

Implantable cardioverter defibrillator multisensor monitoring during home confinement caused by the covid-19 pandemic

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Background: Utilization of remote monitoring platforms was recommended amidst the COVID-19 pandemic. The HeartLogic algorithm combines data from multiple implantable cardioverter defibrillator (ICD) sensors (first and third heart sounds, intrathoracic impedance, respirations, night heart rate, and patient activity) to provide integrated data that may allow for detection of early signs of worsening HF.

Purpose: We examined whether the HeartLogic platform may elucidate behavioral changes that impact HF decompensation, and the possible consequences of home confinement caused by the COVID-19 pandemic.

Methods: The Italian lockdown was imposed from March 8th to May 18th. On March 8th 2020, the HeartLogic feature was active in 349 ICD and cardiac resynchronization therapy ICD patients at 20 Italian centers. The period from January 1st to July 19th was divided in 3 phases: Pre-Lockdown (weeks 1-11), Lockdown (weeks 12-20), Post-Lockdown (weeks 21-29).

Results: Immediately after the implementation of stay at home orders (week 12) we observed a significant drop in median activity level (65min [36-103] in week 12 vs. 101min [61-140] in Pre-Lockdown; $p < 0.001$), while there was no difference in the other contributing sensors. The median composite HeartLogic index increased at the end of Lockdown (4.7 [1.3-10.2] in week 20 vs. 2.5 [0.7-7.0] in Pre-Lockdown; $p = 0.019$). The weekly rate of HeartLogic alerts was significantly higher during Lockdown (1.56 alerts/week/100pts, 95%CI:1.15-2.06; IRR = 1.71, $p = 0.014$) and Post-Lockdown (1.37 alerts/week/100pts, 95%CI:0.99-1.84; IRR = 1.50, $p = 0.072$) than that reported in Pre-Lockdown (0.91 alerts/week/100pts, 95%CI:0.64-1.27). However, the median duration of alert state and the maximum index value did not change among phases, as well as the proportion of alerts followed by clinical actions at the centers (Pre-Lockdown: 31%, Lockdown: 22%, Post-Lockdown: 28%), and the proportion of alerts fully managed remotely (i.e. no in-clinic visits) (Pre-Lockdown: 89%, Lockdown: 90%, Post-Lockdown: 88%).

Conclusions: The system was sensitive to the behavioral changes occurred during the lockdown, i.e. decrease in activity. However, the home confinement had no impact on the other sensors. The higher rate of HeartLogic alerts during lockdown and the increase in the median index after 8 weeks of home confinement suggest the worsening of the HF status, possibly explained by the behavioral changes. Nonetheless, the management of the HF detected events (actions performed and management strategy) was not impacted by the restrictions.