



# **White Paper on Mobile Healthcare Monitoring Industry**

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## 1. Executive Summary

Mobile Monitoring helps in self managing various chronic diseases like Asthma, Diabetes, Heart Diseases etc. with the help of portable medical devices.

Mobile Monitoring has evolved in three stages:

- (a) Stage One-Stand-alone health monitors (like AccuCheck) which take the readings only
- (b) StageTwo-Home Tele-health monitors (like Homemed monitors) which capture data from multiple medical devices at home and transfer the data to backend servers via landline.
- (c) StageThree-Mobile Monitoring (like Aerotel or Polar), mobile phones directly capture the data from medical devices via Bluetooth and transfer the data to backend servers over the air. This is easier to use and is mobile.



Mobile Monitoring is easy to use. It consists of two pieces only (1) Mobile Phone (2) Portal Medical Device suited for patient's condition e.g., Blood Glucose monitor is required for Diabetes monitoring. A Patient uses the Blood glucose medical device regularly from anywhere (home, office etc.) and keeps the phone near by. The Phone captures the data from the medical device and sends it to the call center, where readings are analyzed for any 'red alerts'; also readings are stored in the patients' personal electronic records in the server. In case of any emergency, an alert is sent to the doctor, who can access the health records via mobile phone or computer connected to Internet, and correctly diagnose & prescribe the medicine.

This creates a win-win situation for the Patient, Doctor, Pharmaco, Hospital and Insurance. A patient has peace of mind by being silently monitored all the time, Doctors can be reached anywhere anytime and can provide better advice with help access to complete medical records, Hospitals can discharge patients early, Pharma companies can extend their Disease Management Programs to masses effectively and Insurance companies will save funds with reduced number of hospitalizations.

Social Conditions in India are apt for Mobile monitoring because of high growth of chronic diseases and aged population, lower accessibility to medical facilities, large middle class population, better penetration of mobile phones, and high medical expenses which are paid out of pocket by the patient.

Market surveys have proved that the costs with mobile monitoring were 86% less than the cost of monitoring at hospitals. India presently has more than 60 million of chronic patients from Heart disease and diabetes alone.

Globally, many telecom companies, healthcare companies have initiated projects and also rolled out services in this direction. The growth has been slow primarily because of rapid changes in technology with no standardization and lack of awareness about health and health monitoring solutions.

Mobile Monitoring is bound to grow, given the cost effectiveness of the solution and growing health need. But the challenge is to create the awareness and seriousness to monitor ones health and to educate the doctors and the industry people to promote the solution and create an industry standard.

## 2. What is Mobile Monitoring?

Mobile monitoring is the provision of real time patient care, no matter where the clinician is and no matter where the patient is.

Source: Prof. Kambiz Madani,  
Director Communications and Compunetics Research Group.  
University of West Minster

It facilitates self-management of personal health and helps to minimize visits to doctors and hospitals. "Self Management relates to the tasks that an individual must undertake to live well with one or more chronic conditions. These tasks include gaining confidence to deal with medical management, role management, and emotional management."

Source: Telus Website. Reference paper published by University of Victoria- New Perspectives:  
International Conference on Patient Self Management.

Portable Medical Devices required for monitoring various diseases are:

Category	Examples of Diseases	Medical Devices
Heart	Arrhythmia, Post Operative Monitoring, Heart insufficiency / heart failure	Pulse Oximeter, ECG 3 Lead Monitor, Body weight Scale, Blood Pressure
Lifestyle	Physical Exercise, Wellbeing Programmes, Obesity, Smoke Cessation	Pulse Oximeter, ECG 1 Lead Monitor, Body Weight Scale
Diabetes (Chronic)	Diabetes, Risk diabetes patients	Glucometer, Blood Pressure Monitor, Body weight scales
Chronic Diseases	COPD, Asthma, Emphysema (Lung disease caused by smoking), Sleep Apnoea, Prolonged Pain Treatment, Post Operative Pain, Cancer Pain, Elderly Pain, Prematurely born infants, Pediatric malformations (heart)	Pulse Oximeter, Capnography, PEF meter, Body weight scales
Warfarin* treated patients  (Warfarin is used to prevent blood clots from forming or growing larger)	Myocardial Infraction, Atrial fibrillation, Transplant surgery patients, Heart valve replacement patients.	Coagulation Monitor

Source: Healthservice24, Telus Websites

### 3. The Evolution of Mobile Monitoring

For years, portable medical device manufacturing companies like A&D and Roche (AccuCheck) have been selling 'stand alone' Blood Pressure Monitors and Blood Glucose Monitors. Patients use portable medical devices at home and readings are recorded manually in the notebook.

Often some of the readings were missed or not recorded properly. The need was to capture the data properly so that the doctor could refer to patterns of readings and make the correct diagnosis. These medical devices are being enhanced with communication capabilities like Infrared or Cable, so that they can transfer the data from the medical device to the PC, where the readings can be stored. With advent of telecom (landlines), communication from medical devices got extended to transferring data to back end servers, which gave rise to Home based Tele-health Monitoring.

Tele-health Monitors reside in a patient's home and require a simple telephone line connection, Voice Prompt panels assist patients with medication adherence, appointment scheduling and transmission of: temperature, weight, blood pressure, peak flow, blood oxygen, blood sugar, cardiac and lung sounds and ECG results. Advanced Monitors now offers virtual home visits and web access via digitized technology. This offers patients and practitioners the ability to share real-time interactive video sessions and transmit pictures of wounds or body parts for review. Once in receipt of this information, healthcare providers can offer immediate diagnosis, treatment or referral.

Fig1: Tele-Health Monitoring (via Landline)



Mobile Monitoring is increasingly replacing home Tele-health, with the introduction of medical devices that can transfer data via mobile phones to backend servers. Mobile phones directly capture data from medical devices via Bluetooth and also provide facilities of Web access for Health Information, Video Chats, Photo messaging for interaction with doctors and SMS text messaging for alerts and reminders. Mobile Phone provides Monitoring, Information, Personalization, Communication to better manage ones health.

Fig 2: Mobile Monitoring (via Mobile Phone)



Some of the companies that provide the above Standalone Medical Devices, Home based Tele-Health solutions and Mobile Monitoring are:

Table 1: List of Companies selling Standalone Medical Devices

<b>J&amp;J – Lifescan</b>	Blood Glucose Monitor – OneTouch
<b>Bayer</b>	Blood Glucose Monitor - Ascensia
<b>Roche</b>	Blood Glucose Monitor – AccuCheck
<b>Abbott</b>	Blood Glucose Monitor – Medisense
<b>A&amp;D</b>	Blood Pressure Monitors, Weighing Scales
<b>Omron</b>	Blood Pressure Monitors
<b>Microlife</b>	Blood Pressure Monitors
<b>Polar Electro</b>	Heart Monitors – Targeted towards Sports
<b>TheraSense</b>	Freestyle Blood Glucose Monitors

Table 2: List of Companies selling Home based Tele-health Solution Companies

<b>Honeywell</b>	Homemed Tele-monitoring equipment - complete suite of portable medical devices for measuring Weight, BP, Blood Glucose etc.
<b>Carematix</b>	Carematix Wellness system comprises of BP unit (arm cuff and wrist cuff), weight scale, and blood Glucose meter.
<b>Philips</b>	Tele-station comprises of wireless weight scale,

	BP, pulse unit, ECG / rhythm strip recorder and third party (lifescan) interface for glucose monitors.
<b>Oregon Scientific</b>	Includes BP, Heart rate monitors, pedometers, and pulse meters, weight and body fat monitors.
<b>Smiths-medical</b>	Portable medical devices for Weight, BP, Glucose etc.
<b>Health hero</b>	Interactive “Health Buddy” system for patient education and monitoring of chronic conditions.
<b>Telcomed</b>	All-in-one wireless medical monitor which measures BP, SPO2, Heart Rate, Rhythm, One Lead ECG, Breathing Rate and Temperature.

Table 3: List of Companies selling Mobile Monitoring Solution Companies

<b>Aerotel</b>	Bluetooth enabled Single Lead to 12 Lead ECG Medical Device
<b>IEM, Germany</b>	Bluetooth enabled Blood Pressure Monitors, Weighing Scales and Glucose Monitors
<b>Card Guard, listed on Swiss Stock Exchange</b>	Bluetooth enabled Blood Pressure Monitors, Weighing Scales, Glucose Monitors, Spirometers, ECG Monitors, Fetal Monitors
<b>Telcomed</b>	Wireless Blood Pressure Monitors, Weighing Scales and Glucose Monitors
<b>Taidoc</b>	Bluetooth enabled Blood Pressure Monitors, Weighing Scales and Glucose Monitors
<b>Healthstats</b>	Wireless Arterial Blood Pressure Monitors.
<b>Polar</b>	Sports Oriented Heart rate Monitor

It is evident that for obvious benefits of mobility and the ease of use, most companies are shifting from their standalone or home health based medical devices to devices, which can transfer data to mobile phones and store data on secured Internet.

#### 4. How Mobile Monitoring works?

##### 4 (a) Case Study:

Following case study on the life of a chronic patient highlights the importance of mobile monitoring.

Ayesha is a twelve year old who has just been diagnosed with juvenile diabetes. She uses a glucose meter and cell phone to monitor her blood sugar levels. The cell phone reminds Ayesha to check her blood sugar regularly during the day, and her glucose meter seamlessly transmits her measurements to her cell phone after each use. The data is transferred to a diabetic monitoring service that maintains Ayesha's long-term history and looks for abnormal events. If a reading is unusual, or if Ayesha skips a test, the system automatically contacts her mother, who can get in touch with Ayesha immediately using her cell phone. Some of the features that help Ayesha to manage her chronic disease are:

- Bring health care to home & to her anywhere.
- Improve overall disease management care
- Monitor specific disease progression utilizing biosensors and activity
- Schedule appointments
- Trend analysis and alerts
- Remote consultation: e-mail, chat, video conferencing

Source: Continua Alliance

Fig 3: Diagrammatic Representation of Mobile Monitoring Process



#### 4 (b) Process of Mobile Monitoring

- Patient performs a recording of his ECG, Blood Pressure etc.
- The patient transmits the data from medical device with Bluetooth to Mobile Phone, which in turn transfers to Telemedicine Center and is finally received by the Internet Data Center.
- Data is received by the center and evaluated. A feedback is given to the patient – action is taken in case of Emergency



- Data is stored in Personal Patient Database
- Patient's respective Physician uses the data for consultation and treatment
- Electronic Medical Records can be sent to hospital / doctor by email, fax, or on mobile.

Source: Aerotel Website

## **5. Reasons for Mobile Monitoring**

Lets take an example and explain. A Patient may feel pain, which is difficult to explain and is not even near the heart or he may tend to ignore it thinking that it's a gastric problem or muscular pain but it may be the start of a heart attack. Doctors suggest if the patient is brought within an hour or two, he has much higher chances of surviving. With help of mobile monitoring, patient can take the ECG on slightest of pain that can be easily confirmed by a medical professional at the call center whether it is start of a heart attack or is simply some other pain. If it is a 'heart attack' pain then these crucial hours can be saved and emergency can be called much earlier.

### **5 (a) Benefits for Patient**

- Peace of mind and improved quality of life. This drastically cuts the time between a heart attack and a patient's arrival at a hospital - crucial hours that could mean the difference between life and death.
- Lightweight and easy to use.
- Easy to reach health care services
- Reduced clinical visits
- Enhanced Diagnostic Services and Disease Management
- Enhanced Emergency Response System
- Reduction of Medical Expenditure
- Better medication compliance
- Encourage healthy habits

### **5 (b) Benefits for Physician**

- Significantly upgrades the physician's method of treating patient
- Cumulative patient records assure accuracy of records
- Provides real time access to computerized, comprehensive information for each patient
- Significant improvement in medication management

### **5(c) Benefits for Hospital**

- Early Patient Discharge
- Reduced Hospitalization for Chronic patients
- Improved services and quality for home care patients
- Improve income generation and strengthen patient relationship
- Establishing Infrastructure for a Growing Population

#### **5 (d) Benefits for Pharmaceutical Companies**

- Enhanced base of life long chronic patients.
- Extend Disease Management programs for chronic patients.

#### **5 (e) Benefits for Insurance**

- Significant reduction in unnecessary hospitalization
- Significant savings from early hospital discharge
- Significant reductions in visits to emergency facilities
- Enhanced Research and Clinical Trials
- Enhanced Professional Support

Source: Card Guard Presentation

### **6. Social-Economic conditions that may fuel Mobile monitoring**

Following Socio- Economic Conditions of India clearly indicate that these will fuel the Mobile Monitoring.

#### **6 (a) Socio-Economic Facts**

- About 14% of Indian population (156 million) that has income higher than INR 10,000 per month, is more susceptible to chronic diseases. (Source: Population Data from IMF)
- PC Penetration is still very low in India, less than 2%. Mobile ownership will pass 100 million 2007 (Source: Wireless world forum 2006)
- Health awareness is very low with only 60% of respondents being aware about diabetics before diagnosis. Despite this 19% were of the opinion that diabetes can be fully cured. (Source: Novo Nordisk National Survey)
- Health resources in India are very limited. Only 5% of GDP is being spent on healthcare. The majority of healthcare expenditure is private (4% of GDP) with only 0.9% of GDP spent on public health care. (Source: World Bank Report)
- Cause of the Chronic Diseases: The major risk factors for chronic disease are an unhealthy diet, physical inactivity, and tobacco use. Without action, globally 17 million people will die prematurely this year from a chronic disease. Tobacco use causes at least five million deaths each year. If the major risk factors for chronic disease were eliminated, at least 80% of heart disease, stroke and type 2 diabetes would be prevented; and 40% of cancer would be prevented. (Source: WHO Report)

#### **6 (b) Cost Savings Survey in India:**

Below are the findings from a national survey conducted by ORG Center for Social Research India for Novo Nordisk in India. Findings were presented in September 2005.

**Costs for Monitoring at Hospitals:** Mean estimated direct costs (includes consultation, treatment, drugs, hospitalization etc.) of diabetes in India were Rs.4,724 per individual per annum including drug treatment, monitoring and check-ups. Mean estimated indirect costs (includes man days lost, tax rebates etc.) were Rs.12,756 per individual per annum including measures of productivity and income loss through illness in earning and non-earning family members. Estimated hospitalization costs were Rs.2434 per individual per annum. *Mean estimated total costs of diabetes in India were Rs.19,914 per individual per annum.*

**Home Monitoring costs:** On an average, patients spent Rs.1609 per annum on pathology tests for Type 2 Diabetes. Self-monitoring at home was carried out by less than 12% of patients and only 2% exclusively monitored their diabetes at home. This is both an opportunity and a challenge for the business as we are going to have to increase the overall total number of diabetics who monitor their disease at home. Actual expenditure on home testing includes the one-off cost of a glucometer (Rs. 4771) plus Rs. 577 on urine test strips and Rs. 1589 on blood test strips. *Averaged over a the typical 8 year duration of diabetes in this survey, the average annual cost for home testing was Rs. 2762/-.*

**Key Results:**

- Cost of monitoring at home was 86% less than the cost of monitoring at hospital.
- About 89% of patients funded themselves.

Source: Economic Burden of diabetes in India: Results, conducted by Novo Nordisk.

**6(c) Cost Saving Research in US**

- The medical care costs of people with chronic diseases account for more than 75% of the nation's \$1.4 trillion medical care costs.
- In 1999, Americans made approximately 756,700,000 visits to their physicians. Dr. Lehman's study shows a 50% reduction in physician visits (@ approx. \$50 per visit). This translates into saving of \$22 billion for US healthcare system. Not to mention additional savings generated from reduced hospitalizations and ED encounters.

Source: Center for Disease Control, US Website

**7. Market Scenario of the Key Components**

Market size of mobile marketing is dependent on the market of typically 3 components (1) Chronic Diseases (2) Portable or Home Medical Devices (3) Mobile Phones. Some key estimates are as under:

**7 (a) Market Sizing of Medical Devices & Monitors**

- It is estimated that in 2005 revenue in US was \$2.65 billion with annual growth rate of 8.5% for home and portable devices. These devices include Blood Pressure, Blood Glucose Monitors, Weighing Scales, Electronic Thermometers, Electronic Stethoscopes, Peak Flow / respiration meters, coagulation monitors, pulse oximeters, apnea monitors, cardiac monitors, cholesterol monitors, fetal / pediatric monitors, neurological monitors etc.

- Worldwide Blood Glucose Monitors users are 23 million, 13 million in US alone with sales of about \$5.9 billion in 2004.

Source: Centers for Disease Control

- In India, the market size was estimated at \$20.29 million in 2000 and \$22.95 million in 2001 with growth rate of 13-15 % annually, providing a large market for diabetic devices. In 2003, 4 key players (Roche, Lifescan, Bayer and Abbott) with market shares of 41%, 24%, 14.3% and 8% respectively dominated the diabetes monitoring segment.

Source: Indian Pharmaceutical and Healthcare Industries, 2004, published by Navigant Consulting

- Presently, there are more than 0.4 million Blood Glucose meter owners in India. Bayer has close to 25,000 meters in use since 5 yrs.

Source: Bayer Officials

- A&D as sold about 3 million Blood Pressure monitors worldwide.

Source: A&D Officials

- A white paper released by Park Associates, a market research that focuses on digital products, states that the home health technology market in 2005 was \$450 million. By 2010, it could be \$2.1 billion, fueled mainly by telehealth services and online doctor consultations. The Sales of devices and digital services for home monitoring is projected to grow from \$461 million in 2005 to over \$2.5 billion in 2010.

Source: Telemedicine Information Exchange Website

## 7 (b) Market Size of the Chronic Diseases

### Global Scenario

- Chronic Diseases:** Over 600 million people worldwide have chronic diseases. Chronic diseases are responsible for 60% of all deaths worldwide. 80% of chronic disease deaths occur in low and middle-income countries. Almost half of chronic disease deaths occur in people under the age of 70. Around the world, chronic disease affects women and men almost equally.
- Aged Population:** In 2000, there were 600 million people aged 60 and above; there will be 1.2 billion by 2025 and 2 billion by 2050. Today, about two thirds of all elderly people are living in the developing world; by 2025, it will be 75%. In the developed world, the very old (age 80+) is the fastest growing population group.
- Women outlive men in virtually all societies; consequently in the very old age, the ratio of women/men is 2:1.
- Obesity:** More than 1 billion people in the world are overweight, and at least 300 million of these are clinically obese. Without action, more than 1.5 billion people are expected to be overweight by 2015.
- Diabetes:** Prevalence of diabetes in the developing world will increase by 48% by year 2005, which will equate to an actual number of 170% in the number of diabetes sufferers. By 2025, over 75% of diabetes cases will be in the developing world.

Source: WHO Website

## US Scenario

90 million in US are chronic, and the spending on chronic diseases is expected to increase. For example, in the US alone, spending is expected to increase from \$500 billion a year to \$685 billion by 2020.

Source: Continua Alliance website.

## European Scenario

The European Diabetes Monitoring market reached \$2.1 billion in 2004, the base year for this research service. The market exhibited an estimated growth rate of 14.8% in 2004, and this is expected to increase extensively over the next 5-7 years

Governments of European countries, such as Germany and the United Kingdom, have taken initiatives to promote education and awareness to create a demand of regular self-monitoring which is expected to have a positive effect on the growth rate. In this regard, the European Diabetes Monitoring market is estimated to be valued at \$5.4 billion by 2011.

Source: Frost and Sullivan Research Service

## Indian Scenario

- Cardiovascular Diseases: 29 million in 2000 (35 million by 2010; Another 44 million from rural areas; 60% of world population with Heart Diseases will be living in India).
- Diabetes: The figures will rise from 26 million in 2000 to 46 million by 2015; 80% of this figure is likely to suffer from cardiac condition as well.
- Pregnant Women in Urban Areas: 47.5 million
- Elderly Population (above 65 years): 42.107 million

Source: NHMC background papers – Burden of Diseases in India / UN report 1998

## 7(c) Market size of Mobile Phones

- India is one of the fast growing mobile handset markets in the world. The total number of mobile subscribers as on July 2006 is 113 million including both GSM and CDMA. By 2007, it is expected that there will be around 180-200 million mobile phones in the market.

Source: Voice and Data Sep Issue / EFY Times Website

- According to this year's IDC study, current mobile users are willing to spend on an average Rs. 7,100 while buying the next handset, which is a shade below as compared to last year. "The average amount spent on the current handset is Rs. 4,300; thereby an additional Rs. 2,800 is likely to be spent while upgrading.
- "Integrated Digital Camera, FM Radio and Speaker Phones continue to remain the features which are most likely to drive up-gradation of mobile handsets this year along with MMS, the new entrant to this list. Features like tri-band, Bluetooth, infrared port etc. have also observed growing demand, but are yet to develop any mass appeal" as per the IDC India Mobile Handset Usage Satisfaction Study 2006

Source: EFT Time Website

## 8. Reasons for Slow Growth

Tele-health and mobile monitoring have existed globally in both a big and a small way, but only as isolated initiatives. These have not been organized or formalized and have not been taken as a separate 'niche' industry. Though there are no specific and evident reasons for the 'slow' growth but the feel of the industry is:

- Lack of awareness about the seriousness of the chronic diseases.
- Evolution of healthcare and telecom technology is very fast with no standardization
- Lack of Electronic Health Records and inter-operability of systems
- Government's Telecom and Healthcare policies and systems are still emerging.

## 9. Some Existing Business Models for Monitoring

Mobile Monitoring services exist in various forms depending on country, sponsor, or the service provider. Some examples of various business models existing in various countries are:

- **USA:** In general it is based on insurance reimbursement. Medical devices are usually given to the patient for up to a month. Insurance companies are paying about USD 250, which comprise of payment for technical service and a medical component that goes to the referring physician. Some companies are also offering monthly subscription based monitoring services.
- **In Israel,** the services costs about USD 50 a month with unlimited transmissions while some companies charge extra for the device and others lend it to the patient. The patient is required to return it when the contract is terminated.
- **In France,** the service involves providing a professional service to physicians, meaning the Physician is using the ECG medical device to record and transmit the patients ECG to the Call center where a qualified Cardiology is analyzing and interpreting the ECG and sending the results back to the Physician. The Physician needs to sign a 4 years agreement in which he pays 90 Euro a month for unlimited transmission including the device.
- **In South America,** it is based on government contracts and the government pays for the monitoring services.
- **In Russia,** the services are taken up by customers or physicians, who are paying for the service. Moscow Municipality funds government owned Moscow Ambulances service.
- **In the Netherlands,** the service is partially paid by the government and partially by the Home care organizations.

Source: Aerotel Officials for their ECG Services

- **In Japan,**
  1. **B2G:** Monthly end-user subscriptions: under the Japan National Health Insurance Scheme, patient subscription costs are 70% subsidized. As a prescriptive care service under the control of doctors and healthcare practitioners in clinics or hospitals with fewer than 200 beds. ¥16,500 / patient / month is 70% covered by the NHI.

2. **B2B:** Corporate employee benefit program bulk subscriptions alliances with diabetes medical device manufacturers: This includes bundled services with hardware device as a patient giveaway.
3. **B2C:** Direct Sign up via the web site and mobile phone access. Targeting major Internet portals for marketing and sales alliances.

Source: Lifewatcher, Japan

- **In India,** Medical Devices companies are targeting Hospitals primarily since there are no specific Health Insurance companies to sponsor nor there are Home Health Agencies. Some Hospitals are trying to operate these services in two models:
  1. **As Corporate Service,** where they provide the solution to companies for monitoring health of employees.
  2. **For Consumers,** for pathological lab's home visit monitoring or on doctor rents out the devices for few days or weeks.

Source: Card Guard tieup with Heartline Hospital

## 10. Global Initiatives in Mobile Monitoring

Globally, telecom companies, industry alliances and associations, home health agencies, hospitals, doctors & nurse associations, medical device and equipment companies, health & wellness companies technology companies, and government have initiated services and programs for monitoring health of chronic patients.

Though there are no big success stories but some of these programs do have upto 0.30 – 0.40 million of patients being monitored. Some of the case studies are as under:

1. **Continua Alliance,** Global Consortium of Personal Tele-health has been formed which include companies like Intel, IBM, Motorola, Oracle, A&D, Pricewaterhouse, Sharp, Cardionet, Card Guard, Omron, Philips, Pfizer, Microlife, GE Healthcare, Medtronic, Roche, Siemens, Polar, Dell, Body media, etc. The objectives of alliance are:
  - Developing design guidelines that will enable vendors to build interoperable sensors, home networks, tele-health platforms, and health and wellness services.
  - Establishing a product certification program with a consumer-recognizable logo signifying the promise of interoperability across certified products.
  - Collaborating with government regulatory agencies to provide methods for safe and effective management of diverse vendor solutions.
  - Working with leaders in the health care industries to develop new ways to address the costs of providing personal tele-health systems.

Source: Continua Alliance

2. **Lifewatch Monitoring Service** (Subsidiary of Card Guard, Medical Devices company) – Patient base of 200,000 in USA. LifeWatch clinicians analyze and report on electrocardiogram (ECG) data from more than 20,000 patients each month.

Source: Cardguard.com Website

3. **Teliasonera** – Swedish based Nodic Telecom operator has launched new service BodyKom in partnership with Hewlett Packard and Kiwok. Bodykom is an open

interface platform that will connect wireless sensors to patients' bodies and monitor health status. Teliasonera aims to sell this service to Hospitals, where a similar service is currently used to monitor heart rates. The service will be expanded to monitor diabetes, asthma and other diseases which may require timely intervention.

Source: [www.medgadget.com](http://www.medgadget.com), April 2005

4. **Vodafone** – Conducted the official trials and published the study that SMS reminders to patients lead to a 30 to 50% decline in missed hospital and doctors appointments. Missed appointments in England cost the National Health Service about GBP 789 million per year. A text message support system for patients with tuberculosis can improve treatment compliance resulting in annual savings of up to GBP 1.9 million per 1000 patients. Key findings are:
  - Potential savings of between 240-370 million pounds to the NHS (National Health Service) in England alone with the introduction of short message service (SMS) appointment reminders to patients.
  - Improvements in glucose levels of 10% for young people with diabetes who manage their condition using a SMS support system. This level of improvement can potentially reduce complications of blindness by 76% and kidney disease by 50% associated with their condition.
  - Potential; cost savings of upto 1.9 million pounds per 1000 patients if a SMS support system also leads to a reduction in deaths & leads to public health benefits.
  - Calls to NHS Direct through mobile are increasing faster than by landlines, especially

Source: Vodafone website

5. **Vodafone 3G Health Service** - Vodafone is the first mobile operator in the Netherlands to start testing third generation (3G) services. Through its UMTS network, Vodafone now offers Twente University of Technology the opportunity to test a 2.5G / 3G service that could change medical assistance in a revolutionary way.

Because Vodafone's UMTS network is equipped to send much larger volumes of mobile data than is currently possible, paramedics and ambulance crews at the scene of serious accidents will now be able to send data such as cardiograms directly to the medical teams back at the hospital.

This enables doctors to assess the situation *remotely* so that treatment can start immediately on the patient's arrival at the hospital. MobiHealth Body Area Networks (BANs) will be used in trauma care both for patients and for ambulance paramedics. The trauma patient BAN will measure vital signs which will be transmitted from the scene to the members of the trauma team located at the hospital. The paramedics wear trauma team BANs that incorporate a video camera, an audio system and a wireless communications link to the hospital.

Source: Vodafone website

6. **Swisscom** – Swisscom has acquired 40% stake in Medgate Holdings AG, leading swiss center for telemedicine. Medgate Holding AG includes Medgate AG (services for patients, physicians and health insurance providers), Medcontrol AG (services for pharmaceutical companies) and Sirius Technologies AG (software development and distribution of telemedical systems). With up to 900 telemedical patient contacts daily, Medgate has broad experience in teleconsultation, telediagnosics and teletherapy. The group currently employs 103 staff, 30 of whom are physicians trained in telemedicine, along with 15 medical consultation specialists, and 27 software



developers and engineers. The company has official medical accreditation as a centre for telemedicine and is subject to all the rights and obligations of a medical practice.

Source: Swisscom website

7. **Telebios (shareholders include Telecom Italia)** – Has created a network of telemedicine services. It provides a Home Care service for health care assistance directly at patient's home, avoiding unnecessary or difficult transfers due to the patient's condition, and providing the necessary equipment and the IT technology for a direct communication between patients and physicians.

The requisite home appliances for the patient consist of a normal television, a set-top-box with return channels via internet (also with a normal telephone cable), devices available on the market for measuring vital signs and medical supplies on loan to the patient depending on the patient's needs (electrocardiograph, blood pressure gauge, spirometry device, glucometry device, etc). Patient's health will always be ensured by a constant monitoring, who will receive on their personal TV the information about the health condition. Currently more than 10,000 patients are being monitored for telecardiology service.

Source: Telebios.it & Aerotel.com websites

8. **France Telecom** – Trial in collaboration with Roche Diagnostics & Palm France to capture blood glucose monitoring data and send to physicians, who revert with medical advice to individual patients via SMS text messages.

Source: France Telecom website

9. **Telefonica** – Spanish Telecom Operator has offered services of Remote Monitoring and Tele-medicine. This service allows medical appointment and reminders, capturing of medical parameters via set top box, which captures data from various medical devices.

Source: Telefonica Website

10. **Honeywell Homemed (homemed.com)** – Company expertise in remote patient monitoring and has more than 350,000 patients in US, where homemed monitors have been installed.

11. **Health Hero Network (healthhero.com)** - Health Hero Network is a leading innovator of technology solutions for remote health monitoring and management. HealthHero Network as tied up with Hospitals, Medical Associations etc to reach out to Patients. Healthhero has approx. 50,000 units installed.

Source: Telehealth News Website

12. **Korea Telecom** – Has launched phone (LG-KP8300) with built-in Blood Glucose Monitor, Pedometer which provides features like Reminder function, Automatic data keeping, Automatic notification, Auto consultation and Diet management.

Source: Korea Telecom Website

13. **Lifewatcher, Japan** – Lifewatcher mobile health service is accessible to 85 million mobile phone users of NTT Docomo's i-mode, Vodafone Live and KDDI's au (CDMA),

Source: Lifewatcher Presentation

14. **Qualcomm & Cardionet** – QUALCOMM is providing the QConnect wireless network management service to provide connectivity between the CardioNet mobile

monitoring devices and the CardioNet Monitoring Center. QUALCOMM's QConnect service provides the back-end infrastructure and network management service that allows the device to wirelessly transmit patient ECG data to the CardioNet Monitoring Center, and ultimately deliver succinct, timely information to physicians for diagnosis and therapy management. The wireless service also allows physicians to select events to be monitored and the level and timing of response by the CardioNet Monitoring Center - from routine daily reporting to detailed statistical reports. These reports, available over Internet, email, fax, or mail, have been designed to allow rapid review of cardiac arrhythmia events, assisting physicians in making a diagnosis, assessing the severity of a known cardiac rhythm problem, or in managing treatment.

Source: Qualcomm Website

15. **MobiHealth (HealthService24 Consortium), Europe** – MobiHealth is supported by the European Commission with 5 million euro. The MobiHealth consortium unites 14 partners from five European countries and represents all the relevant disciplines, such as hospitals and medical service providers, universities, mobile network operators, mobile application service providers and mobile infrastructure and hardware suppliers.

The consortium partners include Philips Research Laboratories in the United Kingdom; the University of Twente, Medisch Spectrum Twente, TMS International BV, YUCAT mobile business solutions, LogicaCMG International, HP, all from The Netherlands; Ericsson GmbH and GesundheitScout24 GmbH from Germany; Telefonica Moviles Espana, Corporacio Sanitaria Clinic as well as Universidad Pompeu Fabra from Spain; and furthermore Lulea Tekniska Universitet and Telia Mobile AB from Sweden.

The HealthService24 platform is based on advanced concepts and technologies, like Body Area Networks (BAN), 2.5/3G wireless broadband communications (GPRS/UMTS) and wearable medical devices. HS24 will provide integrated and comprehensive mobile healthcare services to patients, such as management of chronic conditions and detection of health emergencies. Successful Trials have been conducted in 3 areas on more than 3000 sample patient base.

Source: HealthService24.com

16. **Docobo, UK** – Docobo Ltd is a UK healthcare solutions provider, involved in the management and prevention of Long Term Conditions. Docobo has conducted successful trials of more than 250 patients in Europe. A range of products and services are:
- **Doc@HOME** service for the management of chronic disease. It is the means for the collection and analysis of essential patient related data, permitting effective management through efficient interaction between clinicians and patients at home. The doc@HOME service allows patient interface via the web, mobile phones or Docobo's own fit for purpose HealthHUB.
  - **HealthHUB** for collecting physiological, quality of life and life style data; data transfer and receipt of messages permit effective and efficient management of patients in their own homes.
  - **Complaint@HOME:** This involves the use of motivational methodologies to encourage patient usage of the system ("compliance"). This is maintained by the use of context related feedback and educational information relating to disease area and dietary issues, as well as quizzes and relevant current health and wellness information.

Source: Docobo.co.uk website

- 17. Healthstats** – Company that manufactures Arterial Blood Pressure Monitoring device has sold about 30,000 products in Singapore itself.

Source: Healthstats Presentation

- 18. Telstra, Australia** – Breast Screen Program in Australia is an organized national breast cancer-screening program for women, which provides free mammograms every 2 years for women over the age of 50. Telstra, with its CDMA2000 1xEV-DO Network, BreastScreen Victoria and Victoria Regional Health Alliance Network have formed a partnership in order to provide a mobile breast screening service. The CDMA2000 1xEV-DO network links the mobile screening service vans to the regional network allowing transfers of digital files to assessment centers and a client information management system. The mobile mammography service utilizing EV-DO will be available in 15 remote Victorian towns.

Source: Qualcomm Website

- 19. VIVO, Brasil** - VIVO, a 3G CDMA operator in Brazil, has launched “VIVO Diagnostic”, a corporate service available via BREW which allows greater mobility and productivity for medical professionals in Brazil. This application enables doctors and medical professionals to request second opinions via 3G CDMA mobile devices from other doctors and hospitals. By means of this solution, a doctor can diagnose patients via the mobile phone device, request a second opinion from one or more doctors, send medical images (X-rays, ultrasound scans, etc.) to other doctors and load images onto a web site with restricted access. This application also allows groups of medical professionals to discuss particular cases in real time.

Source: Qualcomm Website

- 20. O2, UK** – O2 has tied up with eSan, tele-medicine company, for two healthcare trials on cystic fibrosis and asthma. More than 700 patients have participated in these trial programmes. These trials have been run in conjunction with a number of clinical and business partners, including Aberdeen University, The Bristol Royal Infirmary, the Isle of Man DHSS, Oxford University, mmO2 and The Vodafone Group Foundation.

Source: O2 Website

- 21. Singapore Infocomm Development Authority:** Singapore, the Infocomm Development Authority (IDA) has awarded twelve consortia under its Call for Collaboration (CFC) to develop healthcare services and solutions to bring about an integrated and patient-centric healthcare sector. The CFC has resulted in 10 infocomm solution providers coming on board to co-develop and trial technologies with twelve healthcare institutions. The healthcare institutions come from the 2 public clusters, National Healthcare Group (NHG) and Singapore Health Services (SingHealth), Parkway Hospitals and Ang Mo Kio - Thye Hua Kwan Hospital, a Volunteer Welfare Organization. With a total funding of S\$3 million, the CFC is expected to generate a total spending of S\$12 million by the industry.

Focusing right from the start to meet the needs of the participating healthcare institutions, the pilot projects include the development of innovative solutions to enhance patient care and safety by using wireless measurement of critical vital signs (temperature, blood pressure, ECG and pulse rate) and wireless fall detection devices, amongst others.

Source: Singapore IDA Website

22. **RMD Networks - Collaborative Care Network™** is the communication and care space for a community of physicians, patients, clinical partners, payers and pharmaceutical manufacturers.

The components of the **Collaborative Care Network** include: security, directory management, workflow, structured messaging, reminders/notifications, integration services and reporting. All of this is accessible through a standard Internet browser. It is easy to use and easy to access. Our team can help you get started, trained and coach you on how to optimize the value of the connected community.

Source: RMDNetworks.com

23. **Cingular** – Has tied up with Misys Homecare to provide homecare monitoring services.

Source: Cingular Website

24. **Aerotel** (Home Tele-health solutions company) – Israel has more than 100,000 subscribed patients under Aerotel programs for Heart monitoring.

Source: Aerotel Officials

## 11. Conclusion

As India has no subsidized, coordinated chronic care programme, reducing treatment costs through raising public awareness, regular monitoring and earlier diagnosis should be key objective.

The need is to join hands with health industry – hospitals, doctors, NGOs, pharmaceutical companies, and even health ministry, which can create and promote mobile monitoring as a reliable solution.

Huge challenge is to create awareness about Chronic Diseases among patients, their families, and general public and even doctors for the seriousness of the chronic diseases and spread education about Mobile Monitoring being highly cost effective and reliable solution for monitoring Chronic Disease.

If above challenges can be addressed, huge business opportunity is waiting to be harnessed.