Feasibility Analysis of Immunization Alert System in the Context of Developing Countries

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Abstract - Newborn babies in Developing Countries are expected to take vaccinations during their first year that will provide them immunization against 6 deadly diseases. They are provided immunization as per EPI schedule at four different times. But the rate of immunization coverage declines with the increasing age of the child. This is of course a big health problem, as many children do not get the protection from preventable diseases even though vaccine is available and provided free-of-cost. With the advent of new ICT tools, Internet and mobile telephone is opening up opportunity to integrate interactivity and dialogue in the process of communication in comparison with other communication channels such as print media or radio, television etc. Again with the rapid growth of mobile applications, there is a significant scope of improving health related services. Various Health Information Systems can create a link between the medical and technical knowledge. Immunization alert system is the effective way to collect data both from public and private health care providers to create a record and keep people updated about their latest immunization status to achieve complete and timely immunization. There is possibility of connecting to this database via cell phone as people have an interest on mobile health services through SMS. In this paper, feasibility has been studied throughout a simulated health oriented action setting a mobile and web based health services in Developing Countries.

Keywords -ICT, SMS alert, m-Health, Mobile application, Web application.

1. INTRODUCTION

Immunization is the process of inducing immunity to an infectious organism or agent in an individual or animal through vaccination. In developing countries there remain vaccinations for preventing deadly diseases namely diphtheria, pertussis (Whooping cough), tetanus, poliomyelitis, tuberculosis, and measles. While 95% take the first two vaccinations the numbers decrease for next vaccines. Only 85% take the third and as little as 70% take the fourth immunization at 36 weeks of age. This is considered very important for survival as more than 10 million children in developing countries die every year because they do not access effective interventions such as immunization that could fight against preventable illnesses. The availability of accurate, timely, and analyzed data can directly help individual's health, the understanding and management of overall health systems. Every organization needs to depend on some sort of ICT tools for managing any relevant amount of information.

Mobile devices have reached more people in many developing countries. It is rapidly growing all over the world. The use of mobile technology in health system enables to create more than 5 billion points of contact between consumer and health care providers [1]. Mobile telephony has quickly reached communities and makes them aware of current status. These services run through various forms like SMS based grade checking, information fetching, mobile learning etc.

Again web based information system with database have become very useful. Such system can also help health providers to monitor the members' vaccination history and administer appropriate vaccine with regard to members' reaction to specific vaccine. This paper aims at highlighting the feasibility of immunization alert as an important factor for health care organization.

2. SYSTEM MODEL

There will be a system model for two type of user. Like: the parents of the babies who will get registered in the hospital database when a child born and can get alert for their child's immunization.

The second type of users are the people (>14 years old) who can got registered by their own through the mobile phone, hospital website and can be updated about their immunization. There can be three steps for the model.

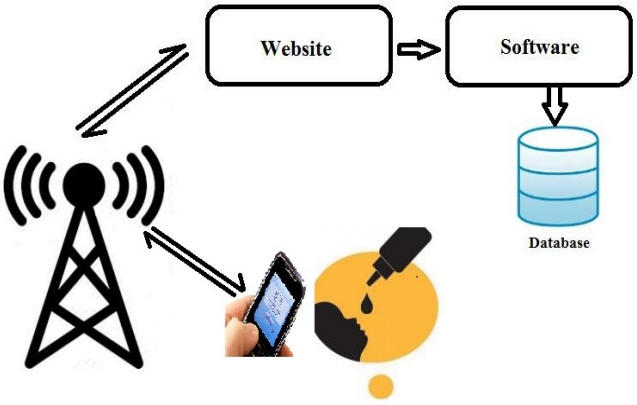

Figure 1: Data Flow Diagram

Step 1: Child's name will be registered in hospital database at the time of their birth where the parent's information are also given. Again Adults will register through SMS or sign up in the hospital website (including

name, DOB) by themselves and can know the information of different vaccinations.

Step 2: Child's Parents will receive SMS about the first dose of vaccine with the nearest location of healthcare. Adults will also receive the alert for their required vaccination they register for.

Step 3: After that, in every 6 months or later, parents will get the alert through SMS about vaccination for their child according to child's age.

3. PREVIOUS WORK

Immunization alert system need to integrate with proven strategies and fresh approaches to reduce the possibility of diseases that may be prevented through the use of traditional vaccines, and to permit the effective introduction of new vaccines.

The ALERT Immunization Information System (IIS) is a statewide immunization registry developed to achieve complete and timely immunization of all Oregonians throughout their lives. ALERT collects immunization data from both public and private health care providers to create complete records for individuals in Oregon. [4]

An eHealth strategic framework is currently implemented in British Columbia that describes BC long term vision for eHealth within the next few years. eHealth is a healthcare system supported by electronic processes and communication, dating back to at least 1999. Since about 2011, the increasing need for better cyber-security and regulation may result in the need for these specialized resources to develop safer eHealth solutions. [2]

Manitoba's immunization registry, the Manitoba Immunization Monitoring System, became functional province-wide in 1988. The aim of the MIMS Annual Report is to provide the overall picture of immunization in the province. [3]

In Nova Scotia, patient records can be kept in hospitals, family doctors and specialists, pharmacies, laboratories, diagnostic imaging units, and public health units. Most of these records are now kept electronically, although some doctors still use paper files. SHARE brings many of these records together into one electronic health record for every Nova Scotian. [5]

4. PROPOSED METHODOLOGY

This research work is mainly partitioned into two areas. One is for the people who are going to using "Virtual Health Care system" and the other is health care provider authorities who will upload the updated notice and materials to deliver people as an alert. The methodology of this paper is based upon an investigation of current mobile based health care support applications in a variety of developed countries and then comparing those applications in order to suggest improvements and a better one for developing countries which was not existing on the paper based system.

A structured framework has been developed for feasibility testing which identifies the efficiency and effectiveness of SMS and web based health care system. [1]

For the feasibility analysis there are different process or methodology. Here in this project the iterative approach is used for the development. There must be some phases for the development process.

Phase 1: Collecting client need assessment

Phase 2: Research and discovery of this system

Phase 3: Designing concept

Phase 4: Developing according to the requirements

Phase 5: Testing and launch

Phase 6: Post production and promotion

Phase 7: Maintaining the system

Phase 9: Iterative input into design

5. SIMULATION/EXPERIMENTAL RESULTS

The final product of the project is mainly web and SMS based. The different user characteristics indicate different user interfaces. The UI is the result of the design process. In the UI design process, the systems' feasibility work properly.

This project can be used as a part of any healthcare organization. Here in the design which keeps only the 'vaccination alert' active. This part includes all the program related to immunization alert system where people are immunized as per the EPI of WHO protocols.

Fig 2: Registration form

In this form (figure 2) there are two kind of criteria. They are: registration for children and registration for adult. Registration for children mainly includes child from birth to 15 months. Here the parents can register for their children for the vaccines for the particular diseases. And on

the other option, the patients can register for their own vaccination.

Registration in the specific criteria will remind the users about the vaccinations date timely.

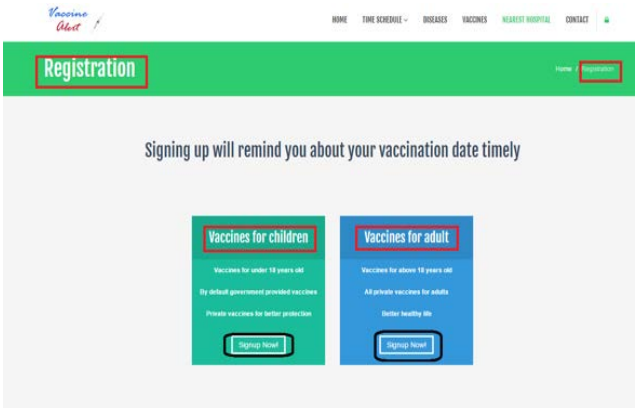

Fig 3: SMS alert

Any individual can't have this information by accessing the hospital database. They get a SMS alert by their cell phone which contains information like vaccination schedule collected from database or physical storage.

There are some hypothesis to analysis the feasibility with structured questionnaires of simple random sampling. Here, the group of subjects are health care center and provider.

Table 1: Hypothesis lists

No	Hypothesis
H1	SMS based immunization seems effective rather than the traditional manual system of immunization.
H2	It seems easy to understand all the functionalities for the health providers and users.
H3	This can increase the adult immunization rates by sending alert in timely fashion.
H4	I am satisfied with all the parts including in the project.
H5	It is easy to understand the system and use this.

6. CONCLUSION

To provide appropriate vaccines of high quality in a timely fashion for all children, there is an urgent need to a centralized system accessible by individuals and health providers to track immunization records at any location. In this report, the database is designed to store different data element. Again the popularity of the application of mobile devices in health services is increasing more and more because of the high rate of use of mobile phones in our everyday life. With this new technologies, the health care sectors can increase their immunization facilities with innovative issues.

7. FUTURE SCOPES

RFID can be used in healthcare industry for variety of purposes such as identifying patients, tracking information in hospitals. If barcode and RFID technologies become integrated, there would be a possibility of preventing adverse event following immunization. RFID enables cell phones and ID bracelets can help health provider with better and more efficient care through the sharing of data

Mobile apps can offer the potential to improve the quality of information containing in immunization information systems and facilitates a timely immunization information between individuals, health care providers and public health. As mobile technology continues to rapidly evolve there will emerge new ways in which apps can enhance immunization record.

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