**CHAPTER ONE**

**INTRODUCTION**

**1.0 BACKGROUND OF THE STUDY**

The term “blood bank” refers to a division of a hospital laboratory where the storage of blood products occurs and where proper testing is performed to reduce the risk of transfusion-related event (Sulaiman et al., 2015).

There are lots of communication gaps among patients (accepting blood), donors (who donate boldly), blood banks, and hospitals in the country. Blood is usually collected from donors, i.e., unpaid individuals who give blood voluntarily and paid individual. Blood Donation Management System in which electronic information about the donors and organizations related to donating blood is created. Through this application, any person interested in donating blood can register himself as a donor. Moreover, general consumer wants to request to have blood online, he can also take the help of this system. As soon as any update occurs in the blood database, the changes are reflected in all the interfaces used. So, the system provides a simple and quick interaction among various groups connected with the blood banks. It is designed to overcome the drawbacks of the existing (Ali, Akkas Jahan, Israt Islam, Ariful Parvez & Shafa-at, 2015).

## 1.1 BACKGROUND

For hospitals, a blood bank known as a blood collection center, also is an area in which collected blood bags are stored and preserved for future use in blood transfusion services. Blood transfusion is a medical operation where a patient requires blood or blood products as a life-saving measure. Most blood banks are still running manual systems in their processes. As such, there is a lack of efficiency because it is still paper-based in collecting information about donors. The lack of proper documentation may endanger patients’ health due to the possibility of having contaminated blood bags. The contamination happened when there is an incomplete donor’s medical history record and the blood bags. Hence, a web-based blood bank donor management system might be needed to address these issues and problems encountered to ensure blood transfusion safety.

The use of blood transfusions has a long history, dating back to the 19th century. The first successful blood transfusion was performed in 1818, using blood from a lamb to treat a 15-year-old boy. However, it was not until the 20th century that blood banks were established, making it possible to safely collect, store, and distribute blood products. (Ali et al., 2015)

The first blood bank was established in 1936 by Dr. Bernard Fantus, who was the head of the therapeutics department at Cook County Hospital in Chicago, Illinois. He recognized the need for a central location where blood could be collected, stored, and distributed to patients in need. Dr. Fantus established the first blood bank at Cook County Hospital, and the concept quickly spread to other hospitals around the world.

Since that time, blood banks have become a vital part of the healthcare system, providing a reliable source of blood and blood products for patients in need. The development of computer-based donor management systems has made it possible to more efficiently and effectively manage the collection, storage, and distribution of blood and blood products. This system would help to improve the safety and availability of blood, and have made it possible for blood banks to serve a larger number of patients.

## 1.2 PROBLEM STATEMENT

The percentage of people donating blood is increasing day by day due to awareness to donate blood for those needed. The blood received have to be managed thoroughly so that there will be no negative effect on the blood receiver once they received blood.

Despite advances in technology, nowadays, most blood bank systems are running a manual system. As such, there is a prevalent problem in the availability of needed blood types. For instance, when a person needs a certain type of blood and this type is not available in the hospital, family members send messages through social media to those who can donate to them and this process takes longer than the life of the patient to the most dangerous. In addition, it seems that there is a lack of proper documentation about blood donors and their medical history. This may lead to blood bag contamination and may affect blood transfusion safety.

At present, the public can only know about blood donation events through conventional media means such as radio, newspaper, or television advertisements. There is no information regarding the blood donation programs available on any of the portals.

The current method used to store, record, and keep track of bloodstock is mostly done manually. With the manual system, there are problems in managing the donors' records. The records of the donor might not be kept safely and there might be missing donor records due to human error or disasters. Besides that, errors might occur when the staff keeps more than one record for the same donor.

There is no centralized database of volunteer donors. So, it becomes tedious for a person to search for blood in case of an emergency. The only option is to manually search and match donors and then make phone calls to every donor (Sharma, Bidhya Nandan Pandey & Ganesh, 2015)

Without an automated management system, there are also problems in keeping track of the actual amount of each blood type in the blood bank.

## 1.3 AIM AND OBJECTIVES

This research aims to design and implement an online blood bank donor management system. This web-based system provides:

1. To analyze the requirement of the propose system
2. To design and develop the system based on the requirement
3. To test and validate the system

## 1.4 DESCRIPTION OF THE SYSTEM

The system that is going to be developed is Blood Bank Donor Management System (BBDMS). This is a web-based database application system that is to be used by blood banks or blood centers as a means to allow the public to make online reservations and request blood.

This system also can keep track of the donor's donation records and the bloodstock in the blood bank. This project intends to computerize the blood and donor management system in a blood bank to improve the record management efficiency due to the growing size of records of data. (Sharma et al., 2015).

## 1.5 SCOPE AND LIMITATION

This research study covers the basic operations of blood banks, namely: donor registration, monitoring of blood bags or products’ inventories, and monitoring of blood bags or products’ issuance. The system will be a web-based responsive database application system that supports four categories of users Admin, Patients, doctor and donors and each user activities will run independently without affecting the operation of another. The system will also integrate the online reservation module that will enable patients request for blood online

## 1.7 SIGNIFICANCE OF THE PROBLEM

The findings of this study will benefit blood banks in managing blood donation donors, activities, and blood bags. This will allow the hospital to decide if a particular type of blood is needed and currently unavailable in the hospital, however, available in another nearby hospital. Furthermore, managing the blood bags in the blood bank will be much easier because each blood bag has information about the donor, and donation activity details. Also, the doctor can use this system to serve blood bags to their patient and monitor the details of the donor.

The main advantages of the system are:

1. Blood bank staff can find and manage the donor details on the system easily.
2. The hospital can be alerted about issued blood bags and their availability.
3. The system is systematized and organized in managing blood donor records and blood donation activities.

**DEFINITION OF TERMS**

1. **Blood bags** are designed for the collection, processing, and storage of whole blood and blood components They help in providing aseptic conditions for the separation of blood components. It acts as a closed system reducing the chances of contamination.
2. **A blood bank** is a place where blood bag that is collected from blood donation events is stored in one place. Which refers to a division of a hospital laboratory where the storage of blood products occurs and where proper testing is performed to reduce the risk of transfusion-related events.
3. **The donor** is someone who gives a part of their body or some of their blood to be used by doctors to help a person who is ill.
4. **Blood:** Blood is a body fluid in humans and other animal that delivers necessary substances such as nutrient and oxygen to the cells and transports metabolic waste product away from those same cells.
5. **Blood Donation** occurs when a person voluntarily has blood draw and used for transfusions and/or made into biopharmaceutical medications.

**CHAPTER TWO**

**REVIEW OF LITERATURE**

## 2.1 INTRODUCTION

A blood bank donor management system is a computer-based system that is used to manage the collection, storage, and distribution of blood and blood products. It typically includes a database of information about donors, including their personal information, as well as information about the blood they have donated.

The primary purpose of a blood bank donor management system is to ensure the safety of the blood supply by carefully screening donors and monitoring the quality of the donated blood. It also helps to ensure that blood is available when it is needed.

## 2.2 REVIEW OF THE EXISTING SYSTEM

This section discusses findings and observations done by some research works on web-based blood bank management systems. The gathered information on these related papers strengthens and supports the research study.

All these projects are on blood bank management systems means how to manage blood banks and how can a recipient can access blood more easily than previous old traditional methods. Many peoples try to improve blood banks by working in their ways and these are some of them.

Al-Amri et al. (2019) Design a Web-based Blood Donation Management System that enables individuals who want to donate blood to help the needy. It also enables hospitals to record and store the data for people who want to communicate with them, and it also provides a centralized blood bank database. The system is developed by using HTML, PHP, and MySQL as a database system to manage and store the data. The Waterfall Methodology, which is the traditional version and the classic approach of a system development life cycle, is used to develop and build the web-based blood bank. The system targets three types of user: the public who wants to donate blood, the recipients who need the donated blood, and the hospitals who that work as an intermediary to manage the communication between the donors and recipients. The main objectives for developing the website is to educate the community on the benefits of blood donation, develop a Web-Based Blood Bank System to manage the records of donors and recipients, and encourage voluntary blood donation, easily accessing any information about blood type and the distribution of the blood in various hospitals in Jeddah, based on the hospital needs.

Teena et al. (2014) in their study entitled “A Study on Blood Bank Management”**,** they defined Blood Bank Information System as an information management system that contributes to the management of donor records and blood bank. The system allowed an authorized blood bank administrator to sign in with a password to manage easily the records of donors and patients who need blood. The system provided many features including the central database, quick access to the system content through the login, includes the search code to find donors on a given basis, and the ease of adding and updating donor data. The main aim of the system was to complete the process of the blood bank. This system was designed to suit all types of blood banks.. The application contains User Login Screen, Blood Management, Donor Management, Donor Registration, Blood Reservation, Recipient Management, and Blood Reservation.

Sumazly & Aziz (2015) developed a Web-based Blood Bank Management System (BBMS) to provide a management functional to the blood bank in order to handle the blood bag. In Kuala Terengganu, East Peninsular Coast of Malaysia has only one government hospital that handles blood bank which is currently using a standalone system. The web-based management system was developed to meet the requirements for Sultanah Nur Zahirah Hospital (HSNZ). Other hospital may have different ways and approach of handling blood bag. The methodology used to build this system uses the Rational Unified Process (RUP). The technology platform in implementing this system is MySQL database and HTML5, CSS and JavaScript for web development.

Bharat (2005) presented Bharat Blood Bank system which allow donors in India who want to donate blood can register at Bharat Blood Bank system. Bharat Blood Bank requests the donor's name, password, and ID to allow the donor to access his account, which contains information about his date of birth, blood group, gender status, email ID, mobile no, city, address, state. After that, the people who need blood can browse the site and display the list of blood donors. Bharat Blood Bank allows recipients to search by area to have more reachable donors. The website provides the phone number to the recipients to make contact with the donor.

Ayeni et al., (2019) developed a web-based system that provides information for the discovery of the blood bank centers and human donors with the highest proximity during emergencies. Web development technologies were used, and the Google Map API was used to track, calculate and display the location of each blood bank and donor. The system thus aid users in obtaining blood faster rather than going from one hospital to another in search for a specific blood type to reduce the number of deaths caused by lack of blood during emergencies.

Shabana et al., (2014) proposed an extended web application to timely update the information regarding the donors, acceptor and patients where the administrator access the whole information about blood bank management system. Also the proposed work has a Push technology with security, to protect the contact details of the donors in web application where it can be misused by third parties. It also maintains the amount of each available blood groups, if the stock of a particular blood group is lower than the required amount then the proposed method notifies the donor to donate blood.

TehGeok (2006)presented an online blood donation reservation and management system in Malaysia used by the hospital blood bank. It is a web database that contains donor and bloodstock information and it can keep track of the bloodstock in the hospital and the donation records of the donors. The website enables the public to make online reservations and includes online advertising for all blood donation events. The hospital managers can manage the donors and bloodstock appointments. The targeted users are the manager from National Blood Center, the public who want to donate blood, and the staff from participating hospitals.

Kumar el al., (2017) developed a web-based blood bank management that assists the blood donor records management and provides ease of Control of the distribution of blood products in various regions of the country that takes into account the needs of hospitals. The system developed was scalable and adaptable to meet the typically complex needs of a blood bank. Based on this study, since blood donor details and related records were captured, Therefore, manual tracking of blood donation activities was complicated and even led to incorrect information. Subsequently, researchers said that the manual system can be a waste of time, result in error results, consumes a lot of work, lacks data security, data retrieval is time-consuming, reporting is time-consuming, and the accuracy of results is less accurate. Thus, in the development and implementation of an online blood management information system, there was quick access to donor data, and the system provided management with timely, confidential, and protected medical reports. There were three (3) users of the system, namely the administrator, donor, and acceptor. The application was developed using ASP.NET, C#.NET, and using SQL Server for the database.

Alexis et al., (2006) developed a blood-bank management system that fetch blood donors and receivers through the shared software platform. Donors can register on the website and enter their information. This system makes readily available, safe blood and other blood components, which can offer moral and accepted ways, consistent with the long-term welfare of the community. That actively encouraged voluntary blood donations, motivates and maintains good records of indexed blood donors, and educates society about the advantages of donating blood.

Liyana (2017) found that it is important for each hospital to use an information system for managing data in the blood bank. Moreover, he noted that the manual system has disadvantages for the user and for the hospital. One of the disadvantages identified was the blood bank staff should enter the details of the donor at any time that gives blood In which he led to duplication of donors and data, they may also be lost or missing after a while. As a result, the author develops a web system to help the blood bank record the details of the donor quickly and easily. The system has used regular regular decisions to ensure a good time decision. In addition, the system can send messages to donors if a particular type of blood is needed.

Sumaryanti & Lamalewa (2018) Design an E-Blood Bank Application. Is an information system which used to organize blood donation data and order blood online. The application is developed electronically so that it can provide information on blood stock in real time and connect it to blood transfusion unit, people who need blood donors, and the donor community. Hence, blood stock information can be accessed through easily accessed media at anytime and anywhere as long as it is connected to the network.

Nzoka & Ananda (2014) designed a blood bank management information system to keeps the name of the donor who is donating blood, a unique id through which the donor can view his account, password for accessing the account, date of birth of the donor, gender status of the donor, blood group of the donor, mobile no, email id, address, city, state. In the system a user clicks on the link “Post your requirement” on the homepage and provides personal details like patient’s name, age, gender, hospital name, reason for requirement, required before date, hospital area, mobile number, country name, city name and the blood group name. Once done via the “Post your requirement” link, the user can send their request which will be saved in the system

**2.3 LITERATURE REVIEW TABLE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **Author(s)** | **Problem statement** | **Methodology** | **Advantage** | **Disadvantage** | **Remark** |
| 1 | Teena et al., (2014) | The manual way of storing information regarding blood bank donor is not effective. | The PHP, HTML programming language was used to develop the web base application. | It helps to organize donor information | Donor’s profile can’t be update. | Normal way of storing donors’ information isn’t effective, using an automated system will improve the system. |
| 2 | Sumazly & Aziz, (2015) | The percentage of people donating blood is increasing day by day due to awareness to donate blood for those  needed. The blood received have to be managed thoroughly so that there will be no negative effect to the blood receiver once they received blood.  From | The technology platform in implementing this system is Java and MySQL for database and HTML5, CSS and JavaScript for web development. | The platform provides donor and receipt with functionalities such as being able to keep track of their tasks | The system has no administrator who’s responsible for managing the system | The system provides a valuable insight into the potential benefits of computerized blood type matching system. |
| 3 | Kumar el al., (2017) | The manual system can be a waste of time, result in error results, consumes a lot of work, lacks data security, | The application was developed using ASP.NET, C#.NET, and SqlServer for the database | The system provides quick access to donor data | Lacks data or information security. | Using papers to keep track of blood donor information is tiring, automating the process will help in preventing error that may occur |
| 4 | Bharat, (2005) | Difficulties in reaching out to the public on the importance of blood donation as well as blood donation events. | The design and implementation of the system is developed with PHP | They provide service through  giving news and details about blood donation events | The system only provides news about blood donation events. | The system enlightens the public on blood donation as well as blood donation events. |
| 5 | Al-Amri et al. (2019) | The number of people who need blood  is increasing and the availability of blood is decreasing due to there is no central Blood Bank that can manage the blood donation in Saudi Arabia. | The system is developed by using HTML, PHP, and MySQL as a database system to manage and store the data | Reduce human error when employees keep the  records | the system doesn’t provide blood stock. | The method uses in storing door and patient who request for blood is not effective, thus using an automated web application will improve the method |
| 6 | Ayeni et al., (2019) | The existing blood bank management systems that help locate available blood bank centers with the needed blood type, they do not provide information on the nearest center and donor | The user interface was developed using HTML, CSS, and JavaScript. PHP was used to design the backend of the system | The system has efficiency in time management | The system has no means of authentication. | The system good in managing time but has no user login to make the system secure |

**2.4 GAPS**

The importance of an effective blood bank donor management system has been widely acknowledged in previous studies. Such a system would help manage donor information and provide resources to manage patients more effectively. Despite these efforts, there remains a gap in the development and implementation of blood bank donor management systems that effectively address the challenges faced by blood bank centers. These challenges include the need for administrators to verify patient applications through a doctor, a lack of communication channel between administrators and donors, a lack of validation of donor information such as age, and a lack of a mechanism for updating donor profiles.

In light of these gaps, this study proposes the development of a comprehensive and user-friendly blood bank donor management system in the form of a web application. This system will address the aforementioned challenges and provide a comprehensive and user-friendly solution for blood bank centers.

**2.3 CONCLUSION**

In conclusion, the proposed blood bank donor management system is expected to fill the existing gap in the development and implementation of blood bank donor management systems. The system will provide a comprehensive and user-friendly solution for blood bank centers and help address the challenges faced by these centers.