

Optimization of the Alarm-Management of a Heart Failure Home-Monitoring System

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MOBILE TELEmonitoring (MOBITEL) was a study on home-based monitoring of heart failure patients after an episode of acute decompensations using mobile phone technology. Within the MOBITEL study it could be shown that by the use of home-monitoring with automated alarm generation not only the number of re-hospitalizations of heart failure patients can be significantly reduced, but also – in case of re-hospitalizations – the duration of the hospitalization is significantly decreased. These results might, however, be further improved by bringing down a relatively high number of false positive alarms generated during the MOBITEL.

In the present study we show by retrospectively evaluating the available data, how the existing MOBITEL algorithm can be improved. This is achieved by reducing the number of generated false alarms and by introducing a unique risk parameter, which can be used to indicate the patient's status.

We retrospectively analyzed data from 120 patients monitored between 2003 and 2008. For the analysis of historic treatment data and measurement tables, GNU-R statistical software was used. A computer based model was generated to optimize the alarm-management of a heart failure home-monitoring system.

The algorithm provides high sensitivity and specificity and shows a significant improvement to the previous model by reducing the number of false alarms, while obtaining nearly the same number of positive alarms.

The developed algorithm offers an opportunity to have a more efficient and precise telemonitoring system to support physicians, reduce hospitalizations, and decrease health care costs. Formulated concepts allow patient physician interaction as part of the control loop. Future works will focus on characterization and modeling of this control system with mathematical and computer science methods in order to find strategies for therapy optimization. Furthermore, the algorithm presented in this paper shall be applied in a prospective study for validation.