

M-Health Frame Work- For Public Health Services

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Abstract

The m-health is a novel application of information technology in which health services are provided to the people through mobile devices. This application provide variety of services in various countries. As in every application the m-Health also has to face lots of threats in the area of security, confidentiality, privacy etc. The technology has its own advantages and disadvantages. As the technology advances, the physicians and patients are more forced to use this new facility of health application .And this services got acceptance in remote areas of different countries. The cost of devices, lack of trained people etc. determines the range of this application in different places. M-Health includes the use and capitalization on a mobile phone's core utility of voice and short messaging service (SMS) as well as more complex functionalities and applications including general packet radio service (GPRS), third and fourth generation mobile telecommunications (3G and 4G systems), global positioning system (GPS), and Bluetooth technology. With all this consideration the study proposes a frame work for the public health services. The state like Kerala, even though the state is first in literacy, the health services are pathetic in public sector as well as in private sector. The facilities are available only for the rich people. The architecture is mainly designed for local body like Panchayath or villages. The study also discuss the anxieties of doctors and patients while accepting the m-health services in public health services.

Keywords: m-Health, Decision support system, patient monitoring, telemedicine.

INTRODUCTION

M-health is the present and popular application that helps the people to access health services through their mobile phones. This application provide variety of services such as health call centers, emergency toll-free telephone service, mobile telemedicine, appointment reminders, community mobilization and health promotion, mobile patients records, information access, patient monitoring, health surveys and data collection , surveillance and decision supporting system. Among this applications only simple services are widely

applicable, where as mobile telemedicine like applications has complex architecture and it is difficult to implement. The major advantages of m-health applications are

Increase patient-physician interaction. Promote self-management of chronic diseases using health application

Physicians can reduce rush in their home by relying on home test results to prescribe medication

Help for time management of both patient and physician

The health services can access from anywhere any time

Because of the above mentioned benefits the expectations of the people on this technology have increased more in developed countries. At the same time the physicians have some worries about these services. In countries like India the acceptance of this technology is far away from the situation as in western countries, even though well equipped IT background is with the country.

The study proposes novel m-Health architecture for the public health services in Kerala. In Kerala the health services are very poor and the common people are worrying to get the latest facilities of medical services. In this scenario the m-health application can serve a lot to the people. The different categories of patients included in the proposed architecture are

Old and bedridden patients

Chronic asthma, cancer, allergic and other life style diseases

Carrying Woman

Patients need pain and palliative care.

Emergency services like ambulance, blood bank facilities etc.

STATE OF EXISTING APLICATIONS IN VARIOUS COUNTRIES

Treatment Compliance

This application mostly used by patients suffering with TB, HIV/AIDS, diabetes like chronic diseases. Through this

service the health officials can send reminder messages or voice SMS to patients to record treatment compliance, disease eradication, and to overcome challenges such as drug resistance. Almost 58% of countries in the high-income group have treatment compliance initiatives. Approximately 40% countries in other income groups. make use of this facility.[1,3]

Patient monitoring

This applications can be used for the continuous monitoring of bed ridden patients. The application helps to control and monitoring the patients from a distance. The application uses sensor devices to collect signals from patients body and reduce the frequent visit to a health centre for check-ups.[3]

Health call centers

This service provide health care advices by trained health professionals through telephone. The application is most effective during national emergencies . In such situation it will easy to broad cast awareness about epidemics that are seasonal and newly burst out like H1N1,EBOLA ,ANTHRAX etc. People has to pay to access this m-health application.[7,8]

Appointment reminders

Application helps the patients to schedule their appointment through SMS. It also includes immunization reminders, treatment results, and follow-up after appointment. In low and lower middle income countries, where access to fixed-line telephony is minimal and in high-income countries where fixed line telephony is being replaced with mobile phones, the mobile phone is swiftly becoming the primary means of getting appointment reminders.[3,10]

Community mobilization & health promotion.

The application mainly helpful to conduct medical campaign and other health promoting activities in the community. "Get the Msg!" has now become an established information service. It provides free health and safety information about common legal and illegal drugs and direct referrals to web sites and help lines by texting the name of a substance to the short code DRUG.

The America, Eastern Mediterranean, and South-East Asian Regions reported the highest usage of this application for community mobilization and health n and health promotion initiatives on specific public health issues such as H1N1, HIV/AIDS, immunization and vaccination, reproductive health, chronic illness, and blood donation. The communications are mainly through SMS .[8]

Mobile telemedicine

This application exploits the various facilities on a mobile devices such as voice, text messaging imaging and video functions etc. for ealth monitoring. The application gives a new phase to m-Health application. It overcomes the shortage

of human resources in health services of bed ridden patients and in palliative care. The health data such as sugar, pressure readings can be send through the mobile devices for monitoring. The Americans European and South-East Asian regions reported high rates of access of mobile telemedicine initiatives, though a large proportion of these initiatives were informal or in the direct phase.[3,6]

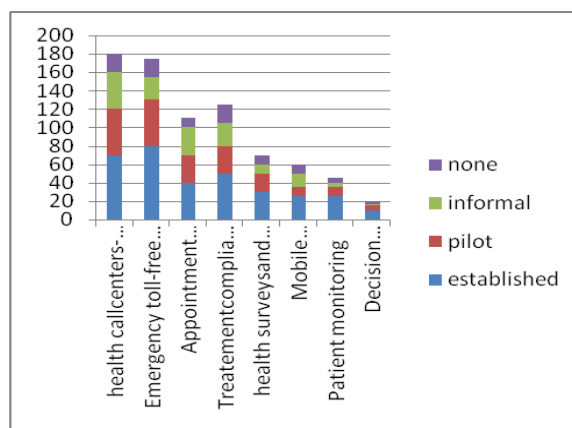
Health surveys and surveillance

The application is used for collecting health related data and use this for further studies in the area of health related problems the data collected through mobile devices are examined and identify the problems and find solutions.. The use of mobile devices for health surveys was low across all WHO regions. Responding countries (37%) in the low-income group . M-Health surveillance activity is more prevalent and active in countries of low-income groups.[7,10]

Decision support systems.

The application uses software algorithms to advise health providers on clinical diagnoses of patients by analysing patient data and medical information, such as prescribed drugs. Which ar obtained trough mobile devices. There is low global uptake of mobile decision support systems within WHO regions; no region reported adoption of over 25%. Countries in the high-income group reported the highest percentage of uptake (42%).[6,9,11]

The stage of various m-health application in different countries are shown in the graph 1.



Graph 1. Stage of m-Health application in various countries.

Proposed architecture with frame work

The study proposes an architecture and detailed frame work for the implementation of m-Health in public health services. The main objective of this architecture is to bring the ICT to common people and give a centralized control to the m-health services. There is no existing work in the basis of this concept.

The fig2 shows the architecture.

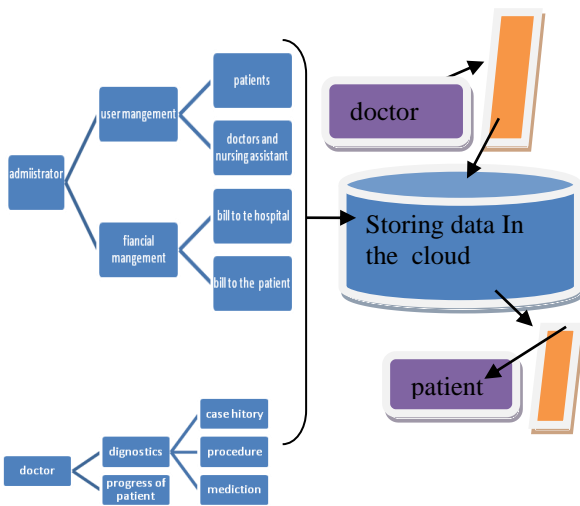


Figure 2: Proposed Architecture

The architecture consists of different modules like administrator module, doctor module and a storage module. The administrator module regulates the registering of patients and doctors. The module also manages the financial management to the patient and doctors.

The doctor module manages the history of patient, diagnostic details, medication details and finally the progress details of the patients.

The third module is the storage section. The proposed architecture uses cloud storage facilities. From the cloud the patient and doctors can access the health details from anywhere any time.

Detailed framework for m-Health in public health services is given in fig.3

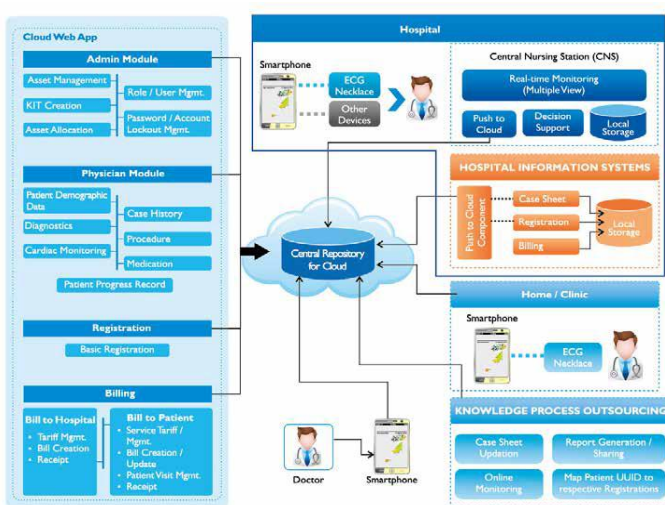


Figure 3: m-Healthframe work

The frame work deals with the different sections like patient's module, doctor's module, emergency services possible to provide and storing of patients data. The frame work clearly describes the structure of m-health with facilities to patients as well as to doctors. The registered patients can provide essential services as needed. The patients can access their doctor as needed, once they registered. The doctors can verify th history of patients and other details through this registering process. After all detailed medical data will be available for the health department for improving their functioning in society, to improve other medical services in the hospitals for the inpatients, to control the epidemic diseases. Etc.

To ensure the security the biometric card can be issued to the registering patients and also the corresponding doctor can access the patients details by the OTP conformation from the patient or relatives. The emergency services can be controlled through the mobile communication directly. So the proposed frame work ensures security of medical data as well as the patients personnel information.

Issues shared in Open discussion

The health care models of yesterday are in adequate to satisfy growing industry and consumer expectation. So the physicians are feeling pressure to meet these expectations. Even though the patients feel more comfort while using this technology both the physicians and patients and the policy makers have some worries on the implementation of the application in public health services.

After proposing the architecture and frame work with the doctors, policy makers and other publics they share some anxieties as well as some expectations.

Priority of health data transferring

Through the m-Health systems the health data are transmitted continuously. So the signals are constantly challenged by the need to make difficult decisions about competing priorities. The problem can be reduce only by registering the m-Health clinics and their members(the doctors and patients) under a cluster base and give license only in the respective cluster.

Lack of knowledge

The lack of knowledge concerning the possible applications of m-Health and public health outcomes was the next highest rated barrier (47%). This highlights the need for evaluation studies of m-Health.

Policies related with m-health

From the existing applications it is clear that there is no rules or policies established or recognized by the ruling officials in the case of m-Health. This finding is not surprising, that m-Health is still in a relatively early stage of adoption and development. Major challenges in the acceptance of m-health are ,security of patients data, standardization of applications, Reliability of signals and diagnosing result. As the part of accepting information technology in all the part of governance

and human life the application also can be include and design policies for the same. This is a multi-step process, which includes public awareness campaigns to highlight the need and potential solution/benefit, research and development trials and their Evaluation to prove effectiveness, and guidelines for use . The policy-making process rarely keeps up with technological development or public's demand; this is especially true of the field of m-Health – where technology evolves so quickly and there are multiple sectors involved.(e.g. health, communications, and technology).[4]

Effectiveness of m-Health solutions is one of the top four barriers cited. The cost-effectiveness of available m-Health solutions are not analyzed. Most of the applications are independent so an inter operable and integrated frame work under a centralized control is needed to overcome all this challenges as well as to meet the economic feasibility.

Consider patient as a consumer

The coming health models will use customer relationship management technology to generate and manage demand. The models will concentrate on patients experience and understanding them in their everyday lives.

Diagnosing from the home itself- The m-health technology provide facility to diagnose health problems from the home itself. The patient sends the data through the mobile device to the physician, and he can analyze the details send by the patient and give proper instruction. With the help of a smart phone the pictures of body parts can be sent to the doctor.

Access to the physician will be more easy-The patients feel that a communication with the doctor will be more comfortable through the mobile devices .they can call the doctor from any where any time for consultation.

Doctors feel more free from the rush of patients-It is easy to the doctor to comfortably answers the queries from the patient by avoiding rush in to home .the doctor can store detail of patients for further reference.

Digitalization of the health care system-In the coming years the tendency of patients to visit doctors will get reduced and each one will be comfortable to use the mobile health care system. The application of m-health like decision supporting system and mobile telemedicine etc are some of the novel area of m-health application that make the diagnosing of body part with the tiny body sensors.

Quality of diagnosis-The physicians are not sure about the quality of diagnosis through the m-health. It is because the symptoms and images sends through the mobile are may not proper or incomplete due to some technical errors .so a perfect diagnosis is not possible.

Payment of the physicians-with this mobile health technology the payment of the doctors may through e-banking or net banking, but the doctors are not satisfied with this.

Authorization of m-health service-Even though the m-health service is becoming popular, there is no strict authorization by the public or private agencies .In most countries it is done by some private agencies.

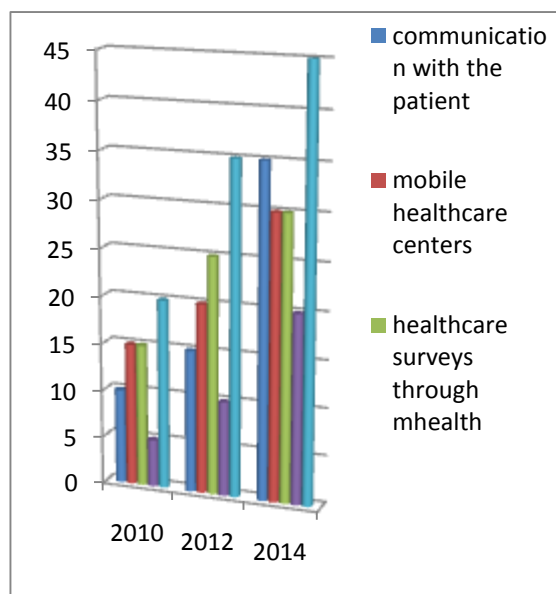
Security and confidentiality of the data-The physicians are also fear about the security of data received through the mobile phones. There may be dropping of data or revealing of identity of the parties etc may occur.

Lack of skilled clinicians for using this technology-It is one another drawback of the m-Health technology. The people in the clinics are not trained enough to capture the sensed data and for sending replies.

Social concern of m-health care system

The health care application becoming a business. More the usage of this application, the technology has to develop new devices that cope with the coming trends in health application. So the business people will try to produce the best mobile devices with network accessing and having more efficient applications. In this scenario the common people will be get troubled to get this devices. The business people will decide doctors and they treat the patient as their consumers.

The following figures shows the rate of mobile health application the last 4 years in various countries



Graph 2. Shows the rate of mobile health application in recent years in western countries

CONCLUSION

The application of mobile health going on increases from countries to countries. Now the rural areas got the benefits from this application more. In India Bangladesh shows highest use of this mobile health application. The application now widens its area with the use of body area networks and helps

to diagnose complex body signals. So patient monitoring with decision making will be the most significant application of

M-health. Also the service can provide emergency health services to the bedridden patients and other needy persons. As in the case of any technology the m-Health also has the disadvantages due to the misuse of technology. The signals passed through mobile devices are highly personal related to the patient. So the fact of mutual belief between the doctor and patient is more important. As in any communication network system the problem of eaves dropping, stealing of information, lack of authenticity etc should consider as a major issues related with this technology.

The lack of knowledge about the technology and lack of trained people in this area are one of the major problems in our area. Especially in Kerala even the physicians are unknown about the application. Only the toll free telephone system. Patient booking system like normal telephone services are existing in Kerala. Based on the pilot study to implement the frame work the paper would like to put forward some suggestion for the health care system in Kerala .

Make provision for the students of MBBBS or other doctor professions to handle with the m-health application in rural area especially for patient monitoring ,keeping record of the patients in rural area, the environmental conditions of the locality chance of epidemic in that area ,give the importance of personal and social hygiene etc.

The government has to take initiative to implement the m-health in the current health care system.

Make setup to give training to physicians and nursing and clinical assistants about this application

The health care system in Kerala even all over India is not in a better position. Even though the technology grows rapidly, its application is very less in the area of health care system .So the proper and efficient use of m-health application can change the society a lot in its health concern.

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