PLACE 2026
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

UNIVERSITÀ POLITECNICA DELLE MARCHE

Diagnosi e gestione della tachicardiomiopatia

Tra vecchi miti e nuove evidenze

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Department of Biomedical Sciences and Public Health | Marche Polytechnic University

Auricular Fibrillation without Other Evidence of Heart Disease*

A Cause of Reversible Heart Failure

EDWARD PHILLIPS, M.D. *and* SAMUEL A. LEVINE, M.D.
Los Angeles, California *Boston, Massachusetts*

What is more important is that the irregularity may precipitate congestive failure when the heart is otherwise normal.

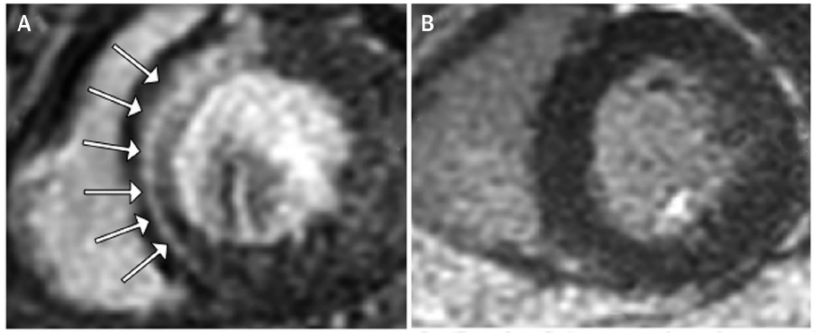
Am J Med 1949 Oct;7(4):478-89.

Definition

"Atrial and/or ventricular dysfunction—secondary to rapid and/or asynchronous/irregular myocardial contraction, partially or completely reversed after treatment of the causative arrhythmia"

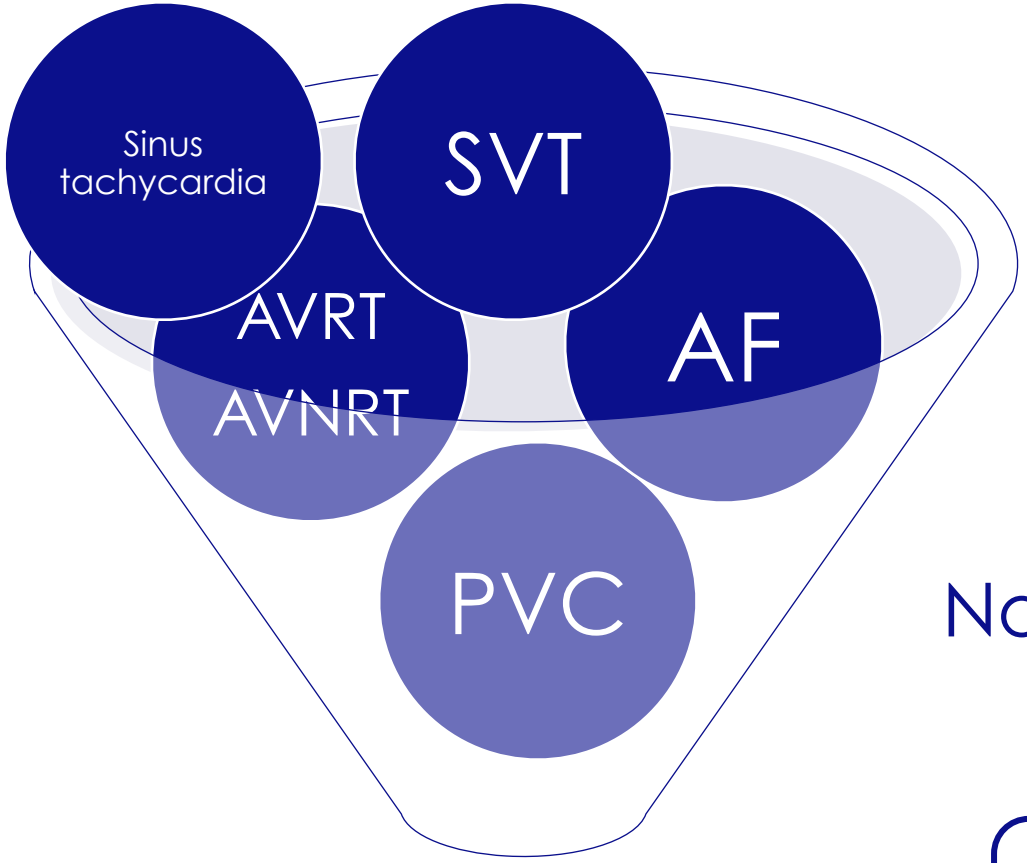
- PURE TCM (arrhythmia-**induced** CM): the arrhythmia is the sole reason for the LV dysfunction

- IMPURE TCM (arrhythmia-**mediated** CM): the arrhythmia can exacerbate or worsen heart failure or an underlying heart disease



J Am Coll Cardiol. 2019;73(18):2328–44; J. Clin. Med. 2019, 8, 1411; doi:10.3390/jcm8091411.

Which arrhythmia?



AiCM

ARRHYTHMIA INDUCED CARDIOMIOPATHY

No specific HR at which HF develops

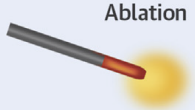
- Tachycardia induced CMP
- AF induced CMP
- PVC induced CMP

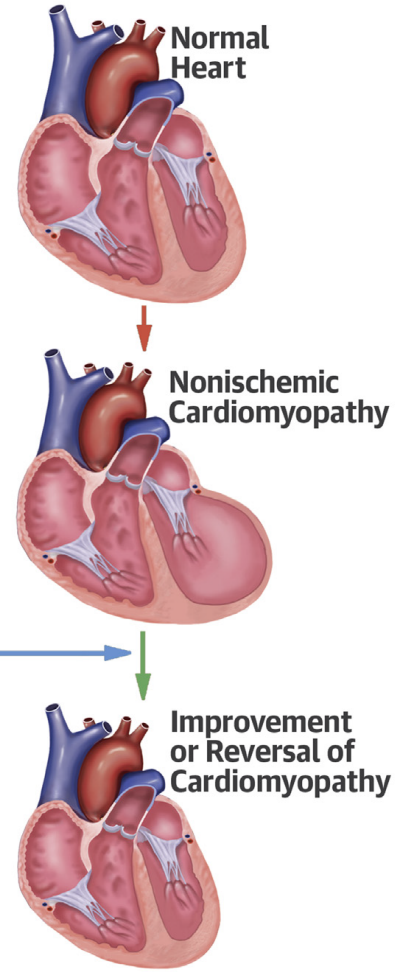
J Am Coll Cardiol. 2019;73(18):2328–44

Arrhythmia-Induced Cardiomyopathy

JACC State-of-the-Art Review

Jose F. Huizar, MD,[a,b] Kenneth A. Ellenbogen, MD,[a] Alex Y. Tan, MD,[a,b] Karoly Kaszala, MD, PhD[a,b]

	Tachycardia	Frequent PVCs	Atrial Fibrillation
Triggers	Increased HR	• LV dyssynchrony • AV dissociation • HR irregularity • Intermittent tachycardia • Sympathetic dysregulation • Post-extrasystolic potentation	• HR irregularity • Sympathetic dysregulation • Loss of atrial contraction
Mediators	• Ca^{2+} overload • Ca^{2+} mishandling	• Ca^{2+} overload • Ca^{2+} mishandling ???	• Ca^{2+} mishandling ???
Effect	• Fibrosis • Myocyte and electrical remodeling • Contractile dysfunction • Neurohormonal activation	• Myocyte and electricial remodeling • Contractile dysfunction ? Fibrosis	• Contractile dysfunction ???
Arrhythmia Suppression	Ablation  Antiarrhythmic drugs 		
Recovery	• Normalized LVEF • Ventricular dilatation • Diastolic dysfunction • Reactive hypertrophy • Persistent fibrosis	• Normalized LVEF and dimensions	• Normalized LVEF ???



J Am Coll Cardiol. 2019;73(18):2328–44

PVC-induced cardiomyopathy

Post-extrasystolic potentiation

- Increase in contractility that follows either an atrial or ventricular extrasystole, associated with Ca2+ overload
- Early PVCs have a greater intracellular Ca2+ and post-extrasystolic potentiation
- Increase in O2 consumption with little change in cardiac output

LV dyssynchrony

- Uncoordinated contraction of the LV segments
- Late PVCs demonstrate a greater LV dyssynchrony

Tachycardia

- Mean heart rate in ambulatory ECG Holters in PVC-CM is frequently normal, likely due to compensatory pauses.
- Clinical and animal studies have not found any difference in mean heart rate between PVC-CM and other aetiologies.

AV dyssynchrony

- Atrial contraction takes place against a closed AV valve during PVC
- PVC-PCWP augmentation was associated with a lower LVEF

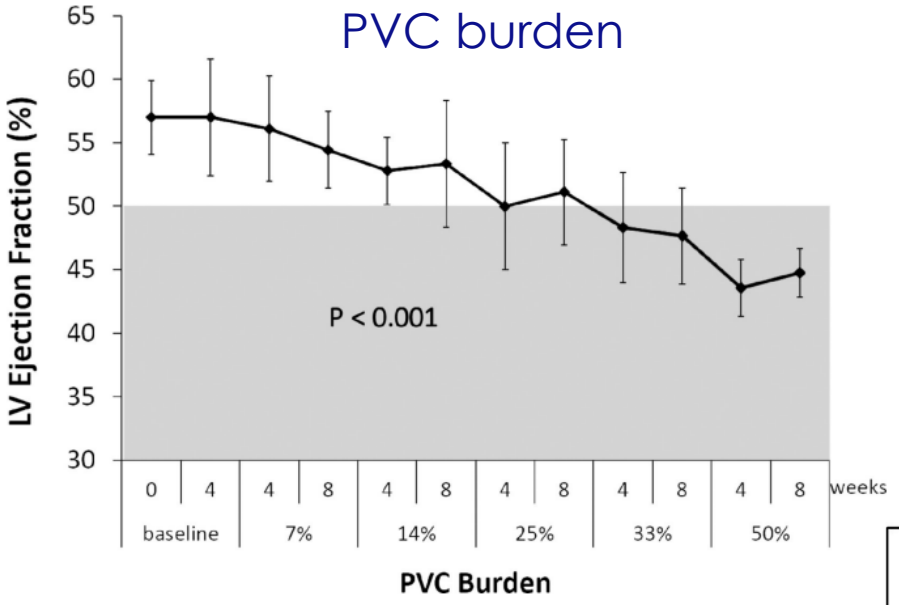
Autonomic nervous system

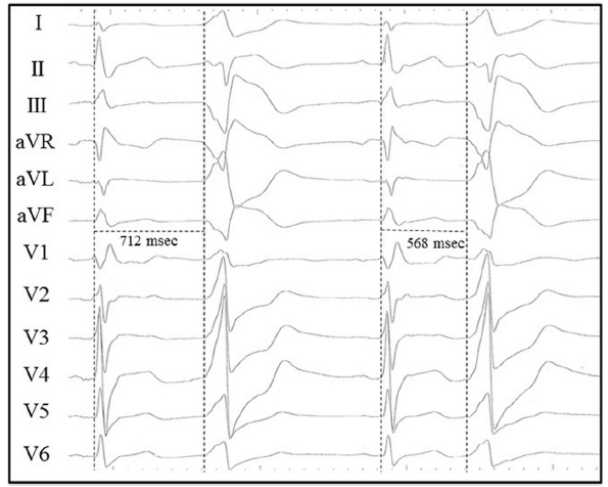
- PVCs alone have shown to acutely increase sympathetic nerve activity not only at a cardiac level but also peripherally

Eur J Heart Fail 2012;14:1112–20; Circ Arrhythm Electrophysiol 2017;10. e004937; J Am Coll Cardiol. 2019;73(18):2328–44

PVC-induced cardiomyopathy

PVC burden





Variability of PVC coupling interval

QRS width

Site of origin:
LCC
VPD QRS: 150ms

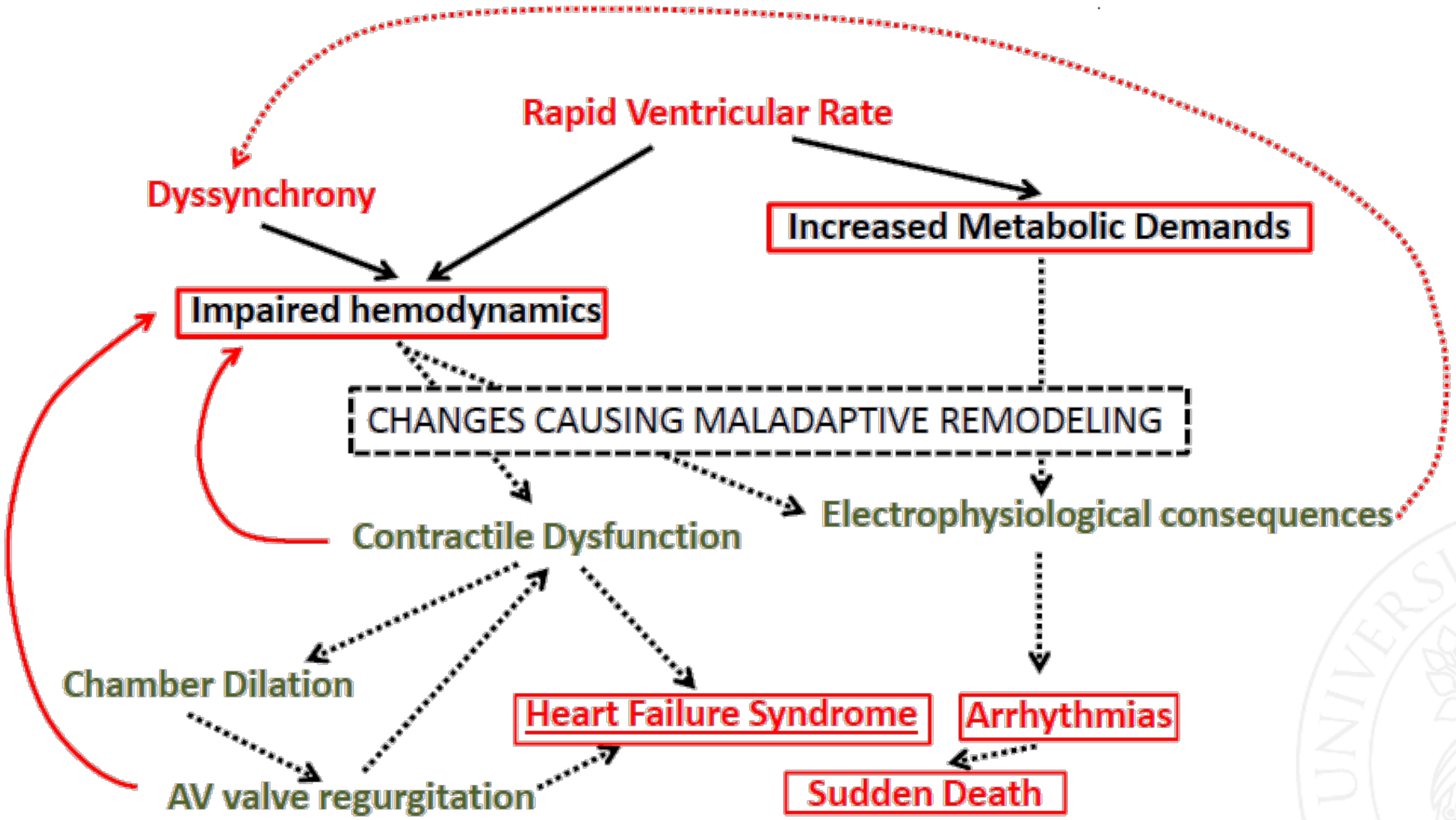
Site of origin:
LCC
VPD QRS: 176 ms

Other markers:

- Male gender
- Epicardial origin
- Retroconducted p-wave

J Cardiovasc Electrophysiol 2014;25:756–62; Heart Rhythm 2016;13:755–61; J Am Coll Cardiol. 2019;73(18):2328–44

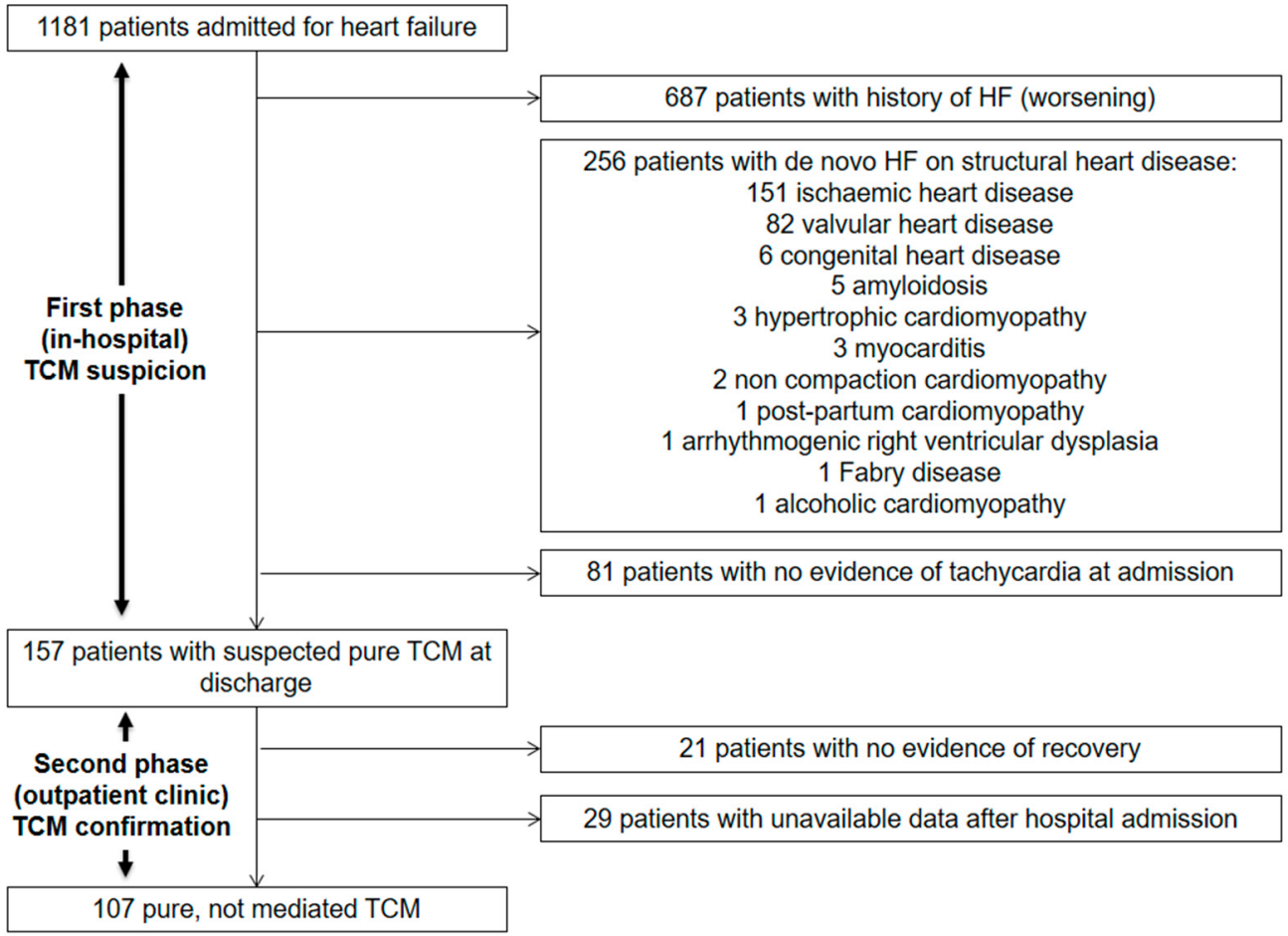
T- and AF- induced cardiomyopathy



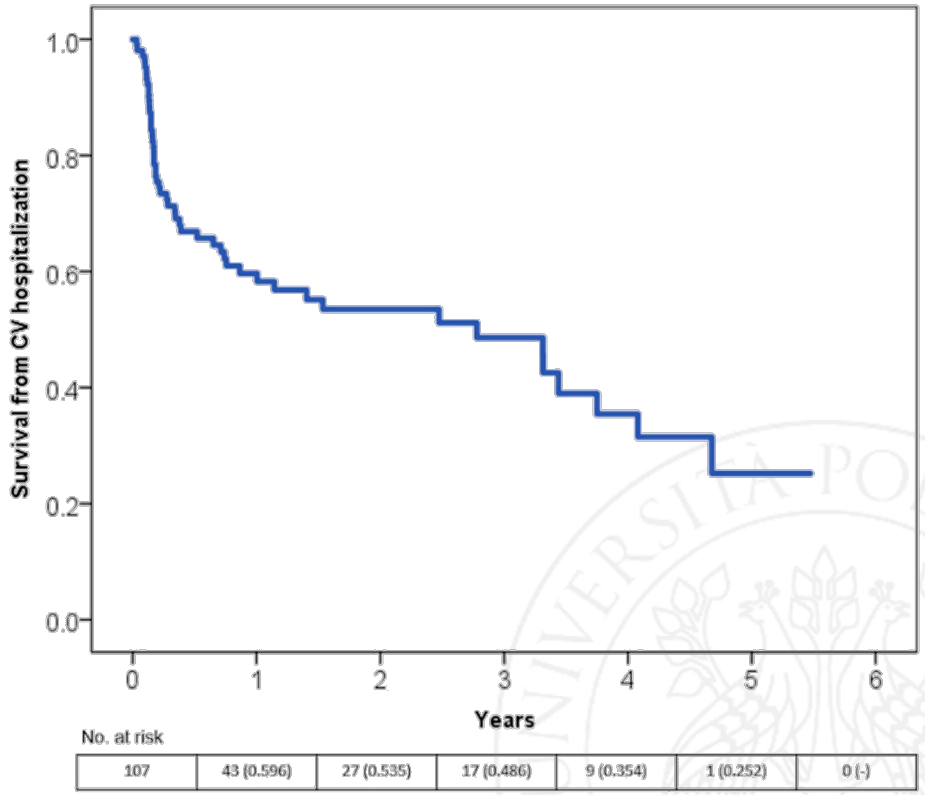
Can J Cardiol 2018, doi: 10.1016/j.cjca.2018.07.475.

Tachycardiomyopathy in Patients without Underlying Structural Heart Disease

Giulia Stronati †, Federico Guerra *,†, Alessia Urbinati, Giuseppe Ciliberti, Laura Cipolletta and Alessandro Capucci



Unplanned readmission



J. Clin. Med. 2019, 8, 1411; doi:10.3390/jcm8091411

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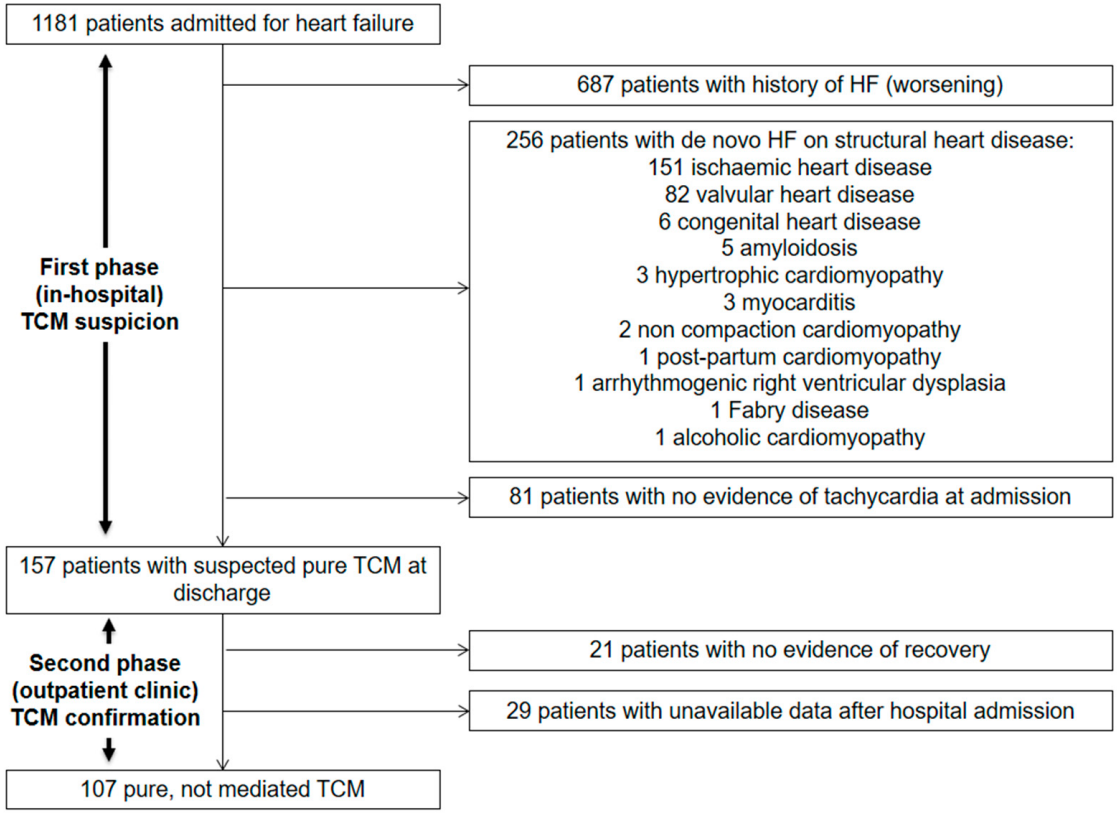

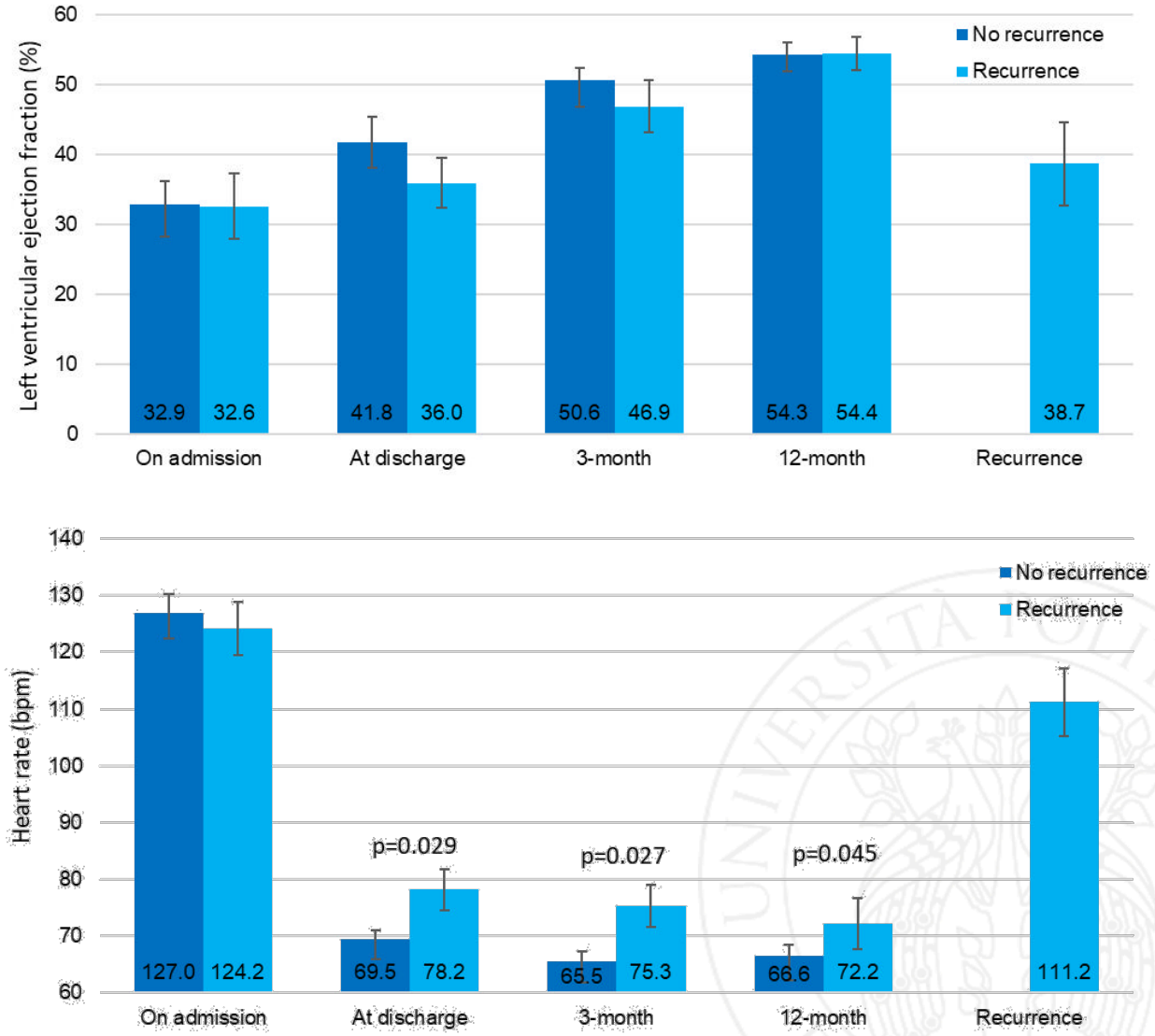

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Tachycardiomyopathy in Patients without Underlying Structural Heart Disease

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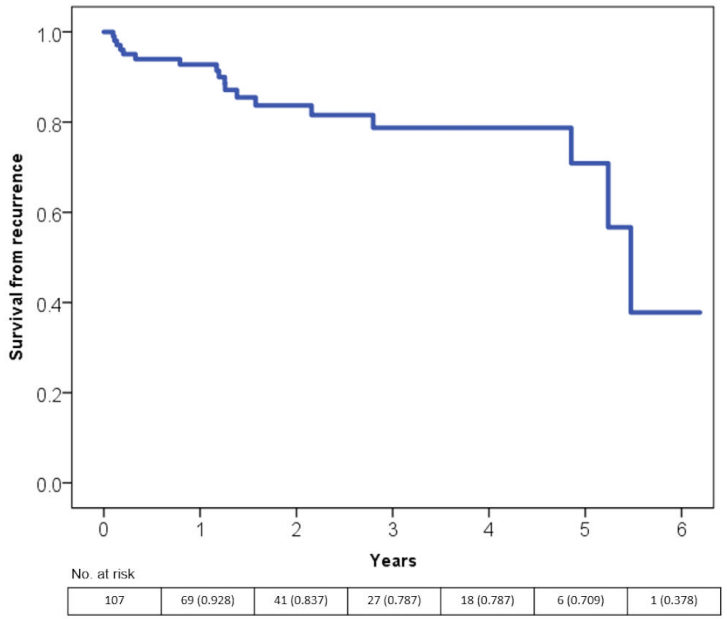
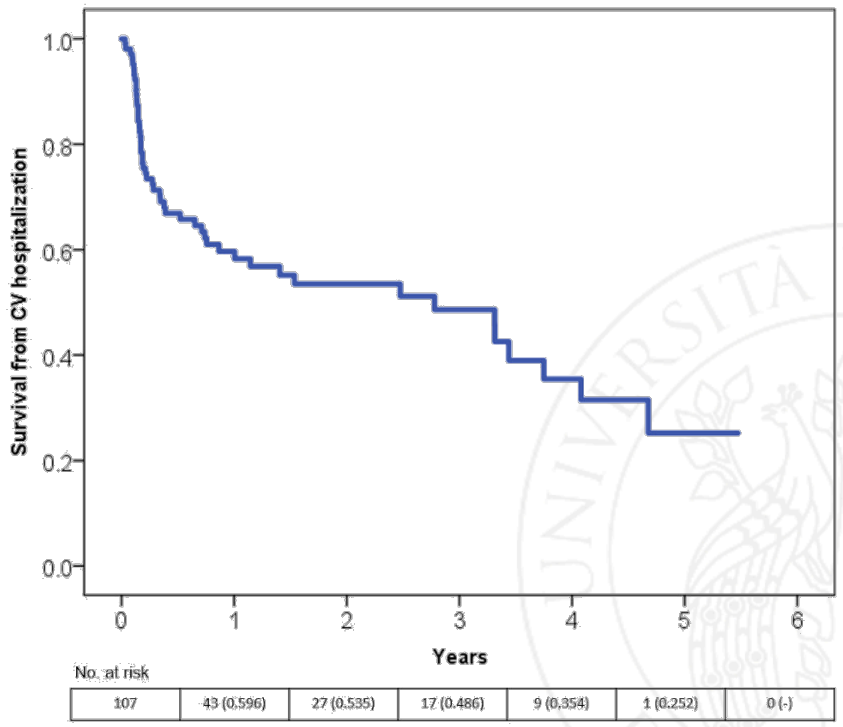
Tachycardiomyopathy recurrence

Variable	HR	95% CI	95% CI	p value
OSAS	5.88	1.38	17.29	0.045
BNP at admission	1.01	1.01	1.03	0.014
HR at discharge	1.05	1.01	1.10	0.029



Unplanned readmission

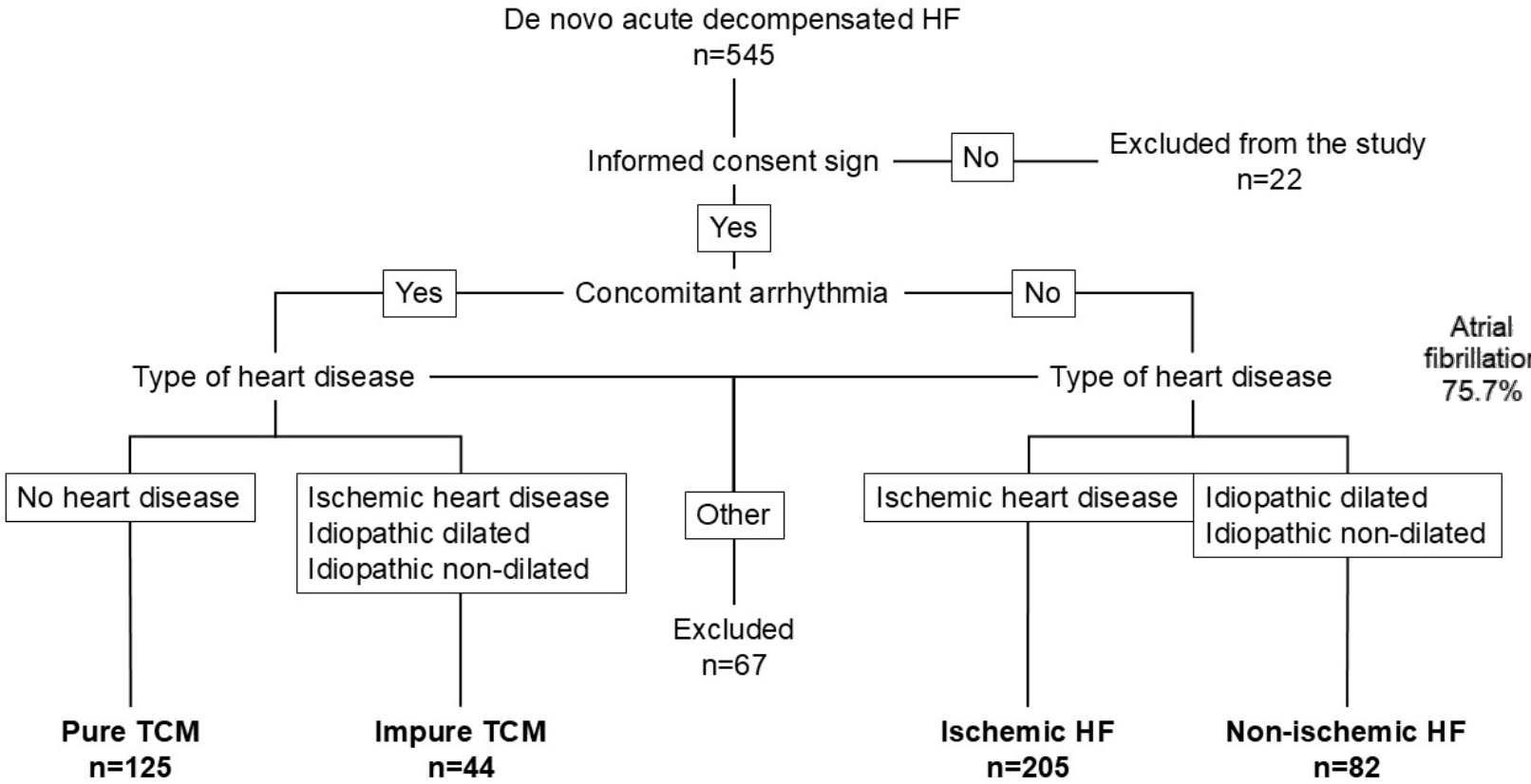
Variable	HR	95% CI	95% CI	p value
LVEF at discharge	0.96	0.93	0.99	0.020
HR at discharge	1.02	1.01	1.04	0.032

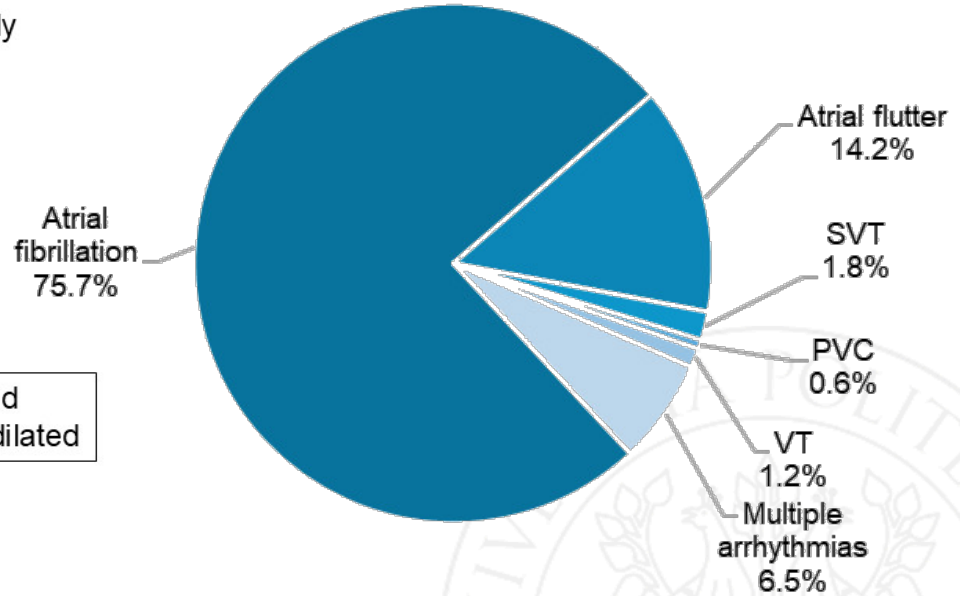


J. Clin. Med. 2019, 8, 1411; doi:10.3390/jcm8091411

Long-term prognosis of pure and impure tachycardiomyopathy

Giulia Stronati[1,2], Michele Alfieri[1,2], Niki Tombolesi[1], Alessandro Barbarossa[3], Samuele Principi[3], Federico Gullì[1], Arianna Massari[1], Gianmarco Bastianoni[1], Francesca Roccetti[1], Michela Casella[3,4], Antonio Dello Russo[1,3] and Federico Guerra[1,2,3]*





ESC Heart Failure 2025; 10.1002/ehf2.15444

Endpoints

All-cause mortality

Primary endpoint 1

Unplanned cardiovascular hospitalisation

Secondary endpoint 2

Sensitivity analyses

1 Propensity score matching

Two-versus-two basis (pure TCM versus non-ischemic HF; impure TCM versus ischemic HF) on log-transformed propensity score

2 LVEF improvement ≥15%

3 Complete LVEF recovery (≥50%)

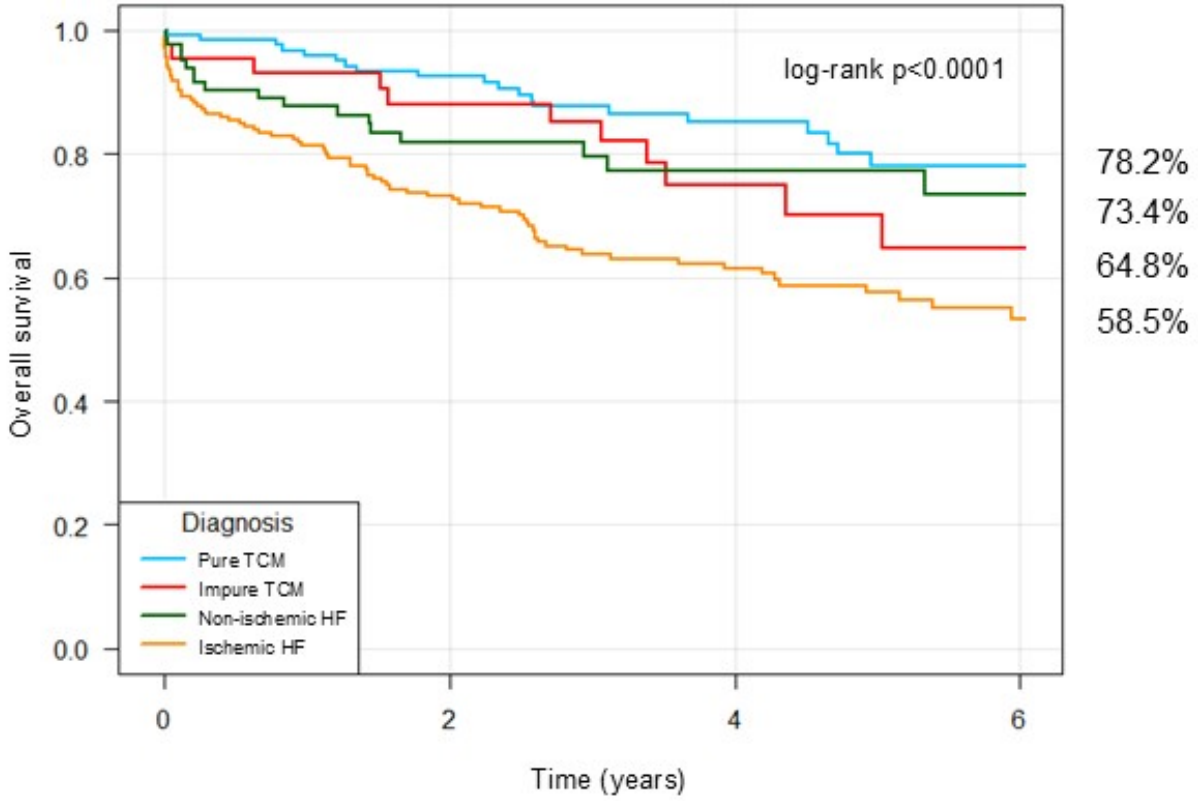
All patients not meeting the stricter cut-off were reassigned to the "impure TCM" group, considering an idiopathic dilatative cardiomyopathy as the most likely underlying structural heart disease

4 Rhythm vs rate control

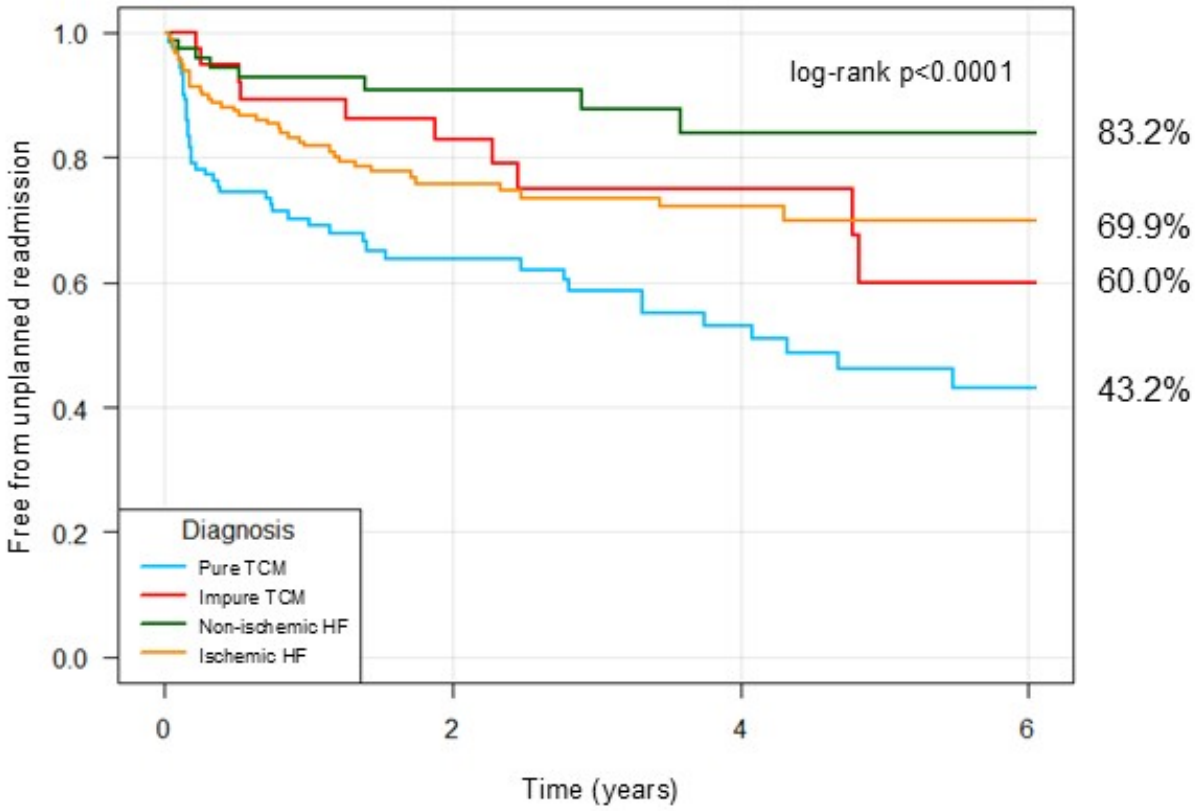
ESC Heart Failure 2025; 10.1002/ehf2.15444

Long-term prognosis of pure and impure tachycardiomyopathy

Overall survival



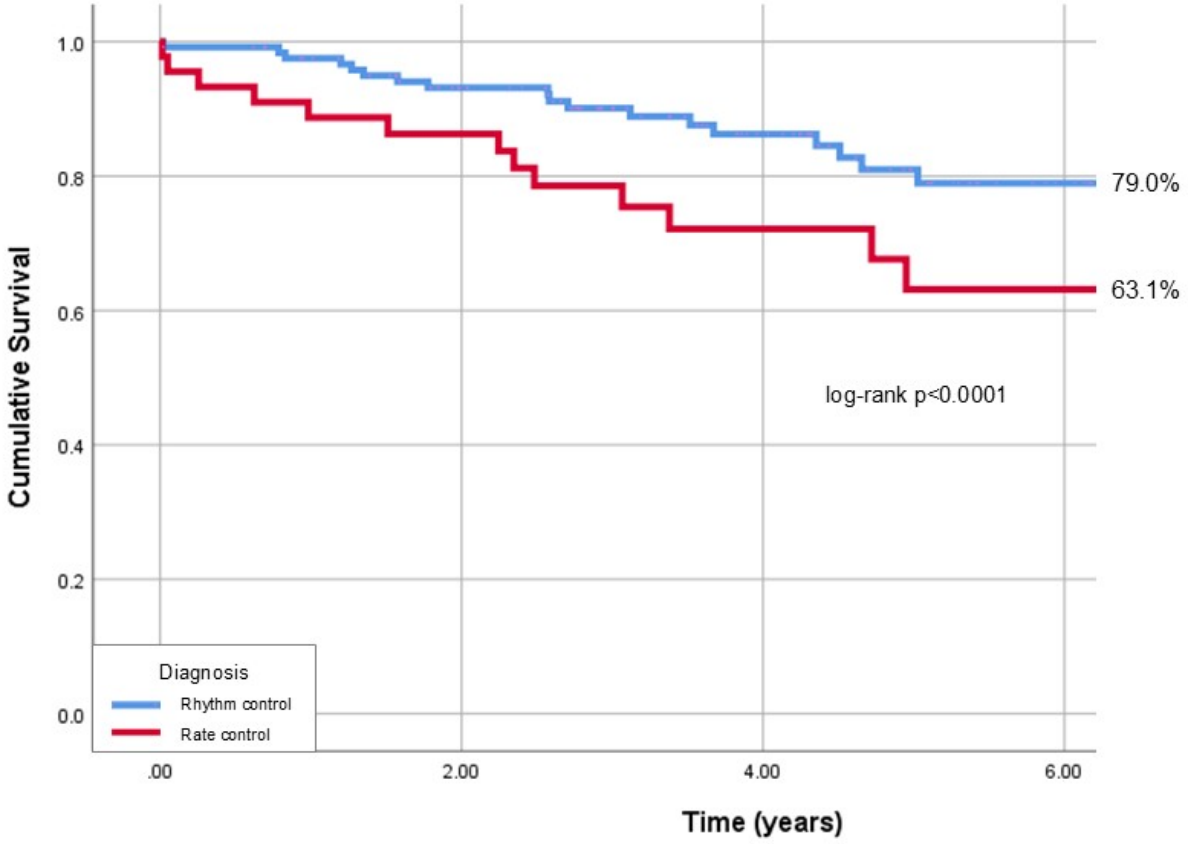
Unplanned readmission



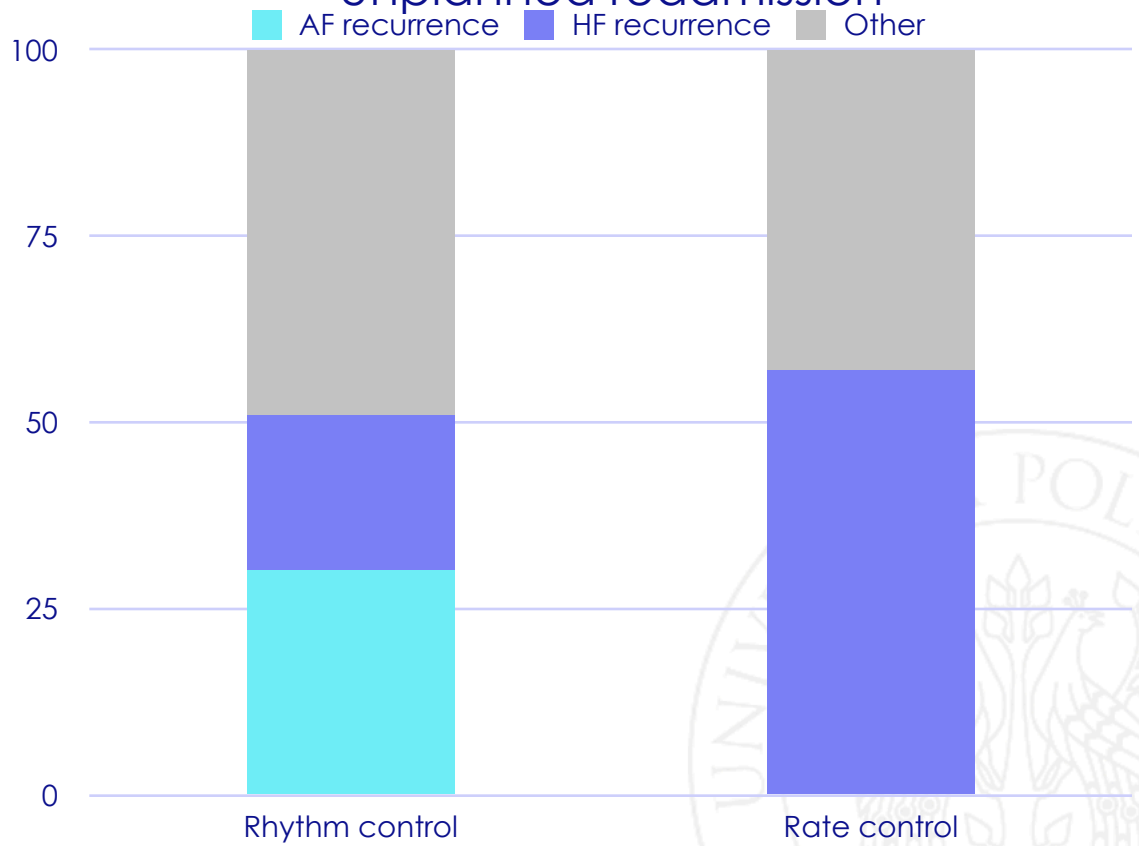
ESC Heart Failure 2025; 10.1002/ehf2.15444

Rhythm vs. rate control in TCM

Overall survival



Unplanned readmission



ESC Heart Failure 2025; 10.1002/ehf2.15444

Management of potential AiCM

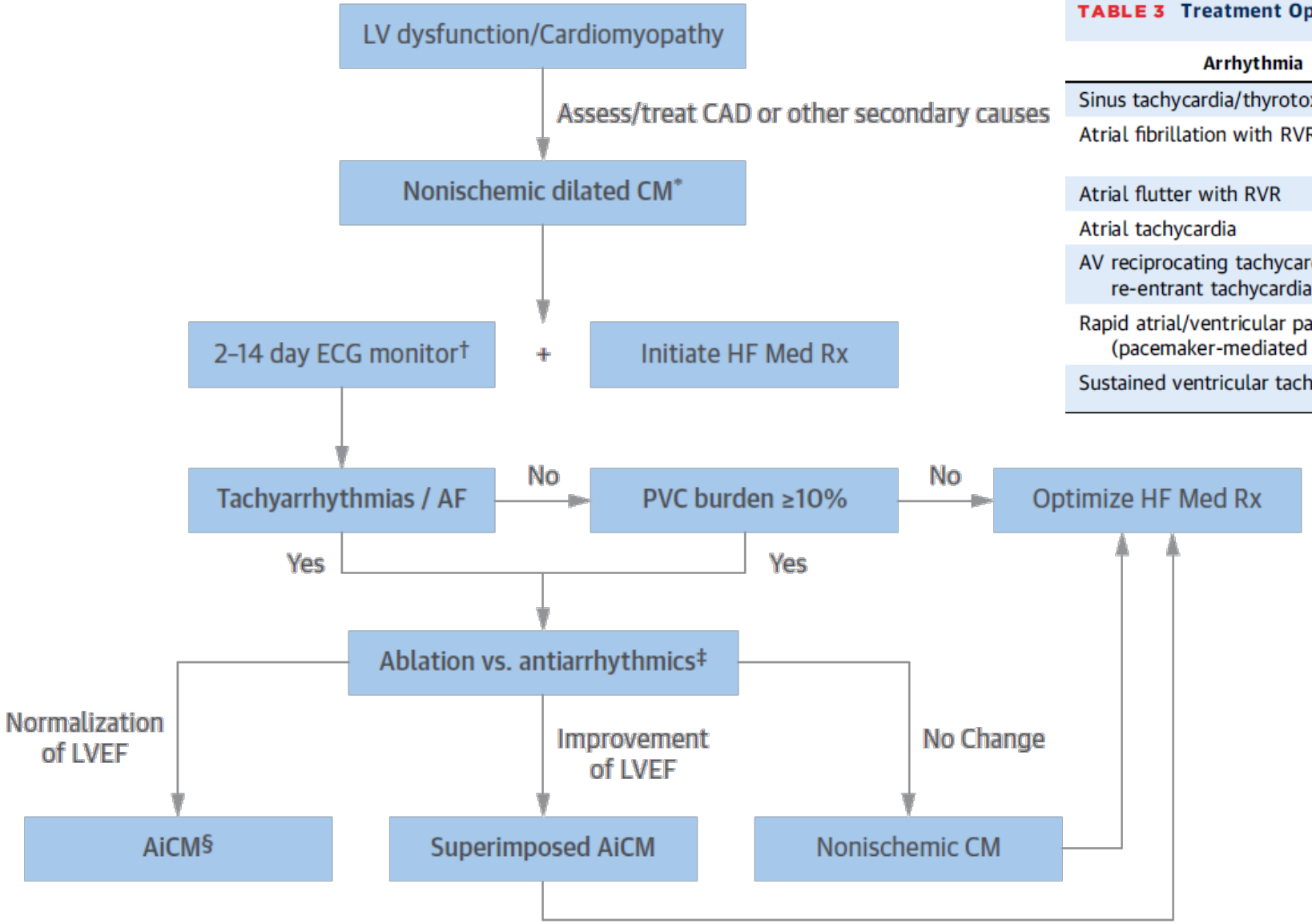


TABLE 3 Treatment Options of T-CM Based on Tachyarrhythmia

Arrhythmia	Treatment
Sinus tachycardia/thyrotoxicosis	BB + treatment of underlying disease
Atrial fibrillation with RVR	Rhythm (PVI ± AADs) vs. rate control vs. AVJ
Atrial flutter with RVR	Radiofrequency ablation
Atrial tachycardia	Radiofrequency ablation vs. AADs
AV reciprocating tachycardia/AV nodal re-entrant tachycardia	Radiofrequency ablation
Rapid atrial/ventricular pacing (pacemaker-mediated tachycardia)	Reprogram pacemaker
Sustained ventricular tachycardia	Radiofrequency ablation ± AADs

J Am Coll Cardiol. 2019;73(18):2328–44

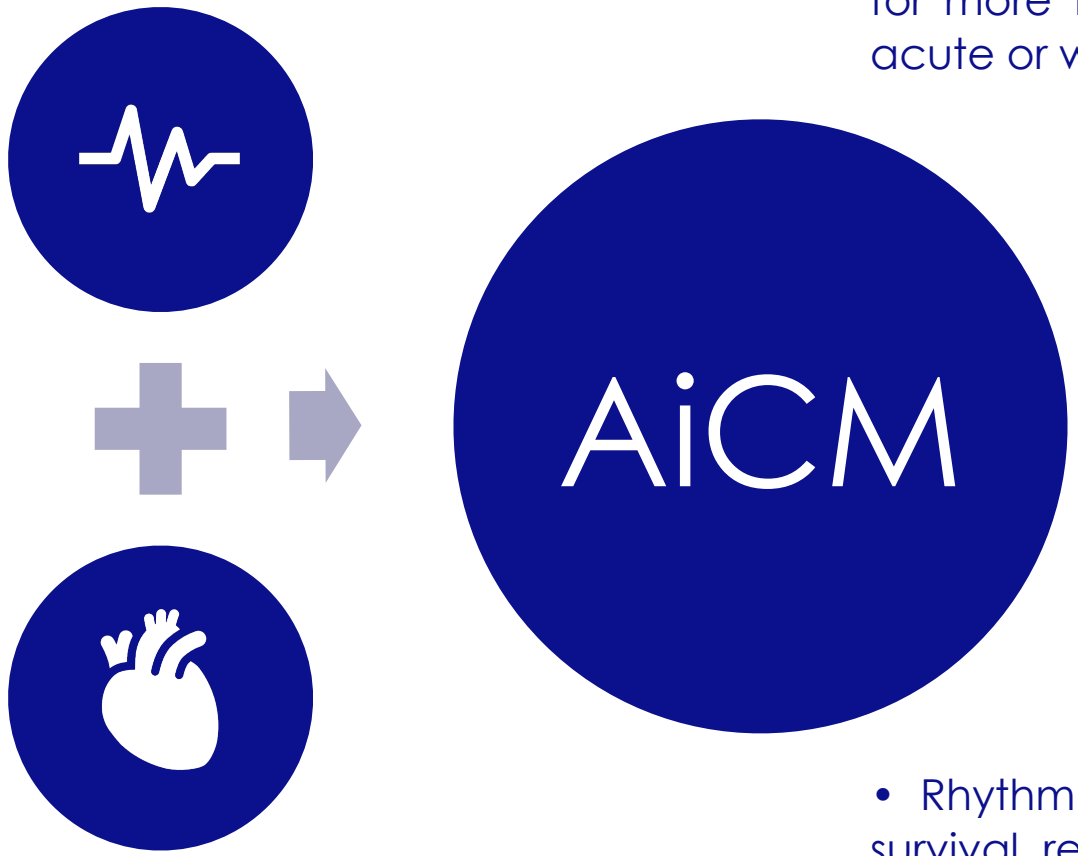
Conclusions

Arrhythmias

- Differences exist between TCM, AF-induced CM and PVC-induced CM
- The best treatment is an aimed treatment

Heart Failure

- Consider impure form of AiCM for long-term specific treatment
- Strict follow-up to avoid overlap of other form of HF worsening



- AiCM is a common cause of left ventricular dysfunction and accounts for more than 10% of all diagnoses of acute or worsened HF

- Reversibility (albeit non always complete) is a key feature of AiCM.
Treat according to comorbidities and organ damage.

- Rhythm control is better for overall survival, regardless of type of AiCM

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Thank you for your attention

Federico Guerra @GuerraCardio @GuerraCardio