Project report
Topic:
blood management system

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I. Research Project Proposal

Title: Enhancing Blood Transfusion Safety Through the Use of Online Blood Bank Management System

SECTION I: Research Proposal

The researchers aimed to develop and implement an online blood bank management system. This web-based application allows hospitals to make inventories of their blood bags online, thus, allowing each hospital to check the availability of blood bags anytime. Likewise, proper accounting of blood donors ensures that the expected blood transfusion services will be safe and secured.

SECTION II: Origin Of Research Problem

Even though the technology has advanced much already, still, today's system in blood banks are usually manual systems. Usually, when a person requires a particular type of blood and that type is not available in the hospital, the persons send messages to family members,

relatives, and friends if they can donate. As such, it is time-consuming and laborious, and may risk the life of the person who needs blood urgently.

SECTION III: Relevance to the national priority and needs

The web-based application ensures that there is mobility of blood bags across the country; it is easier to check for hospitals which hospital has the available needed blood types. Shortage of blood bags of particular blood type can be avoided.

Likewise, there will be blood donors' registration, thus, ensuring that blood transfusion services will be safe and secured.

Subsequently, the application is of great help for doctors, nurses, medical practitioners, patients and others in ensuring a better health care system.

Abstract

Blood transfusion safety is a relevant and significant public health issue in the Sultanate of Oman. Since most blood banks are still in paper-based system, various disadvantages are experienced by various stakeholders, which endanger the lives of patients and deter the healthcare system. As such, the researchers aimed to design, develop, and implement an online blood bank management system (OBBMS). This web-based application allows hospitals in Oman to make inventories of their blood bags online, subsequently, allowing each hospital to check the availability of blood bags anytime. The researchers designed and administered a questionnaire that assess the perceptions of various stakeholders in both manual-based and OBBMS. Based on the findings and results, it was found out that these stakeholders perceived online blood bank management system is much better than the manual system. Therefore, with the use of online blood bank management system, blood transfusion process is safe and secured. Threats on improper blood donor documentation, or misplaced records will be totally eradicated. Also, processes involving recording about blood donors, blood bag collection, storage, and inventory will be systematized and organized, hence, improving the healthcare management for blood banks.

Key words: Online Blood Bank Management System, Blood Bank Management, Blood Donation, Blood Transfusion Safety, Web-Based Application

CHAPTER 1: INTRODUCTION

Blood transfusion safety remains an important public health concern in Oman. The availability of blood products of all blood types and the provision of its safety ensure public trust of its excellent healthcare system. However, lack of availability of these blood products and provision of unsafe blood products still impact morbidity and mortality in the Sultanate. Through the use of online blood bank management system, blood transfusion safety is expected to be enhanced or improved. Risks on improper blood donors' documentation, and misplaced records can be minimized or totally avoided. Also, processes involving blood bag collection, storage, and inventory will be systematized and organized, hence, improving the healthcare management.

1.1 Background of the Study

For hospitals, a blood bank known as 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. . In an article[1] published in Times of Oman in 2014, it was reported by Ministry of Health (MoH) that the total amount of blood donated annually in Muscat is approximately 25,084 units. MoH further reported that its Department of Blood Services is functioning at full capacity to meet the demands in the Sultanate.

Most blood banks are still running manual system in its processes. As such, there is a lack of efficiency because it is still paper-based in collecting information about donors, inventories of blood bags, and blood transfusion services. The lack of proper documentation may endanger patients' health due to the possibility of having contaminate blood bags. Contamination happened when there is an incomplete donors' medical history record and the blood bags' shelf life is not monitored properly. Hence, a web-based blood bank management system might be needed to address these issues and problems encountered to ensure blood transfusion safety.

1.2 Problem Statement

Despite advances in technology, nowadays, most blood bank systems are running in 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 lack of proper documentation about blood donors and its medical history. This may lead to blood bag contamination and may affect the blood transfusion safety. Generally, this study aims to determine how the use of online bank management system enhance blood transfusion safety. Subsequently, this study seeks to answer the following specific problems:

1. What is the level of perception among blood bank's stakeholders on manual-based system?
2. What is the level of perception among blood bank's stakeholders on online blood bank management system?
3. H_0: Is there no significant difference in the level of perception among stakeholders between manual-based and online-based blood bank system?

   H_1: Is there a significant difference in the level of perception among stakeholders between manual-based and online-based blood bank system?

1.3 Objective(s), Scope and Limitations

1.3.1 Objective:

This applied research aims to design, develop and implement online blood bank management system. This web-based application provides:

- To ensure hospital to have good supply or inventories of blood bags.
- To check the availability of blood bags anytime.
- To manage the information of its blood donor.
- Function to check if the person donate blood for the last 3 months.
- To allow good documentation about the donor and its blood donation activities.
- Support fast searching to find match blood bags for the right person.

1.3.2 Scope:

This research study covers the three (3) basic operations of blood banks, namely: donor registration, monitoring of blood bags or products' inventories, and monitoring of blood bags or products' issuance. Also, due to time-constraint, respondents will be from hospitals from North Batinah Region in the Oman, though the research study talks about blood banks in the Sultanate of Oman. In addition, the study considers three (3) possible users of the system, namely: hospital administrator, doctors, and blood receptionists.

1.3.3 Limitation:

This research study does not cover the actual blood collection activity, and actual blood transfusion operation. Blood donors and patients or recipients of blood donation are not system users, their registration or information will be encoded by the blood bank receptionists.

1.4. Assumptions and Hypothesis:

The researchers assume the following assumptions:

1. Internet connectivity is needed for the online blood management system. Internet speed may affect the perception of the systems users with regards to the system effectiveness and efficiency.
2. Blood transfusion should be performed by medical or professional doctors only. The over-all safety depends on the success of the medical operation.

The researchers identify the following hypotheses:

1. There is a significant difference in the level of blood transfusion safety between manual-based and online blood bank systems.
2. There is an increased level of blood transfusion safety in using online blood bank management systems while there is an increased risk when using manual-based one.

5 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 take decision if a particular type of blood is needed and currently unavailable in the hospital, however, available in another nearby hospitals. Furthermore, managing the blood bags in the blood bank will be much easier because

each blood bag has an information about the donor, donation activity details, and the expiration date. Also, 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:

- Blood bank staff can find and manage the donor details on the system easily.
- The expiration date of blood bags can be viewed in the system.
- Hospital can be alerted about issued blood bags and its availability.
- The system is systematized, and organized in managing blood donor records and blood donation activities.

1.6 Definition of terms

- **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.
- **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 product occurs and where proper testing is performed to reduce the risk of transfusion related events.
- **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.
- **Transfusion**: transfusion is done as a lifesaving maneuver to replace blood cells or blood products lost through severe bleeding. Transfusion of one's own blood (autologous transfusion) is the safest method, but it requires advanced planning, and not all patients are eligible.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Introduction

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

2.2 Literature Studies

According to [2]***Teena, C.A, Sankar, K. and Kannan, S.*** (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. Their 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. Once successful in the implementation of the application, it can be applied and rolled out in several blood banks. This application contains User Login Screen, Blood Management, Menu Form, Blood Stock, Donor Management, Donor Registration, Blood Reservation, Donor Blood Test, Recipient Management and Blood Reservation. In similar manner, the researchers planned in their application to have hospital administrator, doctors, and blood bank receptionists as users. The authors did not mentioned the research method they used, and failed to provide screenshots of the system prototypes, making difficult for the researchers to visualize their application. No discussion also for their respondents, samples and sampling techniques used. Subsequently, the researchers planned to provide figures to explain the system, screenshots of system prototypes, and other diagrams that can help other researchers to visualize the development of web-based blood bank management system. Also, the researchers will explicitly discuss its research methods, sampling procedures, and statistical treatment to be used for analyzing the gathered data.

On the other hand, study entitled ***"Blood Bank Management System"*** done by [3]***Kumar, R., Singh, S. and Ragavi, V.A.*** (2017), the researchers developed a web-based blood management which assists the blood donor records management, and provides ease of control in the distribution of blood products in various parts of the country considering demands of hospitals. The developed system was scalable and adaptable to meet the complex needs usually of a blood bank. Based on this study, since entering the details about the blood donors and related records were done manually, thus, tracking of blood donation activities was difficult and complicated, and even led to erroneous information. Subsequently, the researchers mentioned that manual-based system can be waste of time, lead to the error-prone results, consumes a lot of manpower, lacks data security, data retrieval requires a lot of time, reports

consumes a long time to produce, and there is less precise accuracy on the results. As such, by developing and implementing a web-based blood management information system, there was a quick and timely access to donor records, and the system provided management timely, confidential and secured medical reports. There were three (3) users in the system, namely: Administrator, Donor, and Acceptor. Each user has been given user ID and password to identify their identity. The said application was developed using ASP.NET, C#.NET, and using SqlServer 2000/2005 for the database. The research paper failed to mention the methods of research used.

In this study, the researchers learnt the importance of implementing a web-based blood bank management system in handling records for blood donors and blood donation activities to ensure accurate and readily available information for blood transfusion services. Indeed, the impact of using Information Technology on hospitals provides better healthcare services for the public. Likewise, the researchers learnt that there are programming languages suitable for web-based applications such as ASP.NET, PhP, to name a few.

In the study entitled "***Blood Bank Management System Using Rule-Based Method***" undertaken by [4]***Liyana, F.*** (2017), it found out that it is important for every hospital to use an information system to manage data in blood bank. Also, it observed that the manual system has disadvantages for the user and the hospital. One of the disadvantages identified was the blood bank staff should enter the donor details in each time he/she donate blood in which led to duplicate data of the donor and also the data may be lost or missing after period of time. Thus, the author developed a web-based system to help the blood bank to record the donor details fast and easy. The system used rule-based decisions to ensure to have a right decision on right time. Also, system can send messages to donors if any particular blood type is needed. She developed blood bank system based on incremental model. She had chosen this model because the system can be developed through cycle of phase and also because of the advantages of this model such as:

I. Easy to understand to flow of the phases.
II. Changes possible in the middle of any phases.
III. The system can be developed even if there is an error in the middle and it can be corrected in testing phase.

In this study, the researchers observed that the developer failed to include in the system the function to check the availability of blood bags, and to check the shelf life or expiration of blood bags or products. As such, the researchers will include these in their developed system to enhance safety for blood transfusion.

2.3 Conclusion

The purpose of these literature reviews was to collect information on how an information system helped the management of blood banks. Based on the reviews, it was found out that web-based blood bank systems provide convenience, efficiency and security to the system users and hospitals compared to the manual systems. It was found out that manual systems have many disadvantages that disappoint and dissatisfy users. Indeed, online blood bank applications make work easy, and ensures fast retrieval of data when needed.

CHAPTER 3: METHODS AND PROCEDURES

3.1 Introduction

This section presents the research methodology used in the study, the research design, and the data collection process. This section also presents the theoretical or conceptual framework of the study, the sampling plan, and tools to be used for data analysis.

3.2 Theoretical/ Conceptual Framework

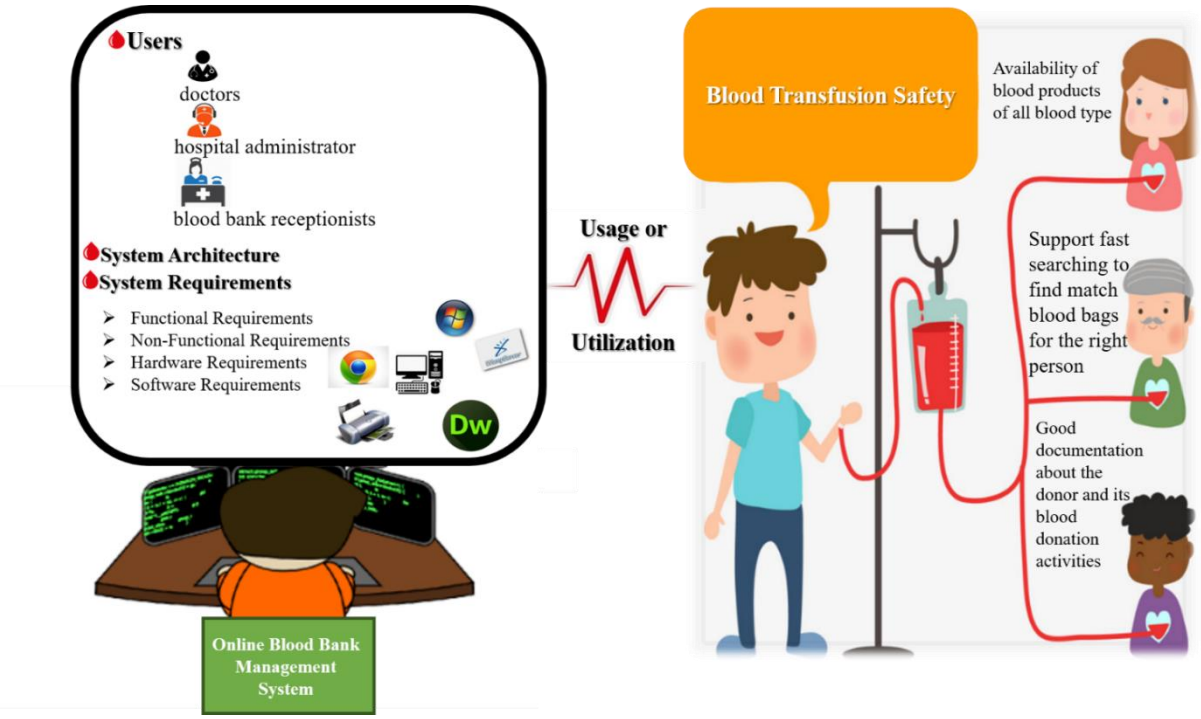


Figure 1.0: Conceptual Framework

The conceptual framework served a mental window of the researchers because it depicted the research design and the relationships of the variables involved. Based on the figure above, the usage or utilization of the online blood bank management system can lead to the enhancement or improvement of blood transfusion safety.

3.3 Methods and Procedures

The researchers used both descriptive research and experimental research design methods. The study was descriptive because it describes the nature of situation as it exists at the time of the study. Also, it was a systematic and scientific approach to research in which the researchers manipulate one or more variables, and control and measure any change in other variables. It involves collection of data in order to test hypotheses or to answer questions concerning current status of the subject of the study. The study was also experimental because it has an assumption of a cause-and-effect relationship, and the researchers introduce online blood bank management system as intervention that caused the change.

In this study, the researchers used questionnaire to collect information and to obtain the perception of the various stakeholders on how they perceive the manual-based system and the

online system. The questionnaire was administered to hospital administrators, doctors, and blood bank receptionists. In sampling, the researchers used cluster sampling in which respondents were grouped according to their roles and responsibilities. The questionnaire includes 18 questions. There were many strategies to analyze data after collected. The researchers counted the frequency of each question, and computed the mean as a measure of central tendency. Also, standard deviation and variance were calculated to perform the t-test. From the mean or average of both manual based system and online system, the researchers compared the computed mean to see if the use of online system is much better than manual system. Also, from the result of t-test, the researchers decided if the null hypothesis will be accepted or not.

Tables and graph were drawn to show these computations and figures.

CHAPTER 4: PROPOSED SYSTEM

The researchers were able to design, and develop an online blood bank management system using PhP and MySQL for the back-end database. Below are sample screenshots of the developed system:

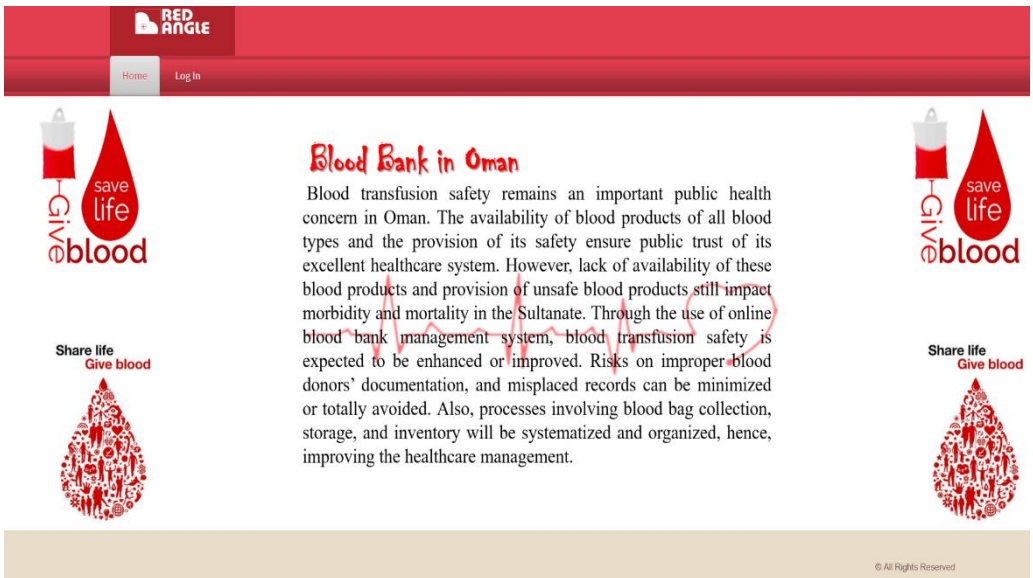


Figure 2: Homepage for Online Blood Bank Management System

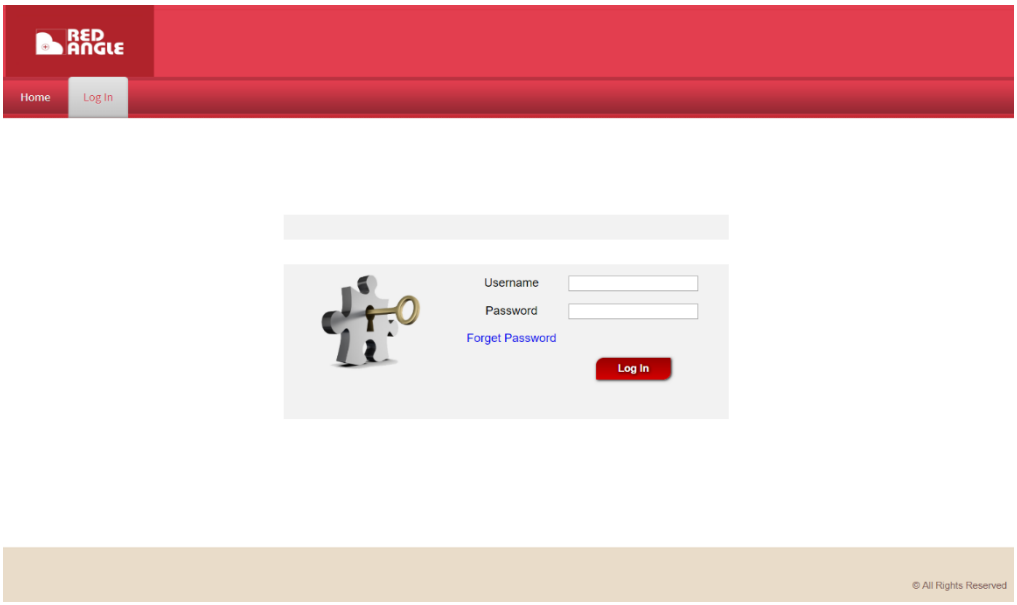


Figure 3: Login Screen

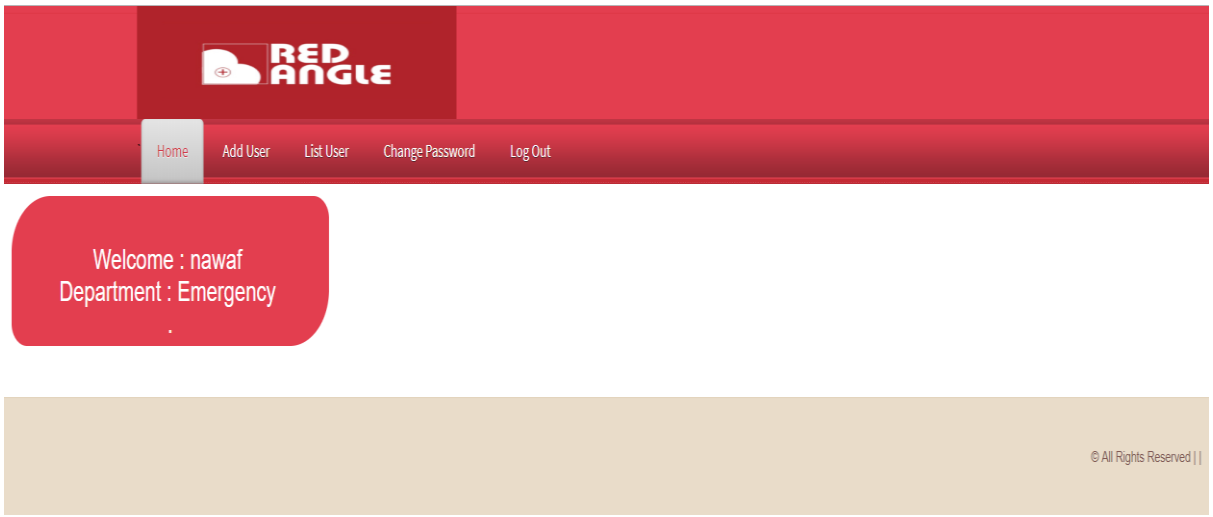


Figure4: Admin Home Page

Figure5: Add User Page

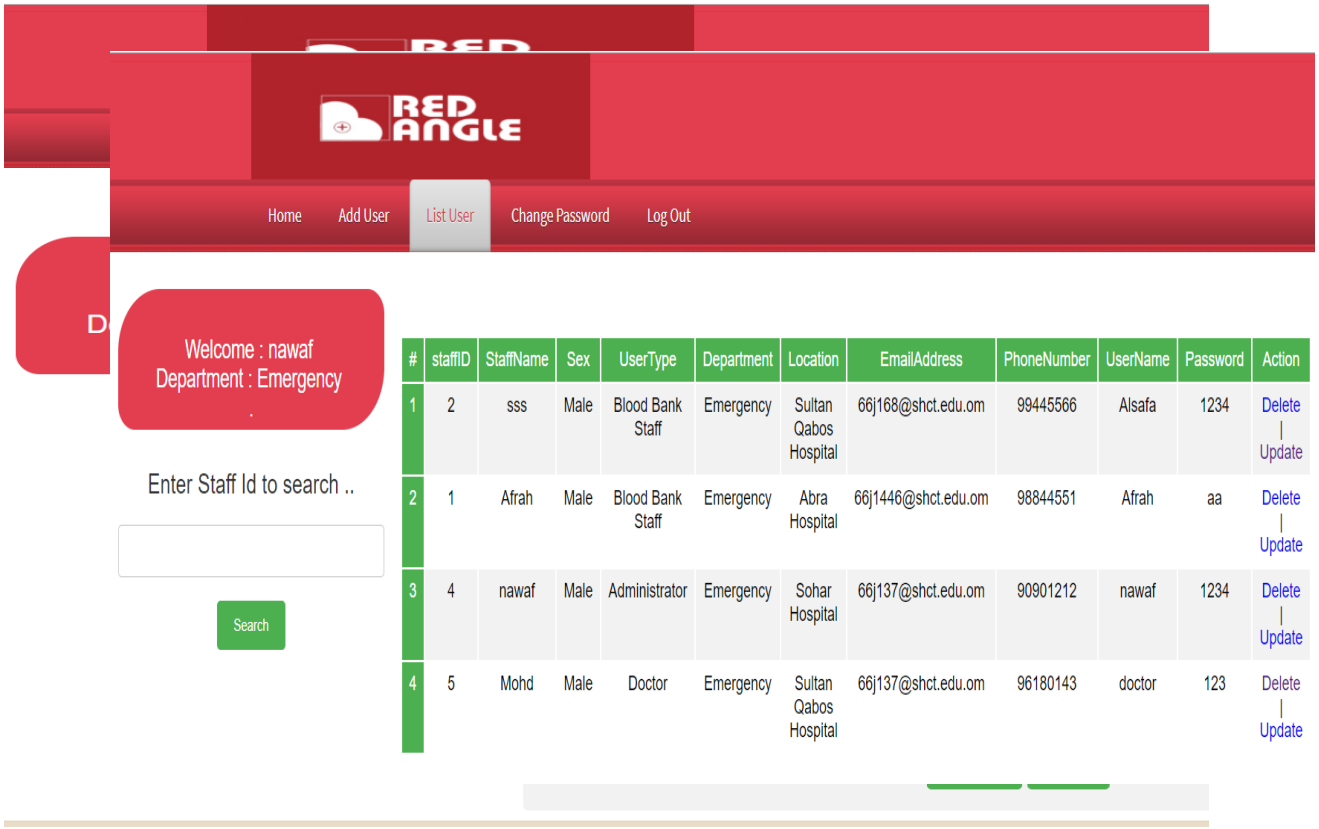


Figure6: List User Page

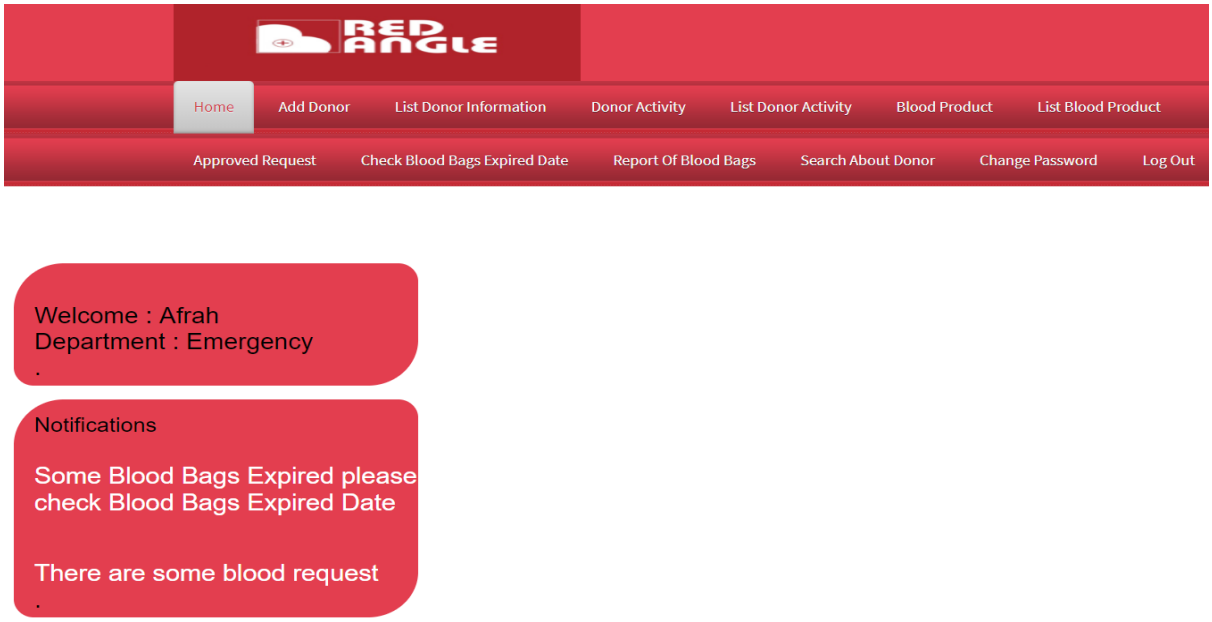


Figure 7: Donor Home Page

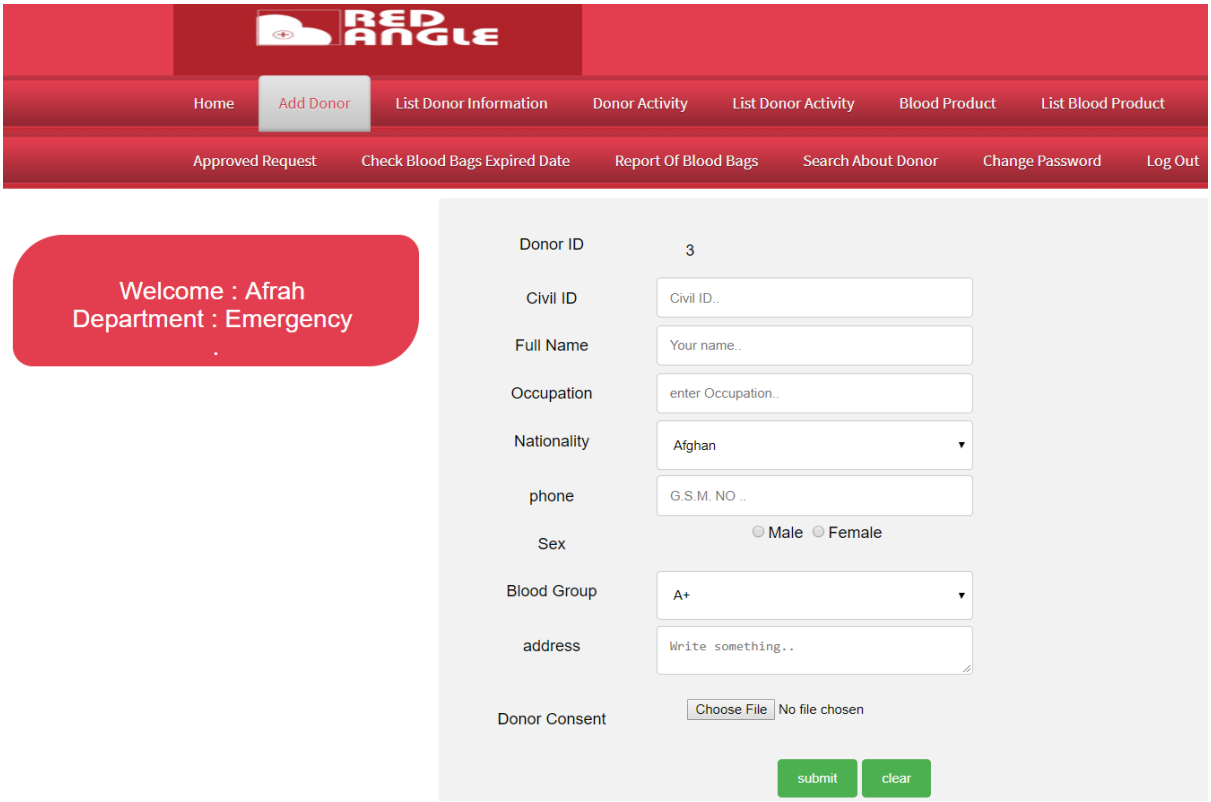


Figure8: Add Donor Page

Figure9: List Donor Page

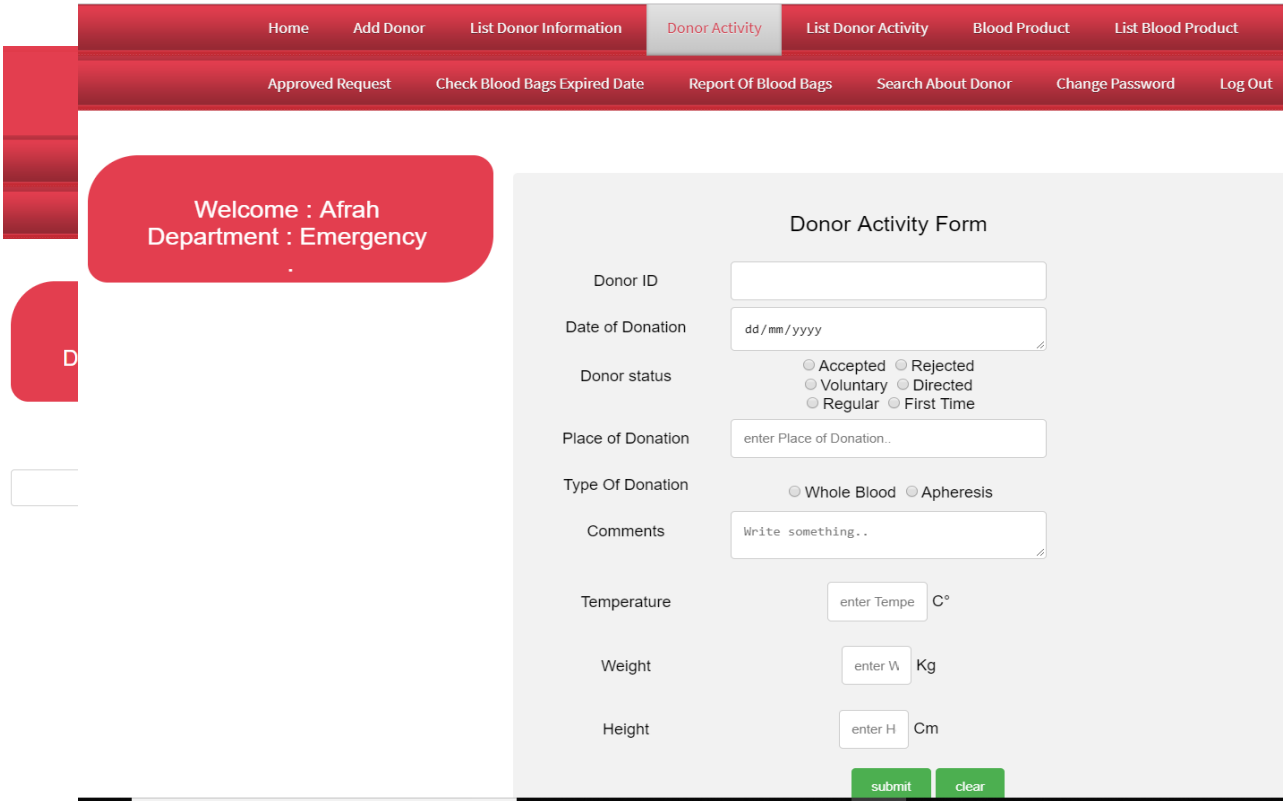


Figure10: Donor Activity Page

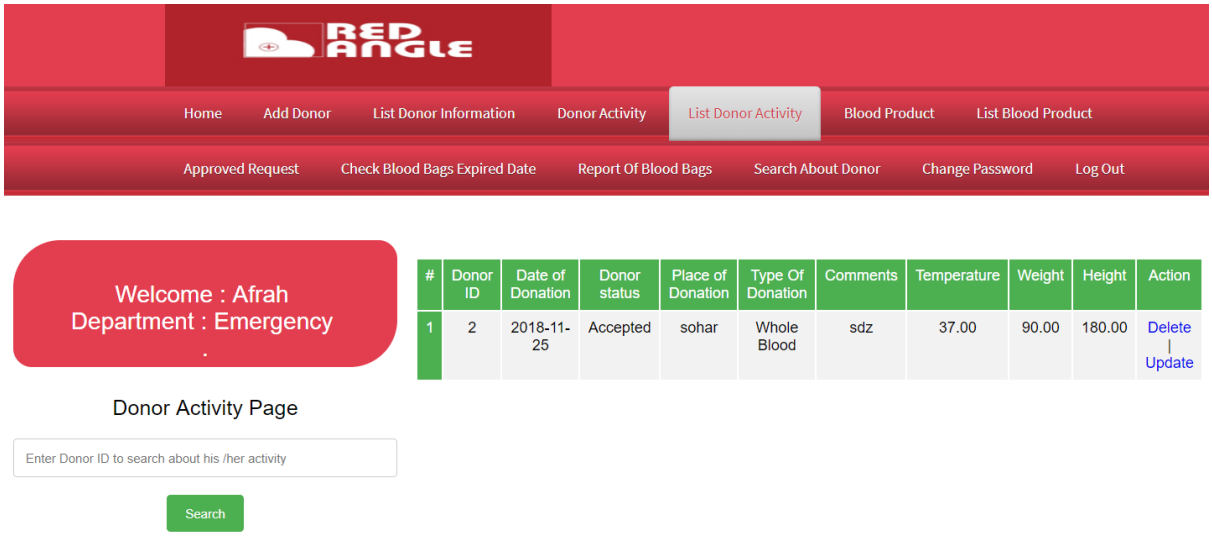


Figure11: List Donor Activity Page

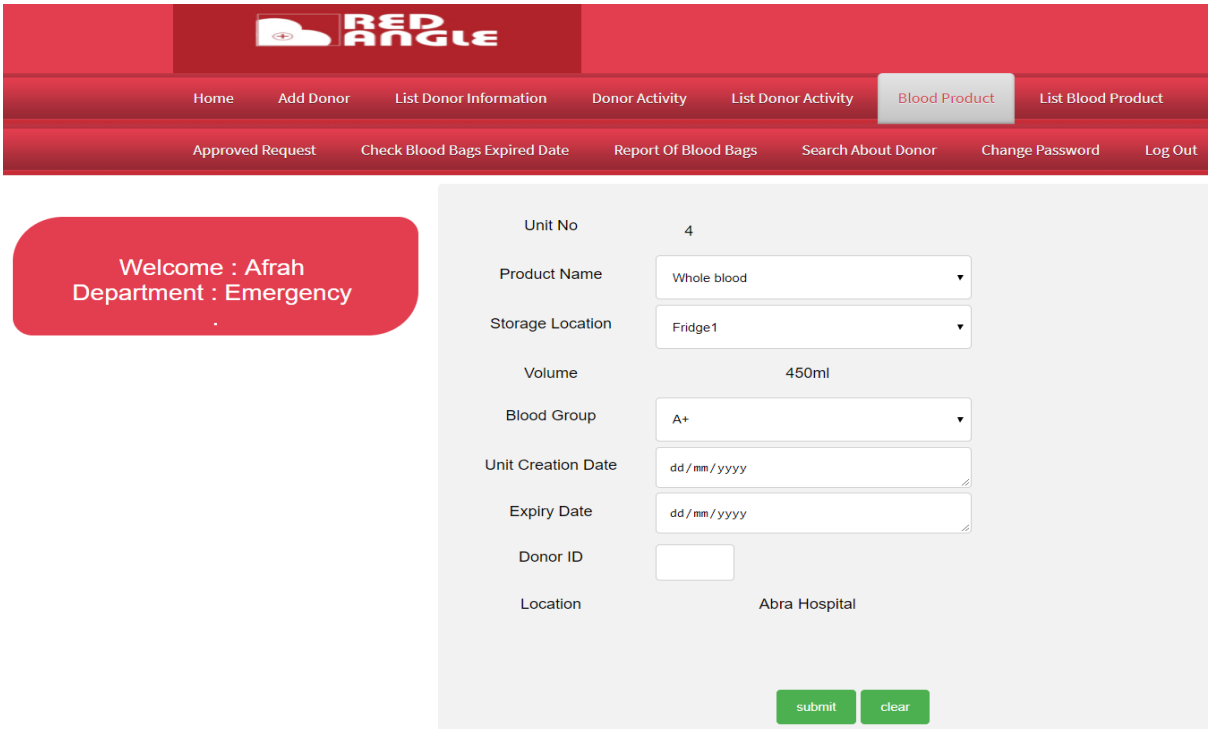
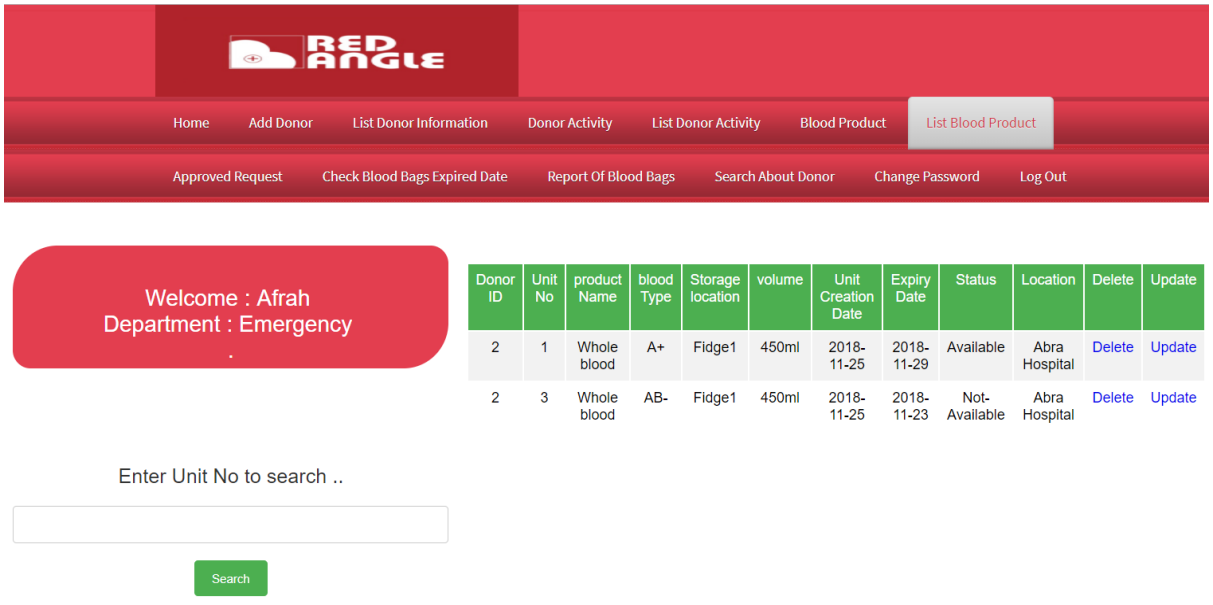


Figure 12: Blood Product Page

Figure 13: List Blood Product Page



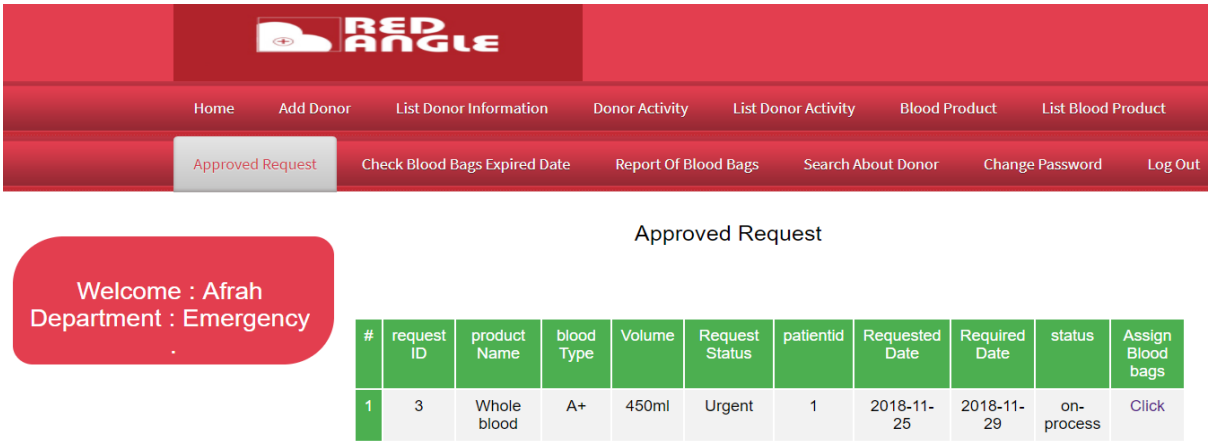


Figure 14: Approved Request Page

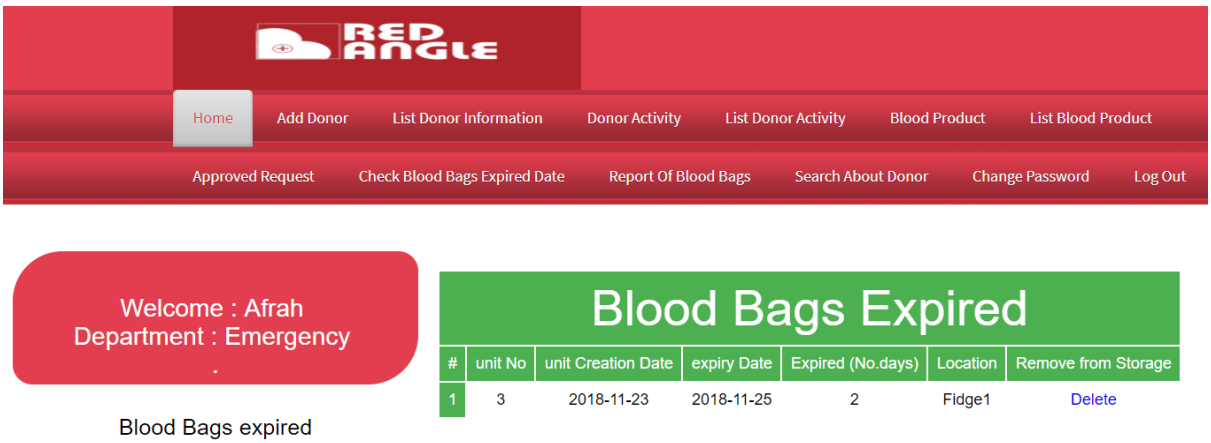


Figure 15: Check Blood Bags Expired Date Page

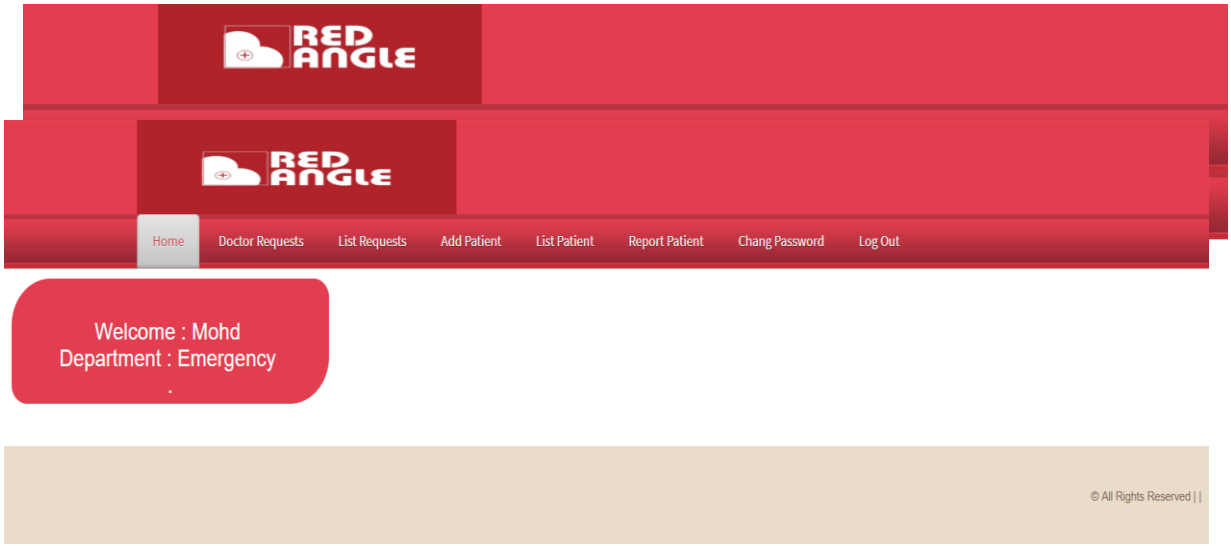


Figure 16: Report Blood Bags Page

Figure 17: Doctor Home Page

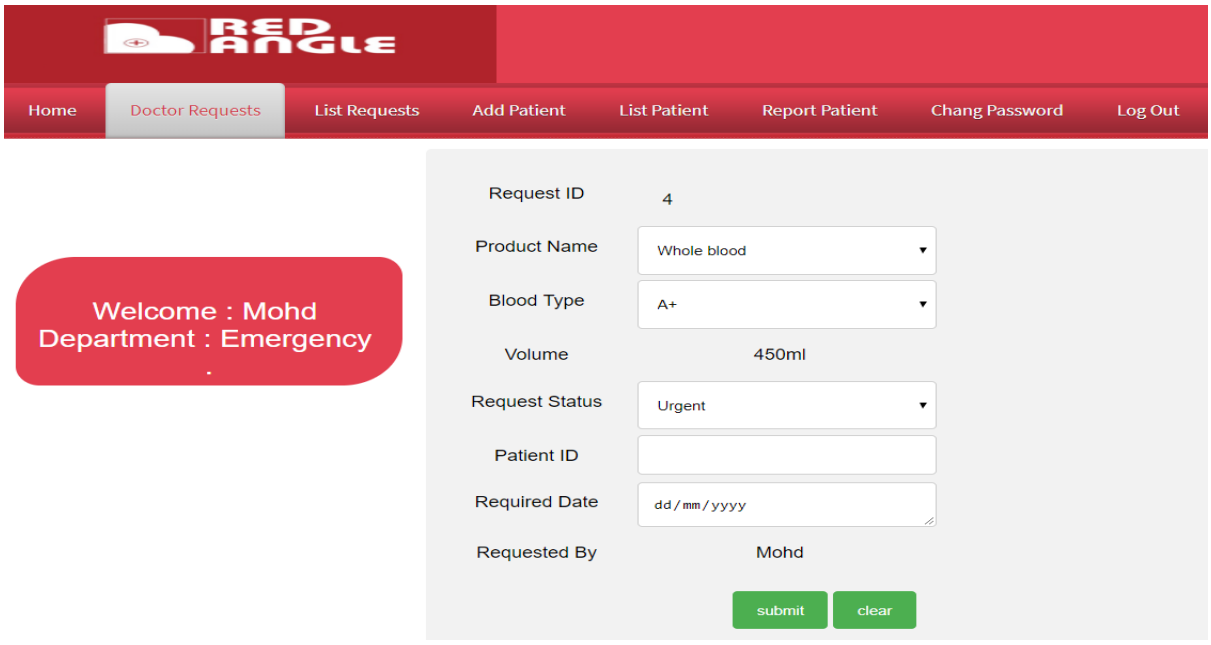


Figure 18: Doctor Request Page

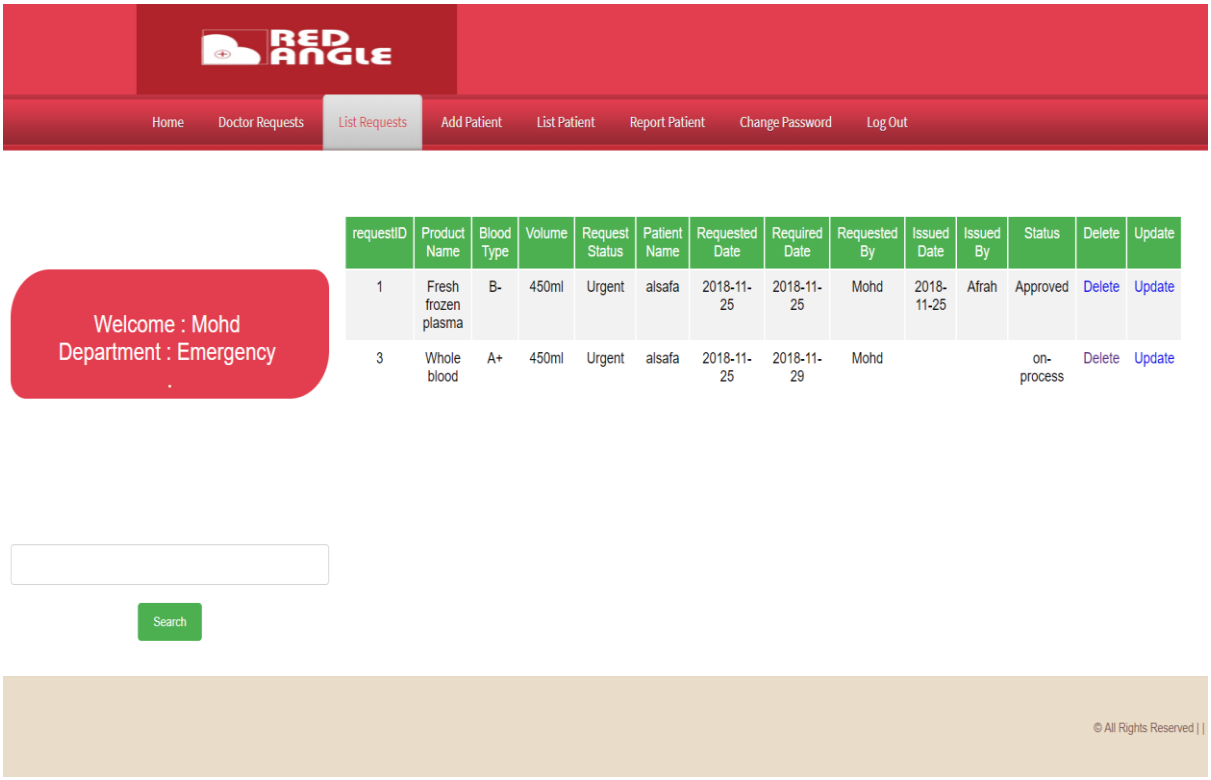


Figure 19: List Request Page

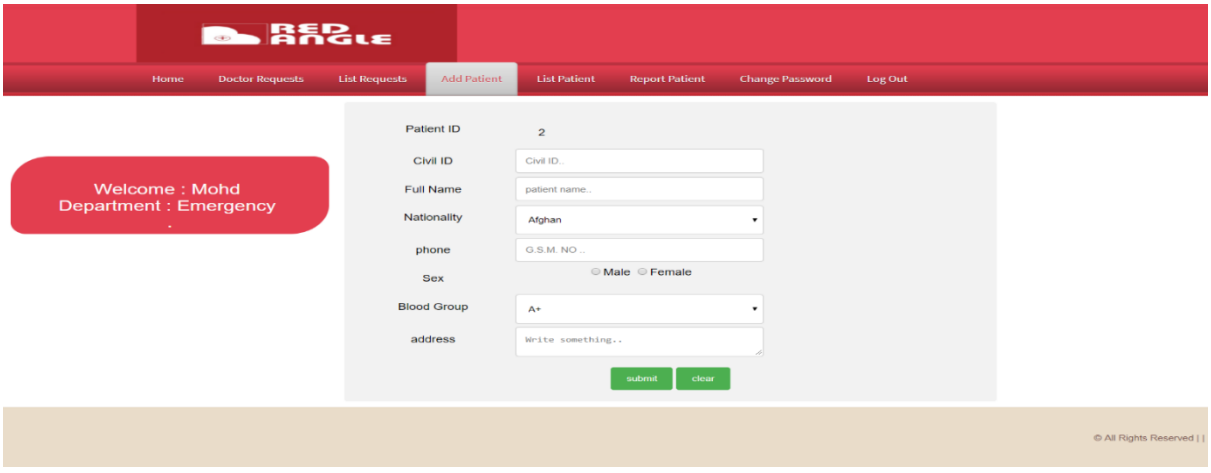


Figure 20: Add Patient Page

Figure 21: List Patient Page

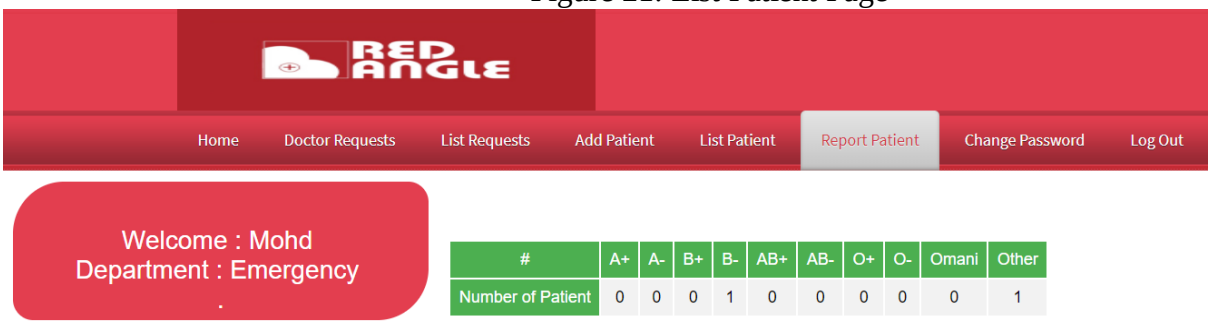


Figure 22: Report Patient Page

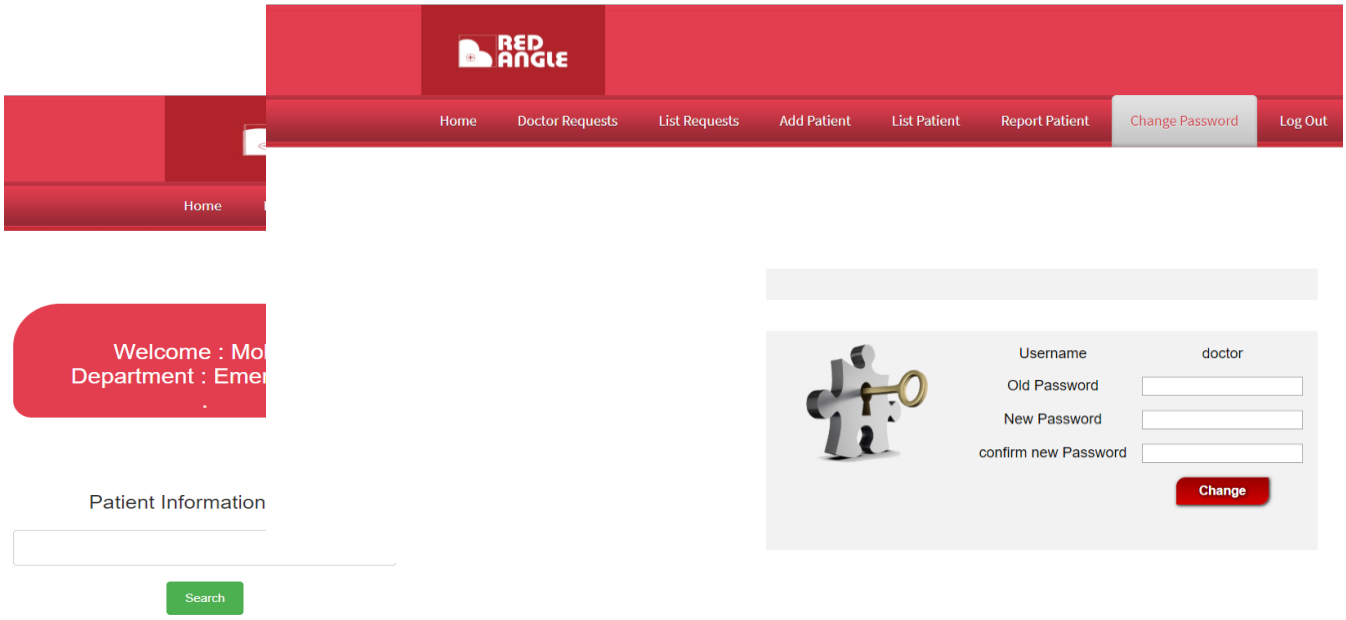


Figure 23: Change Password Page

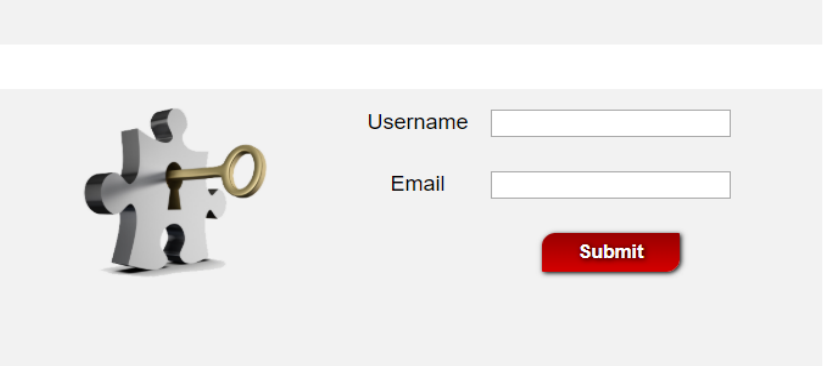


Figure 24: Forget Password Page

Validations:

The researcher used a validation check to ensure data consistency and correctness in the system. One of the validation checks is the *required field validation*. Empty fields are not allowed. Also, the password should match. Likewise, it will alert expired blood bags.

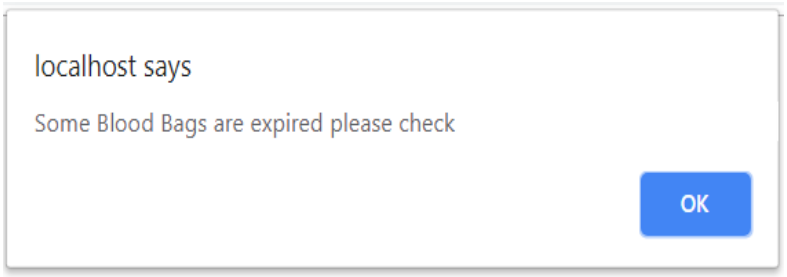


Figure 25: Alert on blood bag expiration

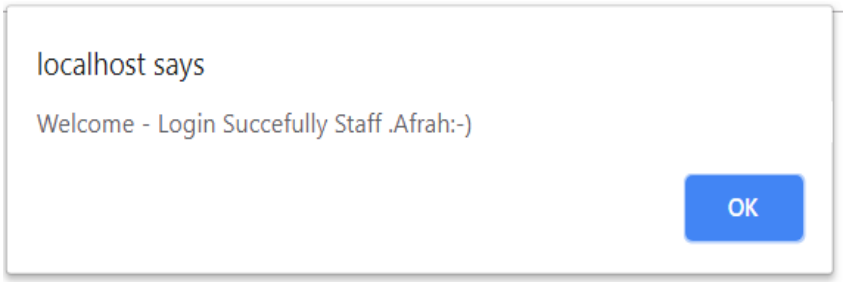


Figure 26: Successful Login Form

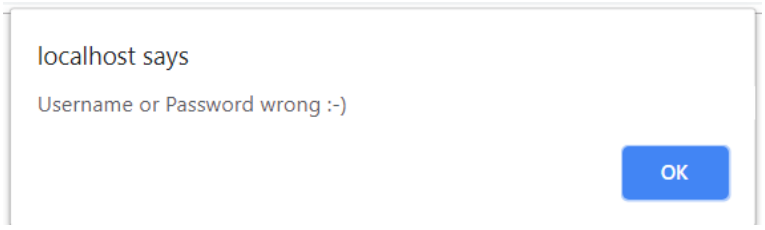


Figure 27: Alert on wrong username or password

Figure 28: Alert on password mismatch

CHAPTER 5: RESULTS AND DISCUSSIONS

The questionnaire used a 5-scale Likert scale, 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree, and 1 for strongly disagree. After administering the questionnaire, the researchers counted the frequency of each question, and computed the mean or average. For

mean, 4.51 to 5.00 is interpreted as strongly agree, 3.51 to 4.50 as agree, 2.51 to 3.50 as neutral, 1.51 to 2.50 as disagree, and 1.00 to 1.50 as strongly disagree.

Below is the results of the administered questionnaire:

		Manual Blood Bank System		Online Blood Bank Management System	
No	Questions	Mean	Interpretation	Mean	Interpretation
1	The system provides good documentation about the blood donor and its blood donation activities.	2.65	Neutral	3.92	Agree
2	The system can search fast the list of possible blood donors through its donors' files.	2.77	Neutral	3.92	Agree
3	The system can clearly monitor the availability of blood bags or products of all blood types.	2.85	Neutral	3.92	Agree
4	The system has the ability to track to whom the blood bag/product has been given using the patient record.	2.85	Neutral	3.85	Agree
5	The system allows user to know easily the period of expiration of blood bags/products.	2.85	Neutral	4.08	Agree
6	The system has the ability to generate medical reports or statistics easily.	2.96	Neutral	3.77	Agree

7	The system offers an organized and systematized filing or record system.	2.88	Neutral	3.81	Agree
8	The system provides easy to use, efficient, effective system to the users.	2.73	Neutral	3.88	Agree
9	The system allows user to know easily if the person donate blood for the last 3 months.	2.85	Neutral	4.00	Agree
Average Mean		2.82	Neutral	3.91	Agree

Table 1.0 Level of Perceptions on Manual and Online Blood Bank Management System

In general, Table 1 showed the average mean of manual system was 2.82 which was interpreted that the respondents were neutral in the assessment of the manual system. The question of ability of providing good documentation about the donor and blood donation activities was rated the lowest which implied that in most manual systems, most files or records have the tendencies of being either misplaced or lost. Though respondents rated the ability of the system to generate reports the highest criterion in the manual system, still the result showed that respondents felt that report generation in manual-system is time-consuming, and laborious. The results showed that the respondents did not agree nor disagree on the ability of the manual-based system on its efficiency and effectiveness.

On the other hand, Table 1.0 showed that the average mean of 3.91 in the online blood bank management system indicates that the respondents agreed that the online system can provide good documentation about donor and its donor activities, monitoring of blood bags availability, tracking of issued blood bags, identification of expired blood bags, report generation, system efficiency and effectiveness, organized and systematized record system, to name a few. Respondents rated the ability of online system to know period of expiration of blood bags as the highest criterion while the ability of online system to offers systematized and organized filing or record system was rated the lowest criterion. The result showed that the respondents agreed on the ability of online blood bank management system in terms of its efficiency and effectiveness.

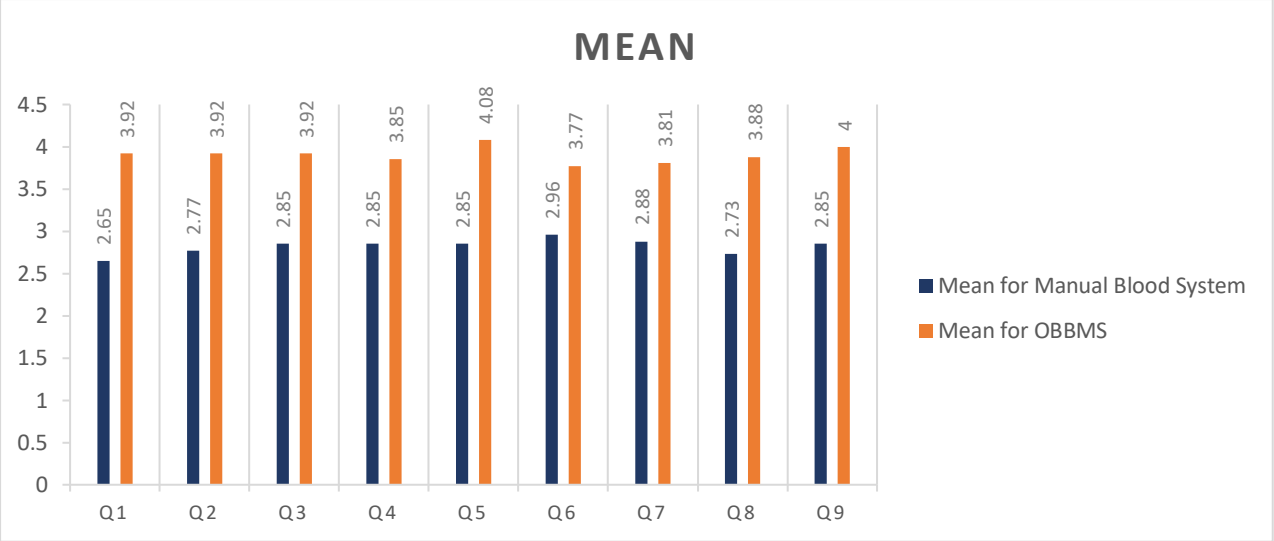


Figure 29: Comparison of Means between theManual System and the Online System

Table 1.0 and Figure 29 showed that the respondents perceived online blood bank system is much better than the manual-based. The difference showed that the respondents felt and perceived that online blood bank management system offers more advantages and benefits over the manual-based. Indeed, these findings strengthen previous studies that mentioned that manual system has lot of disadvantages to the users and hospital. Subsequently, users prefer online system over manual-based.

	Manual Based	Online Blood Bank Management System
Average Mean	2.82	3.91
Standard Deviation	0.0910	0.0944
No. of Questions	9	9

Table 2.0 Average Mean and Standard Deviation of Both Systems

A t-test, a type of inferential statistic, was used to determine if there is a significant difference between the means of two groups, which may be related in certain features. T-test was used as a hypothesis-testing tool that allows testing of an assumption applicable to a

$$t = \frac{(x_1 - x_2)}{\sqrt{\frac{(s_1)^2}{n_1} + \frac{(s_2)^2}{n_2}}}$$

population. Based on Table 2.0 and using the t-test formula, ,the calculated t-value is 24.94

while the tabled t-value at 5% significance (95% confidence) is 1.86. Subsequently, since the calculated t-value is greater than the tabled t-value, the decision is to reject the null hypothesis H_0, and accept the alternative hypothesis H_1. This means that the online blood bank management system offers a lot of advantages and benefits to the users compared to the manual system.

CHAPTER 6: SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Summary

The researchers conducted this applied research to examine and evaluate on how online blood bank management system (OBBMS) can enhance blood transfusion safety. The researchers aimed to design, design, and implement this OBBMS. The researchers used both descriptive and experimental design methods. The researchers floated and administered questionnaire through online to hospital administrators, doctors, and blood bank receptionists from the various hospital in the North Al-Batinah Regions. Further, based on the gathered data, means, standard deviations, and t-value were computed. These computed values were analyzed and interpreted. Based on the findings and results, conclusions and recommendations were made.

Conclusion

Based on results, this study concluded that online blood bank management system is much better than the manual system. The findings showed that respondents prefer to use online blood bank management system rather than the manual system because it offers many advantages and benefits that lead to its effectiveness, and efficiency. Because of the increased confidence on the users on the system, it can be concluded that the online blood bank management system enhances blood transfusion safety because it provides better ways of handling the various processes in blood bank.

Recommendations

In view of the findings, the researchers recommend that implementation of online blood bank management system. Further, the researchers recommend that further studies on how online blood bank management system enhances blood transfusion safety can be undertaken to strengthen this study's findings. This requires actual implementation of the online system and evaluates how the users respond after implementation. This study recommends that it should be roll out across the Sultanate of Oman. Likewise, to ensure that there will be better user engagement, user manuals and proper user training should be given. Lastly, this study recommends that the system can be expanded by allowing donors to register online and be a system user, and these donors will be informed about the planned blood donation activities through the online.

Synopsis:

BLOOD BANK MANAGEMENT SYSTEM

Abstract

Blood transfusion safety is a relevant and significant public health issue in the Sultanate of Oman. Since most blood banks are still in paper-based system, various disadvantages are experienced by various stakeholders, which endanger the lives of patients and deter the healthcare system. As such, the researchers aimed to design, develop, and implement an online blood bank management system (OBBMS). This web-based application allows hospitals in Oman to make inventories of their blood bags online, subsequently, allowing each hospital to check the availability of blood bags anytime. The researchers

designed and administered a questionnaire that assess the perceptions of various stakeholders in both manual-based and OBBMS. Based on the findings and results, it was found out that these stakeholders perceived online blood bank management system is much better than the manual system. Therefore, with the use of online blood bank management system, blood transfusion process is safe and secured. Threats on improper blood donor documentation, or misplaced records will be totally eradicated. Also, processes involving recording about blood donors, blood bag collection, storage, and inventory will be systematized and organized, hence, improving the healthcare management for blood banks.

Key words: Online Blood Bank Management System, Blood Bank Management, Blood Donation, Blood Transfusion Safety, Web-Based Application

CHAPTER 1: INTRODUCTION

Blood transfusion safety remains an important public health concern in Oman. The availability of blood products of all blood types and the provision of its safety ensure public trust of its excellent healthcare system. However, lack of availability of these blood products and provision of unsafe blood products still impact morbidity and mortality in the Sultanate. Through the use of online blood bank management system, blood transfusion safety is expected to be enhanced or improved. Risks on improper blood donors' documentation, and misplaced records can be minimized or totally avoided. Also, processes involving blood bag collection, storage, and inventory will be systematized and organized, hence, improving the healthcare management.

1.1 Background of the Study

For hospitals, a blood bank known as 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. . In an article[1] published in Times of Oman in 2014, it was reported

by Ministry of Health (MoH) that the total amount of blood donated annually in Muscat is approximately 25,084 units. MoH further reported that its Department of Blood Services is functioning at full capacity to meet the demands in the Sultanate.

Most blood banks are still running manual system in its processes. As such, there is a lack of efficiency because it is still paper-based in collecting information about donors, inventories of blood bags, and blood transfusion services. The lack of proper documentation may endanger patients' health due to the possibility of having contaminate blood bags. Contamination happened when there is an incomplete donors' medical history record and the blood bags' shelf life is not monitored properly. Hence, a web-based blood bank management system might be needed to address these issues and problems encountered to ensure blood transfusion safety.

1.2 Problem Statement

Despite advances in technology, nowadays, most blood bank systems are running in 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 lack of proper documentation about blood donors and its medical history. This may lead to blood bag contamination and may affect the blood transfusion safety. Generally, this study aims to determine how the use of online bank management system enhance blood transfusion safety. Subsequently, this study seeks to answer the following specific problems:

4. What is the level of perception among blood bank's stakeholders on manual-based system?
5. What is the level of perception among blood bank's stakeholders on online blood bank management system?
6. H_0: Is there no significant difference in the level of perception among stakeholders between manual-based and online-based blood bank system?

   H_1: Is there a significant difference in the level of perception among stakeholders between manual-based and online-based blood bank system?

1.3 Objective(s), Scope and Limitations

1.3.1 Objective:

This applied research aims to design, develop and implement online blood bank management system. This web-based application provides:

- To ensure hospital to have good supply or inventories of blood bags.
- To check the availability of blood bags anytime.
- To manage the information of its blood donor.
- Function to check if the person donate blood for the last 3 months.
- To allow good documentation about the donor and its blood donation activities.
- Support fast searching to find match blood bags for the right person.

1.3.2 Scope:

This research study covers the three (3) basic operations of blood banks, namely: donor registration, monitoring of blood bags or products' inventories, and monitoring of blood

bags or products' issuance. Also, due to time-constraint, respondents will be from hospitals from North Batinah Region in the Oman, though the research study talks about blood banks in the Sultanate of Oman. In addition, the study considers three (3) possible users of the system, namely: hospital administrator, doctors, and blood receptionists.

1.3.3 Limitation:

This research study does not cover the actual blood collection activity, and actual blood transfusion operation. Blood donors and patients or recipients of blood donation are not system users, their registration or information will be encoded by the blood bank receptionists.

1.4. Assumptions and Hypothesis:

The researchers assume the following assumptions:

3. Internet connectivity is needed for the online blood management system. Internet speed may affect the perception of the systems users with regards to the system effectiveness and efficiency.

4. Blood transfusion should be performed by medical or professional doctors only. The over-all safety depends on the success of the medical operation.

The researchers identify the following hypotheses:

3. There is a significant difference in the level of blood transfusion safety between manual-based and online blood bank systems.
4. There is an increased level of blood transfusion safety in using online blood bank management systems while there is an increased risk when using manual-based one.

1.5 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 take decision if a particular type of blood is needed and currently unavailable in the hospital, however, available in another nearby hospitals. Furthermore, managing the blood bags in the blood bank will be much easier because each blood bag has an information about the donor, donation activity details, and the expiration date. Also, 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:

- Blood bank staff can find and manage the donor details on the system easily.
- The expiration date of blood bags can be viewed in the system.
- Hospital can be alerted about issued blood bags and its availability.
- The system is systematized, and organized in managing blood donor records and blood donation activities.

1.6 Definition of terms

- **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.
- **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 product occurs and where proper testing is performed to reduce the risk of transfusion related events.

- **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.
- **Transfusion**: transfusion is done as a lifesaving maneuver to replace blood cells or blood products lost through severe bleeding. Transfusion of one's own blood (autologous transfusion) is the safest method, but it requires advanced planning, and not all patients are eligible.

FEATURE:

1. Provides the searching facilities of blood based on blood group.
2. It keeps all the information of a donor including blood group and his/ her health.
3. Person can donate or sell his/ her blood to acceptor, hospitals and plasma donationcentre associated with the application.

4. Provides the e-certificate for blood donation, by which a donor can accept blood (ifrequired) for free or less cost.
5. All the details of donor are first .

Advantages:

Online Blood Bank project aims at maintaining all the information pertaining to blood donors, different blood groups available in each blood bank and help them manage in a better way. The blood donors can register to this system by entering their profile information.

Submitted by:1) Prashant badganiya
2)Simran pahuja