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## Heart failure risk remote monitoring program in the very elderly patients with COVID-19 disease

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Telemonitoring  
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### To the Editor,

Telemedicine is particularly important in the field of geriatrics, especially when it comes to the monitoring of elderly patients with chronic diseases such as heart failure (HF) and hypertension who require repeated trips to and from the hospital.

The main goal of *GER-e-TEC* COVID study is to evaluate the use of a remote monitoring platform as a means of structuring and standardizing the medical care of dependent elderly patients to prevent heart failure risk. Below, we present an illustration of the use of the MyPredi platform for the remote monitoring of heart failure involving 30 elderly patients who were hospitalized with COVID-19 disease. This study took place during the 3rd wave of the epidemic in France, during the period extending between December 14th, 2020 and February 25th, 2021 [1].

30 older patients affected by COVID-19 disease were included and agreed to be monitored remotely. The mean age of the patients was 85.9 years with a standard deviation of 6.4 years. There were 18 (60%) male patients and 12 female patients, for a male/female ratio of 1.5 to 1. The patients used the telemedicine solution for an average of 27.3 days, with a standard deviation of 18.5. The mean Charlson score was 6 (standard deviation of 1.2) [1].

During the monitoring, 413 alerts were emitted for the “HF” risk, with an average of 15.3 alerts per patient and a standard deviation of 21.3. Note the sensitivity and the positive predictive value of 100% for the alerts of the decompensated heart failure. Survival analyses showed that gender played no role in the length of the hospital stay, regardless of the reason for the hospitalization (decompensated heart failure ( $p = 0.45$ )). The analyses revealed that the length of the hospital stay was not affected by the number of alerts (decompensated heart failure ( $p = 0.59$ )) [1].

Telemonitoring for chronic heart disease can be divided in passive or automated, typical of implantable invasive devices that send either sporadically or continuously data to the receiving physician; and active, were, on the contrary, non-invasive devices involve an action or a self-measurement (e.g., blood pressure measurement)

that a patient needs to accomplish. While the role of implantable telemonitoring devices for multi-parameters or cardiac hemodynamic activity monitoring has been recently established as an effective way to prevent frequent hospitalizations, the role of non-invasive methods for the remote monitoring of chronic heart failure patients is still under debate [2]. In this setting, the MyPredi™ (formerly E-CARE) project has been initially developed and designed to optimize home monitoring of chronic heart failure patients by detecting, via a telemonitoring 3.0 platform, including artificial intelligence (AI) via the software MyPredi™ (Predimed Technology, Schiltigheim, France), situations with a risk of cardiac decompensation and re-hospitalization [2].

Over the last ten years, several new generation telemedicine projects and trials has emerged in the era of chronic heart failure, particularly in Europe.

During the period from 2005 to 2018, in the field of chronic heart failure, some projects of telemonitoring studies have been conducted like the *Trans- European Network-Home-Care Management System*, which involved 426 patients [3]. Compared to standard care alone, mortality and re-hospitalization rates were shown lower in the groups receiving either telemonitoring or nurse telephone support, without any statistically significant differences between both intervention groups. The BEAT-HF study [4] revealed that all-cause readmissions within 180 days post-discharge occurred in 50.8% (363 of 715) patients from the intervention group versus 49.2% (355 of 722) of those from the control group (adjusted hazard ratio: 1.03 [95%CI: 0.88–1.20];  $p = 0.74$ ). The Telemedical Interventional Management in Heart Failure (TIM-HF) [5] showed all-cause mortality rate (primary end point) was 8.4% patient-years of follow-up in the telemedicine group and 8.7% patient-years of follow-up in the standard care group, without significant difference (Odds Ratio (OR): 0.97 [95% CI: 0.67–1.41];  $p = 0.87$ ). It was followed by the Telemedical Interventional Management in Heart Failure II (TIM-HF2) [6] which revealed the percentage of days lost due to unplanned cardiovascular hospital admissions and all-cause death was 4.88% (95% CI 4.55–5.23) in the remote patient management group versus 6.64% (6.19–7.13) in the standard care group (ratio 0.80, 95% CI: 0.65–1;  $p = 0.0460$ ).

To the best of our knowledge, it is the only remote monitoring platform designed to help prevent the deterioration of heart failure risk in the context of COVID-19 infection. The main objective of the GER-e-TEC COVID project is the study of the contribution of telemonitoring of dependent elderly patients with the COVID-19 disease with a structuring and a protocolisation of their medical care, in order to avoid situations of acute decompensation and complications of geriatric risks. The geriatric risks concerned are: falls, constipation, dehydration, confusion, iatrogenia, malnourishment, heart

failure, diabetes, infections, and bedsores [1,7,8]. Unlike other projects, our project targets the wellbeing of all those involved in the treatment process. First of all, it is based on an innovative approach to healthcare. A coordination unit (made up of a nurse, a doctor, and a hospital) makes it possible to optimize the care that is offered to nursing home residents. These residents benefit from long-term medical monitoring by way of the daily, non-intrusive collection of their physiological data. The remote monitoring platform then allows for standardized and personalized medical follow-up thanks to its main technological asset: built-in artificial intelligence. If a patient's condition risks deteriorating, an alert is sent to a medical coordination unit (nurses and doctors) so appropriate actions can be taken. The *MyPredi*<sup>TM</sup> remote monitoring platform has proven effective at automatically and non-intrusively generating alerts in the event of heart failure risk. With *MyPredi*<sup>TM</sup>, patients benefit from personalized and preventive care that improves their quality of life. This includes multidimensional care and the monitoring of several indicators that are not addressed by other projects, such as the risk of constipation, dehydration, iatrogenesis, pain, infections associated with Covid-19, and sleep disorders.

The results of this phase of the GER-e-TEC COVID study with the monitoring of geriatric syndrome in COVID-19 elderly patients will be communicated in the *Journal of Personalized Medicine* [1].

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### Declaration of competing interest

The authors declare no conflict of interest except Mohamed Hajjam, who is CEO of PREDIMED.

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