Design and Implementation of Mobile Patient Follow-Up System

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June 08, 2012

Addis Ababa, Ethiopia
Outline

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1. **Introduction**

- Healthcare quality, cost and patient safety are adversely affected and compromised by the current largely paper-based system.
  - Doesn’t support the monitoring and close watch (follow-up) of patient care
  - Puts burden on patients to make their treatment and comeback for follow-up visits.
  - Patients must travel long distance and pay for transport.
Nowadays, efficiency, cost-effectiveness, quality, and safety of medical care delivery in the healthcare system can be improved through ICT applications, particularly mobile applications;

Mobile phone based service:
- Offer effective means of bringing healthcare services.
- Improve healthcare services even in remote and less resourced settings.
- Provide continual follow-up about treatment status for out-patients
Motivation

- Mobile phones are one of the fastest spreading technologies.
- Mobile phone technology presents a great opportunity and potential to address and positively impact the many health challenges facing resource-poor countries.
- There is no solid evidence yet to demonstrate the impact of these services on health outcomes especially for patient follow-up purpose for chronic condition.
Statement of the Problem

- As there are senior citizens and patients with chronic diseases in Ethiopia, the number of people who need **constant assistance** is high.

- Patients that are being discharged by hospitals and often require **additional healthcare services** including health status follow-up.
Statement of the Problem...

- Nevertheless, the current system shows **long patient and operation waiting lists**, **inadequate** number of professionals.
  - There is no effective **monitoring** and **close watch** of patient.
  - Burden on patients to make their **treatment** and to **return back** for follow-up visits
  - Pay for transport and travel **long distance**.
2. Related Work

**FrontlineSMS**
- FrontlineSMS: Medic is an SMS based healthcare delivery system.

**TRACnet**
- TRACnet is a system designed to collect, store, retrieve, and disseminate critical program, drug, and patient information related to HIV/AIDS.

**Mashavu**
- Mashavu is a computer-based system that enables doctors to connect with children in developing countries via mobile phones.
Related Work...

**SIMpill**
- The SIMpill solution is designed to help ensure compliance

**ODKClinic**
- A mobile phone medical record system

**AMPATH**
- A mobile phone data collection application for HIV treatment and developed using an open kit is called ODK

**Sana Mobile**
- Sana Mobile is an open source mobile application and Tel-health platform
3. Proposed System

- The system supports long term outpatient follow-up treatment activities and creates remote reliable communication between health workers and outpatients.

- The proposed system includes the following modules:
  - **Phone Module**
  - **Dispatch Management Module**
  - **Diagnose Module**
  - **Utility Module**
4. System Design

System Architecture

- Mobile and Web Client
- Communication medium: WiFi/GPRS/SMS
- Web-Based Application (Dispatch and Diagnose module)
- Medical and Client Database

Figure 2: System Architecture
Hardware Software Mapping

Mobile Phone Device
- Phone Module

Personal Computer Device
- Web Browser

Application Server Device
- Dispatch Management Module
- Diagnose Module
- Utility Module
- DBMS

Figure 3: Deployment Diagram
5. Implementation

The System Development Environment

- Android operating system based smart phones are selected.
- The basic reasons to choose Android platform are that:
  - It uses Freetype, a free and open source bitmap and vector font engine, which supports Unicode text layout.
  - Ethiopian Unicode fonts, such as Microsoft's Nyala and GFZ's Geez Free Zemen, can be used to render text using Freetype on the Android platform.
  - Other platforms such as the Palm OS lack the internationalization support required to fully meet the needs of Ethiopian software development.
Application icon inside android setting and the main menu of the system

Figure 2 : Main menu
How patients communicate with health professionals using video data type procedure.

Figure 3: Application starter
Data entry and checking processes

Figure 4: New Record Entry
Figure 5: The patient fills birth date, gender and captures his/her photo.

Figure 6: The patient records a video data (follow-up request) and checks the data. Then, the patient sends the data to the server.
Figure 7: How the patient can confirm whether the data is sent or not.

Figure 8: Log-In and Patients’ follow-up request queues
Figure 10: Analyze and feedback the patient request

Figure 11: Received Diagnosis Result
6. Result of the Project

- Support long term out-patients follow-up treatment activities
- Create remote reliable communication between health workers and outpatients.
- Health professionals should be able to register patients and record any type of patient treatment and diagnosis results (like lab, x-ray, ultrasound etc).
- Enabled to give follow-up and recommendations to their out patients in remote area.
Result of the Project...

- Help health professionals and organizations give higher quality of service on time.
- Avoid patient crowding, and job dissatisfaction and inefficiency.
- Patients can get follow-up services from their home instead of returning to hospital.
- Address the very limited reach of specialists who are often confined within a few large cities in developing countries.
Result of the Project...

- Follow-up of chronic conditions that may require technology not available in remote areas
- Scaling up remote real-time access to specialists
7. Conclusion

- This work:
  - provides continual follow-up for out-patients
  - records of critical data such as laboratory tests and medication.
  - prevents a patient from returning for follow-up in resource-poor environments and the frequent need for migration due to poverty and social disruption.
  - increase the efficiency and effectiveness of delivery outpatient healthcare
  - decrease the substantial financial losses for healthcare systems.
Thank You 😊