

Secure and Intelligent Blood Information System (SIBIS)

SIBIS user Interface

All stockholders must be vaccinated from — — —

4 1. Register in SIBIS system as SIBIS administrator or Blood Donor or Blood Recipient

a. SIBIS administrator → Profile update → Define the profile's components —

Or

b. Blood Donor → Profile update → Define the profile's components

Or

c. Blood Recipient → profile update → Define the profile's components

5 2. Login as an existing user → SIBIS administrator or Blood Donor or Blood Recipient

Option of updation of stockholder profile

6 3. SIBIS administrator

3a) Receive blood request from Blood Recipient → Open his login and password profile on first time request.

3b) Receive blood request from Blood Donor → Open his login and password profile on first time request.

3c) SIBIS administration task → 3c.1 Tasks related to blood bank storage management

- Table 3.1a (Non-Functional Requirements)

- Table 3.1b (Functional Requirements)

Table 3.1a

3.1a Blood Bank IS (BBIS) non-functional Requirements

The non-functional requirements for BBIS are:

- 2 Security.
- 3 Privacy according to WHO guide line

Encryption, Description, program authentication

x?

- 4 Intelligence Management of Blood Donors by age, and blood group. → and by components ✓
- 5 Intelligently organize the blood donor according to demand prediction and donor commitment in case of emergency availability. |||*

| Non-Functional Requirements | How to be implemented |
|---|-------------------------|
| Security | which algorithm → Book |
| Privacy | ? How to implement x |
| Management of Blood Donors by age, and blood group | more precise definition |
| Organize the blood donor according to demand prediction and donor commitment in case of emergency availability. | How to |

Ex. A blood group is more demand, has to deal with
 A " " is more required from hospital --- So on

Description of the non-functional requirements:

✓ 6 Security.

Donors blood donation records must be kept secure and confidential, protecting them from any threat posed by individuals with potential malicious intentions or any unforeseen hazards of the security of the data. The use of online blood donation system, which applies concepts on database security and encryption where the donor has to register and fill in a form if they want to donate. The person will be able to view all the details and records of all earlier donations and information on upcoming blood donation events. Blood bank refrigerators have password protection preventing unauthorized setting, hence the blood would not be tampered with. ✓

7 Privacy according to WHO guide line.

These are meant to keep information secure and help strengthen national health information systems. They are used during data collection, management, storage and use.

How to implement ✓

Table 3.1b

The following table will be functional requirements for the BBIS.

| Functional Requirements | How to be implemented |
|---|--|
| <p>1- Monitor the temperature variation, power failures in the blood storage room.</p> <p><i>due to the sensor I know the temp.</i> <i>if the temp. of blood less than → expire</i></p> | <p><i>what to do.</i></p> <p><i>Steps</i> <i>Algorithm</i></p> |
| <p>2- Blood handling:</p> <p><i>by SBIS</i></p> <p>a. Health of Refrigerator. b. Health of Blood bank employees c. Hardware life, d. Software upgrade, e. Medical equipment needed.</p> | <p><i>procedure need to define.</i></p> |

The following is description of functional requirements of Blood Bank IS.

1- Temperature variation, power failures in the blood storage room.

Blood banks should always have a backup generator in case of power outage. There should be coolers where the blood samples are temporarily stored in. Ice packs and insulating materials like bubble wrap could be used to prevent the blood samples from being affected in the event of an outage.

*clear definition
require
how to
implement.*

2- Blood handling

7.1 Health of Refrigerator.

Packed red blood cells are stored in a blood bank refrigerator at a temperature of 1-6 degree Celsius until issue. The shelf life is 42 days from the day of collection. There is a team of lab assistants who are responsible for cleaning, using bleach cleaner, the interior and exterior of each laboratory refrigeration device to remove residue and keep all surfaces clean. One shelf or area needs to be cleaned at a time to minimize temperature change impact of removing those products from the refrigerator. In the event of a malfunction, it needs to be taken out of service for repair, its contents are transferred to another refrigerator that is monitored and maintained under the same standards.

*clear definition
require
How to
implement.*

7.2 Health of Blood Bank employees.

Health workers should sanitize when they enter and leave the blood bank premises. Personal Protective Equipment that includes gloves, a lab coat and goggles are necessary especially during handling of the blood (Jessop et al., 2020). In case a health worker has some health issues, he or she should be temporarily suspended from the post to avoid contaminating the blood.

7.3 Hardware life.

They should be in proper condition such that they do not have any deformities or any malfunction. They should be used according to the manufacturer's instructions, especially their lifespan. In case the equipment has been disposed, the new one replacing it should be able to offer the same services as the later.

7.4 Software upgrade.

This includes updating any software that is used to run the devices in the blood bank. This helps to prevent hacking and the software of being attacked with computer viruses.

7.5 Medical equipment needed.

Blood Collection equipment-these are used when collecting blood from donors.

Platelet Storage Equipment- are used by clinicians and researchers for platelet function analysis, the study of cell fragments that help control bleeding.

Plasma Thawing Equipment- they are used for thawing out and warming plasma, blood and stem cells.

Blood Bank Refrigerators-they is used to keep blood at low temperatures before they are administered to those who need the blood.

Plasma Storage Freezers- they are highly insulated designed to maintain samples at low temperatures for long-term storage at -30 to -40 degree Celsius.

ULT Freezers-used for long-term storage of various biological items like viruses and bacteria at temperatures below -80 degree Celsius.

Contact Shock Freezers-are designed to fast freeze plasma in compliance with medical standards.

- 3- An individual who has received Covid-19 vaccine is not eligible to donate plasma. That is because the donors should be symptom free and can be able to safely donate blood.

How to
implement

traceability. Additional primary labels are also used in the processing facility, e.g., in a blood bank or in a hospital. Once blood has been collected, blood bags must be labeled and barcoded with important information, such as blood type and donor number. The adhesive used on such labels shall not alter or damage the composition of the blood products. Primary Blood Bag Adhesive has been approved by ISEGA and complies with ISO 3826 for direct labeling of blood bags. [37]

As a part of improvements considered in our project, is proposing a new labeling and barcode system for blood packs in the blood banks and hospitals. The new labeling system for blood packs consisted of 13 digits, first three digits represent the City, second two digits for blood type, 2 digits for month or production, 2 digits for year of production, last 4 digits as sequence number as illustrated in figure2.



Figure 2 innovative blood barcode number

5- Management of Blood Components (4 Components).

Blood is a specialized body fluid. It has four main components: plasma, red blood cells, white blood cells, and platelets. Blood has many different functions, including:

- Transporting oxygen and nutrients to the lungs and tissues
- Forming blood clots to prevent excess blood loss
- Carrying cells and antibodies that fight infection
- Bringing waste products to the kidneys and liver, which filter and clean the blood
- Regulating body temperature

6- Blood components are

1. Plasma.
2. Red Blood Cells (called as erythrocytes or RBCs)
3. White Blood Cells (also called leukocytes)
4. Platelets (also called thrombocytes)

*Configuration
definition
sequence.*

Future work

Implementation?

*How to
implement*

1.2 Donor Requirements in detail:

*Donor user
interbamer
check list*

| Category | Criteria / Description / Example | Recommendation |
|----------------------------------|---|--|
| ✓ 1. Age | Lower Age: 18 years | <ul style="list-style-type: none"> Where permitted by national legislation or in se lower age limit of 16 or 17 years for blood donation. The usual lower age limit for blood donation is 1 |
| | Upper Age Limit: between 60 - 70 | <ul style="list-style-type: none"> First-time donors older than 60 years and re donors over the age of 65 may may are accepted discretion of the responsible physician |
| ✓ 2. Weight | Donors should weigh at least 50 kg. | <ul style="list-style-type: none"> Prospective donors of whole blood donations weigh at least 45 kg to donate 350 ml \pm 10% or kg to donate 450 ml \pm 10% or Prospective donors of apheresis platelet or pl donations should weigh at least 50 kg or Prospective donors of double red cell apheres donations should have an estimated blood vo more than 5 liters; this requirement is general by non-obese individuals weighing more than or |
| ✓ 3. Frequency of blood donation | The min interval between donations of whole blood should be: <ul style="list-style-type: none"> Males: 12 weeks Females: 16 weeks | <ul style="list-style-type: none"> The minimum interval between donations of blood should be 12 weeks for males and 16 v females The minimum interval between donations of should be 4 weeks or The minimum interval between donations of should be 2 weeks or The minimum interval before an apheresis pl plasma donation should be 4 weeks following |

blood donation, an apheresis red cell donation
failed return of red cells during apheresis

4. Donor Health

Prospective donors should be accepted only if they appear to be in good health and comply with donor selection criteria.

*Definition
require*

5. Diabetes Mellitus

- Individuals with diabetes mellitus well controlled by diet or oral hypoglycemic medication are accepted.
- Diabetes who requires insulin are not accepted.

Accept

Individuals with diabetes mellitus well-controlled by diet hypoglycemic medication, provided they have no history orthostatic hypotension and no evidence of infection, neu vascular disease, in particular peripheral ulceration

Defer permanently

Individuals with:

- Diabetes who require insulin
- Complications of diabetes with multi-organ involvement.

*Blood test
Implementation
Definition*

6. Inactivated Vaccines

- Non-live vaccines and toxoids include cholera, diphtheria toxoid, hepatitis B, human papillomavirus (HPV), in uenza, meningococcal meningitis, pertussis, pneumococcal, polio (injected), rabies, tetanus toxoid, tick-borne encephalitis and typhoid.
- HBV is an exception as vaccination may cause transient HBsAg positivity. A 14-day deferral is therefore recommended provided the donor has not

Accept

Individuals who have received non-live vaccines and tox (the exception of HBV vaccine) with no history or known and who feel well

Defer

Individuals with no known exposure to hepatitis B who h recently received routine vaccination: defer for 14 days

*How to
Implement.
Procedure
require*

been exposed to infection

Recipient Requirements

X

| Functional Requirements | How to be implemented |
|--------------------------------------|-----------------------|
| Register in the Website | |
| Login as an existing user | |
| View his/her profile | |
| View hospitals / Blood Banks profile | |
| Submit request for blood | |
| Contact the blood donor | |

Recipient functional requirements

→ Definition require + implementation procedure

Please include the recipient requirement from WHO: quality of blood guideline. Blood glucose level monitor, Hemoglobin level.

Please provide detail

Recipient non-functional Requirements

The non-functional requirements for Recipient are:

| ?

- Security
- Privacy

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| Non-Functional Requirements | How to be implemented |
|-----------------------------|--|
| Security | Very clear mythology need to be define about security in cooperation |
| Privacy | Very clear mythology need to be define about privacy in cooperation |