"Sathkaara" for Inter Intensive Care Unit Patient Transfers

W.A.S. Sirichandra
University of Colombo School of Computing
Sri Lanka.
Email : sirichandra.was@gmail.com

S.O.K. Liyanage
University of Colombo School of Computing
Sri Lanka.
Email: sudam234@gmail.com

W.V.S. Jayasinghe
University of Colombo School of Computing
Sri Lanka.
Email: wvsjayasinghe@gmail.com

S.M.K.D. Arunatileka
Senior Lecturer
University of Colombo School of Computing
Sri Lanka.
E-mail: shiromi_a@hotmail.com

K. R.P. Chapman
Consultant Surgeon
District General Hospital
Chilaw
Sri Lanka.
E-mail: keith_rpc@hotmail.com

N. Wijesooriya
Consultant Anesthesist and Intensivist
Teaching Hospital - Ragama
Sri Lanka.
E-mail: nilmwije@hotmail.com

Sri Lanka Journal of Bio-Medical Informatics 2010;**1**(3):163-68
DOI: 10.4038/sljbmi.v1i3.1776

Abstract

This paper describes the crucial issues in patient transferring between hospitals (from Intensive Care Unit (ICU) to ICU) and possibility of using Information and Communication Technology (ICT) to change the process of patient transfer, enabling a faster and more reliable transferring mechanism. With the proposed system, 'Sathkaara', a better health care service is expected in the Sri Lankan government health sector.

Keywords: Intensive Care Unit, Critical Care, Information Systems, ICT in Healthcare *Sri Lanka Journal of Bio-Medical Informatics* 2010;**1**(3):163-68
DOI: 10.4038/sljbmi.v1i3.1776

Background

Intensive Care Unit (ICU) availability is limited to 60 hospitals out of the 612 government hospitals (at the end of 2008) in Sri Lanka simply because of high expenditure to maintain ICUs. An ICU is a specialized department used in many hospitals to provide vital life support facilities. Many hospitals also have designated intensive care units for certain specialties of medicine, as dictated by the needs and available resources of each hospital. Although 60 hospitals have ICUs, there are differences in the available facilities[(1)]. Teaching hospitals have most of the high end facilities. Patients are commonly transferred between Surgical, Medical and Paediatric ICUs.

The Transfer Process

Most common conditions to transfer a patient are infections, cardiac problems, neuromuscular diseases, head injuries, poisoning and specific cases for observation. Patients are transferred often for ventilator support, further investigations and special attention.

Before transferring the patient, the consultant has to find a suitable ICU bed in another hospital. The current method of finding a suitable hospital is through telephone communication. First, ward or ICU doctor has to decide whether to transfer the patient or not. Then he has to inform the telephone exchange operator that there is a patient to transfer. Then the exchange operator calls each and every nearby hospital according to a list in order to find an available ICU bed. If a nearby hospital has an available ICU bed, then the exchange operator makes a telephone communication channel between the transferring hospital doctor and the consultant at the hospital where the bed is available. Then they discuss the facilities and requirements that the patient needs. If that hospital is able to meet the patient's requirements they can transfer the patient to the other hospital directly. However, if that hospital doesn't have the necessary facilities then the transferring doctor has to re-inform the exchange operator to find another hospital. This process, sometimes, goes on for hours, until a suitable hospital is found.

The transfer form and investigation reports are also transferred with the patient. The accepting hospital receives these documents with the patient; therefore, medication could only be prepared after the arrival of the patient at the receiving hospital.

Project Objective

The project 'Sathkaara' is being carried out by the Consultants of the Ministry of Healthcare and Nutrition and Staff and Students of the University of Colombo School of Computing (UCSC) of Sri Lanka. The main objective of the 'Sathkaara' system is to save lives of critical patients through the use of information and communication technologies to find out the availability of ICU beds in the nearest hospital by reducing the search and reservation time for ICU facilities when critical patients need a transfer. Further, improvement in the inter ICU communication and document transfers of patient details are expected through an adaptable

system for different level of IT infrastructure.

Related Work

"eBeds" is a web based bed management system using the geographical location of the beds in a hospital. The main purpose of using the geographical format was to display the data in a visual real-time layout with the exact location of the bed and current and future occupancy rate of each hospital bed within a room, ward or floor[2].

The Emergency Bed Service (EBS) is a system that is based on telephone survey of available critical care beds[3]. But this system has many limitations in data recorded. Because there are only three telephone enquiries per day, there is a considerable lag time on bed availability. Many units preserve beds for 'internal' or 'specialist' use only, some of which may not be declared. Further, some transfers are happening without informing the EBS.

Further Geographical Information Systems are used in critical care to find optimal path [4], but it increases the complexity of our system with additional non-productive work load.

Project Deliverables

Real time online system for the ICUs in hospital network

The Sathkaara system shows the real time bed occupancy in the ICU in a very simple manner. The system will be updated as and when patients are admitted and discharged from the ICU, making the system up to date all the time in keeping with the admission and discharge policy of that particular ICU. System reduces time taken to find a hospital with necessary facilities and this will help the patients find better medical care as soon as possible. Unlike in the existing process, the consultant can start communication directly with the receiving hospital. This saves time which is critical to a seriously ill patient.

Ability to search for beds and resources by distance to hospitals

The location of hospital is shown in the form of a map and within seconds, the system shows nearby hospitals having bed availability with the distance. This will allow consultants to search for a hospital with necessary facilities quickly and at once. Special equipments like CT scanners and MRI scanners will be required for diagnosis purposes, information on the availability of such facilities is also critical for the decision to transfer. The hospital can be informed of the possible requirement for using these special equipments before the transfer of the patient.

Ability to inform consultants/doctors about special situations by SMS alerts

Details of doctors in the ICU ward will be captured with their qualifications and specialized areas where this information could be referred before transferring a patient. (The uploading of this type of data would be handled by the relevant doctor in charge of the particular ICU) This type of feature enables hospital staff to get ready early, before the patient arrives at the hospital. When a particular specialist's services are required, the option of contacting them via SMS or telephone link is also added to the system. Through these options, the specialists can be informed early and their service will be available without any delay.

Ability to send the patient details through Electronic Medical Record to the transferred hospital

This will help the receiving hospital to prepare early according to the patient's medical condition (e.g. Prepare drugs and equipment needed by the patient) so that the patient will receive treatment without any delays or hesitations. Currently available EMR solutions would be thoroughly evaluated before using in the system to provide this service.

All the patient transfers to other hospitals are managed through ICU

In the current patient transferring process, the hospital ICU is not required to transfer a patient to another hospital unless patient is admitted to the hospital ICU. To make the transferring process well ordered, the suggestion is to assign all the transfers to other hospitals to the ICU to manage them.

The system will be hosted in a web server to allow the ICUs to communicate through internet as well as to search for ICU beds and reserve the facilities (Figure 1).

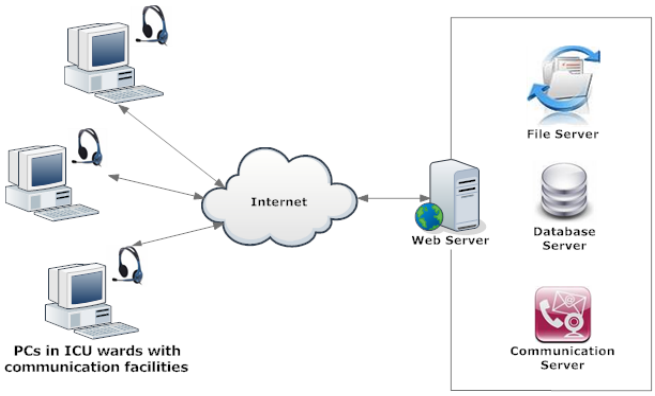

Figure 1. ICU wards are connected to the internet through computers with communication facilities where they can access the web server to utilize the service offered by the system.

Future work

For the success of a system's implementation, it is vital that all stakeholders are consulted in the development process[5,6]. Training requirements should also be addressed before system implementation as a parallel process to the current system. Feedback from user experience should also be acquired and analyzed to improve the usability. This is supposed to be collected through a post implementation survey on the efficiencies gained. Then the system could be expanded to the extent where all the ICUs are inter-connected and managed through the system with detailed and accurate patients information and improved communication within ICUs to improve the health sector of Sri Lanka.

References:

1. Yatawatta AB, Wanniarachchi CR, Goonasekera CDA. An audit of state sector intensive care services in Sri Lanka, *The Ceylon Medical Journal*. 2004;49(2):51-54.

2. Nicholls AG, Young FR. Innovative hospital bed management using spatial technology, Spatial Science Queensland. 2007; (2): 26-30.

3. Hopkins P, Wolff A.H. Intensive care transfers, Critical Care. 2002; (6): 123-24.

4. Thirumalaivasan, D. and Guruswamy, V., 2009. Optimal route analysis using GIS [cited 18 December 2009]; Available at: http://www.gisdevelopment.net/application/Utility/transport/utilitytr0004.htm.

5. Chetley, A. Connecting people: the role of ICTs in the health sector of developing countries. [cited 18 December 2009]; Available at: http://www.asksource.info/pdf/framework.pdf

6. Beatty, P. C., 1999. User Attitudes To Computer-based Decision Support in Anesthesia and Critical Care: A Preliminary Survey, The Internet Journal of Anesthesiology. **3(1).** [CITED 18 December 2009]; Available at: http://www.ispub.com/journal/the_internet_journal_of_anesthesiology/volume_3_number_1_53/article/user_attitudes_to_computer_based_decision_support_in_anesthesia_and_critical_care_a_preliminary_survey.html.