Observations during the COVID-19 pandemic in chronic heart failure patients with complex devices in a tertiary care cardiac centre using the HeartLogic software

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Introduction: Decompensation of heart failure leading (HF) to hospitalisation is the single most important drain on healthcare resources when managing patients with left ventricular systolic dysfunction. Cardiac resynchronisation therapy with/without defibrillators (CRT-P/D) decreases hospitalisation due to HF and improves survival while implantable cardiac defibrillators (ICD"s) have a favourable effect on the former. Proprietary software algorithms embedded in these complex devices give an early warning to clinicians when decompensation of HF is imminent allowing preventative action to be undertaken.

HeartLogic (HL) is one such new algorithm in Boston Scientific CRT-D/ICD devices using multiple sensors to track 5 physiological parameters, combining them into one composite Index, with an Alert being triggered if the Index is >16. The COVID-19 pandemic, due to multiple reasons, resulted in a significant decrease in availability of routine HF services in the United Kingdom, especially during the initial lockdown period from 23rd March to 1st July 2020.

Aim: To assess the impact of the COVID-19 pandemic, using HL, in patients with HF and complex devices.

Materials and Methods: Retrospective analysis of patients in a tertiary care cardiac centre in whom the HL software had been activated in March/April 2019 (n = 49) and comparison of those with (Group A n = 21) and without (Group B n = 28) an Alert (HLA) during the COVID-19 pandemic.

Results (Table): Whole cohort n = 49. Age: 72 ± 12 years, Median: 75, Range: 36-95. 36/49 (73.5%) males. Type of device implanted: Resonate X4 CRT-D: 28/49 (57.1%); Momentum CRT-D: 8/49 (16.3%); Resonate ICD: 13/49 (26.5%). Ischaemic aetiology of HF: 35/49 (71.4%), Total duration of HL monitoring: 632 ± 7 days (median: 632; range: 626-672). There was no difference in the age, gender, and type of device implanted between Group A and Group B. Over nearly ~1 year of monitoring in each of the groups, Group A had more unstable HF with 10/21 (47.6%) having their first HLA during the pandemic. Multiple HLA"s, longer period in HLA and those with ischaemic aetiology of HF were higher in Group A. 17/40 (42.5%) HLA"s in Group A were within the first lockdown period (March - July). 24/28 (85.7%) patients in Group B had no HLA"s either before or during the pandemic. There was no difference in the HLA score between Groups A and B.

Conclusion: In this limited group of patients with a medium term follow-up, using the HeartLogic software, patients with ischaemic aetiology of HF and those with more HLA"s prior to the pandemic did worse than those who no HLA"s. First HLA"s, multiple alerts and longer duration of alerts in this group of patients suggests a lack of access to adequate HF services during the pandemic. It has implications with regard to how HF services are configured in future whenever resources are constrained.

Abstract Figure.

Table

	Whole Cohort N=49	Group A (HLA during pandemic) N=21	Group B (No HLA during pandemic) N=28	P value Group A versus Group B
Age (years): mean ±SD; median; range	72 ±12 75 36-95	71 ± 14 75 36-95	72 ±10 76 37-86	NS
Males (%)	36 (73.5)	16 (76.2)	21 (75.0)	NS
Type of device: *Resonate X4 CRT-D (%)* *Momentum CRT-D (%)* *Resonate ICD (%)*	 28 (57.1) 8 (16.3) 13 (26.5)	 12 (57.1) 4 (19.1) 5 (23.8)	 16 (37.1) 4 (14.2) 8 (28.6)	 NS NS NS
Ischaemic aetiology of HF	35 (71.4%)	19 (90.5%)	16 (57.1%)	*0.0113
No HLA	24 (49.1%)	NA	24 (85.7%)	-
First HLA during pandemic	NA	10 (47.6%)	NA	-
Patients with multiple HLA	18 (36.7%)	11 (52.4%)	1 (3.6%)	*0.0001
Days in alert (days) Mean ±SD; Median; range	37.0 ± 37.9 28.5 3-175	44.3 ±35.5 35 6 - 175	21.5 ± 24.4 15.5 3-69	*0.0105
HLA Score	26.9 ±11.0 23 16-71	27.7 ± 12.1 25 16-71	22.0 ± 9.5 19.5 16-41	0.0648 (NS)

Legends: HLA = Heart Logic Alert (Index >16); * P<0.05