



HealthService24

Why HealthService24?

Today the health care sector faces serious and increasing problems with regards to limited resources for effective disease prevention management. In most of our Western societies, the “acute care” paradigm has led to the design of “find-it, fix-it” health systems, but they are not meeting the changes in demand of care services prompted by the aging population. The economic and social burden is pressing heavily on governments, health care providers and citizens. Emerging proposals are stressing the imperative need to redesign the provision of services in more flexible ways. Technology, especially mobile applications, seems to be the cornerstone that will make this transformation possible.

The economic potential of mobile health services is very high. The number of chronic patients in Europe for the next decade is estimated to more than 100 million. Even if only one of these patients out of ten is using a mobile health service, the economic benefits are substantial. Furthermore, the use of mobile health services will boost the use of wireless communications, pushing for a reduction of wireless telephony communication costs and improving the coverage of wireless networks. In the long term we expect that mobile health services will be a fundamental part in the transformation of today’s health model, allowing access to high quality treatment and follow-up, anytime and from anywhere.

Issues being addressed

HealthService24 supports forthcoming changes in the healthcare industry and gives solutions to the problems of the different players in the health market such as decreasing budgets and deficit problems stemming from an increase of people with chronic diseases, erosion of traditional business models of the pharmaceutical industry due to shortening period of exclusivity, need for hospitals to manage and control administrative and treatment related costs and most of all increasing demand from the patients to be closely involved in the care process (patient empowerment).

HealthService24 proposes a solution to these upcoming challenges. The project has validated and prepared the launch of innovative, mobile patient monitoring and management services. This was done with the design and integration of a healthcare services platform based on state-of-the-art communication networks and technology.

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. HealthService24 provides integrated and comprehensive mobile healthcare services to patients, such as management of chronic conditions and detection of health emergencies.



Objectives of the project

HealthService24 aim was to develop a viable mobile health care service, permitting healthcare professionals to remotely and interactively follow-up patients whilst the patients are free to continue their normal daily life activities. The HealthService24 concept allows patients to monitor their physical condition and obtain advice and information at any place and moment.

In the HealthService24 project the feasibility of deploying mobile healthcare services has been tested in three different pilots in order to get insight on the precise conditions to be fulfilled for the subsequent deployment of the services.

The HealthService24 project has addressed the study of the related social aspects, working conditions and the related economic issues stemming from the deployment of its services on a larger scale, including the changes that will be brought to the processes and practices of the healthcare organizations and medical personnel. The needs, expectations and requirements of the entire value chain were also identified.

The Consortium

The HealthService24 consortium consists of 8 partners:

- **Ericsson Enterprise AB (S)** – Project coordination & Industrial Partner
- **University of Twente (NL)** – Project Scientific & Technical Management
- **University of Cyprus (CY)** – Hospital Information System Support
- **Hospital Clínic Provincial de Barcelona (E)** – Healthcare Provider
- **Medisch Spectrum Twente (NL)** – Healthcare Provider
- **LITO POLYCLINIC PARALIMNI LTD (CY)** – Healthcare Provider
- **TMS International B.V. (NL)** – Medical Systems Manufacturer
- **Yucat B.V. (NL)** – Mobile Business Solution Development

Benefits

Deploying the HealthService24 services benefits patients and medical personnel as well as medical insurances and hospitals:

- Patients benefit from better accessibility which turns into increased patients' mobility, quality of life and peace of mind.
- Health professionals can be more efficient and accurate in following-up patients' evolution thanks to the easy availability of patient data. This facilitates the provision of advice and better tuning of the treatment regime.
- Traditional services and providers benefit from the reallocation of these patients under programs that have less impact in the use of the sophisticated premises and specialists' time. A good example is the reduction of occupied beds in the hospitals that leads to a substantial cost reduction and helps in meeting fixed budgets.
- Pharmaceutical industry benefits from a faster time-to-market and lower R&D costs by using mobile clinical trials.



Executive summary of the pilots

The HealthService24 project ran patient trials from September 2005 – July 2006 at 3 sites in parallel. Each trial site targeted patients with different health conditions, so that a wider spectrum of conditions and cases could be validated in the timeframe of the project. The target was to test the HealthService24 system in real-life scenarios, assessing the feasibility for integration in the clinical process and market viability. Another target was the validation of the system and its services from the medical and health-economic point of view. To fulfil these goals, each participating trial site developed specific clinical scenarios in which the use of the HealthService24 system supports the respective clinical process as a whole.

The system enables mobile monitoring of different vital signs; e.g., ECG, EMG, Oxygen saturation, respiration, activity and temperature. Vital sign selection depends on the trial site and patient.

Our trials showed that the introduction of a mobile health monitoring service is not disruptive and can easily co-exist with other formats of service delivery, in some cases supplementing them or, in other cases, replacing previous practices. However, the willingness to review the way care is being delivered must be clearly present, as well as the acceptance of re-allocating some professional roles. This reflects one important lesson of the pilots: the process of incorporating the mobile monitoring solution is more of socio-technical nature. Technology alone is not enough – it requires the right perception and use by the users to drive a change.

Trial 1: High Risk Pregnancies (Medisch Spectrum Twente, The Netherlands)

Women with a high-risk pregnancy are admitted to the hospital frequently for medical examination and intensive monitoring of maternal and foetal vital signs. Based on monitoring data, a gynaecologist is able to act pro-actively in case of emerging complications. In many cases, an examination reveals no immediate health-risk for both mother and foetus. Hence, a high-risk pregnant woman is unnecessarily bound to a hospital bed for a substantial amount of time. This mobile monitoring system allows her to continue her normal daily life, visiting the clinic only in case of emerging complications.

18 women with term pregnancies participated. They were asked to apply the HealthService24 Body Area Network (BAN) and register their uterine activity (EMG signals) during an hour each day until labour ensued, or whenever they thought contractions occurred. The observation time was therefore different from case to case - ranging from a couple of days to a couple of weeks. Overall the system was convenient to wear, but the sensor cable length needed to be reduced to increase convenience. It was also reported that the registration process of the uterine activity was disrupted because of GSM interference. It turned out that the pregnant women were using their mobile phones during the registration process in close distance to the registration device. Lab tests proved that these technical problems are solved in the next generation of EMG registration devices. Despite the interference problems during the trial, both patients and doctors are very enthusiastic about the potential of the system.

From the economic and hospital process validation point of view, the pilot results showed that the potential financial benefits can be very high and that the integration to the MST hospital process is feasible at low cost.

Trial 2: Cardiac patients (LITO Polyclinic, Cyprus)

Two distinct groups of cardiac patients were tested in this pilot:

Group 1 – Patients with an acute episode. They have been admitted and stabilised, but need continuous monitoring of their condition and drug regime for a few days. Using the HealthService24 system allows these patients an earlier discharge, with an appropriate follow-up (by using the system) in the place of their choice.

Group 2 – Patients in a suspected acute episode. After medical examination, a decision needs to be taken whether to keep the patients at the hospital for observation, or to discharge them home. In case a patient is

discharged with a suspicion of an abnormal condition, the patient was equipped with the HealthService24 system enabling constant monitoring of the patient's health state.

The pilot included 20 patients. Although the users were happy with the overall concept, feedback for the first phase was given regarding the usability of the mobile part of the system (i.e. BAN). For example, too long ECG cables reduced wearability, BAN usability depends on the battery capacity (4-6 hours), limited usability due to poor connectivity of the local GPRS network. Many of these problems were fixed for the second phase of the trials. The performance of the system was excellent when using the clinic's WiFi and satisfactory when having good GPRS coverage. Most cardiac patients (90%) found that the solution was convenient to them with a rate of satisfaction similar or higher to the classical treatment. They felt more reassured because they were provided constant care. Some patients, however, showed reluctance to use the system due to psychological reservations such as "it might have side effects", or "I am not that sick" etc.

From the economic and social validation point of view, the LITO clinic has already identified savings and possibilities for the HealthService24 services to different types of patients. A lower rate in unexpected patient admissions was observed (60%). In addition, a high rate of early discharge was observed because patients using the system felt more reassured. Furthermore, the HealthService24 system was integrated into the DITIS Hospital Information System used at the LITO clinic and this increased efficiency further.

Trial 3: COPD patients (Hospital Clínic Provincial de Barcelona, Spain)

This pilot used the HealthService24 to support remote assistance for elderly and chronically ill patients suffering from COPD (Chronic Obstructive Pulmonary Disease) with or without other concurrent diseases. The HealthService24 BAN was used to perform patient measurements during nurse home visits. The significance of the selected group of patients derives from the fact that they are usually high consumers of resources and especially in winter time cause the problem of "bed-blockers". Hence there is a high need to facilitate patients' access to healthcare professionals without saturating the available resources.

25 patients participated in the trial. The users acknowledge the advantages offered by the system as well as the dramatic improvement of the usability and interfaces (compared with its forerunner MobiHealth www.mobihealth.org). The mobile health monitoring services tested proved to have a positive clinical impact. COPD patients claimed to have a better understanding of the disease and better adherence to the treatment was achieved after 6-8 weeks follow-up. Thus, a higher percentage of patients had a better knowledge of the disease (58% versus 27%) which led to a better self-management of their condition (81% versus 48%). Comments regard the short life of the BAN batteries and the sensitivity to poor GPRS network connectivity.

From a socio-economic point of view, professionals highlighted the fact that the solution could be easily applied to their current work practices. In the COPD pilot a reduced use of resources (emergency room, admissions, shorter length of stay) has been observed leading to a reduction of 38% in direct costs when compared to the conventional treatment. Although some treatment and follow-up pathways were introduced to ensure that the appropriate use and frequency, the related costs as well the benefits are clear for the hospital and the patients.

Reference Data

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