

# The Dawn of High Tech Blood Transfusion Services in Assam, India

**E- Blood Bank: A Completely Automated Web based Blood Bank Management Information System in 26 No. of Govt. Blood Bank, including six Medical Colleges of Assam,India**

**Dr. Prasanta Kr Baruah**

Associate Professor of Pathology, Guwahati Medical College & Hospital; Deputy Director of Blood Safety, Assam State AIDS Control Society, Guwahati, Assam, India

**Abstract:** E-blood bank is an integrated system which manages all the blood bank activities starting, blood collection from voluntary donors or replacement donors to the issue of the blood units to patients on requisition, along with alerts and acknowledgement mechanism for Donors and blood bank users. This is an effective management tool for both, Individual Blood Banks and Multiple Blood Banks by interconnecting all into a single network. Also citizen can avail the blood stock availability status at their end through integrated SMS Facility. In Short: E-Blood Bank helps in Blood collection monitoring, Blood issue management, Stock management, Camp Management and User and system management. **Advantages:** All blood banks are in single Dashboard to provide the data base for all 26 no. of Blood Bank in the State with Principal control in the State Log-in Panel in Khanapara, Guwahati, Assam.

**Keywords:** Blood donation, E-Blood banking, web-based automation, State Log-in etc

## 1. E-Blood Bank Software

E-Blood Bank Software is a Blood tracking & tracing system which will ensure safety and accessibility of blood to the citizen within a minimal processing time in the State of Assam.

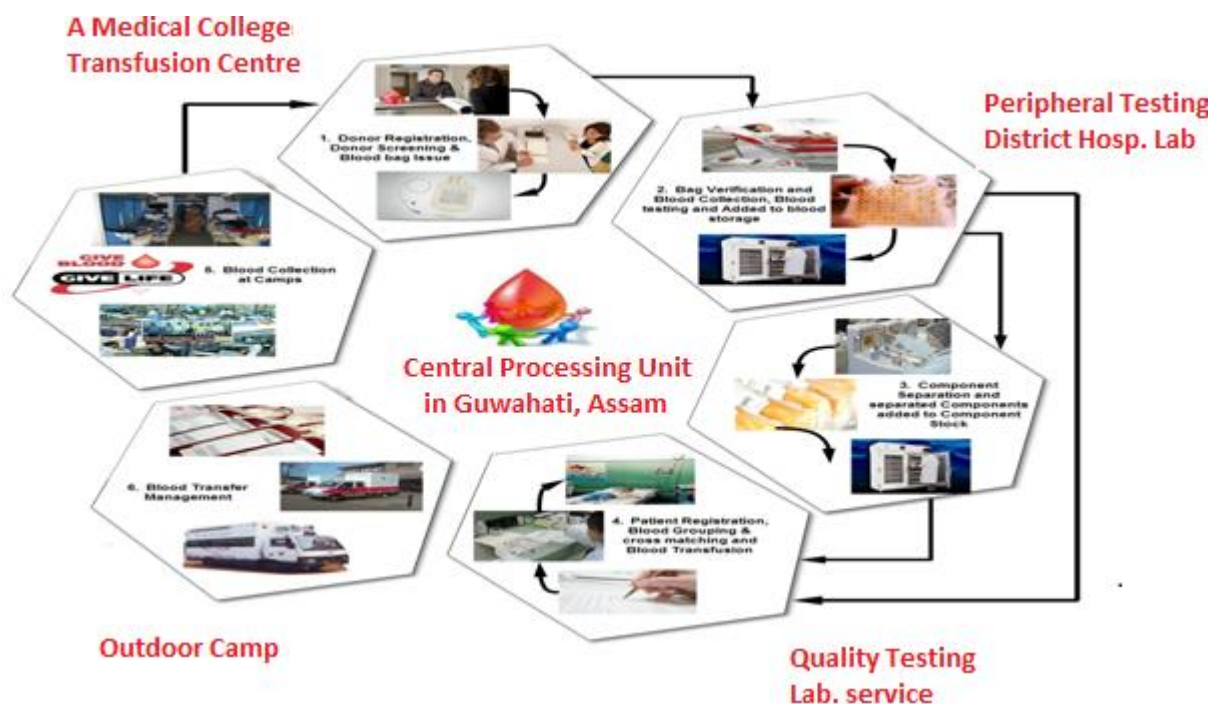
The proposed system will interconnect all blood banks located at different places in the state of Assam into a single network and a centralized database will be maintained.

The system is going to manage the entire activities from camp blood collection both from voluntary donors as well as in house voluntary donors and replacement donors till the issue of blood units.

The System will have facility to be integrated with other websites & applications if needed, so that necessary and important data can be shared all across the Government's Health vertical and important controls and Software is made available to key management under one umbrella.

The **E-Blood Bank Software** will help the public for easy access to the blood availability status of blood banks through web portal, which helps the citizens to reach out with the proper data of the availability of blood at any point of time they need.

## 2. Blood Bank Core Process: Life Cycle



### 3. Objective

The core objectives of the proposed system are as follows:-

**a) Ensure Safety:**

- To reiterate firmly the Govt. commitment to provide safe and adequate quantity of blood, blood components and other blood products to citizen
- Optimal utilization of the blood units before expiry.
- Proper Screening of donors with unique codes before collecting blood to ensure the quality.
- To maintain Centralized blood donor database for entire state.
- Proper management of blood & blood products including Kits & Consumables based on FIFO (First In First Out) order.
- Ensures 100% secure blood to citizen through proper testing process.
- To avoid human error by Eliza Reader integration in testing process.
- Blocking of days for blood donation can be made according to Gender (male donor can donate in 3 months interval and Female can donate in 4 months), Last date of donation and donation type (Whole blood / blood components) of donor.
- To encourage appropriate clinical use of blood and blood products.
- Proper management of Bio-waste materials of blood bank in an adequate manner.

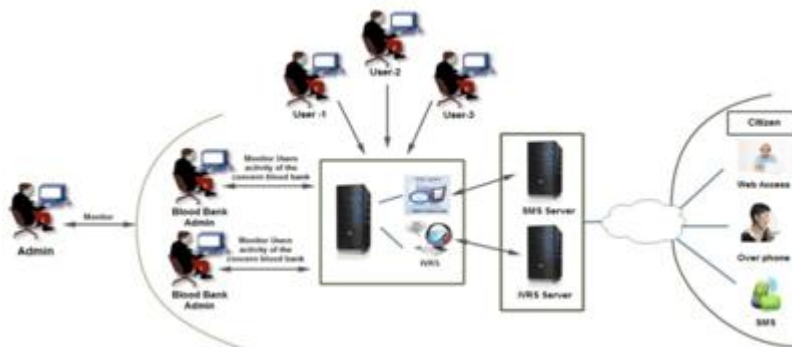
**b) Ensure Accessibility:**

- Provide a better transfusion service for needy blood seekers.
- To take adequate regulatory and legislative steps for monitoring and evaluation of blood transfusion services and to take steps to eliminate profiteering in blood banks.

- Access to verify the issued blood bags status online by citizen.
- Faster processing of service and management of blood inventory on emergencies.
- Real time information update and access of real time stock details online.
- To Provide Alerts and Acknowledgement mechanism for blood bank users to get alerts on expiry of inventory (both blood & blood products and blood bank consumables). Also system alerts on license expiry of blood bank license.
- To generate Required Prescribed reports relating to blood banking services on daily/ quarterly/ monthly/ yearly basis.

**c) Ensure Availability:**

- To make conveniently available good quality, safe blood & other blood components to citizen can be provided in a sound, ethical and acceptable manner, consistent with the long term well being of the citizen.
- Provide a centralized blood donor database for all blood groups as per requirement in emergencies.
- Actively encourage voluntary blood donor for donation, motivate and educate citizens on the benefits of blood donation.
- To serve as the site for interaction of best practices in reducing professional blood donors, blood hoax and help the state work more efficiently towards self-sufficiency in blood.
- To make latest IT technology available for operating the blood banking services and ensures its functionality in an effective manner.



**Advanced Feature**

- Barcode scanner & Printer for bar-coding of each blood unit to identify uniquely.
- Biometric device to take thumb impression of donor for unique identification.
- SMS Gateway integration to generate SMS alerts to donors & blood bank users for various purposes.

**Lets be united in our thoughts“**

- About e- Blood Bank
- Blood Transfusion services prior to e-blood bank.
- Background (Problems) and Pre system analysis.
- e-Blood Bank of Assam & Impacts of e-Blood Bank in Assam

**Advantages**

- State level Monitoring mechanism
- Latest Features yet to be implemented in e-Blood Bank
- Creation of ROSS Dashboard
- Press Releases, UAT and Photographs

**About E-Blood Bank Assam**

- The e-blood bank service, a web-enabled system for electronic monitoring of blood collection, testing, storage and final use or disposal. Centralized donor database for all donors scattered throughout the state by connecting all blood banks in a single network.

#### **Blood Transfusion Services, prior to E -blood banking**

- a) Constraints and challenges
  - Public had no easy access to know the availability of blood units in blood banks
  - Manual donor screening systems
  - Levels of operation at multiple sites
- b) Equipment failure due to Variations in laboratory procedures and practices (SOP)
- c) Unstructured storage of blood and blood products
- d) Issues related to testing kits and reagents
  - FIFO, LIFO, Quality control
- e) Manual error
  - Inadequate procedures for identification - Patient or donor blood samples, donations or processed units of blood
- f) Inaccuracies in the recording or transcription of test results, records not readily available

#### **4. Back ground (Problems) and Pre System Analysis**

##### **Pre System Analysis**

##### **Gaps identified and classified**

- Record & Registers maintenance
- Quality aspects
- Database management
- Inventory management
- HR Management BB staffs
- VBD camp

##### **Record & Registers maintenance**

- Records & registers not properly maintained, hampering statutory requirements.
- Due to manpower constraint and over load of work, records are not maintained in time.
- Unable to trace the details of the Blood & Blood product collected & prepared.
- Target vs Achievement of blood units issued, disease & unit wise record not maintained.

##### **Quality aspect**

- Donor Screening. Temporary/permanent deferral donor.
- Poor documentation of Kits & reagent quality test.

- Poor documentation of Installation Qualification (IQ) – Operational Qualification (OQ) – Performance Qualification (PQ) of the equipments.
- SOP for any change in the system is not properly documented (e.g. incorporation of new Elisa test method).
- First in first out usage of testing Kits & reagent not maintained.

##### **Database management**

- Donor database is limited to individual BB.
- Poor maintenance of unattended requisition.
- Public had no easy access for the stock status of blood units (group wise) in a specific blood bank at a particular time.
- No real time facility to know collection v/s issue status by state level admin. (except MPR).

##### **VBD camp**

- Tracking & retention of donors & camp organizers.
- Poor maintenance of pre-camp checklist.
- Post camp follow up record not maintained.

##### **Equipment's & Consumables**

- Improper inventory management for assets & consumables.
- Not possible to trace the short expiry product by state authorities.
- Unable to know the purchase status of the equipment, reagents, etc against individual BBs.

##### **Major Technical Areas**

- Not able to trace whether unit is tested within 72 hours of collection.
- No facility to know the daily quality checking with internal known sample for testing kits.
- No facility to preserve testing results for a long period.
- Only manual preservation facility for recording of blood bank refrigerator.

##### **E -Blood Bank - Objectives**

- Minimize the gaps of present system through IT automation.
- Additional inputs to improve the quality by standardizing blood banking services ( e.g, unique identification code of donor & tracking of tube Sl. no. through bar coding of blood units, etc)
- Status of the availability of blood unit (group wise) to citizen of Assam on finger tips.
- Web based Camp management.
- Working status of each equipment.

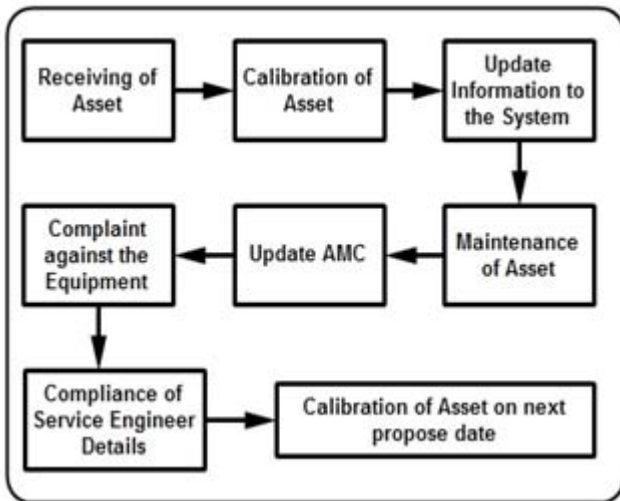
#### **5. Blood Bank Core Process Life Cycle**

A schematic Modules along with Blood bank core life cycle



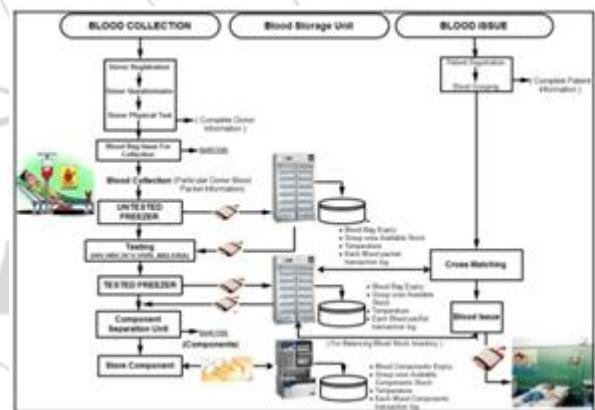
### 6. An Operational Flow of Blood bank: (Model)

#### Asset Management : (Model)



#### Features

- Real time Inventory Tracking.
- Serial Number Tracking.
- Expiration Date Tracking.
- Manufacturer Lot Tracking.
- Alert Mechanism on expiry of items
- Monthly/ Daily Inventory balance Updation.

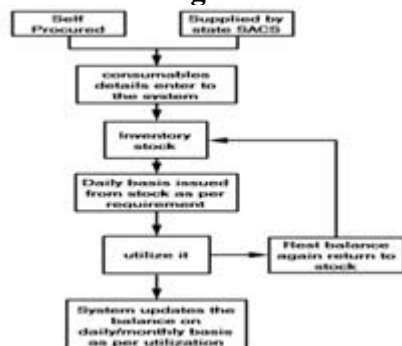


#### Features

- Alert Mechanism for AMC /
- Calibration.
- Retrieval of Asset information at time of requirement.
- Easier Complaint /Registration process.
- Tracking of Complaint Records.
- Tracking of Calibration Records.
- Status of Complaint.

### 8. Biowaste Management

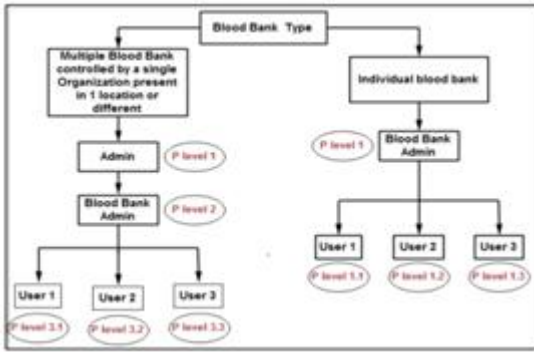
### 7. Consumables Management



#### Features

- Eco-Friendly control of pollution.
- Tracking of Agency details.
- Deferred Blood bags Management.
- Expired Blood Bags Management.
- Record keeping of Destroyed Blood bags.

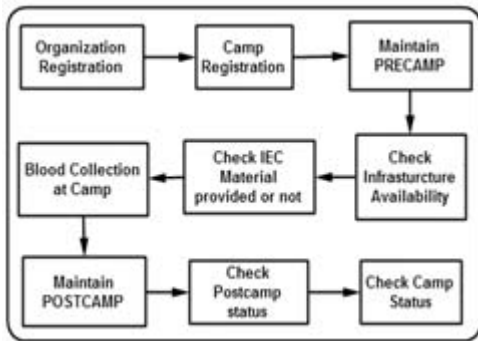
## 9. Camp Management Model



### Features

- Easier Record keeping of different camps with their status.
- Camp Status check.
- Records keeping of IEC Material Provided.
- Tracking of Records of Different Organizationa those have organized camps.

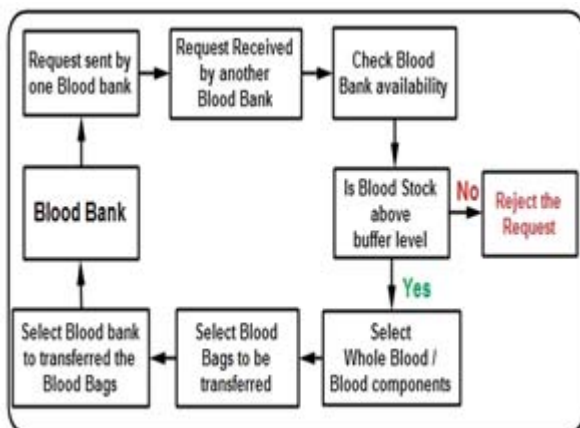
## 10. User /Power level Mgt



### Features

- Access Authentication.
- Smooth Control Mechanism.
- Proper power Distribution.
- Smooth User Authentication as per the Work Responsibility.
- User Status Up-dation.
- Unauthorized Access Restriction.
- Tracking of User Information.

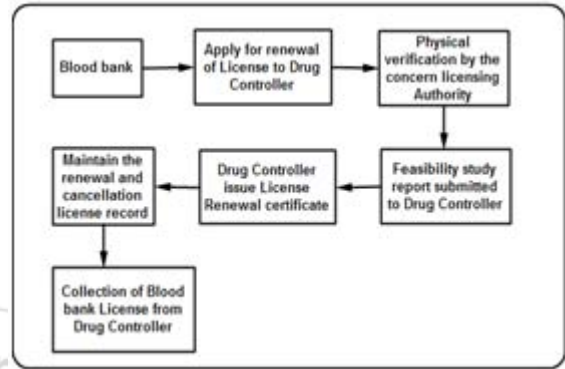
## 11. Blood Transfer Management(Model):



### Features

- Distribution of Blood/ Components between blood banks connected in single network as per requirements based on indent.
- Distribution of Blood from Blood Bank to Blood storage unit.
- Equal Distribution of Blood to citizen.

## 12. Blood Bank License Mgt.



### Features

- Alert Mechanism for License Renewal.
- License Status Check.
- Control Authentication.
- Tracking of License Details.
- Paperless License documentation.

### System Architecture

Multiple blood banks situated at different location controlled from single PMU.

### Citizen Services

Through the web portal:

### SMS (Short Messaging Service)

- Pull and Push SMS services.
- Web Based MIS Reports to view SMS Usage and its Details.

### Convenient and transparent for the citizen

- The citizen needn't have to visit any Blood Bank for obtaining blood information in critical condition of life of a patient.
- He/she can simply visit the e-Blood Bank website for blood related information or send a SMS to the specified number to get the blood stock availability status in blood banks of the state.

## 13. Efficiency Enhancement of the Blood banks

- This helps Administrators and Govt. to track and monitor the whole system in single click of mouse.
- It establishes the transparency of process and keeps tracking of accountability of the Blood Bank Officers while discharging their duties and services.
- Blood Bank Officers are finding the system extremely useful, as the system maintain all specified 12 registers and other, which were earlier hardly maintained.

- Maintains reports for State level users like; Blood Donor Records, Equipment Calibration Records, Records of Components Supplied, Discard Register Reports, Master Records of Blood and its Components, Asset Inventory Stock Report, Whole Blood Expiry Report, Blood Component Expiry Report, Records of Blood Bags Report, Blood Testing Report, BSU Blood Transfer Report, BSU Blood Issue Listing Report, Return Stock Report, License Renewal Report, SMS Tracker Report, Whole Blood Stock Report District Wise, Component Blood Stock Report District Wise and Record of Transfusion Adverse Reaction and more.

### Conflict Interest

None till date

### References

- [1] E-Blood Baking, Govt.of Odisha
- [2] E-Blood Bank, Govt.of Assam
- [3] E-Blood Bank, Govt.of Meghalaya, Shillong.
- [4] E-Rokt Koch, Govt.of India.

## 14. Broad Outcomes

- State & Blood Bank dashboard to provide the group wise blood stocks status for all stakeholders
- Dashboards for Blood Bank Officers (Tested/ Untested/ Buffer stock of blood units)
- Distribution of blood from mother blood banks to blood storage centers
- Recruitment and retention of the regular blood donors in the state.
- Maintain all the registers according to Drugs & Cosmetic Act of 1940.
- Inventory of kits and consumables with alert for short expiry.
- Alert mechanism for License, regular donors, organization to do VBD Camps.
- Provides a paperless donor room.
- Real time information form collection to testing and uses of blood and blood products
- Unique bar coding for each blood packets.
- The citizen can access the availability of blood units from any blood bank of Assam by using website, SMS.

### Advantages of E-Blood Bank

- a) Process Automation.
- b) Quality & Standard.
- c) Effective Management.
- d) Citizen services.

### Biometric device Use and Advantage:

- Biometric device to take thumb impression of donor for unique identification.
- It Uses Central Database to store the detail of the donor for once.
- Increase productivity and Operational savings / Fast and Reliable information
- Restriction of professional /permanent unfit donor from blood donation.
- Improves regular donor management.
- Donor records can access on emergency blood requirement.
- Unique donor ID throughout the state/Region.

