Proposed E-Health Service Model by using Smart Phone Apps for Uttarakhand

Mukesh Joshi
Research Scholar, Teerthanker Mahaveer
University Moradabad

Durgesh Pant, Ph.D
Director, School of Computer Science & IT,
Uttarakhand Open University

ABSTRACT
For E-HEALTH initiatives in Uttarakhand the proposed E-HEALTH service model may allow better sharing of health information among multiple government departments, locally as well as at a distant location. But without coordination of different departments in Uttarakhand we cannot setup good e-health solutions. Priorities of Uttarakhand government for providing E-HEALTH facilities to rural areas are yet to be fulfilled. At present stage less budget from state government for health, and lack of coordination have triggered down trend in health services in rural and hilly areas of Uttarakhand This paper reviews use of ICT applications at different locations in our country and also try to provide a model for Uttarakhand province. Some suggested services using ICT and smart phone apps in healthcare are explained in this paper also. Use of smart phone apps to communicate health associated alerts using SMS services and collect information from rural areas suggested here in this paper.

Keywords
E-HEALTH, Smart Phone Apps, Uttarakhand

1. INTRODUCTION
E-HEALTH is the use of the ICT based services in health, such as medical consultations and drug prescriptions, etc. Under E-HEALTH doctors/ health practitioners would consult and treat patients remotely via telephone or fax. After analyzing the government reports [1, 2, 3] and making a survey of certain rural and hilly area, availability of E-HEALTH services is almost nil in all parts of Uttarakhand. Also, due to the presence of poor geographical conditions there is a high need of an E-HEALTH model. In the present research paper, we have proposed an E-HEALTH service model [4, 5] which is based on some latest smart phone apps and also recommends the development of smart phone app especially required for the model.

The proposed model after its implementation is use to send the SMS alerts to the patients and informing the patients about the availability of medicine in their nearest location.

2. ABOUT UTTARAKHAND
The state of Uttarakhand is bounded by Nepal in the east, the Tibet Autonomous Region of China in the north, Himachal Pradesh in the west and Uttar Pradesh in the south. The total geographical area of the state is about 53,483 sq. km. According to the Census, the State's population was 1.01 crore (10 million) in 2011 census. Uttarakhand was carved out of Uttar Pradesh and given an independent status as the tenth Himalayan state and the twenty-seventh state of the Indian Union on 9th November, 2000. Formation of this state was a long-standing aspiration of the people of Garhwal and Kumaon as this would accelerate the pace of socio-economic and human development. The state has been created with the inclusion of 13 districts of undivided Uttar Pradesh. It is further divided into 49 sub-divisions and 95 development blocks in order to ensure rapid human development through effective administration. There are 15,638 inhabited villages and 86 urban settlements in the state. However, it is very tough to create policies based on health care conditions due to everly constrained hilly regions of this state as well as due to various physical, geographical and environmental problems in Uttarakhand [6].

3. AREA SURVEYED
For developing the proposed E-HEALTH model i have surveyed a remote village located in District Almora of Uttarakhand state. The village named Bareth (Block Dwarahat Distt. Almora), having a population of about 1600 (approx.), is five km away from motor-road. A single pedestrian is the only way for villagers for reaching to a connected road. In terms of medical facilities an ANM subcentre is present in the village. This sub center is the only medium for 1600 villagers for getting first aid for any medical consequence in a village. The government doctor is present at PHC which is located about 15 km from the village at a place called gonchar, Dwarahat (Almora). In this 15 km journey villagers have to travel about 3 kms on foot because of no motor-road availability. So after surveying the area the following issues has been raised regarding the health services in the village.

1. For Pregnant womens it is very tough to reach PHC because of 5 km on foot journey. So they are totally dependent on ANM center for any kind of medical aids. But unfortunately due to lack of communication with ANM they are unable to get medical aids in time.

2. As per the ANMs, some time they would not get the required vaccines because of its unavailability.

3. The unavailability of oral pills like iron and calcium is another issue because most of the time PHC could not generate the requirement of medicine because of not getting the exact figure of children's pregnant womens in specified time.

So as per the above issues we have tried to propose a model with the help of ICT tools and application which helps us in providing better E-HEALTH services in Uttarakhand.

4. STUDY OF SOME EXISTING E-HEALTH MODELS
Apollo for Aragonda, Andhra Pradesh
The e-health project for remote area of Andhra Pradesh was started by Apollo hospital in 2000. This is a 40 bedded fully equipped hospital connected by using VSAT [7] link with Chennai for speciality and super speciality consultation.

CMC LTD: India Healthcare Project in Andhra Pradesh

CMC with the help of Government of Andhra Pradesh has provided one of the best solutions for improving remote health services. Under its project Personal Digital Assistants, specially designed for e-health, are being provided to the ANM's Auxiliary Nurses and Midwives. By using these devices ANM's collect the data from their respective areas. At later stage they transfer this information to the system [7] available at PHC level.

This procedure of data collection helps in generating reports at PHC level, district level and State level and also allows in preparing best policies [7].

Amrita Telemedicine project

The Amrita institute has used the technology to provide medical support during epidemic outbreak and disaster. On 13th January 2003 in Kerala, Amrita's first remote tele-surgery procedure was performed.

Wipro project for Delhi Municipal Corporation (DMC)

Wipro in collaboration with Delhi Municipal Corporation for its associated six hospitals is providing a Hospital Management Information System (HMIS) [7].

21st Century's HealthNET in Goa

State Government in Goa in collaboration with 21st Century Health Management solutions is providing a HMIS (Health Management Information System) for government medical colleges, which is also known as HealthNET.

5. PROPOSED E-HEALTH MODEL

After making an analysis of above mentioned existing E-HEALTH model I have tried to propose a model that can be used to provide better E-HEALTH services [8] in remote areas of Uttarakhand. In the initial phase the model (Figure 1) can be used for collecting the information in a required format and also use some smart phone Apps for providing the health service to patients.
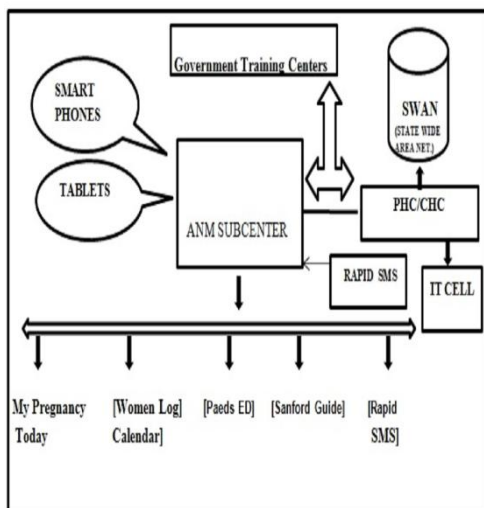

Figure 1: Proposed eHealth model

Flow of Working

STEP 1: Patients will move to the Sub Center, equipped with tablet and smart phones, for making their Registration (in below mentioned format), In Initial phase the facility is available only for Pregnant Women's and Children's.

STEP 2: The registration (Figure 3) is done through pan card, voter ID card, ration card or any other proof which can be treated as an identity proof. After completing the registration process the patient/ child will be allotted a unique ID number.

STEP 3: The registered data of patient should be save in a database which has been provided by SWAN (Already available in Uttarakhand upto Block Level).
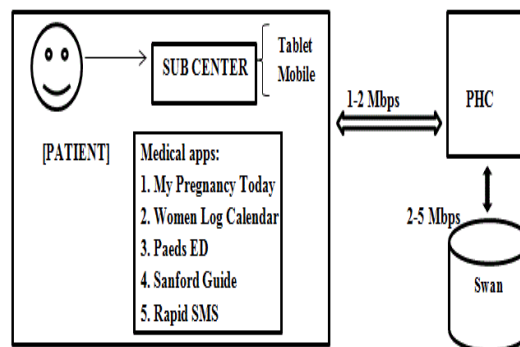

Figure 2: Initial Model for eHealth

STEP 4: Now, registered patients will get the SMS [9] about child vaccination date, information about special camps for pregnant women's and medicines availability in their nearest location.

STEP 5: After patient registration, when pregnant women goes/meet with ANM regarding her vaccination the ANM enter her record through registration form App, while if child is coming to subcentre than his/her record is also entered through smart phone App.

STEP 6: Some additional services for e.g. if a pregnant women wants to know the progress about the foetus than apps like My Pregnancy Today can help in this hypothetically.

Figure 3: Registration Form for old & new patients [10]

6. SMART PHONE AND ITS APPS

A smartphone is a mobile phone which is based on a mobile operating system, with more advanced computing and communication facility in comparison to any other phone. In Uttarakhand smart phones can be used for delivery of E-HEALTH services and spreading medical education [11, 12].

Some of the Smart Phone Apps for delivery of E-HEALTH are discussed below:

1. My pregnancy today- This app is brought out by BabyCenter, the most trusted parenting resource, supporting 25 million women worldwide. It is useful for pregnant women. By entering the baby's due date, the smartphone will be converted into an expert guide for your exact day of pregnancy. It can also use and get the answers you need, whenever you need them.

2. WomanLog Calendar- WomanLog is a menstrual and fertility calendar for women. It may help the infertile couple for knowing the fertile period.

3. Paeds ED- This app helps to calculate Age / weight / situation-specific pediatric drug and dosage which will be helpful for pediatricians and students for dosage calculation.

4. Sanford guide- This application is useful in disaster or epidemic outbreak. It is the essential resource for healthcare professionals who care for patients with infectious diseases. The Sanford Guide to Antimicrobial Therapy.

5. Rapid SMS: This is a web framework based paid sms service. It is used for sending bulk sms at a reasonable amount.

7. BENEFITS/ RESULTS OF THE MODEL

After successfully implementing the above mentioned

E-HEALTH model some of our objectives are achieved in E-HEALTH services for Uttarakhand. Some objectives are discussed below:

1. The reports could be generated easily, like [13,14]:

    a. Number of pregnant womens in a respective area.

    b. Availability of Blood group can be ensured at Blood Banks

    c. Number of children's to be vaccinated in a respective sub center in a respective day.

    d. Status about medicines requirements for a sub center.

2. Policies creation is easy for children's and pregnant womens.

3. Personal attention can provide by doctors by arranging special camps in the nearby locations for pregnant womens and infant children.

4. Vaccine requirement for a particular day could be generated at PHC level.

8. CONCLUSION

This paper analyses the scope for smart phone application of ICT in healthcare services for Uttarakhand. Effective use of smart phone apps and ICT in hospitals and Medical Colleges supported by Networking and Video Conferencing [15, 16] will help to increase efficiency, quality of Patient care and patient satisfaction as a support system. As a sub part of E-health system, Telemedicine aims to deliver health care at doorstep to the patients in remote and hilly areas. Presently implementation of smart phone Apps in health services is in initial stage but its further use in both providing medical education and specialist healthcare will revolutionize the healthcare provided by Government hospitals. This paper purposed a good use of smart phone apps as a support in public health service system. Some suggested smart phone apps are covered in this paper, that apps when executed will save precious time and cost for rural area citizen of Uttarakhand. Finally good quality health care service at doorstep in reasonable cost would help the state of Uttarakhand with the support of ICT and Smart Phone Apps.

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