**MANAGING BLOOD AND ORGAN DONATION IN SRI LANKA**

2022\_311

Project Proposal Report

IT19121734 – R.M.S.Dananjani

Bachelor of Science (Hons) Degree in Information Technology

Department of Information Technology

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   Mrs. Uthpala Samarakoon

Supervisor

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**DECLARATION**

I declare that this is my own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person.

|  |  |  |
| --- | --- | --- |
| Name | Student ID | Signature |
| R.M.S.Dananjani | IT19121734 |  |

The above student are carrying out research for the undergraduate Dissertation under my supervision.

2022/01/24

…………………………… ……………………………

Signature of the supervisor: Date

Mrs. Uthpala Samarakoon

# **Abstract**

In Sri Lanka there isn’t any application to predict the future blood necessities with the connection between the blood banks and the hospitals. The focus on rural hospital such as base hospitals and divisional hospitals by the blood bank is relatively low. In emergency situations such as the ongoing covid pandemic, these rural hospitals often get crowded and the hospitals won’t be able to supply the necessary blood to all the patients. However, we are of the view that the efficiency can be further enhanced by introducing a software-based management system for this purpose. Covid-19 may identify issues such as blood shortages and contributions experienced by blood banks during the pandemic period.

This is a mobile blood and organ donation management application that allows those who desire to help others in need to do so by donating blood and organ. It focuses on a system that will enhance blood bank and tissue bank database management, resulting in a stronger interaction between blood and organ donors, banks, receptors. This application also provides an opportunity for social service organizations such as blood donation camping and can be used as a community awareness tool.

*Keywords: Predict* *the future blood, blood shortage, receptors*

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# **Introduction**

The procedure of blood donation is critical for health-care systems. As a result, hospitals' ability to predict donor flow has become important. Managing the supply and demand for blood is central to the health care supply chain, as blood plays an essential role in saving lives [1]. There has been a significant increase in deaths Due to a lack of quick blood donors and the bureaucracy associated with sick people quickly receiving their required blood type. In 73 countries, donation rates are less than 1% (fewer than 10 donations per 1000 people). 70 of these are either developing or transitional countries [2].

The deficiency of future accessibility of blood and lack of prediction. This idea is suggested by a medical officer form his personal perspective. In Sri Lanka there is no technology to predict the amount of blood needs in the future and there is no proper procedure to connect blood bank and the hospitals. The focus on rural hospital such as base hospitals and divisional hospitals by the blood bank is relatively low. In emergency situations such as the ongoing covid pandemic, these rural hospitals often get crowded and the hospitals won’t be able to supply the necessary blood to all the patients. As a solution for this matter, we have done this research to overcome the future obstacles.

The proper accessibility of blood which are needed for base hospitals and divisional hospitals. It is easy to predict the amount of blood needed for the future. As an example, there is a high demand of blood in festive seasons due to accidents. Therefore, the predictability of blood through this system leads to minimize the wastage of blood and to be prepared for the respective time periods. The system is composed of a stored knowledge based and system offers a categorized solution for an emergency.

# **Background and Literature Survey**

**Background**

Prediction of blood for future use, is an uncommon area among Sri Lankan’s. Hospitals and blood banks are focused on this research. It can be used to reduce blood wastage, and the hospitals would be able to take precautions at emergency situations.

Worldwide, applications have been made to predict the blood in Haemoglobin and predict the blood glucose levels and etc, but no applications have been made in Sri Lanka. The research area I’m conducting has never been looked in to previously.

In this research we mainly focus on base hospitals, divisional hospitals in Western Province Sri Lanka. We have conducted a google survey to come up with an idea of the medical staff on the knowledge about the above-mentioned research area. We shared this survey from directors to minor staff.

From these two Figure ,Figure we can get an idea that some hospital staff members are not aware about the blood group type are most needed for a year and blood groups type are given the most for a year by the blood bank.

Chart, pie chart

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Figure 3 Currently working hospitals

Chart, pie chart

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Figure 4 Emergency situations where you run out of the blood to give patients

Chart, bar chart

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Figure 5 most needed blood groups type for a year

Chart

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Figure 6 Blood groups types are given the most for a year

# **Literature Survey**

This section addresses various research projects that have already been conducted by researchers to provide blood prediction section systems. Blood prediction systems approaches are conducted for blood and organ donation management.

Even if there was research about blood prediction, there was not any to be found under “the connection between blood bank and the hospitals”. In this research, we focused on the base hospitals and the divisional hospitals in Western province Sri Lanka.

We expect from this research to give out blood needed for hospitals and blood banks when they need blood this will affect the blood wastage to keep it minimum, also if there is to be a huge blood request in a short amount of time, this system will assist and the help the situation.

To summarize, several studies have been developed in data mining algorithms that used blood amount predict systems to determine the solution to a particular problem. Only a few studies are devoted to blood predict system. According to the previous studies it was completely clear, blood amount predict system has not yet been develop the connection between hospitals and the blood banks. Such as, the amount of Blood needed for each Hospital by the Blood bank is predicted by the System, in which Times, selected Hospitals need more Blood than Regular months, for A selected Hospital, the most and least wanted Blood Groups are predicted.

# **Research Gap**

To the best of the researcher's knowledge, no research has been done to design blood amount prediction system for a hospitals and blood bank. But there has been some research done to predict the blood in Haemoglobin and predict the blood glucose levels (Techniques such as predicting BG (modelling of a personalized profile), and modelling BG dynamics are central to the development of these diabetes management technologies [3].

The proposed system aims “the amount of Blood needed for each Hospital ​, in which Times, selected Hospitals need more Blood than Regular months, for A selected Hospital, the most and least wanted Blood Groups​”.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Research** | **The amount of Blood needed for each Hospital** | **In which Times, selected Hospitals need more Blood than Regular months.** | **For A selected Hospital, the most and least wanted Blood Groups** | **Get the information about previous blood Availability Records.** |
| Research [1] | No | No | No | Yes |
| Research | No | No | No | Yes |
| Research [2] | No | No | No | No |
| Proposed System | Yes | Yes | Yes | Yes |

The main purpose of this components is to create a strong connection between blood bank and the hospitals. Also, this component will help to take precautions in blood emergency situations and reduce blood wastage.

The component will calculate the amount of blood needed for a year by collecting data from previous blood amount records. It will also predict how much blood types are needed for a selected hospital in a year and predict the seasons where specific blood types are needed the most.

# **Research Problem**

It is clear from the research conducted in the literature review that there is no research conducted to predict the future blood necessities with the connection between the blood banks and the hospitals. We developed clinical models predictive of short-term clinical outcomes in a broad patient population discharged after hospitalization for HF [4]. In Sri Lanka there is no technology to predict the amount of blood needs in the future and there is no proper procedure to connect blood bank and the hospitals.

The focus on rural hospital such as base hospitals and divisional hospitals by the blood bank is relatively low. In emergency situations such as the ongoing covid pandemic, these rural hospitals often get crowded and the hospitals won’t be able to supply the necessary blood to all the patients. As a solution for this matter, we have done this research to overcome the future obstacles. The need of blood prediction for future use is suggested by a doctor.

According to the survey, many medical staff are not aware about the blood group type are most needed for a year and blood groups type are given the most for a year by the blood bank and many of them do not know how to deal with the problem and they seek specialized expertise. Hence, this research proposes a system for blood prediction. That can assist the user with the amount of Blood needed for each Hospital by the Blood bank is predicted by the System, in which Times, selected Hospitals need more Blood than Regular months, for A selected Hospital, the most and least wanted Blood Groups are predicted.

# **Objective**

**Main Objective**

Design and develop an application to manage blood and organ donations in Sri Lanka. And predict the amount of blood needs in the future and connect blood bank and the hospitals.

**Specific Objectives**

System offers a categorized solution for the amount of blood needed for each Hospital by the Blood bank is predicted by the System, in which Times, selected Hospitals need more Blood than Regular months, for A selected Hospital, the most and least wanted Blood Groups are predicted. The system is composed of a stored knowledge-based technique.

This component mainly focuses on the Blood Availability in Base Hospitals and Divisional Hospitals in Western Province. The need of blood prediction for future use is suggested by a doctor. The information was gathered from the Homagama Hospital, Awissawella Hospital, Navagamuwa Hospital etc. in Western Province. Since we don’t take personal details, the hospital allowed us to take their blood availability details.

* The amount of Blood needed for each Hospital by the Blood bank is predicted by the System.
* To identify the severity of emergency using an indexing technique, count of blood will be counted using indexing technique for the researchers to decide on a control method.
* In which Times, selected Hospitals need more Blood than Regular months.
* The amount of Blood needed for Hospitals in the seasonal Times is higher than normal times.
* Using previous data records system can predict how much blood is needed for these times and the system will send a notification to user.
* For A selected Hospital, the most and least wanted Blood Groups are predicted.
* By taking the amount of most used and least used blood groups for a year, system can predict the amount of blood needed for the next year. This will mainly manage blood storage efficiently.

# **Methodology**

The proposed System is to predict the amount of blood needs in the future.

* The amount of Blood needed for each Hospital by the Blood bank is predicted by the System.
* In which Times, selected Hospitals need more Blood than Regular months.
* For A selected Hospital, the most and least wanted Blood Groups are predicted
* Send the alert messages to the user

Blood Amount Predict system offers the several advantages, this will give out blood needed for hospitals and blood banks when they need blood, this will affect the blood wastage to keep it minimum, also if there is to be a huge blood request in a short amount of time, this system will assist and the help the situation.

The blood Amount Predict system is created using the Data mining algorithm. The characteristics and capabilities of the algorithm that data mining incorporates are the reasons for choosing it.

We still haven’t chosen an algorithm for this but, we did refer some algorithms such as K-mean algorithm, Regression algorithms, Segmentation algorithms and etc. The reason for chosen this algorithm is to create a model. First the algorithm analyses the data which we provide, looking for specific types of patterns or trends from the data set we provided. The algorithm iterates through the finding of this research to identify the best parameters for developing the data mining model.

**System Architecture**

The system architecture is shown in Figure

Diagram

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Figure 8 High Level Architectural Diagram

The selection of an appropriate methodology is essential for the entire development of any software application since it ensures that a reasonable timeframe for each step of the project is created and that requirements are properly defined. This section explains the best development technique for this project.

During the life cycle of a project, agile methodology divides the development process into iterative phases and promotes flexibility, testing, and change. It helps to reduce overall project risk, manage change, and improve customer satisfaction. The project's exploratory approach is followed by iterative development cycles. At the conclusion of each build, a subsystem or function will be built. With each incremental build, new requirements are likely to be discovered and implemented, and the project will become more complex, building on the preceding build's features and eventually contributing to the application's final implementation. Because requirements are split down into smaller pieces that are implemented at the end of each build cycle, organizing the development of the project over multiple build cycles can reduce the risks associated with development to a more manageable level.

Faults are detected early in short, manageable cycles, allowing for efficient testing, and debugging. The Agile Methodology is the ideal development approach for this project.

Diagram

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**Requirement Gathering and Analysis**

The most effective process to gather data for this project was to use a questionnaire. Responses to surveys will be collected neatly and automatically in Forms, with real-time response information and charts. As a result, reading and analysing data to identify requirements is easy.

**Feasibility study**

* **Schedule feasibility**

The proposed system should be completed within the timeframe allotted, with each step producing consistent results on time. Additionally, meet the deadline for the final output.

* **Economy feasibility**

Even if the proposed system's end result is ideal and produces preferred correct results with no errors or mistakes, it cannot be considered a success if it is expensive.

* **Technical Feasibility (Skills)**

To successfully complete the proposed system, you will need to be skilled in a variety of technologies.

**Implementation**

The implementation includes the construction of the blood predict system. Documented sources are used to gather relevant data. The proposed system will then be coded in the next phase. This is done with the help of a data mining algorithm. The next stage is to create the user interface that will allow users to connect with the system. Java is used to develop the user interface.

To improve accessibility and user friendliness, the final solution incorporates an Android mobile application. The framework will be Flutter, and the database will be Firebase. The aforesaid features will be provided to the user through the mobile application.

**Android Application development**

The final solution includes an Android mobile application to boost accessibility and user friendliness. Java will be used to create the application. It's simpler to implement, keeps costs down, and allows for a faster release.

**Testing and Evaluation**

The system has been thoroughly evaluated and tested. When a proposed system is finished, it should be tested and evaluated to see how well it performs and whether it fits the needs of its users and is applicable in the domain. Then the system is tested and evaluated as the final phase in the process. To determine if the system fulfils its requirements, system tests and user acceptability testing are used.

**Functional Requirements**

* User must be a registered user
* System will send alert Messages to the Hospitals and Blood Bank

**Non-Functional Requirements**

* Availability​
* Security & Privacy​
* Performance​
* Accuracy​
* Usability​

**Software Requirements**

Android Studio

**Hardware Requirements**

• Processor – intel core i5  
• Android Device

**Work Break down Structure (WBS)**

Diagram

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Figure 9 work break down structure

**Grant Chart**

Chart

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Figure 10 Grant chart

# **Commercialization**

**Our target demographic -** Average medical field like eChannelling and insureme application.

Graphical user interface

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Figure 11 example application

**Social Media –** We will use Facebook and Instagram advertising to determine our target audience.

# **References**

|  |  |
| --- | --- |
| [1] | C. Salazar-Concha, "Predicting the Intention to Donate Blood among Blood Donors," 10 August August 2021. |
| [2] | W. H. Organization, "Blood safety and donation," [Online]. Available: https://www.who.int/bloodsafety/global\_database/GDBSFactSheet%20.pdf. |
| [3] | "Data-driven modeling and prediction of blood glucose dynamics: Machine learning applications in type 1 diabetes," July 2019. |
| [4] | C. M.O'ConnorMDa, "Predictors of mortality after discharge in patients hospitalized with heart failure: An analysis from the Organized Program to Initiate Lifesaving Treatment in Hospitalized Patients with Heart Failure (OPTIMIZE-HF)," October 2008. |

# **Appendix**

The following questionnaire is based on a survey we conducted to identify the actual problems which hospital and blood bank staff face. This would be used to determine the amount of the need for research.

Graphical user interface, text, application, email

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Graphical user interface, text, application

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Graphical user interface, text, application, email

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