PREVENTION OF ICD PLACEMENT IN HFrEF WITH OPTIMAL GDMT: A PILOT STUDY

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Background

The guideline-directed medical therapy (GDMT) for heart failure with reduced ejection fraction (HFrEF) includes an evidence-based beta blocker (BB), an angiotensin converting enzyme inhibitor (ACEi), angiotensin receptor blocker (ARB) or angiotensin receptor-neprilysin inhibitor (ARB/ARNi), and an aldosterone antagonist. This is supported by clinical evidence of improving clinical outcomes such as reducing morbidity and mortality associated with systolic heart failure by reverse remodeling of the left ventricle. After optimization of GDMT, patients who have EF ≤35% qualify for the placement of an implantable-cardioverter-defibrillator (ICD) for primary prevention of sudden cardiac death as per the ACC guidelines. Recent studies have revealed that <25% of patients with HFrEF are on the appropriate medications and/or the optimal dose. As GDMT improves EF, ICD placement can be avoided with optimized GDMT. The aim of our study was to assess the effectiveness of GDMT in improving EF>35% and thus avoiding the need for ICD for primary prevention.

Methods

A retrospective analysis of patients enrolled at a single community heart failure clinic was performed. Using various International Classification of Diseases (ICD) codes, 76 patients were identified to have HFrEF ≤35%. Baseline characteristics including demographics and co-morbidities were recorded from the first clinic visit. Patients were placed on GDMT for HFrEF in accordance with the 2017 ACC/AHA/HFSA recommendations. Medications were added and optimized at each heart failure clinic follow up appointment. The ejection fraction was checked at 3-6 months after GDMT was initiated and/or after medications were up titrated to optimal levels. The primary outcome was to assess the number of patients who had an improvement in EF >35% on GDMT and thus avoid ICD indication for primary prevention. We also performed subgroup analysis using Chi-squared test to determine whether age (young, age <65 vs elderly, age ≥65), gender, type of cardiomyopathy (ischemic vs nonischemic) and specific GDMT medication class (guideline directed beta-blocker, ACEI/ARB, ARB/ARNI and aldosterone antagonist) had an association with EF improvement in those who had an EF>35% on GDMT.

Figure 1: Baseline Characteristics of Patients in a Retrospective Cohort (n=76)

Age, y		NYHA class, n (%)	
Mean (SD)	61.2 (15.7)	I	4 (5.3)
Gender, n (%)		II	16 (21.1)
Male	45 (59.2)	III	34 (44.7)
Female	31 (40.8)	IV	12 (15.8)
Race, n (%)		Not documented/missing	10 (13.2)
White	65 (85.5)	LVEF, %	
Black	10 (13.2)	Mean (SD)	23.2 (6.3)
Other	1 (1.7)	Systolic blood pressure, mm Hg	
Heart failure origin, ischemic, n (%)	36 (49.7)	Mean (SD)	122.2 (17.6)
Prior MI, n (%)	25 (33.8)	Not documented/missing, n (%)	4 (5.3)
History of atrial fibrillation/flutter, n (%)	30 (40)	Resting heart rate, bpm	
History of diabetes mellitus, n (%)	26 (34.2)	Mean (SD)	82.2 (16.4)
History of hypertension, n (%)	66 (88.8)	Not documented/missing, n (%)	5 (6.6)
History of CVA, n (%)	6 (8)	Body mass index, kg/m²	
History of obstructive sleep apnea, n (%)	22 (28.9)	Mean (SD)	30.5 (9.3)
History of smoking, n (%)	43 (56.8)	Not documented/missing, n (%)	6 (7.9)
History of ICD implantation, n (%)	21 (27.6)	Creatinine, mg/dL	
History of CRT implantation, n (%)	12 (15.8)	Mean (SD)	1.24 (0.77)
		Not documented/missing, n (%)	10 (13.2)

Figure 2: Subgroup Analysis for Gender, Type of Cardiac Insult, Age, and GDMT Medication Class to Assess for Association with EF Improvement to >35% on GDMT

Category	Subgroup	Representation, n (%)	EF >35% on GDMT (no ICD indicated), n (%)	Chi-Square value	p-value
Gender (n = 76)	*Male*	*45 (59.2)*	30 of 45 (66.7)	5.68	0.02
	Female	*31 (40.8)*	28 of 31 (90.3)		
Type of Cardiac Insult (n = 75)	*Ischemic*	*36 (48.0)*	27 of 36 (75.0)	0.21	0.64
	Non-ischemic	*39 (52.0)*	31 of 39 (79.5)		
Age (n = 76)	*18-64 adult*	*42 (55.3)*	35 of 42 (83.3)	2.56	0.11
	65 and older	*34 (44.7)*	23 of 34 (67.6)		
Beta Blocker (n = 76)	*Prescribed*	*75 (98.7)*	57 of 75 (76.0)	0.31	0.57
	No	*1 (1.3)*	1 of 1 (100)		
Aldosterone Antagonist (n = 75)	*Prescribed*	*45 (60.0)*	33 of 45 (73.3)	0.44	0.51
	No	*30 (40.0)*	24 of 30 (80.0)		
ACEi or ARB (n = 76)	*Prescribed*	*30 (39.5)*	25 of 30 (83.3)	1.35	0.25
	No	*46 (60.5)*	33 of 46 (71.7)		
ARNi (n = 76)	*Prescribed*	*36 (47.4)*	25 of 36 (69.4)	1.79	0.18
	No	*40 (52.6)*	33 of 40 (82.5)		

Results

The retrospective cohort included 76 patients with systolic HF identified by EF ≤35% being followed at a community heart failure clinic. After the initiation, use, and optimization of appropriate heart failure medications 58 of the 76 (76.3%) patients had an EF>35%, translating to 76.3% patients avoiding ICD indication. A chi square test of association, albeit with low statistical power, found a significant difference in subgroup analysis for gender with 90.3% of female patients in the study showing an improvement of EF >35% as compared to 66.7% for males. There was no significant difference found in subgroup analysis for age, type of cardiomyopathy and GDMT medication class however, there was a trend favoring young age being associated with EF improvement to >35% as compared to older age.

Conclusion

Optimized GDMT is associated with improvement in EF >35% and avoidance of ICD. Female patients may have more improvement in EF than males. Larger studies with higher sample size are required to evaluate if age, gender, type of cardiomyopathy and GDMT medication class have an impact on EF improvement to >35%.

References

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