District Hospital Ambulance Management System

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Abstract: A significant issue in hospitals is the exchange of ambulance information and updates. The District Hospitals, who maintain Ambulance information as well as other information like drivers' and partners' availability, are also having problems with it. All these activities take place in the hospital office's transport department. The entire mechanism operates entirely manually. Today, government entities place a high value on the use of computers and information technology. Most government entities conduct their regular business utilizing manual processes. same in hospitals as well. Due to the workload, there will be a lot of confusion in the system when district hospitals are involved. As a result, there will be delays and information loss. Because district hospitals now use manual procedures for this, the suggested methodology and the associated program to construct an ambulance management system are pertinent and accurate. Therefore, it should be easier for the district hospitals to efficiently handle their ambulances.

Keywords: Emergency Service, Ambulances, Hospitals

1. Introduction

Ambulances are the most practical medical equipment now available in every nation. The health care industry heavily depends on ambulances. Ambulances are used to transport a patient to the closest hospital or healthcare facility in the event of an incident or if the patient is in a very serious condition. To maintain and operate the entire ambulance system in a country like Sri Lanka, manual handwriting procedures are still used.

Research Problem: Government hospitals are very numerous in Sri Lanka. District hospitals make up 19 of them. Some hospitals are situated in critical locations.

When there is an emergency, the majority of people use ambulances. When an event occurs, they make a call to the closest hospital to request emergency service. When this occurs, persons who are a member of the system must wait longer for an ambulance and the hospital personnel must check the vehicle logbooks of certain hospitals to see if an ambulance is on hand.

Therefore, it would be advantageous to create a web-based application for Sri Lanka's district hospitals so that they can manage their workload while also improving the quality of care they can give to their patients. The entire process of system management is automated with the aid of this system. The system's automation, which includes tracking ambulances as well as updating and tracking ambulance drivers' attendance to manage their vacations, distinguishes it from the existing system. The system also offers records of ambulance services and shows the date for the next planned service. The performance and maintenance of the ambulances will be improved. Having a well-kept ambulance available in case of emergency is also preferable.

Research Aim: The aim of this web-based system, however, is to quickly examine the availability of ambulances, including drivers and their partners, as well as to avoid leaks of the current method for releasing ambulances.

2. Literature Review

Sri Lanka's government provides a free health service in the form of Western medicine, which is practiced in hospitals throughout the country, and Ayurvedic medicine, which is practiced in one hospital in Colombo. The health-care system (Western medicine) is divided into two parts: preventative and curative. (Paskins, 2001) In Sri Lanka health care is provided via national hospitals and teaching

hospitals. A provincial general hospital is a general hospital with additional services. Each district has a single general hospital (referred to as a district general hospital) that provides care in the four major specialties as well as some subspecialties. Only the four major specialties are served by base hospitals. There are extremely few facilities in divisional hospitals, peripheral units, and rural hospitals, and they do not provide any specialist care. There are 19 District hospitals in Sri Lanka. (home, no date)

In Sri Lanka, there are currently no qualified emergency medical physicians. In 2012, however, a specialty training program for emergency physicians was launched. There is no formal structure in place for emergency medical technicians to be trained (EMTs). In the event of an emergency, Sri Lankans frequently take taxis or their own vehicles to the hospital. Ambulances are available at all the hospitals to transport patients between them. (Wimalaratne et al., 2017)

An ambulance is a specifically built, well-equipped vehicle that transports patients safely until they are handed over to a facility where they will get final care. Ambulance services are designed to save a person's life before they reach the hospital. (Nandasena and Abeysena, 2019)

When considering the ambulance drivers, they are working according to their duties. So, every ambulance has a driver and a partner. They are working for shifts. As a result of this sometimes hospitals fail too when finding an ambulance driver with a partner.

In hospitals the uses of ambulance are,

• To carry serious disease cases from smaller hospitals and maternity homes to the institution to which the ambulance is linked or to the Base/Provincial/Teaching hospitals directly.When a Family Health Worker summons the Ambulance, it is to transfer urgent pregnancy cases within the Ambulance's service area to the institution to which the Ambulance is linked.To carry similar cases from the institution to which the Ambulance is assigned, such as the Base/ Provincial/ Teaching Hospitals.Ambulances may also be used to transfer patients to any other hospital for the purpose of returning to a Teaching/ Provincial/ Base Hospital. Ambulances should not be utilized to carry

medical staff or for any other purpose unless the PDHS has given its prior clearance.

And, when hospitals need drugs sometimes, they are using Ambulances as a transport method. But the problem is with the use of ambulances hospitals can only transport small quantities of drugs from medical supplies division/divisional drugs stores on the return journey. Such drugs must be packed under the seats and drivers should be instructed not to load them. And there are some instructions for the drivers. There are two types of instructions, are daily and weekly,

As Daily,

Clean and wash vehicles, Check the water level in radiator and oil level, Test breaks and lights, Check steering, Start the engine and listen for any unusual noises.

As Weekly

With used engine oil, clean the undercarriage, engine, springs, transmission, and steering, Cleaning the vehicle's equipment is also required, Cleaning the vehicle's equipment is also required, Battery terminals should be cleaned and tightened, Fill the battery cells with pure water to the necessary amount, On the move, look for rattles, loose bolts and nuts, and strange noises, All tools should be cleaned and oiled, and the air pressure on all wheels, including the spare, should be checked.

In Sri Lanka some hospitals in having 10 to 15 Ambulances. But some hospitals have only one to 3 ambulances. So, in that case, if there are any emergency cases, they must ask for an ambulance from another hospital. ('ManualDHPURHmanage.pdf', no date)

If there is any injury patient at a tertiary hospital who used an ambulance should have to get to the first health facility from the respective ambulance. IN that case, there are some assigned persons for an ambulance. They are, Ambulance driver, A hospital attendant or trained labourer should be detailed to accompany the patient. (A female attendant or a female labourer should accompany a female patient), The midwife should always accompany maternity cases. (Reynolds et al., 2021)

NHS ambulance system in London, are providing ambulance to the patient within 8 minutes of average time. The patient can make a call to 999 and they will have an

ambulance withing 8 minutes of time. Another thing is the have trying categorized each call to give the best response to the patients. According to that category one is for calls about people with life-threatening injuries and illnesses. For that category they planned to response withing 7 minutes of average time. The second category is for emergency calls. These calls will be responded an average time of 18 minutes. In this category stroke patients will get to hospital or specialists stroke unite quicker because they can send the most appropriate ambulance first time. Category three is for urgent calls. The patients who are getting staff treatments at their own home comes under this category. So, for that they response at least 9 out of 10 times before 120 minutes. The last category is for less urgent calls. In this category may be given advice over the phone or referred to another service such as GP or pharmacists. The less urgent calls will be responded to at least 9 out of 10 times before 180 minutes. The new system of NHS in England is focusses on ensuring patients get rapid lifesaving, life changing treatments. (National Health Service, 2017)

According to Ahmed Shaikh at el, in India most people are dies because the patient is not able to reach the hospital in time. With the use of GPS, they have developed an application that can reduce the waiting time of the patient and the ambulance driver. With the help of GPS, the location of the patient goes to the ambulance driver. For this the user and the driver must have a smart phone. When the user clicks the emergency button it will directly send its location to the ambulance driver. The main function of this project is to reduce the time between the patient and the driver. With that they trying to save someone's life. As technology they use Google map, Application programming Interface (API), android studio and the GPS connectivity are used. (Allfrey, 1882)

3. Methodology

However, this web-based system aims to quickly examine the availability of ambulances, including drivers and their partners. And, to avoid the leakages of the prevailing system. In a country like Sri Lanka, all government-provided healthcare, including emergency treatments, is completely free. The emergency services must be well-prepared for any emergency scenarios that may arise at any time or location. Additionally, hospitals need to be able to allocate better emergency services so that they can transport patients and administer first aid there. These activities are now being done by ambulance. The issue, however, is that the hospital cannot manage an emergency properly or get a better ambulance when one is needed.

It was discovered, with the aid of numerous research articles, what functions ambulances must perform in this healthcare industry. Additionally, to identify the issues, associated personnel created a questionnaire to gather information from the personnel who use ambulances in emergencies. With that, it was discovered that many patients had issues with waiting times, facilities provided by the ambulance crew, and their opinions of the current ambulance dispatching system. By communicating with the vehicle clerk of a few hospitals in Sri Lanka, were able to learn about all of their present procedures for dispatching ambulances. In that situation, determine the ambulance dispatching system's operation as well as the performance of the drivers' and their partners' duty rotations.

Observations are another technique for gathering data. Now, countries like Sri Lanka are seeing a lot of accidents. By keeping an eye on these situations, information that is required to design the system is gathered. In that situation, list the personnel who are involved with ambulances and the functions they do. Additionally, watched how they functioned in emergency situations and what each employee's duties were.

Analysis: Priority will be given to the technology for gathering data and analysing technique to identify the optimal plan for developing the system. Around the world, a variety of applications are used to manage the ambulance dispatching system and deliver high-quality care to patients. These apps helped identify the optimal system components that may be used. Additionally, in that situation, the problems with those applications were noted, as were the problems with gathering, understanding, and breaking down a system into its component elements. Numerous aspects, including aims, can be covered by system analysis.

Data gathering: Methodologies like interviews, questionnaires, observations, and referring to research articles were employed to collect the data. The system requirements and user needs were determined with the aid of that.

Interview: To learn more about the current method, questions were asked of both ambulance room employees and vehicle clerks. It is helpful in identifying the flaws and the current system operations. Through this process, the requirements that must be incorporated within the new system were achieved. and a series of questions to get the necessary information for the applicable field. as a result, learned about the data that is contained in the "Vehicle logbook". All vehicle information, including that pertaining to ambulances, was kept in a book called a vehicle logbook. This approach is still used by Kegalle Hospital, Kurunegala Hospital, Colombo General Hospital, etc to handle their vehicles. In that instance, the vehicle clerk must consult the vehicle logbook to designate the appropriate ambulance for each ward when one is required. There will be a waiting period in this scenario. If the patient's circumstances were risky, it might harm the patient. The failure to verify the availability of ambulance drivers was another flaw that was discovered during the relevant parties' interviews. These are the issues that the interviews revealed.

Questionnaires: Asking question from the relevant parties who are involved with the system will gain a better idea to full fill the requirements. So, for that created a google form with prepared questions to obtain the information form the relevant parties. In that case collected much information. The summery of the questionnaires is as follows.

Question	Got Responses		Response %
Are you male or female?	107	Male	53.3%
		Female	46.7%
Did you ever use an ambulance for like emergency situations?	107	Yes	60.7%
		No	31.8%
		Never	7.5%
Are there any problems when you are getting an ambulance?	104	Yes	55.8%
		No	44.2%
For what reason you use an ambulance?	106	Emergency situation	60.4%
		Normal situation	14.2%
		Never used	25.5%
Is the ambulance arrived at correct time?	106	Yes	30.2%
		No	31.1%
		Don't know/ Can't remember	7.5%
		Never Used	31.1%
Was the way you got into the ambulance suitable? (e.g. by walking, on a stretcher etc.)	105	Yes	56.2%
		No	11.4%
		Don't know/ Can't remember	32.4%
Overall, how would you rate the care you received from the ambulance service?	101	Excellent	30.7%
		Very Good	10.9%
		Good	18.8%
		Fair	6.9%
		Poor	29.7%
		Very Poor	3%
What do you think about the current ambulance dispatching system?	102	Excellent	30.4%
		Very Good	5.9%
		Good	20.6%
		Fair	4.9%
		Poor	30.4%

Figure 1 : Table of responses

In addition, inquire as to whether hospitals in Sri Lanka have an ambulance management system. Considering that, have received 52 responses. Most people claim that the ambulances' delay was caused by poor management of the current system.

4. Results and Recommendation

With the helped of the identified defects through the analysis it's better to have an automated ambulance management system for districts hospital. In that scenario with the help of this system can manage the ambulances in effective and efficient way. The entire system is a web-based application which is run in Realtime. To develop the system have using Node.js which can be run in chrome V8 engine. The system First register a new user into the system getting valid information's from the users who are really involved with the system.When logging in, the system must check the user's email address and password against the database of users.Officer in charge is the only authorized person that can update the system information's. So, he can be able to review and update of the details about the ambulances and details of drivers and their partners. He Must be able to include service records of the ambulances. The clerk is the second authorized user who can request the approval form the Vehicle officer to make changes in the system.

The driver and their partners can only mark the attendance and the review of their information's such as the days of they have been in worked and the number of vacations that they can have for a period of month. It because of if they have authority to update the records, they can mark their attendance at any place. So, in this system the area that they can access is limited.

If any ward wants an ambulance, they can request an ambulance through clerk to the officer in charge of vehicle. After the approval of the officer in charge clerk can release the ambulance through the system .at that time the message will pass to the driver who is available.If the record room request after the completion of month of period, the system generates a full report of ambulances Such as leaving times arrival times and the destinations and the service records to the Record room via email. And, if administration office requests a full report of drivers including their partners from the vehicle officer through clerk the system must be able to send a full report of drivers via email to the administration office. Entire system is as follows.

User registration: First user must have register to the system by providing valid information's such as valid passwords and email. The user must be aware about the limitation of the system and user must log in to their limited areas.

User login: After successfully register into the system user can access to the system that they have authorized paths of the system.

Data entry: When successfully log in to the system authorized users can update the details. Officer in charge of vehicle can add remove everything in the system. But the driver only can update and check the details. All the ambulance records should be entered by the officer in charge who manage the entire system.

Data deleting or modify: Officer in charge of vehicle only the person who can delete or modify data in the ambulance and drivers' data bases.

Data releasing: The data can be release only officer in charge of vehicle. By giving the authority of the system.
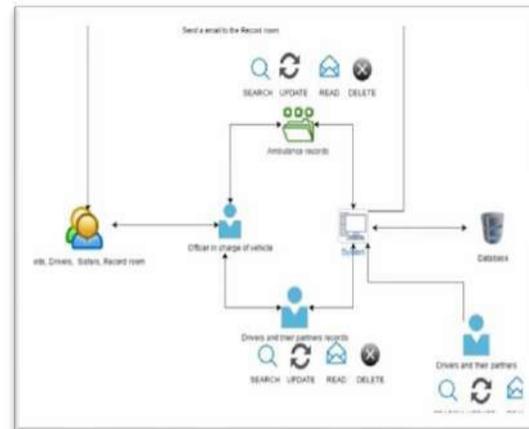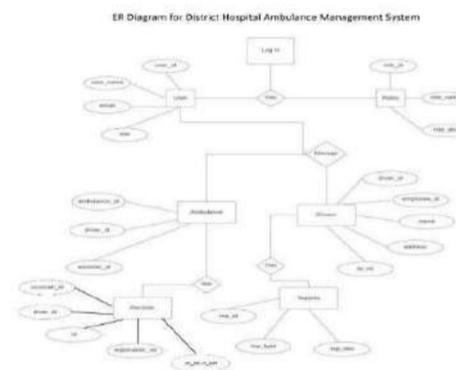

Figure 2 : Proposed system
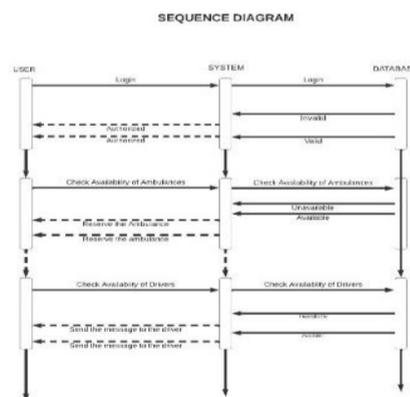

Figure 3 : ER diagram

Figure 4 : Sequence diagram.

5. Conclusion

More than 15 district hospitals exist in Sri Lanka. Therefore, manual ambulance dispatching is still in use at all hospitals. It requires a lot of waiting time. That is the

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issue most patients are currently having. The hospital staff may thereby lessen their workload with the aid of an automated ambulance dispatching system and deploy the appropriate ambulance at the appropriate moment with no waiting periods. Additionally, patients will benefit from receiving first aid in case of an emergency.

Acknowledgment

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