



mHealth



# Remote monitoring as an mHealth solution in Sri Lanka

This study was conducted in liaison with Dialog Axiata, Ericsson, and Asiri Surgical Hospital. It was to address the effectiveness of ambient remote monitoring technology for patients with cardiac abnormalities.

In Sri Lanka the ability to overcome serious health challenges and improve the quality of healthcare is hindered by several core obstacles such as shortage of health professionals and access for remote patients to the large hospitals. But the growing ubiquity of mobile technology offers new hope for the promotion of quality healthcare through mHealth solutions.

mHealth offers potential benefits to both healthcare providers and patients.

### Healthcare provider:

- Ability to provide a more informed and patient-oriented service
- Improved ability to deal with chronic and long term disease
- Improved efficiency in dealing with a larger patient base
- Reduction in treatment/management & patient related costs/use of hospital resources

### Patient:

- Better quality life
- Quick, user-friendly self-administered service
- Reduced costs and time incurred in travelling
- Retained freedom of mobility



For the purpose of this case study, a remote monitoring device is defined as a personalized, non-invasive mHealth solution which intends to improve comfort and the quality of life for individuals with chronic illnesses.

Figure 1 illustrates how the ecosystem in this case study works. The cardiac patient is assessed as a suitable candidate by the doctor and is recommended this solution. The patient is equipped with a non-invasive wireless sensor to monitor a particular vital sign. The devices, provided by Ericsson, obtain the monitored medical parameters of a patient and transmits them to a mobile communication device using Bluetooth. The communication device in turn sends the collected sensor data using Dialog's 3G/GPRS network to a mHealth

database, where it becomes available for viewing and further analysis by qualified physicians. The remote patient monitoring can be done intermittently or continuously depending on the patient's condition, and as determined a the doctor.



**More information about 'Ericsson Mobile Health' is available at:**

[http://www.ericsson.com/hr/ict\\_solutions/e-health/emh/index.shtml](http://www.ericsson.com/hr/ict_solutions/e-health/emh/index.shtml)

### The design of the study

Initially, an observational pilot study was carried out in a controlled setup to demonstrate the feasibility of the system with five healthy individuals (control subjects). The pilot study was to evaluate the transmission, recording and retrieval of data. Following the pilot study, a definitive study on five individuals with cardiac abnormalities was conducted.

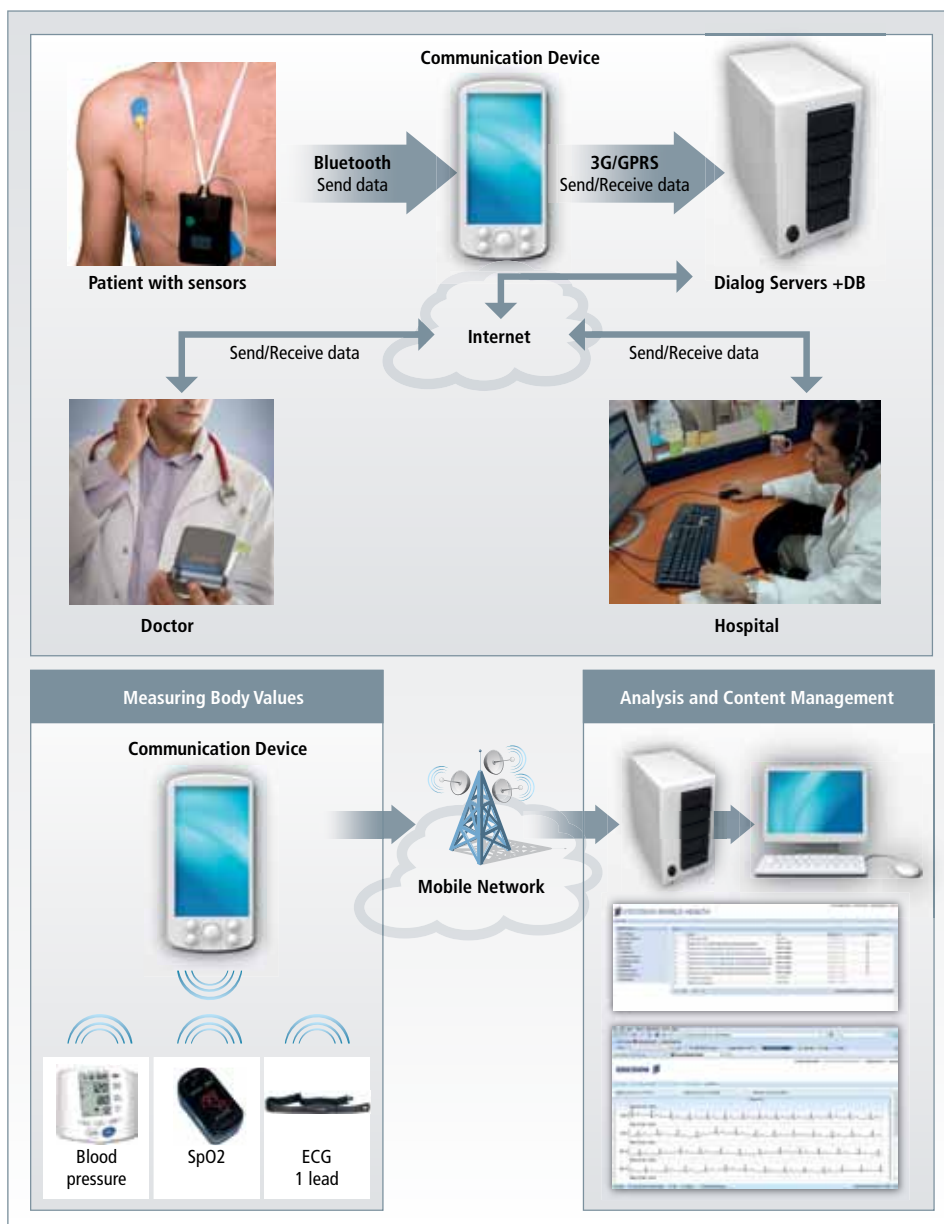
Objectives of the study:

- Investigate whether remote monitoring:
  - Provides clinically meaningful reassurance to patients
  - Improves the ability to diagnose a patient
  - Improves detection of abnormalities
- Obtain feedback from patients and physicians regarding usability and practicability
- Investigate the usefulness and efficiency of the solution

Study patients were chosen by the hospital and by the physician based on selection criteria established with the attending doctors at Asiri Hospital. Patients from both genders, irrespective of caste, creed, race and culture, from all over Sri Lanka were considered for the trial.

The study patients were instructed on how to use the sensors and the mobile communication device and the hospital-based-nurse and the physician were trained on the software as well as on the devices. The patients utilized the sensors as per the physician's instructions and a user guide was provided for reference. Nurses monitored each volunteer's progress, and patients were required to repeat the measurement if the data received was unclear. However, no such cases of repeat measurements were reported during the study. During the course of the trial, the physician examined the patient records everyday and advised the volunteers accordingly.

Figure 1 Proposed mHealth solution's ecosystem



Study patients were observed for a period of 3 days and technical and clinical experiences were recorded. The patients and the hospital staff were then surveyed on their interactions with the mHealth solution after the trial period. The quality and significance of this study was then determined by assessing the results obtained from both physicians and study patients.

For the purposes of this mHealth trial, two Ericsson M-Health units were used which included the following sensors, along with the communication device:

- 1 lead ECG Belt
- Pulse Oximeter
- Blood Pressure Monitor

The results of the pilot study were presented to the Asiri Surgical Hospital ethics committee to obtain approval to proceed with the definitive study.

### Findings from the study

The pilot and definitive studies were conducted in accordance with the agreed design without any significant difficulties.

40% 'strongly agreed' that the communication device should be replaced with a mobile phone. 60% 'strongly agreed' that the mHealth solution is practical and useful and that it provides a secure means for monitoring.

The solution was embraced positively overall. However, the pilot study individuals felt that the primary beneficiaries of this solution would be patients. It was observed that remote monitoring would not be a practical wellness and lifestyle solution for the healthy and the working due to the following reasons:

- Difficulty in removing the sensors and wearing them for sporadic measurements during work hours (for the purpose of the trial the volunteers were monitored intermittently)



- To have/carry the communication device near/with you while the ECG measurements were taken
- Unwanted attention due to sensors – patients did not want to be seen to be sick and therefore the target of social gossip and stigma. The external sensors such as the Pulse Oximeter and Blood Pressure Monitor were quite large and could easily be seen by others.

Study patients engaged for the definitive study found the solution practical and useful. The participants benefited from the trial by:

- Having the opportunity to test a regimen that will improve his/her quality of life
- Gaining access to new technology before it is widely available
- Obtaining expert medical attention at a leading health care facility
- Helping others by contributing to medical research
- Reduced visits to hospital and reduced costs associated with travel

The physician and nurse were satisfied with the outcome of the trial and identified remote monitoring as a practicable solution.

### Regulatory requirements

The regulatory requirements for mHealth services vary considerably depending on the country. In Sri Lanka, approvals must be sought from the participating hospital's ethics committee prior to commencing a clinical study. The approval process on average takes about one to two months.

In this case, Dialog Axiata was required to obtain approval from Asiri Surgical hospital's ethic committee in order to conduct the pilot study. They were also given the opportunity to present the solution to the committee at the time of submitting the application.

The Cosmetics, Devices & Drugs Regulatory Authority of Sri Lanka (CDDA) were also informed of the trial and approval needed to be obtained to import the medical devices. CDDA initially issued a sample license to import the devices to Sri Lanka for trial purposes, A 'Commercial License' from the CDDA would be required for for import of such devices intended for commercial use i.e. when such remote monitoring services would be commercially offered by hospitals to patients as part of their treatment options.

### **About Dialog Axiata PLC**

Dialog Axiata PLC, a subsidiary of Axiata Group Berhad (Axiata), operates Sri Lanka's largest and fastest growing mobile telecommunications network. Dialog has been at the forefront of innovation in the mobile industry in Sri Lanka since the late 90's, propelling the nation's mobile telephony infrastructure to a level of advancement on par with the developed world. The company delivers advanced mobile telephony, high speed mobile broadband, CDMA fixed wireless telephony, WiMAX 16D high speed broadband, Radio and Optical Fibre based transmission infrastructure facilities and data communication services along with Direct-to-Home(DTH) Digital Satellite TV services to a subscriber base in excess of 7.5 Million Sri Lankans. Dialog also provides International Roaming Services in more than 200 countries.  
[www.dialog.lk](http://www.dialog.lk)

### **About Ericsson**

Ericsson is the world's leading provider of communications technology and services. We are enabling the Networked Society with efficient real-time solutions

that allow us all to study, work and live our lives more freely, in sustainable societies around the world. Our offering comprises services, software and infrastructure within Information and Communications Technology for telecom operators and other industries. Today more than 40 percent of the world's mobile traffic goes through Ericsson networks and we support customers' networks servicing more than 2.5 billion subscribers. We operate in 180 countries and employ more than 100,000 people.  
[www.ericsson.com](http://www.ericsson.com)

### **About Asiri Hospitals**

Asiri Surgical Hospital is a subsidiary of Asiri Group of Hospitals which is the largest private sector healthcare provider in Sri Lanka. Asiri Surgical Hospital offers an array of services and treatments using the latest medical technology. It consists of several Intensive Care units, Emergency Treatment services, Modern Operating Theatre suites and includes Trauma Care, fully fledged Urology services and a state of the art Heart Centre which offers world class cardiac care.  
[www.asiri.lk](http://www.asiri.lk)



### **About the Connected Living programme**

Connected Living is a three year market development initiative whose mission is to help mobile operators accelerate the delivery of new connected devices and services. Our target is to assist in the creation of 700 million new mobile connections, whilst stimulating a number of service trials and launches in the Automotive, Education and Healthcare sectors. The Connected Living programme is also working with the city of Barcelona, the Mobile World Capital, to develop and showcase smart city services.  
[www.gsma.com](http://www.gsma.com)



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