

# Telemonitoring can improve overall survival of HF patients

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Two trials presented at the Heart Failure Congress 2011, organized by the Heart Failure Association of the European Society of Cardiology (HFA of the ESC), will help to define the precise populations of patients with chronic heart failure (CHF) in whom telemedical management delivers benefits. Both the TIM-HF and TEHAF studies - presented in Late Breaking Session 1 - revealed that telemonitoring showed significant benefits in defined subgroups of patients. The results, which will be used to help in the design of future trials, come after the overall results from both trials demonstrated no statistical benefit for telemonitoring.

Remote telemedical management is emerging as a medical technology that may help to optimise therapy for CHF patients. "Compared to 20 years ago patients are living longer with CHF due to improvements in the [medical management](#) of the disease. Finite health care resources are making it more important than ever before to keep patients well and out of hospital," said Friedrich Koehler, the principal investigator of the TIM-HF study. Remote telemedical management, he added, has the potential to improve patient compliance and allow early detection of the signs and symptoms of cardiac decompensation that if treated promptly can prevent both [hospitalisation](#) and death.

Two recent meta-analyses (including a [Cochrane Review](#)) showed that telemedical monitoring of CHF patients can improve overall survival by 17% to 47% during six to 12 months of follow-up<sup>1 2</sup>. The results, however, are in direct contrast to the TIM-HF<sup>3</sup> and TEHAF studies that

revealed no such benefits.

"The fact that we showed no benefit when two [meta-analyses](#) had previously demonstrated benefit suggested there could be problems with our study design and indicated the importance of undertaking further post hoc analyses," said Koehler, from Charité Universitätsmedizin, Berlin. "There was a real danger that with the wrong trial design we could be writing off life saving therapies."

## **TIM-HF study**

In the Telemedicine to Improve Mortality in Heart Failure study (TIM-HF) Koehler and colleagues found themselves in the unique position of being involved in the development of the telemonitoring platform used in the study. The investigators defined key features for the telemedical system, which included using mobile phone technology to enable monitoring devices to be used anywhere, the ability to get data transmitted within one minute and an easy to use system that could be operated by elderly patients.

"It's vitally important to develop mobile systems because the current improvements we're seeing in the health status of heart failure patients are enabling them to get out and about more than ever before," explained Koehler, adding that the entire equipment (which includes a portable ECG device, scales, blood pressure monitoring equipment, and a pulse oximeter to measure oxygen saturation) can be packed in small box that together with the equipment weighs less than 10 kg.

The technology, which cost €16 million to develop, was funded by a public-private partnership between the German Federal Ministry of Economics & Technology and industry. The system has also been designed to incorporate monitoring of co morbidities such as diabetes, chronic obstructive pulmonary disease, anticoagulants, and implantable

cardiac device information. For emergency support, a mode for continuous ECG monitoring and oxygen saturation can be activated.

In the TIM-HF trial - which took place between January 2008 and June 2010 at 165 participating sites - 710 stable patients with NYHA class II or III, left ventricular ejection fractions less than 35% and a history of HF decompensation were randomized to remote telemedical management (n=354) or usual care (n=356). Results published in *Circulation*<sup>3</sup>, showed that at a median follow-up of 26 months remote telemonitoring management delivered no significant beneficial benefits compared to usual care on all-cause mortality (P=0.87), or the composite end point of cardiovascular death and HF hospitalisation (P=0.44).

Reluctant to write off the technology, the investigators decided to undertake a second analysis exploring outcomes in pre specified sub groups according to age, NYHA class, whether patients lived alone or not, median left ventricular ejection fractions, episodes of prior HF decompensation, the presence of implantable cardioverter defibrillators, uric acid levels, blood pressure, creatinine levels and scores from questionnaires that screened for depression (the PHQ-9 depression scores).

The investigators found that for patients with a prior history of decompensation, no depression on the PH-Q depression score, and who had left ventricular ejection fractions above 25%, cardiovascular death was statistically less likely to occur in the group randomised to telemedicine monitoring than those randomised to usual care (P

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