

HEART FAILURE

Telemedicine for HF management

Use of remote patient management reduces the unplanned time spent in hospital for cardiovascular reasons as well as all-cause mortality compared with usual care when used in well-defined, selected populations of patients with heart failure (HF). These findings from the TIM-HF2 trial were presented at the 2018 ESC Congress.

The trial included 1,571 patients with NYHA class II–III HF and left ventricular ejection fraction $\leq 45\%$ (or $>45\%$ if receiving oral diuretics) who had been admitted to hospital for HF within 12 months before randomization. Patients were randomly assigned to remote patient management plus usual care or to usual care only, with up to 393 days of follow-up. The approach involved daily transmissions to a telemedical centre of data on bodyweight, blood pressure, heart rate, heart rhythm, and peripheral capillary oxygen saturation measured with a telemonitoring system in the patient's home, as well as a self-rated health status. A risk profile was defined for each patient with the use of algorithms and biomarker data obtained at follow-up visits, which enabled staff to provide tailored patient management such as changes in medication, admission to hospital, or educational activities.

The proportion of days lost from unplanned cardiovascular hospital admissions and all-cause death was lower in the telemedicine group than in the usual care group (4.88% versus 6.64%; ratio 0.80, 95% CI 0.65–1.00, $P=0.0460$), with a reduction in the days lost per year from 24.2 for patients receiving usual care to 17.8 for patients in the telemedicine group. The rate of all-cause death per 100 person-years of follow-up was also lower in the telemedicine group (7.86 versus 11.34), but no significant differences were found for cardiovascular mortality.

These findings suggest that telemedicine can help to detect early signs of cardiac decompensation and enable a timely and personalized intervention before HF worsening. Of note, the approach was tailored for the German health-care system; therefore, its application to other health-care systems will require specific adaptations.

Irene Fernández-Ruiz

ORIGINAL ARTICLE Koehler, F. et al. Efficacy of telemedical interventional management in patients with heart failure (TIM-HF2): a randomised, controlled, parallel-group, unmasked trial. *Lancet* [https://doi.org/10.1016/S0140-6736\(18\)31880-4](https://doi.org/10.1016/S0140-6736(18)31880-4) (2018)

BIOMARKERS

Perivascular fat mapping predicts cardiac death

According to the results of the CRISP-CT study presented at the 2018 ESC Congress, the perivascular fat attenuation index (FAI) — a new CT-based metric monitoring coronary perivascular adipose tissue (PVAT) changes — is a predictor of cardiac mortality.

Although widely used to screen for coronary disease, noninvasive CT angiography does not detect small vulnerable plaques that can cause acute coronary syndromes. The identification of inflamed arteries could facilitate the early detection of atherosclerosis, but a measurement technique is not readily available in the clinic.

Previously, Charalambos Antoniades and colleagues showed that vascular inflammation induces phenotypic changes in PVAT that are detectable using CT and quantifiable with the FAI. The objective of their new study was to evaluate the predictive value of the FAI for adverse outcomes by performing coronary PVAT mapping on CT scans from two independent cohorts of 1,872 patients and 2,040 patients (median follow-up of 72 and 54 months, respectively).

FAI values around the proximal right coronary artery and left anterior descending

artery were predictive of all-cause and cardiac mortality. A cut-off FAI ≥ -70.1 Hounsfield units was associated with a fivefold to ninefold increase in the risk of cardiac death. Inclusion of the FAI also significantly improved the discriminatory value of traditional risk factors for death.

“We have validated a novel tool to flag high-risk individuals that are currently missed through traditional interpretation of CT scans,” says Antoniades, adding that the FAI will contribute to more personalized strategies for the prevention of cardiovascular disease. Future directions include the integration of artificial intelligence and machine learning into the FAI. “The FAI is not a static biomarker with a fixed definition; it will continue to evolve, allowing further improvements in risk prediction,” concludes Antoniades.

Alexandra Le Bras

ORIGINAL ARTICLE Oikonomou, E. K. et al. Non-invasive detection of coronary inflammation using computed tomography and prediction of residual cardiovascular risk (the CRISP CT study): a post-hoc analysis of prospective outcome data. *Lancet* **392**, 929–939 (2018)

RISK FACTORS

Assisted reproductive technologies increase risk of hypertension in offspring

Assisted reproductive technologies (ARTs), such as in vitro fertilization or intracytoplasmic sperm injection, have been shown to be associated with premature vascular ageing in apparently healthy children, and a new study now shows that this phenotype progresses to arterial hypertension. In developed countries, 2–5% of births are the result of ARTs. Given that ARTs are fairly new, the cohort of individuals born using these techniques is quite young, and the long-term outcomes of ART-induced alterations in vascular function are not well-characterized.

In a study performed by Meister and colleagues, 54 young (mean age 16.5 years), apparently healthy participants conceived by ARTs and 43 age-matched and sex-matched controls underwent assessments of vascular function and 24-h ambulatory blood pressure monitoring. At 5-year follow-up, flow-mediated dilatation was $\sim 25\%$ smaller in the ART group than in controls. This reduction seemed to be related to endothelial dysfunction. Similarly,

carotid–femoral pulse wave velocity and carotid intima–media thickness were significantly increased in the ART group compared with controls.

Of note, systolic blood pressure (119.8 mmHg versus 115.7 mmHg) and diastolic blood pressure (71.4 mmHg versus 69.1 mmHg) were significantly higher in the ART group than in controls. Overall, 15.4% of the ART group compared with only 2.5% of the control group fulfilled the diagnostic criteria for arterial hypertension. Blood pressure variability was also increased in the ART group.

“ART causes premature vascular ageing in young, apparently healthy children,” conclude the investigators. “There is increasing evidence that in experimental animals, epigenetic mechanisms contribute to ART-induced alteration of the cardiovascular phenotype.”

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ORIGINAL ARTICLE Meister, T. A. et al. Association of assisted reproductive technologies with arterial hypertension during adolescence. *J. Am. Coll. Cardiol.* **72**, 1267–1274 (2018)