

# A Cloud based Healthcare Services for Remote Places

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## Abstract

The Healthcare system refers to providing healthcare service to the patients at remote places from specialist doctors. This system can also be used by medical institutes to get facilities such as providing online classes and how to diagnose diseases of patient. In disaster places if patient condition is critical, the patient cannot be hospitalized, so the patient requires treatment at disaster place, since travelling to the hospital takes more time, due to which the patients' health condition becomes more critical. To avoid such conditions, we have proposed a healthcare service system which provides treatment from healthcare coordinators at remote places. This healthcare service system provides first-aid treatment and pre-investigation can be done at the consultation centre which can be located at disaster place or on the way to hospital. The information obtained from patient at disaster place will be sent to regional hospital & stored in to cloud server and can be accessed by specialist doctors of that regional hospital who could be consulted by Healthcare Coordinators to treat that patient at disaster place using telecommunication system. This system will reduce expenses, and also travelling time.

**Keywords: Consultation Center, Healthcare Service System, Regional Center, Specialist Center**

## I. INTRODUCTION

Healthcare system is systems delivering health care services from specialist doctors to remote places using communication medium. This communication medium can exchange valid information of patient to provide required treatment & how the patient can be treated. This system can provide specialised treatment at different situation such as natural disaster, accidental situation & at backward areas and to train students at medical institution. In this type of situation, distance & transportation will take some time and condition of the patient becomes critical. Hence reduces time, distance & expenses, and can improve health of the patient by providing this healthcare service. Healthcare coordinators will investigate and pre-investigation tests of patient information will be stored in Electronic Medical Information's records (Cloud). Using those EMI records, specialist doctors will see patient condition & communicate with patient and suggest further treatment to healthcare coordinators.

The aim of healthcare system is to extend medical resources & provide health care services from specialist doctors to remote places.

Healthcare system consists of the following:

- 1) A Healthcare Consultation Centre consists of medical pre-investigation check-up equipments such as ECG tester, Glucose Tester, Blood pressure Tester, Computer/Tab, Camera/Web camera etc. Healthcare co-ordinators will pre-investigate the patient and upload EMI records to cloud server. Then specialist doctors will check uploaded records from Healthcare Specialist Centre then suggest for further treatment to Healthcare coordinators.
- 2) The Electronic Medical Information (EMI) contains information about patient, pre-investigation reports, X-Ray, Scanning etc. The EMI records are exchanged from hospital to healthcare providers via communication medium to improve patient's health and these records will be stored in regional hospital cloud server.
- 3) The specialist doctors are present in Healthcare Specialist Centre. Specialist doctors will check uploaded reports from remote places and they communicate with Healthcare coordinators and also with patient through Audio/Video conference. Communicating with patient or by seeing patient condition specialist doctors can suggest for further treatment. If a patient condition is critical, patient will be shifted to ICU otherwise patient can take treatment in home by a healthcare coordinators.
- 4) The Regional Hospital will get notified by consultation centre, to provide healthcare service to patient of disaster place. This patient EMI record will be shared to Healthcare Specialist Centre and specialist doctors on interact with coordinators/patient using a video/audio conference.
- 5) The regional hospital consists of Database Server, Application Server, Web Server and systems that are configured using a cloud based Storage Infrastructure. In regional hospital storage servers are configured using Storage Area Network type.

- 6) The Storage Area Network uses a TCP/IP or Fibre Channel protocol. Based on protocol type, storage area networks are classified into fibre channel SAN or TCP/IP SAN. There are two ways to access EMIs from regional hospital cloud servers through a network.
  - Block Level Access: - Block level access will access in terms of Blocks/Chunks, which are fixed size & stored in linear memory address.
  - File Level Access: - File Level Access will access in terms of files by specifying name & path of the file.
- 7) Pharmacy coordinator will check frequently the regional hospital for notification of E-prescription to provide medicine for patient at remote place. Insurance coordinator will search patient information in insurance database servers to claim patient insurance and also this notification will be shared with government offices.

#### **A. Motivation**

Providing Health care service and supports at emergency places by a specialist doctors. There are different places such as rural areas, Disaster & Accidental emergency places, and Education institute that require special training and treatment. In below is the list where places health care services and support needs to be provided from specialist doctors.

- Healthcare at Disaster place: The main goal of Healthcare System is to provide Emergency health care service at disaster places and also reduces a specialist doctors travelling time & expenses to a disaster place. Because a specialist doctors cannot provide a services in this situation to all patients, so by using a Healthcare coordinators will provide treatment on Specialist Doctors suggestion.
- Healthcare at Accidental Place: In this situation patient condition will be critical which requires an Emergency treatment. But to provide a health care service from specialist doctors to accidental places they require EMI record of patient to provide further treatment. To provide health care services at this situation, Healthcare System should be used.
- Healthcare at Rural Place: The Healthcare Consultation Centre uploads EMI records of all patients to regional hospital cloud servers. It will store all information in an EMI that contains personal information, pre-investigation reports, X-rays etc. An EMI will be stored in a Regional Hospitals cloud based servers using a secure Storage Network type.
- Healthcare at Education Institute: The Medical Education Institute provides training by Specialist Doctors to their students using a video conference. Specialist doctors will teach, share their knowledge, experience & provide training throw video conference and discuss with students.

Healthcare from remote places delivery of health care services from healthcare professionals using a communication medium for the Rural, Critical & disaster places and education institute. The Healthcare system approach helps us to reduce time, distance & expenses and also provide health care service & support from specialist doctors. To provide a health care services and support at emergency places using telecommunication technology as shown in below system.

## **II. PROPOSED SYSTEM**

The below fig (1) shows providing healthcare service to emergency places by specialist doctors using a communication medium. The healthcare coordinator will investigate patient pre investigation, reports and discuss with a specialist doctors then further treatment will be provided to the patient at emergency place throw a telecommunication medium. All Electronic Medical Information will be stored on Regional Hospital servers. Specialist doctors will access electronic medical information on request from regional hospital of particular patient. The EMI will be stored in regional hospital cloud server, EMI can be accessed from anywhere by requesting to regional hospital. The special doctors will observe patient investigated reports and suggest for further treatment to Healthcare coordinators using communication medium.

The below fig (2) shows an internal working flow of Healthcare system. The Health care coordinators will do the pre-investigation of patient like the tests and condition about the patient. The Healthcare coordinators fill detail information of patient in Electronic Medical Information (EMI) and EMI records are stored in Regional Hospital cloud servers. The Regional Hospitals are configured like Storage Area Network.

Storage Area Network is a type of Storage Infrastructure of big data and cloud. This cloud will be shared to Healthcare System, Specialist Doctors / Health Care Coordinators can access patient information, by requesting to Regional Hospital will be transfer EMI throw secure channel using telecommunication medium.

The Specialist Doctors communicate with patient to understand condition and Specialist Doctors will request for EMI from Regional Hospital. If a patient condition is critical, patient will be hospitalised or patient can be taken care at home by Healthcare coordinators. Healthcare coordinators / Family members can exchange the information about patient to Specialist Doctors to provide further treatment.

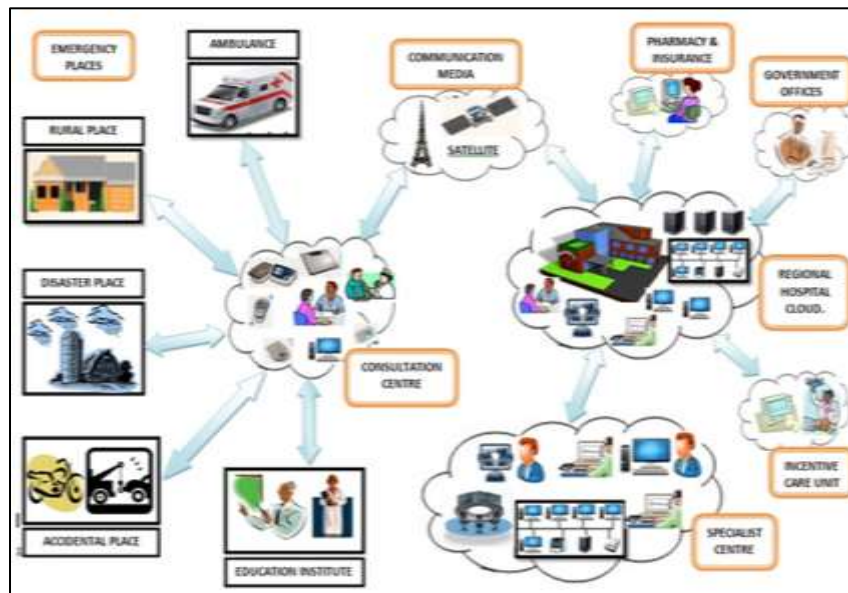


Fig. 1: Healthcare service to emergency places

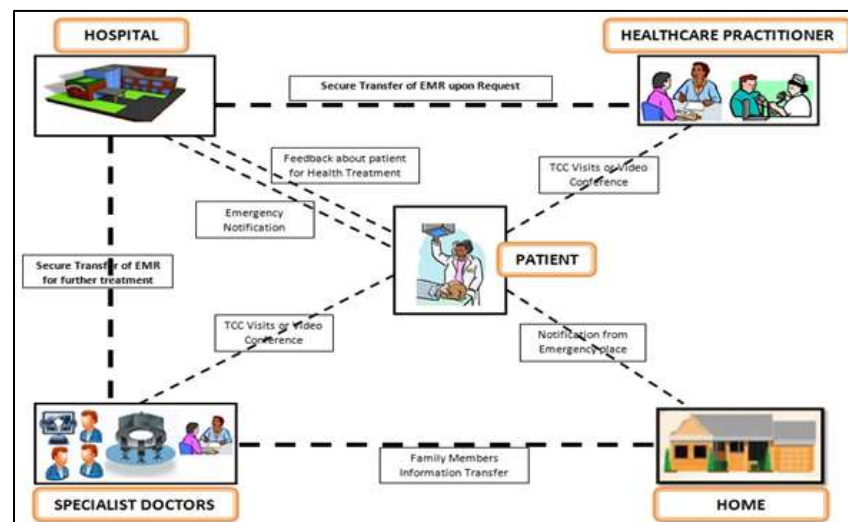


Fig. 2: Internal flow of Healthcare service system

### A. The Procedure of Healthcare Service System

This section describes how patient can communicate with specialist doctor and how patient records (EMI) will be sharing from one section to another section.

### B. Healthcare System Algorithm

This step involves how patients, Consultation centre, Specialist centre, Regional hospital and Pharmacy / Insurance are interact and share EMIs between.

#### 1) Emergency Place

##### a) Algorithm

- Request: Healthcare service required, intimated to Consultation Centre & Regional Hospital.
- Process: Receives request & check a nearest Consultation Centre assign to emergency place.
- Response: Consultation centre will provide healthcare service at emergency place assigned by Regional hospital.

#### 2) Consultation centre

##### a) Algorithm

- Notification Received: Notification received from emergency place for healthcare service or Emergency place.
- Pre Investigation: Healthcare provider will Pre investigate of patient & EMI upload to Regional hospital server.
- Send Intimation: Regional hospital receives EMIs, analyses the EMI & assign to Specialist doctors for treatment.

### 3) Regional Hospital

#### a) Algorithm

- Intimation Received: EMIs received from Emergency place / Consultation centre.
- Assign: Assigning Specialist doctor to Emergency place & share EMIs to know about patient condition.
- Sent to Specialist Doctors: Intimated & EMIs are sent to Specialist doctors.

### 4) Specialist Doctor

#### a) Algorithm

- Notification Received: Receives EMIs & Notification from Regional hospital.
- Diagnose / Process: Interact with Healthcare coordinators, patient & report and given suggestion for further treatment to consultation centre.
- Report: Specialist treatment is provided to patient by interacting with consultation centre and patients.

## III. RELATED WORKS

In this section we are going to look at the work done by different authors on the Healthcare from Remote places and its use in emergency place to provide healthcare service. With the help of telecommunication technology how Specialist doctors, Health Coordinators, Patient, Regional Hospital, Pharmacy, Insurance & Government office interact / communicate with each other.

Abel Garai, Adamko Attila & Istvan Pentek [1] designed the Healthcare framework with dynamically adaptive content management system. Also explained algorithm for Majority voting and cloud computing system using Internet of Things. This paper also demonstrates the social technical environment, the applied cognitive information communication methodologies and the elements of adaptive technology.

Syed K Islam, Aly Fathy, Yazhou Wang, Michael Kuhn and Mohamed Mahfouz [2] described about medical applications using a wireless sensor technologies and wireless body area network. Also explained about wireless sensor devices, biosensors using an initial tracking system. This paper uses a wireless sensor network technology for home assistance, smart home care and remote monitoring of patient.

Georgi Grasczew, Stefan Rakowsky, Theo A Roelofs and Peter M Schlag [3] describes how to use different medical technologies to provide healthcare services and also explained Workstation for Telemedical applications via Satellite / Wavelet-based interactive video communication system technologies used in following projects galenos, medaship, emispher and virtual hospital.

P Baranyi, A Csapo, Gy Sallai [4] present the Healthcare in healthcare system and explained about patient section, doctor Section, Hospital database section. Also explain about how the internal information in designed system.

## IV. CONCLUSION

In Healthcare system is designed to provide healthcare service to emergency & disaster place from a Specialist Doctors, they interact with each other using a telecommunication technology. This system can provide healthcare service at emergency place, disaster place and also providing video tutorial training for education institution. This system provides healthcare services for individuals, who require healthcare service at emergency place and disaster place. This system will reduce expenses, travelling distance and provide healthcare service to patient at critical condition.

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