PROPOSED REMOTE HEALTHCARE SYSTEM FOR RURAL DEVELOPMENT

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ABSTRACT

Abstract - This paper presents the Remote Patient Monitoring (RPM) system which is perceived to be more convenient and cost effective than traditional care, since it enables healthcare organizations to monitor and manage patients remotely; provisions of the right information, in the right place, at the right time are the fundamental in RPM. However, the current uses of wired sensing devices as well as their connections to network systems are not suitable for long-term RPM, as their usage restricts patients’ mobility. Advances in biomedical sensors and wireless network technologies have made it possible to develop a wireless RPM system. Such a wireless RPM can provide enhanced mobility and comfort to patients during hospitalization.

Keywords: ICT, Rural, Development, Strategy, Analysis of use of ICT, Healthcare.

1. INTRODUCTION

Vital sign measurement is the initial and the most important task in RPM. The existing instruments are commonly equipped with cable-based sensors, which make them bulky, intrusive and inconvenient. These sensors may not suit for long-term monitoring of vital sign in RPM on general wards. To improve comfort and mobility of patients, wireless biomedical sensors are considered. They are normally small in size and have wireless communication capability. This paper evaluates sensors that can be used to measure vital signs in RPM on general hospital wards.
2. DIFFERENT TYPES OF SENSORS

Sensors for Heart Rate Monitoring: Heart rate is very important in patient monitoring. In traditional medicine, heart examination and monitoring was carried out by stethoscopes, through which medical personnel listened to a patient’s heart sound and made decisions based on their knowledge and experience.

Electrocardiograph (ECG) sensor: ECG is primarily a tool for examination of cardiac diseases.

Pulse oximeter: It can be used to examine two types of vital signs: heart rate and blood oxygen saturation

Sensors for Measuring Blood Pressure: There are five common methods for measuring blood pressure: auscultation, palpation, flush, oscillation, and transcutaneous Doppler'. Furthermore only the oscillation and transcutaneous Doppler can be adopted in remote monitoring by incorporation of sensors for pressure oscillations or Doppler shift in the pressure cuff around the wrist or finger.

Sensors for Measuring Body Temperature: Body temperature can be measured by three types of sensors: resistance thermometer, thermocouple and thermistor.

Sensors for Measuring Body Weight: Weight can be measured either by spring balance or electronic balance. Between these electronic balance is used for remote patient monitoring. It has Bluetooth through which we can send sensor reading to gateway devices via particular interface.

Sensors for blood glucose measurement: Blood glucose monitoring is a way of testing the concentration of glucose in the blood. Particularly important in the care of diabetes mellitus, a blood glucose test is performed by piercing the skin (typically, on the finger) to draw blood, then applying the blood to a chemically active disposable 'test-strip'.

3. RPM ARCHITECTURE AND SERVICES

In this section we are proposing architecture and associated services for transmission of vital signs (data) from patient to the doctor, vice-versa, data from doctor to pharmaceutical company and data transmission between insurance company and doctor.

Hospital/Ambulatory services: Patients vital signs will be transmitted to an attached Hospital where a doctor can analyse the received data from patient and prescribe patient accordingly. Hospital shall also provide ambulatory services in case of emergency.

Pharmacy: After medicines prescribed by the doctor, electronic prescription will be automatically routed to pharmaceutical companies attached in network and drugs shall be allotted to concerned patient with his/her consent.

Drug Delivery: Medicines shall be delivered to patient’s home after pharmacist allots the drug. For this service additional 3rd party integration is required in network so that medicines could be transferred as per defined timelines.
Call Centre: We can also setup a 24x7 operational call center for emergency services like ambulatory services, drug delivery, billing and other general enquiries.

Billing: Patient would be charged according to predefined charging scheme and amount would be deducted from his account. Billing and charging schemes need to be defined as online or offline.

Insurance: If the patient is covered under insurance then the relevant information is sent to the company and billing is done accordingly.

The Tele-clinics approach aid service is one amongst the necessary basic desires. Pathological state may have an effect on the living standards directly and indirectly. aid service within the rural areas wherever quite seventy maximize Indians live, is abhorrently inadequate. Many of the general public aid services like Public Health Centre’s (PHCs) and sub-centre in rural areas don't seem to be equipped and staffed to produce quality aid to the agricultural poor. This means the yawning divide between rural and concrete aid services, between the agricultural poor and therefore the well to do. The new developments in aid haven't percolated to the agricultural areas and this is often a matter of nice concern. Whereas public aid system in Asian country has the simplest professionals and one amongst the simplest systems (decentralized up to the sub centre level) there's a requirement to explore the ways in which and means that to bring equity in access to health professionals and establishments. The use of entitlements to fulfil consumption desires may have an effect on a family’s reserves negatively within the long-standing time and will have an effect on the power of a family to face uncertainties. although it's encouraging to notice that some efforts square measure created to produce social protection to the poor through insurance policies offered (public non-public partnerships) by some company insurance firms (even although a results of operational compulsion by government) and a few state governments, these schemes square measure nonetheless to achieve the bulk living within the rural areas. Health standing affects human development in many ways. in line with the Noble Laureate professor. Amerada subunit, health is one amongst the necessary human capabilities that confirm access to wealth.
4. TELE-CLINIC: AIMS AND OBJECTIVES

Tele-clinic initiated by Christian Hospital in Bundelkhand is one amongst the innovative mixtures of technology and health protection supplement. It’s a shot to introduce ICT in aid to boost the access to specialty care to those living in remote rural areas. The communication between a doctor and a patient is enabled through the employment of a phone. Tele-clinic could be a phone enabled closed network of rural folks, trained medical experts and medical professionals of Christian Hospital. This network permits communication between doctor and a patient in a very remote rural village with the assistance of a phone. A trained medical expert facilitates the communication between a doctor and a patient through a WLL phone provided by the BSNL (government in hand telecommunication agency). A trained medical expert is recruited all told the decision centre’s. These decision centre’s offer services like primary aid, machine service, phone consultation, emergency medication and then on. One call centre covers 3 to 5 encompassing villages. The on top of mentioned project is innovative and could be an initial with this distinctive combination within the whole world, particularly in Asian country. it’s a mix of economic protection and aid access. the most goals and objectives of Tele-clinic square measure as follows.

Aim

Develop healthy and economically productive rural citizenship through facilitating cheap, reliable and top quality health data to the agricultural poor victimization ICT.

Objectives

• To produce emergency aid to the agricultural poor.
• To make sure safe delivery and kinship in rural areas.
• To produce access to health data and creating aid accessible to the poor.
• To facilitate quality treatment to the poor in remote rural villages.
• To produce public health safety web to the agricultural poor.

4.1. Tele-clinic: Levels of treatment

Tele-clinic uses a 3 tier aid service through use of knowledge and Communication Technology (at gift phone is being used)

a) Call Centre level is medical aid manned by a medical expert.
b) Weekly referral clinics at call centre Level manned by nurse & laboratory technician.
c) Hospital level – secondary care

At all these levels the consultation of a professional practicing a specialist is vital. All treatments square measure provided once specialist consultation over phone, except just in case of causalities wherever medical expert administer emergency medication refer the patient to the hospital.
The Health Unit is LTE-Wi-Fi connected to help link the unit to the central medical centre.

The patient at the remote health unit and the doctor at the central medical centre communicate with each other.

The Doctor orders the following diagnostic tests
1. Blood Pressure
2. ECG
3. Temperature
4. Oxygen Saturation (SP O2)

- The paramedic helps conduct these tests one by one on the patient
- Results of each test are conveyed over the LTE network to the doctor. At the same time he is video communicating so that he is able to guide the paramedic and the patient during the diagnostic tests
- It will also be an option that the doctor views the patient’s medical reports offline
- The doctor examines the medical reports and keys-in the prescription to the patient at the remote health unit
- The prescription is printed at the remote unit and handed over to the patient
- The doctor and patient communicate on video to discuss any outstanding aspect of treatment
- To ensure that the prescription is honoured by the chemist, there would be a process of authentication including measures such as Identity Management and Digital signatures
- There will be options such as direct communication of prescription to identified chemists as well as obtaining assistance of other services like ambulance in the case of emergencies
- The entire health care program will be supported and coordinated through backend applications and customer care centre that link hospitals, pharmacists, diagnostic centres, patient homes, doctor’s offices and medical insurance.
CONCLUSION

This work has translated into observable outcomes such as:
1. Improved access to specialists increased patient satisfaction with care.
2. Improved clinical outcomes
3. Reduction in emergency room utilization
4. Cost savings
5. Employment Opportunities increase.

Given the various benefits observed through the provision of health care via telemedicine, there is a tremendous amount of momentum toward increasing access to care through the use of health information technologies, thereby creating an exciting and central role for innovation and implementation of new and advanced platforms for service delivery. Two such platforms include the use of wireless and telemonitoring technologies. It is our belief that healthcare delivery is about to make a significant leap forward.

The development and installation of high-speed wireless telecommunications networks coupled with large-scale search engines and mobile devices will change healthcare delivery as well as the scope of healthcare services. It will allow for real-time monitoring and interactions with patients without bringing them into a hospital or a specialty care center. This real/near-time monitoring and interacting could enable a healthcare team to address patient problems before they require major interventions, creating a potentially patient-centred approach that could undoubtedly change our expectations of our healthcare system.

REFERENCES


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