

A multiparametric ICD algorithm for heart failure risk stratification and management: an analysis in clinical practice

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Introduction: The HeartLogic algorithm combines multiple implantable cardioverter defibrillator (ICD) sensors to identify patients at risk of heart failure (HF) events.

Purpose: We sought to evaluate the risk stratification ability of this algorithm in clinical practice. We also analyzed the alert management strategies adopted in the study group and their association with the occurrence of HF events.

Methods: The HeartLogic feature was activated in 366 ICD and cardiac resynchronization therapy ICD patients at 22 centers. The HeartLogic algorithm automatically calculates a daily HF index and identifies periods IN or OUT of an alert state on the basis of a configurable threshold (in this analysis set to 16).

Results: The HeartLogic index crossed the threshold value 273 times (0.76 alerts/patient-year) in 150 patients over a median follow-up of 11 months [25-75 percentile: 6-16]. Overall, the time IN the alert state was 11% of the total observation period. Patients experienced 36 HF hospitalizations and 8 patients died of HF (rate: 0.12 events/patient-year) during the observation period. Thirty-five events were associated with the IN alert state (0.92 events/patient-year versus 0.03 events/patient-year in the OUT of alert state). The hazard ratio in the IN/OUT of alert state comparison was (HR: 24.53, 95% CI: 8.55-70.38, $p < 0.001$), after adjustment for baseline clinical confounders. Alerts followed by clinical actions were associated with a lower rate of HF events (HR: 0.37, 95% CI: 0.14-0.99, $p = 0.047$). No differences in event rates were observed between in-office and remote alert management. By contrast, verification of HF symptoms during post-alert examination was associated with a higher risk of HF events (HR: 5.23, 95% CI: 1.98-13.83, $p < 0.001$).

Conclusions: This multiparametric ICD algorithm identifies patients during periods of significantly increased risk of HF events. The rate of HF events seemed lower when clinical actions were undertaken in response to alerts. Extra in-office visits did not seem to be required in order to effectively manage HeartLogic alerts, while post-alert verification of symptoms seemed useful in order to better stratify patients at risk of HF events.