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AN APPLICATION TO FIND SPATIAL DISTRIBUTION OF BLOOD DONORS FROM BLOOD BANK INFORMATION SYSTEM

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The availability of blood is one of the important requirements in treating medical emergencies. The blood banks do not maintain buffer stocks as required during that time. Thus the buffer stock is crucial for disaster management. This application helps people to get the right information about the availability of blood in the current location for the sake of transfusion at their need of the hour without running from pillar to post in getting the required blood during emergency. In this paper we propose a system to find the nearest blood bank with stock details and the display of donor/s in that locality during emergency with an integration of Geographic Information System (GIS) to online requisition of voluntary donors, receptors, data base of blood banks, stocks of blood, blood transfusion and related issue management to address the global blood related problems in coming future.

Keywords: GIS, Blood Bank Information System, Spatial Distribution.

1. Introduction

India's blood banking system has serious Shortcomings. The gap between demand and supply of blood is continuously widening. India has an annual requirement of approximately 5.0 million units of blood [1]. The actual collection is only approximately 3.5 million units. A study conducted by the National AIDS Control Organization (NACO) [2], regarding blood banking services in India has revealed many shortcomings, including the decentralized nature of blood services and a deficit in the availability of blood, especially from voluntary donors and non-remunerated blood donors [1]. In the current system, there is no tool to find number of blood donors of the required blood group in current time and place, there is no interaction between blood banks, no exchange of blood or its components, there is no integration of Web launching with all the above mentioned facilities [2]. In order to explore all these issues an efficient Information management system is required, with the aim of ensuring that every patient has access to an adequate quantity of safe blood. This application called Network of Community Blood Bank (NCB) is a web based blood bank management system with the integration of Geographic Information System (GIS). This application is designed to achieve the analysis of the spatial distribution of donors, which shows how GIS can be used quickly to locate the blood donors of the required blood group near to a given blood bank location using a GIS based map of Tumkur city. All these are available as a web application including finding nearest blood bank with the availability of the required group of blood at right time and right place. This web based blood bank service portal also provides awareness generation to facilitate the coordination between the need of blood during emergency, arrangement of blood donors and blood banks. This system will help the citizens in finding the availability of blood, service directory, FAQ for citizens, online donor registration and Awareness generation.

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2. Methods

2.1 Study Area

Tumkur is a district place of Karnataka in India. The city has a population of over 3,00,000, 4 allopathic hospitals and 69 private hospitals and there are only six blood banks. One blood bank attached to Government hospital and other five are private and community blood banks. As the demand of blood is very high and there is deficient of 40-50 percent of blood, Voluntary contribution is only 25 percent. Thus there is a need for widespread of the importance of voluntary blood donation with the aim of recruiting, retaining voluntary and recognition of non-remunerated blood donors.

2.2 Research Issues and Analysis Techniques

In this paper we propose a new web based application to address issues like efficient management of blood bank services and maintenance of donor list with their location using GIS. This application is designed to be a spatial decision support system to meet blood demand throughout the city during emergency. This application provides a good example for exploring how to use GIS by the blood banks management, which cover three main demand related issues, a web application to maintain network of community blood

bank, finding catchments of donors to a particular blood bank and finding nearest donors from a blood bank. The proposed system provides enhanced functionality and efficient process design that enables the application to maintain the information of blood banks, blood campaigns, blood requests which are sent by the patients, donors, hospitals and doctors [3]. All of these data are linked to demand coverage and used for the second issue of this application which is related to quickly locating the blood donors of the required blood group nearer to a given blood bank location and also to determine and visualize catchments of donors to a particular blood bank on a GIS based map of Tumkur city. GIS has several techniques and functions that can be used for blood bank service planning [4]. One of these tools is called on screen digitizing is used by the present study to capture and display the geographical map of Tumkur city.

3. Results and Discussions

3.1 Web Application to Maintain Network of Community Blood Bank

The Network of Community Blood Bank(administrator) part is a complete blood bank management solution that covers all the activities of a blood bank like Blood donation, transfusion service and management of blood bank service through a web application [2]. It helps in maintaining patient registration, assists in donor recruitment, maintains stock, performs blood cross–matching and monitors issues like Donor history, cross–match result, antibody profiles transfusion outcome etc are as shown in Figure 1. In addition to this there is a facility available in the system to record and maintain donor information including record of donor name, address, phone number and email id, details of previous transfusions and On-line availability of stock positions of all blood products. Blood products nearing expiry date can be identified and donors can be contacted in case of emergency.

Figure 1. Blood Bank Management and Donor Management Modules

Network of Community Blood Center (user Part) is a web enabled Transfusion Management system, which bridges the gap between the blood donors and the people who need blood (recipients). It provides the information of blood banks, donors, hospitals, and doctors for the users at the time of emergency as shown in Figure 2. The search facility gives the blood bank information, which is nearer to the recipient. The search facility is also available for donors, doctors and hospitals. This system also intimates the future blood campaigns; interested donors can donate the blood in respective blood campaigns.

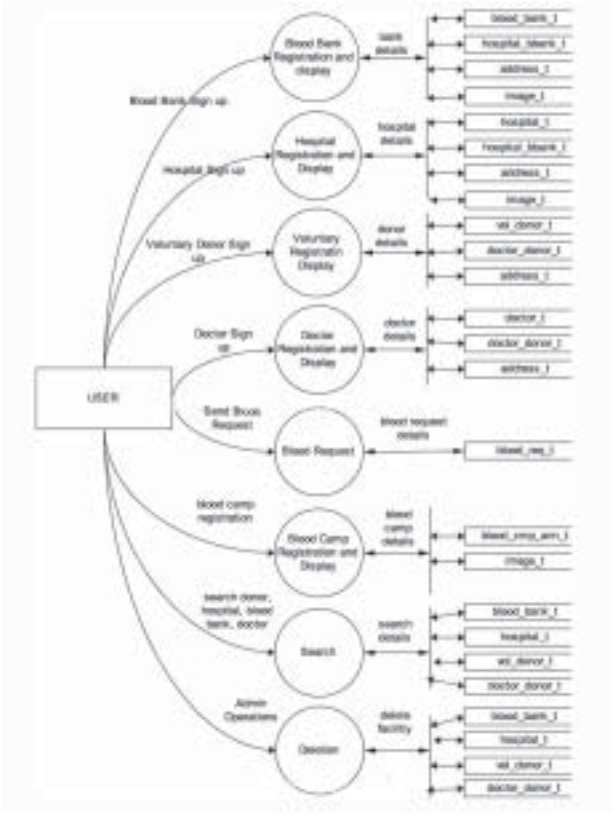

Figure 2: Blood Transfusion Management

3.2. Catchments of Blood Donors

The above web application has a database of its existing donors and receivers. One of the main issue related to knowing the blood donors catchment is to make the collective counts of donors in the city. A GIS function called Geocoding can be used to create point features on a map from a Table having *x, y* coordinates of any donor address. Onscreen digitization is another GIS function that can be used for data entry purposes [5]. It uses different drawing tools such as point, line and polygon tools for identifying feature location. The presented study has used digitization method for the purpose of identifying blood donors on the map. Based on the collected data, donors around the city are visualized and counted according to ward level. The

below shown map is the GIS coverage for identifying catchment of donors in the wards of Tumkur city and finds nearest donor to a selected blood bank. Therefore the created application provides a good example for explaining how to use GIS in planning and identifying more number of donors around the city.

Figure 3: Tumkur City Map with Catchments of Donors and nearest 'O Negetive' Donors

4. CONCLUSION

In this paper, we explore the mechanism of special concerns on blood donation and transfusion service as implemented in this system. An efficient blood bank management system should help every patient to access an adequate quantity of safe blood at their location. The management system can solve the issue of demand and wastage of blood and lead to self sufficiency in blood requirement. It could be replicable to any other cities also.

5. REFERENCES

[1] THE HINDU Dt. Sunday, April 28, 2002, "Save a Life" *http://www.hindu.com/thehindu/mag/2002/04/28/stories/2002042800150700.htm.*

[2] THE HINDU Dt. Monday, July 19, 2004, "Blood Online" *http://www.thehindu.com/thehindu/mp/2004/07/19/stories/2004071900670100.htm.*

[3] Catassi, C. A., Petersen, E. L. "The Blood Inventory Control System-Helping Blood Bank Management Through Computerized Inventory Control", *Transfusion*, 7:60 (1967).

[4] Chou,Y., Exploring Spatial Analysis in Geographic Information Systems, On Word Press, Santa Fe, NM, (1997).

[5] Murad. A, Creating A GIS Application for Local Health Care Planning in Saudi Arabia. Int. J. Environ. Health Res. **14**(3) (2004) 185-199.