

HeartCycle

Compliance and effectiveness in HF and CAD closed-loop management

HeartCycle is an Integrated Project aiming to provide a disease management solution for heart patients. The project develops technologies and services to remotely monitor patients at home and motivates them to be compliant to treatment regimes and to adopt a beneficial lifestyle.

Objectives of the Project

Cardiovascular disease (CVD) kills around 1.9 million people every year in the EU, with the associated annual health costs estimated at EUR 105 billion. Around half of these deaths occur in people who have previously had a heart attack, most of whom will develop heart failure before they die. There are currently around 10 million heart failure patients in the EU and it is one of the commonest medical reasons for hospitalization in adults.

Finding better ways to manage and treat coronary artery disease (CAD) and chronic heart failure (CHF) is therefore seen as one of the most effective ways of reducing the human cost and financial burden of these debilitating conditions. Especially non-compliance to the treatment therapy is seen as one of the major problems. HeartCycle will develop a personalised complete care system, integrating care at home with professional care in the hospital. The major objectives of the project are:

- Improve Disease Management in CVD
- Improve Compliance in CVD Treatment
- Develop a Health Status Assessment for Patients at Home
- Enable smart Vital Body Sign Sensing
- Measure Medication and Lifestyle Effectiveness
- Closing the Loop
- Model Cardiac State Prediction, Lifestyle and Medication Effectiveness
- Design a Decision Support System for Closed-Loop Management
- Improve User Interaction Techniques
- Develop the CVD Management Technical Platform

Project Description

HeartCycle will provide a closed-loop disease management solution being able to serve both heart failure patients and coronary artery disease patients. The HeartCycle system consists of two loops (see Fig 1). An inner home-

based loop directly interacts with the patient in his daily life, giving feedback, motivation, and tailored help. An outer loop involves medical professionals, maintaining a personalised care plan for optimal therapy. The daily analysis of the patient status by means of unobtrusive and easy-to-use wearable sensor technologies will allow for a much more frequent and earlier adaptation of the therapy than in the traditional care system. Primarily vital body signs monitoring and multi-parametric analysis will be used to assess and track the health status of the patient and the impact of the current treatment. The latter will show the patient the importance of being compliant to the treatment, motivating him to improved treatment adherence, and a more active role in his care. In case of unfavourable trends and by detecting upcoming health problems, adverse event alarms will be generated for immediate professional attention and an automated decision support system will derive therapy recommendations from the information acquired.

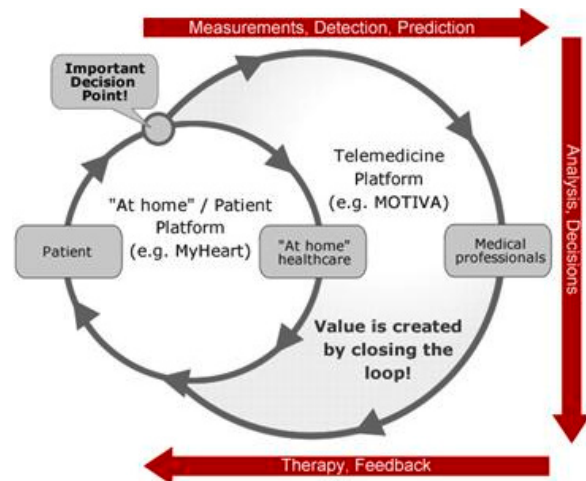


Figure 1 - The closed-loop management approach, consisting of two loops

Furthermore, the HeartCycle system will allow closer monitoring of the effects of medication and lifestyle, making more personalised treatment

SCENARIO

Marian used to be a very active person. She has been diagnosed with heart failure a couple of years ago. Even though she followed the treatment, the disease got a lot worse last year and she was rushed to hospital. Since then she is in constant fear about this happening again and she wishes to continue her life feeling safe. A hospitalisation once a year is typical for heart failure patients. The HeartCycle system will enable patients and their treating physicians to avoid hospitalisations by assessing the health status via daily measurements of vital body signs, providing intelligent alerts if the health status deteriorates, and guiding patients to better manage their disease by providing feedback on the effectiveness on their medication and lifestyle.

plans possible. The first three years of the project are dedicated to researching and realizing the technical system solution, whereas year four is preserved for the technical and clinical validation of the achieved results.

After the first 18 months the HeartCycle consortium has finalized the concept developments by respective validations of the proposed HeartCycle solutions in interview rounds with patients and

“HeartCycle requirements are based on insights from patients and medical professionals.”

professionals. The interview results have been used to select the final applications (use cases) to concentrate on. A proper development

process has been started to guarantee that the realized HeartCycle systems can be utilized in clinical validations with patients in the last year of the project.

Expected Results & Impacts

HeartCycle will conduct validations via test beds implementing the proposed solutions in real patients' homes. We aim at demonstrating that the technical monitoring and user interaction solutions can be used by patients without medical assistance in their homes. It will be of utmost importance that the HeartCycle solutions deliver reliable measurement results and health status assessments where medical professionals can base decisions on. This is a prerequisite for closing the loop and enabling efficient healthcare and cost effective disease management. Furthermore strategies to motivate patients to be compliant will be tested against control groups.



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- NHS Lothian

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KEYWORDS

Personalized health, Tele-monitoring, Compliance, Medication effectiveness, Decision support