

HEARTEN: the Heart Failure Knowledge Management System

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Abstract— HEARTEN platform utilizes the advances in communication technologies to monitor clinical and patient variables, enabling the patient to be empowered and adherent and the other ecosystem actors to offer personalized, predictive and preventative care. This is accomplished through the collection of data expressing medical knowledge about heart failure and analysis of data through the HEARTEN Knowledge Management System (KMS). In this study, the overall architecture of the HEARTEN is presented with special emphasis on the KMS.

I. INTRODUCTION

Heart Failure (HF) has become an epidemic worldwide, associated with unpleasant outcomes. New strategies to early detect disease progress and effectively monitor the HF patients will prevent the HF-related hospitalizations and reduce the healthcare costs. HEARTEN is an mHealth collaborative platform that engages all ecosystem actors: the HF patients, their caregivers, the healthcare professionals, the nutritionists, the psychologists and the physical activity experts. It facilitates their intercommunication and tight collaboration for effectively and efficiently monitoring and managing the patient's disease [1]. The HEARTEN architecture includes the: (i) Sensors/Biosensors, (ii) mHealth app, (iii) Web app, (iv) Databases, (v) KMS, (vi) Dynamic Patient Communication Protocol (DYNPCP) components.

II. HEARTEN KMS ARCHITECTURE

HEARTEN KMS consists of nine (9) modules (Fig. 1): (i) NYHA Class Module, which detects if the patient has changed NYHA class, (ii) Association module, which provides interesting interrelations from multiple and heterogeneous data, that reflect the lifestyle, clinical condition and medication of the patients, (iii) Statistics Module, that allows to find and explain dependencies frequently observed within the collected data, (iv) Adherence Risk Module, which provides an estimation regarding the adherence profile of the

patient, (v) Treatment Adherence Module, which examines if the patient is adherent or not with the guidelines provided by the experts, (vi) Score Module, which computes several acknowledged risk scores allowing the experts to build risk profiles for their patients, (vii) Event Prediction module, which predicts the possible presence of adverse events (relapses and mortality) and provides the etiology of the event, (viii) Monitoring-Reporting Module, which combines and presents the output of the rest modules and, (ix) KMS Alerting Mechanism module, which transforms the output of the modules to crucial alerts and messages about the patients' condition and delivers them through the DYNPCP to the ecosystem actors. Selected module outcomes are stored in the Databases and employed as input features to subsequent modules.

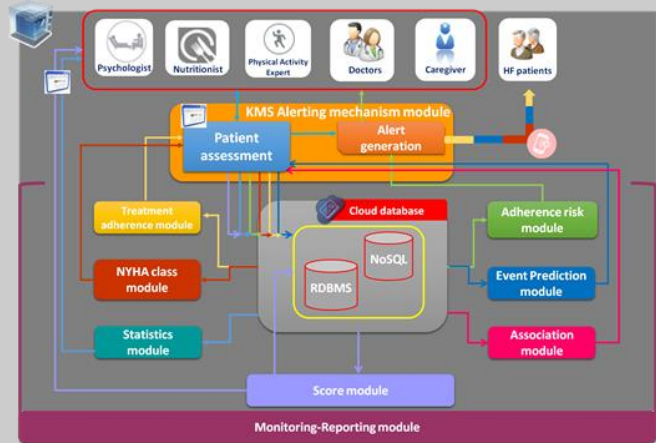


Fig.1 HEARTEN KMS overall architecture.

The functionality of the HEARTEN KMS strongly depends on the data that are collected (general patient information, allergies, drug side effects, medical condition, medication, biological data, clinical examination data, sensor and breath/saliva biosensor data, nutrition data, and recommended treatment). The frequency of measurements is described in the clinical protocol defined by the two clinical partners of the project. 80 patients will be enrolled in order the KMS component to be developed and trained, while 80 more patients will be employed for the whole platform evaluation and the validation. For the preliminary evaluation of the first and the fourth KMS modules, retrospective data from 396 patients are utilized.

REFERENCES

- [1] "HEARTEN: A co-operative mHealth environment targeting adherence and management of patients suffering from Heart Failure.", <http://www.hearten.eu/>.

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