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Development of a Blood Bank Management System

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Abstract

The process of managing the blood bag that is received from the blood donation events needs a proper and systematic management. The blood bag must be handled with care and treated thoroughly as it is related to someone's life. The development of Web-based Blood Bank Management System (BBMS) is proposed 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 currently is using a standalone system. This 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 uses J2EE programming environment with Java and JSP, using MySQL for SQL database and HTML5, CSS and JavaScript for web development.

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Keywords: Blood bank management system; Sultanah Nur Zahirah Hospital; blood bank

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1. Introduction

Blood bank is a place where blood bag that is collected from blood donation events is stored in one place. The term “blood bank” 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 (Vikas Kulshreshtha, Sharad Maheshwari).

Pathology Department is one of the most important departments in Sultanah Nur Zahirah Hospital (HSNZ). It processes blood that will be supplied to the patients in HSNZ according to their needs. Before the blood is supplied to the patients, the blood will undergo several tests to ensure that the blood receiver is not infected by serious diseases. There are a few units operating in this department such as Blood House Unit, Blood Transfusion Unit, and Blood Distribution Unit.

Every month, HSNZ will organize blood donation event which is one of the way they can increase the blood stock. After the blood donation events, the blood bags that they obtained will undergo tests. All of the blood received at the blood donation events must be managed thoroughly and systematically to avoid patient who need the blood infected by any viruses or diseases.

Blood Bank Management System (BBMS) is a web based system that can assists the information of blood bag during its handling in the blood bank. With this system, the user of this system can key in the result of blood test that has been conducted to each of the blood bag received by the blood bank. The result of test will indicate whether the blood bag can be delivered to patient or not.

From this system, there are several type of report that can be generated such as blood stock report, donor's gender report and the total of blood donation according to months and year. The system also can give the information to the donor about blood analysis test result for each time the donor makes contribution. Hence, BBMS will make the blood bank stock more systematic and manageable.

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 to the blood receiver once they received blood.

From the observations and interview conducted that have been made during the user requirements phase, it was found out that there is no interaction medium between HSNZ and the public to announce their blood donation schedule. The blood donation event schedule is normally advertised to the public so that they are aware of the blood donation campaign period. At the blood house unit, the staffs and nurses only are informed about the blood donation schedule for each month on the whiteboard at the blood house. So they are using manual way in informing the schedule. The problem arises when the space provided is not enough. The medium used to inform the staff about the schedule of the month is using whiteboard and it is written by using whiteboard marker. Therefore, the writing tends to become unclear. The public did not have knowledge about blood donation. There are brochures distributed to the donor but not to the public because they only available at blood donation house. Hence, the public are not getting any details information about blood donation unless they go to the blood donation house.

To oversee these, the BBMS interface will be constructed to cater for the blood house staff to post about the blood donation events. These details can be viewed by the public so that they know and they can allocate some time to go and donate their blood. To ensure that the blood donation event schedule is informed among the blood house staff, there will be an interface for staff to be able to fill in details and list of location of the blood donation events for each month. The data inserted will be displayed to the other blood donation staffs such as nurse so that everyone can be notified about the blood donation event schedule even though the staff's are not available at the HSNZ. By

having this function in BBMS, it is easier for the blood staff to make any correction if there is any incorrect details and make any changes if there is any changes in location or specified date.

One of the factor of the public afraid to donate their blood is they believe in myths. The myths that they always believe are, if they donate their blood they will become fat and if they donate their blood, their blood will become less in total of amount and they will become pale. This BBMS should provide more information in order to educate the public so that they know blood donation will not give bad effects. By giving awareness to the public, this will increase volunteers to donate their blood.

3. Literature Review

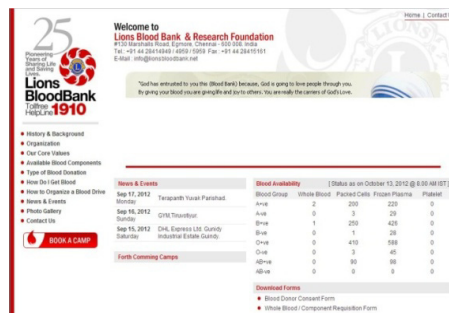
There are three systems that have been selected as benchmark for the development of BBMS. They are the Blood Bank India (BBI) at <http://www.bloodbankindia.net>, Lions Blood Bank & Research Foundation (LBBRF) from <http://www.lionsbloodbank.net/> and a previous BBMS standalone version. The website for Blood Bank India is a website that provides the facility for the donor to register by him or herself as a blood donor. Only citizen in India can register to the system. It also provides a feature where a person or hospital can request the blood bag or blood stock from the Blood Bank India.

LBBRF is a private organization that functions as a place to donate blood. They give a charge to the person or patient that is in needs of blood. However, the money that they collected is not for the profit for them but for recover the expenses incurred in recruiting and educating donors. This is also to ensure that the blood transfusion is as safe as possible. In Lions Bank & Research Foundation, They will make sure the availability of blood stock in their blood bank. They also published the current status of blood stock in their website homepage. This is for them to keep the website visitor especially donor informed about the needs of blood. They also inform the donor and the public where and when is their next event. However, this blood bank does not provide any facility for the donor and the patient. Therefore, they cannot know how many times that they have donated their blood. As for the donor, they cannot know their blood screening result for each time they donate their blood. Without having this function in the system, the donor cannot monitor his or her health condition. This will make the donor become unaware of their health condition. Fig. 1 and Fig. 2 illustrate the web interface design for BBI and LBBRF while Fig. 3 shows the previous BBMS standalone version.



Source: <http://www.bloodbankindia.net>

Fig. 1. BBI Webpage



Source: <http://www.lionsbloodbank.net/>

Fig. 2. LBBRF Webpage



Fig. 3. Previous Version of BBMS

Donor ID	Name	Blood Group	Address	Phone Number
1	arnav	A+	kolkata	9163125708
3	rajib	A+	kolkata	25441166
4	manas	B+	kalyani, Nadia	987766551
6	Ranajit Saha	B+	Naihati, Garfa	9766223457
7	Wasim Akram	O-	Birati	98667744
10	Rakesh Biswas	B-	Barnout	66557744
27	Rahul Sen	A+	Kalyani	985532244

Fig. 4. Sample Report

This stand-alone system contains the basic functions of the blood bank management system. This system uses the Microsoft Access as the database of the system. The function modules are user account management, view stock list, donor registration and the customer registration. A blood donation sample report is illustrate in Fig 4.

4. Methodology

Methodology that has been chose to develop BBMS is the Rational Unified process (RUP) from Noushin Ashrafi, & Hessam Ashrafi and Rational Unified Process at www.ibm.com/developerworks/rational/.../1251_bestpractices. By using this methodology, if there is any changes in requirement or misunderstood the requirements given by the Pathology Department (PD) can be implemented in the next iteration of certain phase. Fig. 5 shows the phases of RUP. As we can see here, there are four phases involved in this methodology. They are Inception, Elaboration, Construction, and Transition.

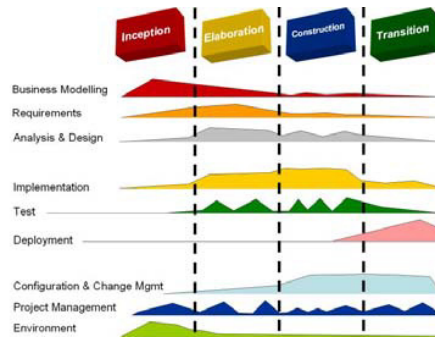


Fig. 5. RUP Methodology

4.1. Results

Fig. 6 shows the main page of the BBMS. This interface can be accessed by all of the users of this system. This interface is accessible not only for the registered user of the system bt also can be access by the public. Fig. 7 shows the example of the information that can be obtained by the registered user and public. The information that the public can get are related to blood donation such as advantages of donating blood, what blood group can donate to which blood group, and what are the advantages that the donor get from HSNZ according to how frequent the donor donate their blood.

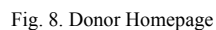
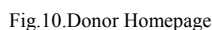


Fig. 8 shows the homepage for the Donor. The Donor can view the blood donation schedule, blood donation history and also blood test results for each of the blood donation that has been made. The Donor can view the advance blood test that has been made to his or her blood during the donation. He or she also can view the previous blood advance test. By having this function, the Donor can monitor his or her health every time he or she donates blood. Fig. 9 shows the interface of this function. Blood test function (see Fig. 10) is accessible by the Laboratory Staff. The laboratory staff will enter the blood test result. If one of the results of critical tests which are HIV, Syphilis and Viruses is positive, the overall test will be failed.



Blood request function is for the Doctor. If the doctor is in the need of blood to fulfil the patients need, the doctor needs to request for the blood bag. The doctor also can view the request history. In the request history, the Doctor can view the status of the blood request (see Fig.11).

5. Conclusion

BBMS is a management system that is developed to manage blood bank in HSNZ. The BBMS had been developed in accordance to HSNZ user requirement. This is to make sure that the management of the blood stock became effective, systematic and meeting user requirements. The functional services provided in the current version are profile management, blood stock management, and blood analysis management. In the next phase we will develop a portable and modified BBMS version based on android OS. The modified version will include a user self monitoring health profile history.

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