Broadening Insights into Implantable Cardioverter Defibrillator Appropriateness: The Role of Economic and Psychosocial Markers, Cardiomyopathy Subtypes, and Advanced Therapies

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Dear Editor,

We read with great interest the article by Carvalho et al. titled "Potentially Inappropriate Cardioverter Defibrillator Implants in Secondary Prevention of Death",[1] which highlights the critical role of socioeconomic and psychosocial markers (EPSM) in predicting early mortality post-implantable cardioverter defibrillator (ICD) implantation. While the study provides valuable insights into multidisciplinary team (MDT) assessments, we would like to address two significant limitations that could refine future research and clinical practice.

The study rightly emphasizes the prognostic implications of EPSM but does not address the role of guideline-directed medical therapies (GDMT), which have been shown to significantly reduce the risk of sudden cardiac death in patients with heart failure with reduced ejection fraction (HFrEF). For instance, sodium-glucose co-transporter-2 (SGLT2) inhibitors, such as dapagliflozin, reduce cardiovascular mortality by 14% (hazard ratio [HR]: 0.86; 95% confidence interval [CI]: 0.76–0.98), as demonstrated in the DAPA-HF trial,[2] independent of left ventricular ejection fraction. Similarly, the mineralocorticoid receptor antagonist spironolactone significantly decreased all-cause mortality by 30% (risk ratio [RR]: 0.70; 95% CI: 0.60–0.82; $p<0.001$) in patients with advanced HFrEF in the RALES trial,[3] irrespective of socioeconomic factors. Additionally, cardiac resynchronization therapy (CRT) has been shown to improve survival in patients with a QRS duration >150 ms and left bundle branch block (LBBB), reducing mortality by 36% compared to ICD alone.[4] The lack of data on GDMT adherence and CRT eligibility in the study limits the ability to discern EPSM's independent prognostic significance fully. Stratifying outcomes by GDMT utilization and CRT responsiveness could provide a more nuanced understanding of the interplay between socioeconomic, psychosocial, and clinical variables.

Another critical limitation is the heterogeneity of cardiomyopathy subtypes. The cohort included 51% of Chagas cardiomyopathy patients but did not analyze high-risk etiologies (e.g., cardiac amyloidosis, sarcoidosis, malignant genetic cardiomyopathies) separately. Transthyretin amyloidosis (ATTR-CM), for instance, has a median survival of 3.6 years post-diagnosis, with a high arrhythmic burden despite ICDs.[5] Conversely, peripartum cardiomyopathy and myocarditis often show LV recovery (40–50% of cases), making early ICD implantation potentially inappropriate.[6,7] Chagas cardiomyopathy involves a unique pathophysiology dominated by fibrosis and autonomic dysfunction, which may confound EPSM-related outcomes.[8] Subgroup analyses by etiology could clarify whether EPSM impacts all populations equally or interacts with disease-specific factors.

Finally, the discrepancy between the predicted one-year mortality rate (15.9%) and the observed rate (25.8%) based on the MAGGIC risk score highlights the potential influence of unaccounted variables, such as adherence to GDMT, arrhythmic burden, or other risk factors. Additionally, the high prevalence of Chagas disease within the study cohort raises concerns about the generalizability of these findings to non-endemic regions. While Carvalho et al.[1] study emphasizes the value of MDT assessments, integrating data on GDMT adherence, CRT eligibility, and stratification by cardiomyopathy subtype in future research could improve the accuracy of prognostic models and enhance patient selection strategies, particularly in resource-constrained settings. Multicenter studies designed to address these limitations are crucial for optimizing patient outcomes and refining ICD implantation practices.

Keywords

Cardiomyopathies; Heart Failure; Therapeutics; Defibrillators; Mortality

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Reply

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We are grateful in advance for the pertinent and constructive considerations and criticisms made of our work.[1]

Some of the limitations reported and cited in the letter were, albeit subtly, reported by the article's authors.

Table 1 provides other questions regarding the comparison (unpaired Student's T-test) between the groups regarding pharmacological therapy and the etiologies of heart failure.

Table 2 describes the number of patients per group (WITH MEPS and WITHOUT MEPS) who died in the first year of implantation according to each etiology.

We believe that some factors are associated with the low rate of patients using ISGLT2 in the sample, and we can mention some facts: our study was started 2.5 years before (2017) the publication of the study Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction and the release for marketing of the drug, which was published in 2019. Another important factor addressed in the article is the low monthly family income of the sample and the high cost of the medication for the profile of the population studied, which may have contributed to one of the causes of low medication adherence (one of the economic and psychosocial markers - MEPS). It is also worth mentioning that, until the end of the study follow-up, there were no programs to facilitate free access to ISGLT2 in the time necessary that could eventually increase the rate of ISGLT2 use in time for data analysis.

We emphasize that despite drugs' relevance in reducing mortality in patients with HF, such variables were not made available in the original version of the article; however, we believe that they were not a preponderant factor in changing the outcome studied.

Table 1 – Comparison between groups WITH MEPS vs. WITHOUT MEPS regarding drug therapy and etiologies of patients undergoing ICD implantation as secondary prevention at Hospital Ana Nery

	With MEPS	Without MEPS	
	167	89	p
ACEI/ARB/ Sacubitril-valsartan	122 (73%)	67 (75%)	0.831
Beta blocker, n (%)	127 (76%)	76 (85.4%)	0.562
Spironolactone, n (%)	100 (60%)	47 (52.8%)	0.481
ISGLT2, n (%)	14 (8.3%)	11(12.3%)	0.323
Amiodarone, n (%)	99 (59.3%)	46 (51.7%)	0.761
Myocarditis, n (%)	18(10.7%)	9 (10.1%)	0.892
Idiopathic dilated	8 (4.8%)	7 (7.9%)	0.126
Amyloidosis	7 (4.2%)	5 (5.6%)	0.332
Peripartum	2 (1.2%)	4 (4.5%)	0.089
Non-compaction myocardium, n (%)	2 (1.2%)	2 (2.2%)	0.112

ACEI: angiotensin-converting enzyme inhibitor; ARB: aldosterone receptor blocker.

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Table 2 – Deaths < 1 year of patients WITH MEPS vs. WITHOUT MEPS according to the etiology of HF who underwent ICD implantation as secondary prevention of sudden cardiac death at Hospital Ana Nery

	Deaths with MEPS 10/167 (6%)	Without MEPS 2/89 (2,2%)
Myocarditis	4 (40%)	—
Amyloidosis	1 (10%)	1 (50%)
Idiopathic dilated	3 (30%)	1 (50%)
Non-compaction myocardium	2 (20%)	—

Finally, there are no questions or concerns about the potential benefits of cardiac resynchronization therapy (CRT), given that our study did not address this prosthesis.

I remain at your disposal to clarify any further doubts.

William N. Carvalho

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