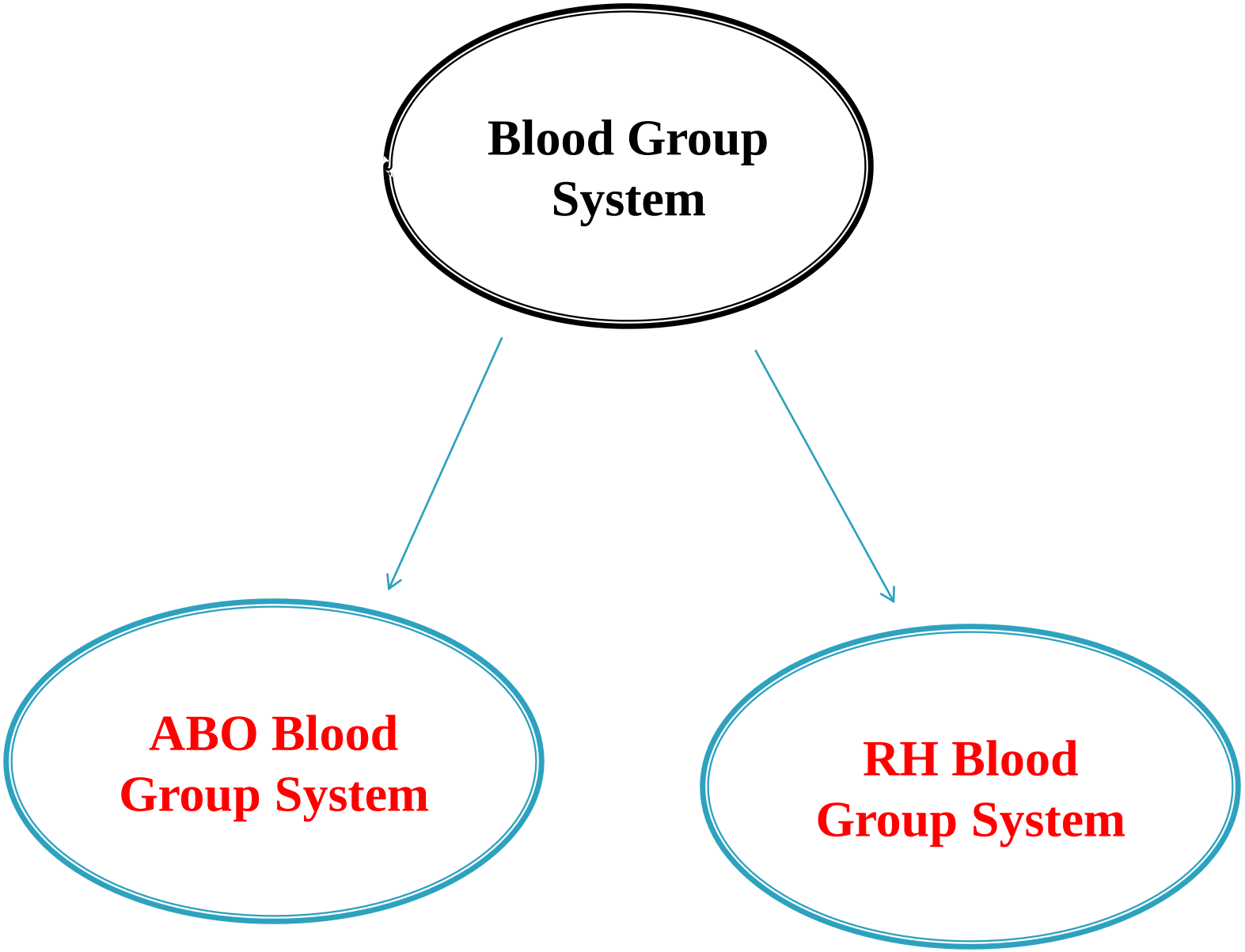
- In blood transfusion, the blood grouping system is essential.

# TYPES OF BLOOD GROUP

- If another blood type is brought into the body, our immune system attacks it because it perceives it as alien, leading to a transfusion reaction.

- The most severe and potentially fatal transfusion responses occur when the Rh and ABO blood types are not matched.

- Therefore, it is advised to have a blood group analysis done prior to receiving a blood transfusion.


Blood Group System
ABO Blood Group System
RH Blood Group System

## 1. The system of ABO Blood Groups

- Antigens A and B serve as the foundation for the ABO classification system.

- Based on the presence or lack of plasma antibodies and antigens on the surface of red blood cells, the ABO grouping system is divided into four categories.

1. Antigen A and antibody B are present in group A.

2. Antibody A and antigen B are present in group B.

3. Group AB has neither A nor B antibodies but both A and B antigen.

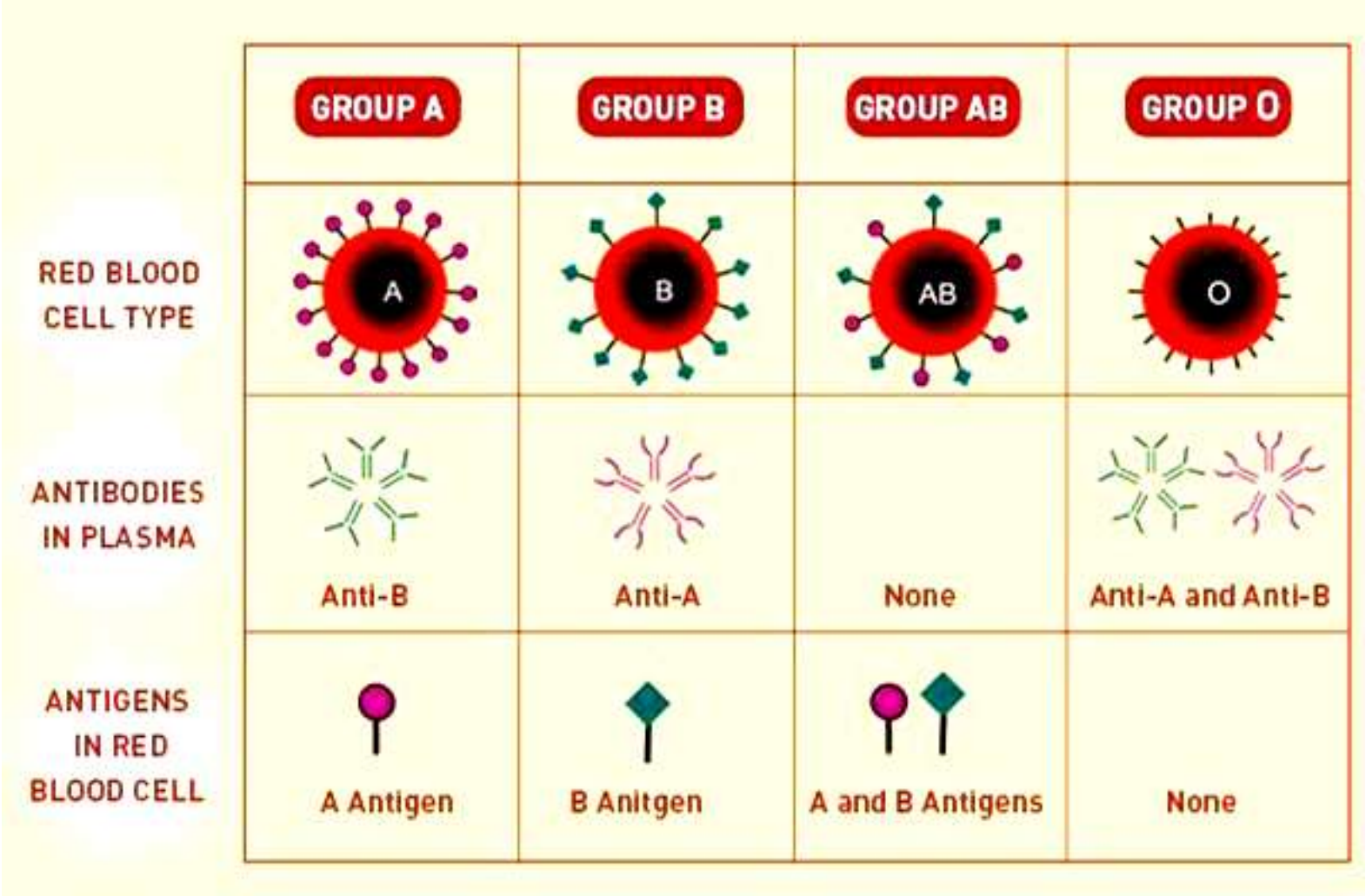
4. Group O has both antibodies A & B but no A or B antigen.

- When donating or receiving blood, the ABO group system is crucial since a mismatched blood group can cause red blood cells (RBC) to clump together and cause a number of illnesses.

- Donor-recipient compatibility, or the matching of blood cells, is essential during transfusion.

- For instance, because blood group A lacks antibodies for both A and O, a person with blood group A may receive blood from either group.

# 1. ABO Blood Group System



## 2. System of Rh Blood Groups

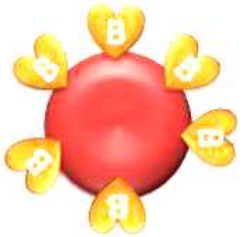
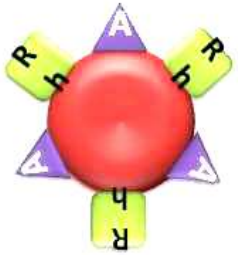
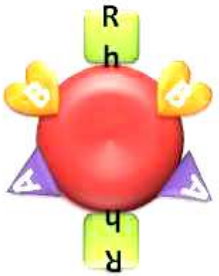
- The Rh blood group system is another well-known blood grouping system in addition to the ABO system. The third antigen, known as Rh factor or Rh antigen, is present on the surface of RBC in roughly two-thirds of the population;

- Whether the blood group is positive or negative is determined by this.

- A person is rhesus positive (Rh + ve) if the Rh factor is present; if it is not, they are rhesus negative (Rh-ve) since they make Rh antibodies.

- Thus, compatibility between the individual and the donor is also very important in this situation.

# 2. Rh Blood Group System

| | | | |
|---|---|---|---|
| O- | A- | B- | AB- |
|  |  |  |  |
| O+ | A+ | B+ | AB+ |
|  |  |  |  |

# REQUIREMENT OF BLOOD BANK

1. Space
2. Manpower
3. Electricity
4. Equipment
5. Consumables
6. Disinfectants
7. Storage
8. Transportation - Cold Chain

# REQUIREMENT OF BLOOD BANK

**1.Space**: Just 10 square meters of clean, well-lit, and ideally air-conditioned space are needed to set up the facility.

**2.Manpower**: No additional employees are needed at this time. For this, one of the current medical professionals and technicians ought to be assigned. They should receive training on how blood storage facilities operate as well as other fundamental processes such blood storage, grouping, cross-matching, & release. The overall operation of the storage facility will be under the control of the medical officer assigned for this purpose.

**3.Electricity**: A consistent, round-the-clock source is necessary. A backup generator must be available.

**4.Equipment**: The following are necessary for every blood bank:

I. Refrigerators for blood banks that can hold 50 units of blood.

II. Deep freezer-frozen transportable ice packs.

III. Cold chain conveyance of blood bags using insulated caregiver boxes with ice packs.

IV. A centrifuge and microscope.

**5.Consumables:** There should be an adequate supply of consumables & reagents for blood grouping. Glass tubes, glass slides, test tube racks, rubber teats, gloves, tissue or blotting paper, an alcohol-based marker pen, toothpicks, and a Pasteur pipette are a few accessories.

**6.Disinfectants:** Use hypochlorite solution and bleach as necessary.

## 7. Storage:

I. The storage facility should check the condition of the blood upon receipt from the mother blood bank and during the duration of storage.

II. Cross-matching and storage. The storage center will be in charge of any transfusion-related issues. or No blood unit should be stored for transfusion if it shows signs of hemolysis, turbidity, or color change.

III. Appropriate measures should be implemented to guarantee blood sterility by maintaining orderly storage areas.

IV. The average blood expiration time is 35–42 days, depending on the blood bags used.

V. New blood should be drawn and used blood bags should be sent back to the mother blood bank at least ten days before they expire.

## 8. Transportation - Cold Chain:

I. Insulated transport crates should be used to preserve the cold chain during the transfer of blood from the mother blood bank to the blood storage facility till the blood issue.

II. For transportation, the blood needs to be properly packed in cold boxes with ice packs all around. It is important to use clean ice and keep it away from blood bags.

III. Blood should be kept in the blood bank refrigerator between 4 and 6°C . Blood temperature must be continuously monitored.

**Cold Chain Transport Blood Bag**

# FUNCTION OF BLOOD BANK

1. Blood collection
2. Blood processing
3. Blood testing
4. Blood storage
5. Blood transfusion
6. Blood inventory management
7. Donor recruitment and retention
8. Research and development

# FUNCTION OF BLOOD BANK

Gathering, processing, testing, and storing blood & blood products for use in transfusion therapy is a blood bank's main duty. The following are some of the particular roles that a blood bank plays:

**1. Blood collection**: The blood bank uses blood drives or the blood bank itself to gather blood from willing donors. Sterile procedures and the proper collection tools are used to obtain the blood.

**2. Blood processing**: Following collection, the blood is processed to separate its constituent elements, including platelets, plasma, white blood cells, & red blood cells.

**3. Blood testing**: To guarantee that given blood is safe for transfusion, it must be examined for a number of infectious illnesses, including syphilis, HIV, & Hepatitis B and C.

**4. Blood storage**: To preserve the various blood components' viability and potency, the blood bank keeps them at the proper temperature.

**5. Blood transfusion**: The blood bank supplies hospitals and other healthcare facilities with blood & blood products for transfusion to patients in need of them as a result of a variety of illnesses, including cancer treatments, trauma, and surgery.

**6. Blood inventory management**: The blood bank keeps track of blood and blood products & makes sure there is a sufficient quantity on hand to satisfy community needs.

**7. Recruitment and retention of donors**: The blood bank aggressively encourages blood donation & frequent donations from donors.

**8. Research and development**: To address the changing demands of the medical community, the blood bank may carry out studies to enhance transfusion therapy & create new blood products.


THANK
YOU!