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Web-Based Information System for Blood Donation

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Abstract

This research work is an attempt to practically implement the Information Technology in real world problems. This system provides multiple facilities, i.e. maintaining record, analysis of various parameters for research issues and providing online information. Hardly there exist such types of online systems in Pakistan that can serve mankind and save precious lives. This system enables users to search, collect and donate blood to the patients who are waiting for the last drop of the blood and are nearby to death. Data was tested for the Blood Donor Society, Gomal University, D.I.Khan. The website contains ***42 links****, some of them are static and all others are dynamic. The registered donors are very small as compared to the total strength of* ***7414*** *of the university*[1]*. The system is much secure and no unauthorized user can change it. This system can be extended to other welfare societies, health organizations and hospitals through WAN.*

Keywords

Online System, Blood Donation Analyses, Information Technology, CBIS

1. Introduction

In this age of wisdom and modernity ironically the greatest predicament that exists is that the cost of living and saving lives has become higher, and unfortunately life itself has lost its worth to us. Numerous blood donors' societies are there in Pakistan and in the world as a whole. But very few online systems exists that could help humanity well in time and save precious lives. Manual systems as compared to Computer Based Information Systems (CBIS) are time consuming, laborious, and costly.

This paper introduces the software named as "Web-Based Information System for Blood Donation", being tested for the Blood Donation Society, Gomal University, Dera Ismail Khan, Pakistan. A record of few years was tested for various parameters to achieve different reports and analysis.

This software was developed through using tools, like: ASP, XML, Java and SQL Server. This system maintains detail record of registered donors with their blood groups details, contact addresses and status of blood donation. This software is highly secured and only authorized users may make changes in the records. Patients may achieve the required blood by contacting the donors through using Internet or just through phones.

This CBIS updates the record of donors with new entries and/or deletion in the present record. The users may easily get information about all the functions of the blood donor society as well as to contact the donors within minutes. So this system is not only an information processing system but will also be used for publication and research. Some of these reports may be seen in the following paragraphs.

This study shows the comparison of donors in various forms, e.g., number of male and female with their blood groups, groups by profession and donation by districts, donors as well as maintains patients' records. This system is self-explanatory and is easy to use both for novel and experienced persons.

In view of the existing opportunities and challenges faced by the people of remote areas, the objective is to prepare an information system that may not only provide online information but may become a means to save precious lives. The basic aim of this article is to prepare a document that will be used as a base for introducing an information system to make the blood collection, blood searching and blood donation process easier in remote areas. Similarly, to develop a system that could analyze the facts both in tabular as well as in

[1] Source of Data: Gomal University, Dera Ismail Khan, Pakistan

graphical forms, to provide a deeper and broader sense of understanding the issue at hand.

2. Related Studies

"And whose saveth the life of one; it shall be as if he had saved the life of all mankind" (**Al-Quran**). The best one among you is that who is most beneficial to others (Prophet Muhammad –P.B.U.H.).

The literature shows that the need to collect enough blood and to make it available for patients is more acute in developing countries. Many patients, especially women and children, die because of lack of blood or are infected when transfused with unsafe blood. This occurs often in remote areas, which lack facilities for blood collecting, storing and processing.

We live in a materialistic, opportunistic society where being selfish is the norm for survival and giving has become a sigh on the weak. This is not a dark dismal picture, it is the truth of what we have become, and we need to expand our horizons and open our hearts. Blood Donor Society, Gomal University, Dera Ismail Khan, made an effort on this front and started a mission, understanding the fact that all lives are precious. The outlook was to help save lives in faster, better and efficient manner, because the truth is that no matter what cost you may allocate to a life saving; method, ***Nothing Can Be as Precious as Life.*** For this purpose, a service named ' Blood Donor Society' was launched in 1994. It is absolutely free of cost. Gomal University has the privilege of being the only university in Pakistan to have initiated such a service, which is so unique in nature.

To coincide with the 80th anniversary of blood collection services in Australia, the Federal Government has designated 2009 the Year of the Blood Donor. It's an opportunity to showcase our **514,000** special donors and hear from the people whose lives are transformed by their generosity [1].

Notable findings from the 2007 NBCUS and comparisons with the 2005 report were as follows [2]:

- Total WB/RBC collections in 2006 increased from 2004 by 5.8%, to 16.2 million units.
- Total WB/RBC transfusions in the same period increased by 3.3%, to 14.7 million units.

To donate blood, find a blood bank near you using AABB's blood bank locator. Then, call the blood bank to make an appointment. When making the appointment, ask the following questions [3]:

- What are your general donor requirements? (Most places require you to weigh a minimum of 110 pounds, be at least 16 years old and be generally healthy).
- What kind of identification is required? (First-time donors are usually asked to present two forms of identification—the type of identification needed varies by facility).

Every health organization wants to provide maximum facilities to their patients. Ministry of Health, Govt. of Pakistan publishes various publications for public information and has informed the people about different infections caused by unsafe blood like AIDS, HIV, HBS, and Blood Cancer etc. Small and large health organizations and different welfare societies throughout Pakistan wrote different books and pamphlets in Urdu language as well as in English, which depicts the main causes and preventions of unsafe and infected blood [4].

Some of the gaps to be filled in though this work, which the current system is seriously facing, are:

- Lack of communication between the Donors and Patients.
- Searching the members, their status, addresses, contact numbers and willingness.
- Problems in the record keeping.
- Frequent errors in record keeping.

That is why it is the issue of the day to develop a high quality CBIS that may practically solve the real world problem at a cheaper rate.

3. Online System Development

This system was developed through various phases, like data collection, designing, coding, testing and implementation. Test data was acquired from the record of the Blood Donor Society, Gomal University, Dera Ismail Khan. Numerous books, articles, were thoroughly studied along with checking different web sites to get help for changing thoughts into reality. It was felt that there is a dire need of development of an online system to fulfill the requirements of blood to patients. This software was developed through using ASP, XML, Java and SQL SERVER. Phases to develop this system followed as: System study, requirement analyses, data acquisition, designing, coding, testing and implementation. Prototype type system development approach was used, i.e. single module was developed, tested and verified. Another module was developed and linked them together to develop the whole system. A database was developed

and various queries were made to prepare reports and analyses. A dynamic web page was developed to make online changes as well publish results globally. This system was developed in such a manner that it may provide online analyses for researchers and students may use it as a pedagogical instrument for learning these tools. Few years' data were used as a sample space. The whole process of the problem domain was depicted through a Data Flow diagram in ***Annexure-I***, which clearly show the processing of data and producing results.

4. Results and Discussions

Various reports were generated through this prototype software. The reports were generated both in tabular as well as in graphical form. This system generates various reports as:

1. Registered Donors
2. Blood Donated Report
3. Donors' Confirmation Report
4. Donors Recipient Report
5. Areas-wise and blood groups-wise Report
6. Frequently Asked Questions
7. Comments and Suggestions
8. Gender-wise Analysis
9. Professional-wise Analysis
10. City-wise Analysis

Moreover, there are **42 links**, which may retrieve all of the records, reports and analyses. Internet user may use the website along with having facility of "***Frequently Asked Questions***" along with provision of "***Comments and Suggestions***".

Some of the reports were included in this paper, which are described as below:

4.1 Blood Donors' Record

This record view displays details about the member donors. This result is useful both for the administrators as well as patients to know the donors contact numbers, as well as his group. See the following report for detail.

4.2 Donors Report

This report depicts the total numbers of registered donors along with depicting and female donors of the society (see Table 3 and Fig.1). Male donors are 70.2 % with female as 29.8 %. Less number of female is due to cultural situations in the country as a whole and especially in the Gomal University, Dera Ismail Khan. Another factor is that the numbers of male are much greater than the females in the university.

Table 1: Blood Donors' Record View

ID	Name	Father Name	Gender	Profession	Department	City	Blood Type	Contact No	Donation Date mm / dd / yyyy
1	Asad	Ali	Male	Student	DVM	Peshawar	A-	89765589000	11/13/2006
2	Saleem	Sadiq	Male	Professor	CBA	Mardan	A-	78906765544	11/1/2006
3	Shoaib Qureshi	Mr Qureshi	Male	Student	ICIT	Bannu	B+	0928330031	11/19/2006
4	Tariq Usman	Mohd Saboor	Male	Student	ICIT	Karak	A+	03469695304	10/11/2006
10	Hafeez Ali	Rehman	Male	Student	HPE	Bannu	AB+	09287654323	11/25/2006
11	Kamal	Jalal	Male	Lecturer	English	Lakki	AB+	03012343234	11/25/2006
12	Javed	Sehroon	Male	Lecturer	CBA	Swat	B+	89097766566	11/25/2006

Table 2: Registered Donors

Total Registered Donors	Male	Female
450	316	134

Following is the graphical representation of registered donors with males and females

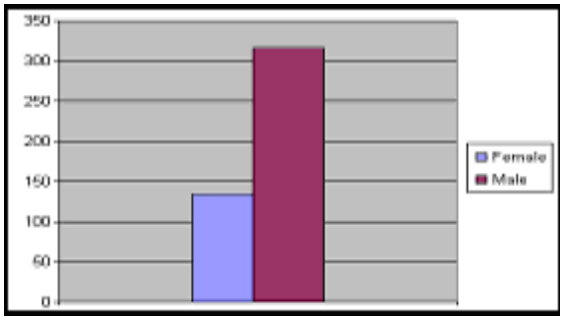

Fig. 1: Total Male and Female Donors

4.3 Gender-wise Blood Group Analysis

This report shows details about total males and females having different blood groups including the grand totals of various groups. Group O^+ is the greatest in the female, which is equal to 44, while in male; B^+ group is the greatest figure of 94. As a whole, the maximum value in both the groups is O^+, which is equal to 137. See the following table for detail.

Table 3: Gender-Wise Blood Groups

PivotTable1

	gender		
	⊞ Female	⊞ Male	⊞ Grand Total
blood_type	Count of blood_type	Count of blood_type	Count of blood_type
⊞ A-		6	6
⊞ A+	28	69	97
⊞ AB-	1	3	4
⊞ AB+	20	35	55
⊞ B-	2	7	9
⊞ B+	37	94	131
⊞ O-	2	9	11
⊞ O+	44	93	137
⊞ Grand Total	134	316	450

Graphically this report may be seen as below.

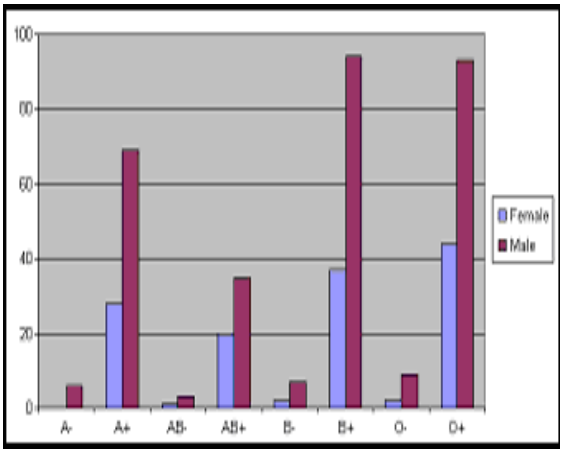

Fig 2: Male-Female Blood Groups

4.4 Employees Report

This report shows the blood group distribution according to a profession along with profession-wise registered donors. There are very few employees who are registered donors. Some of the reasons are, like: age, communication gap between the society members and the employees, lack of interest due to unawareness of the utility of the society. There are 1414 employees[2] in the university, while only 16 are member donors.

[2] Source of Data: Gomal University, Dera Ismail Khan, Pakistan

Table 4: Profession-wise Blood Groups

	gender ▾ deptt ▾	
	⊞ Male	⊟ Grand Total
profession ▾	Count of blood_type	blood_type ▾
⊟ Clerk	3	B+ O+ O+
		3
⊟ Dispenser	1	O+
		1
⊟ Lab Assistant	2	B+ O+
		2
⊟ Lecturer	5	A+ A+ AB+ O+ O+
		5
⊟ Librarian	1	B+
		1
⊟ Peon	3	B+ O+ O+
		3
⊟ Professor	1	O+
		1
⊞ Grand Total	16	16

The following graph shows that lecturers' donors have a maximum value of 5 and smallest figure is only 1 each for dispensers, librarians and professors. In the university, dispensers are few in number, 6 professors are there in the university but librarians greater than both of them.

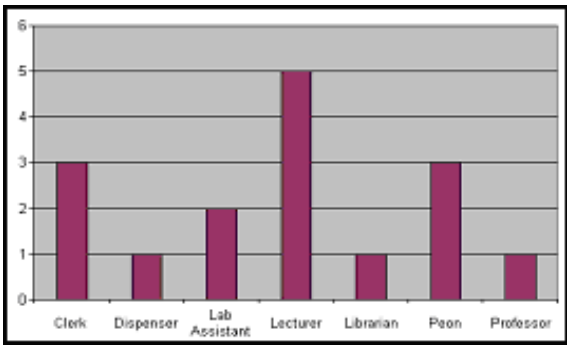

Fig 3: Profession-Wise Blood Groups

5 Conclusions & Further Research

Computers are gradually becoming accepted in about every field of life, like business environment, health, industries, and research environment. Within these application areas, online systems appear to have become most suitable for health care and life saving processes. The proposed system is able to manipulate these real facts. These analyses reports show that most of the peoples are unaware of the utility of such activities. In this context seminars and wide publicity is required both in male and female.

This system can be extremely useful to patients, doctors and researchers, which may further be extended to research purposes, like:

- Group-Wise Availability of Blood
- Area-wise Availability of a Blood-Group
- Age-wise Availability of Blood
- Age-Wise Requirement of Blood
- Area-Wise Requirement of Blood
- Group-Wise Requirement of Blood
- Trend in Blood Donation

It may be concluded that this work is not a one-time job and not a website only but is a continuous work to be adopted for further research and the system can be used in various "what-if" scenarios. This work may be extended to interconnect all the blood donors' societies in the country through using LAN technology.

6. References

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Annexure-I

Data Flow Diagram of the Problem Domain