

Telemonitoring in Heart Failure: models and results

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Conflicts of interest

- Nothing to declare

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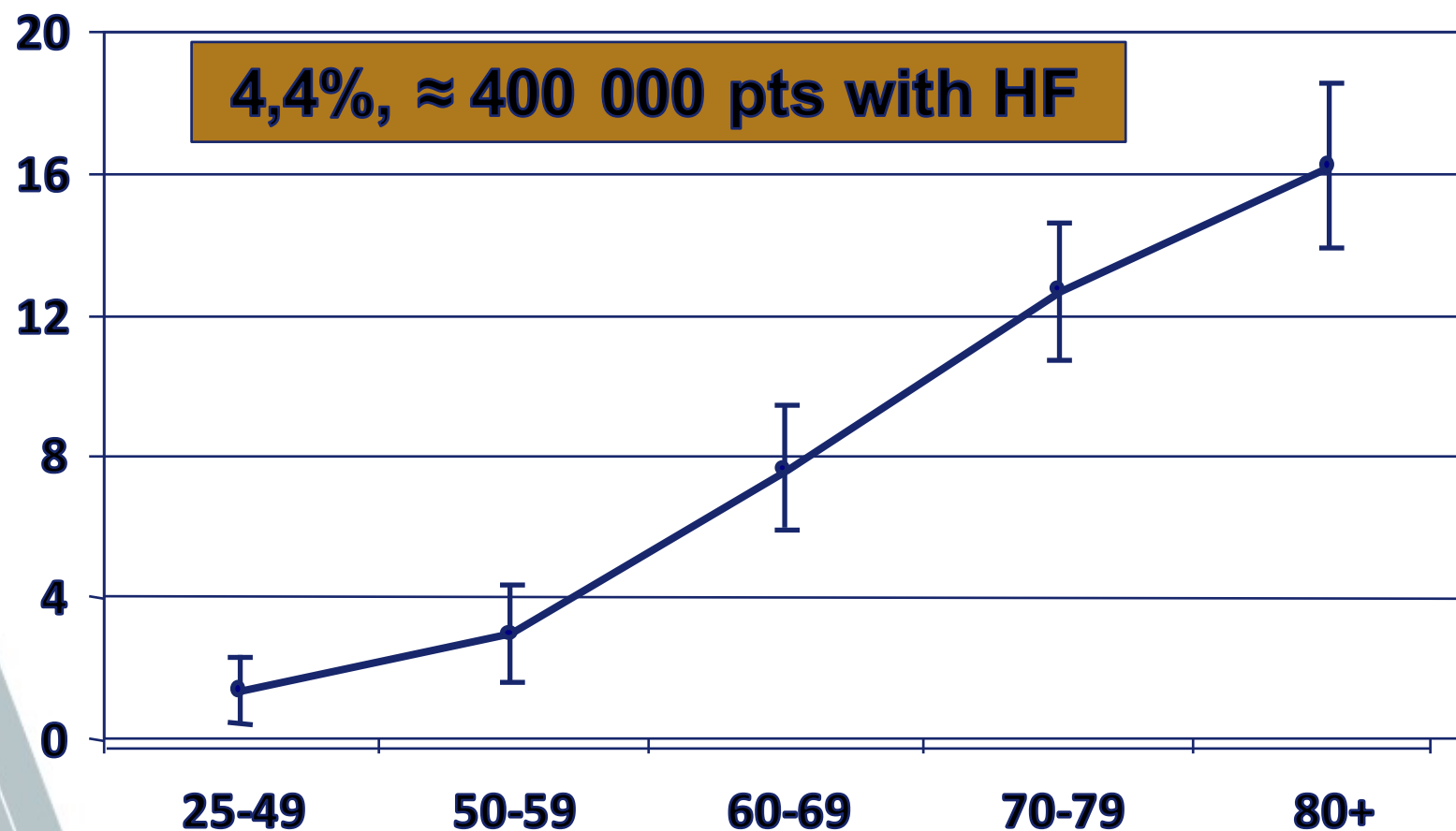
2. Models and Results

3. RICA HF_{team} Telemonitoring

4. Conclusions

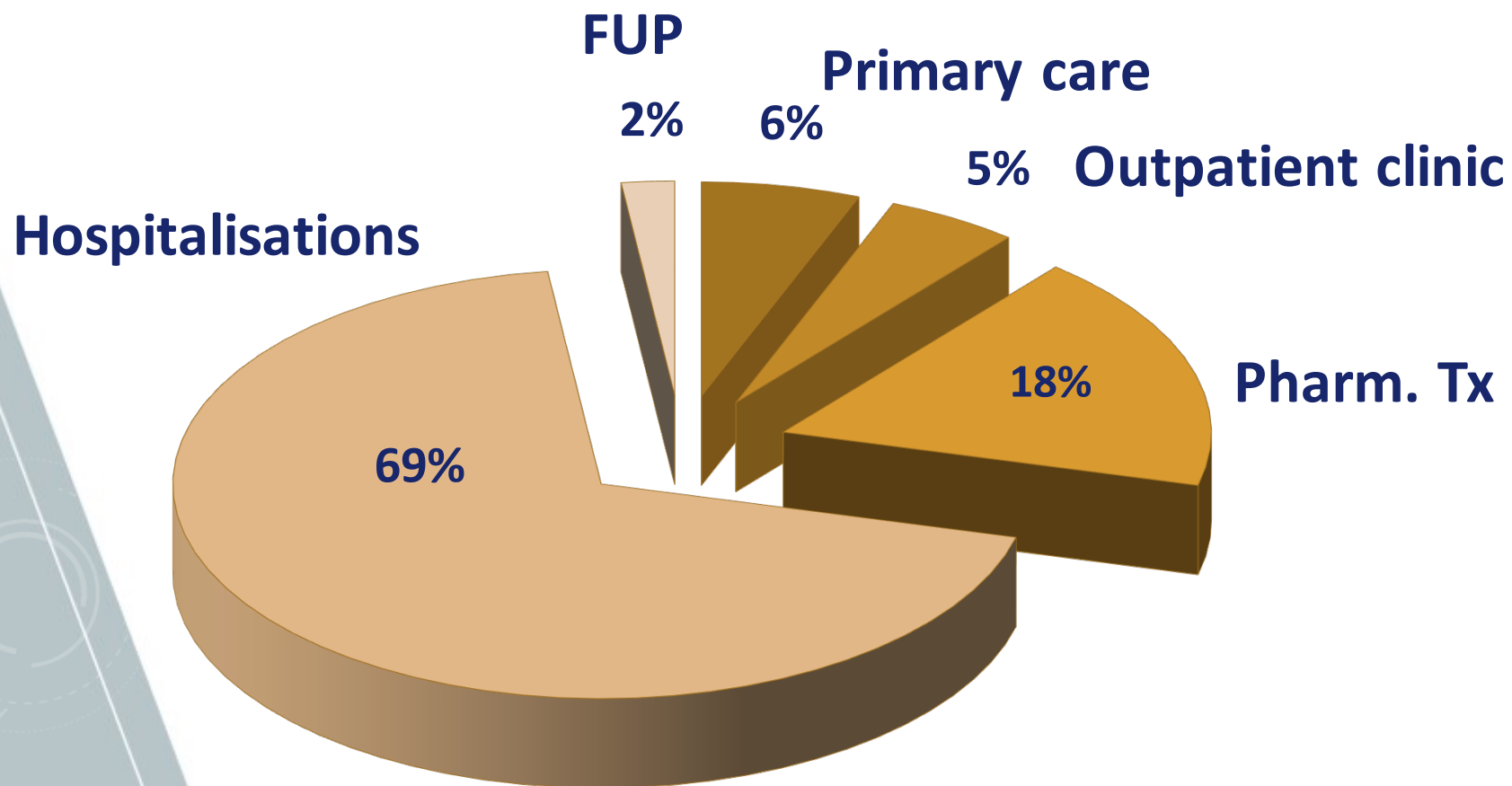
Heart Failure in Portugal

- Increasing prevalence of HF worldwide and Portugal



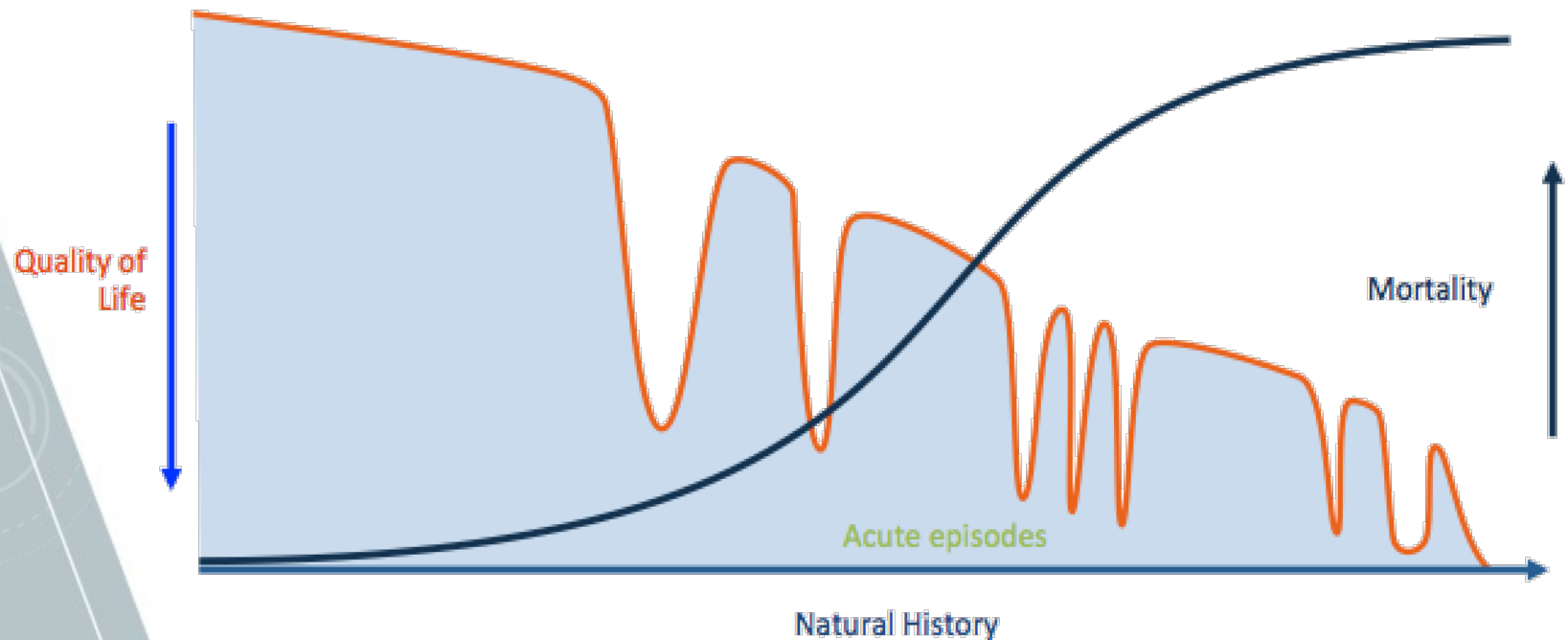
Heart Failure in Portugal

- Main costs due to hospitalisations



Heart Failure in Portugal

- Structured follow-up programme ↓ hospitalisations

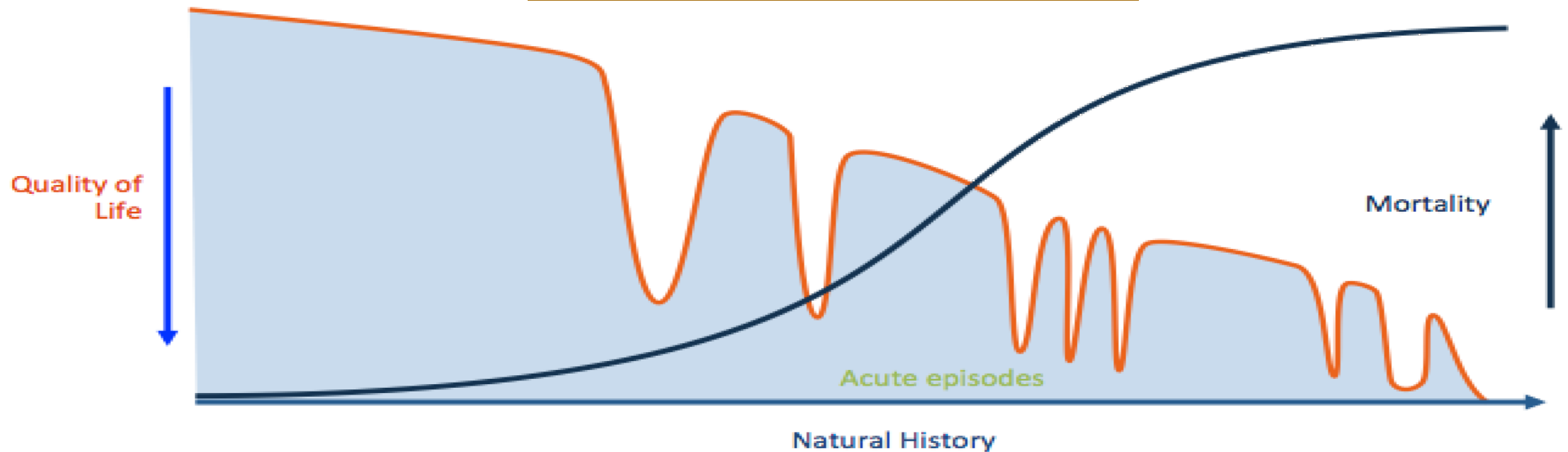


Heart Failure in Portugal

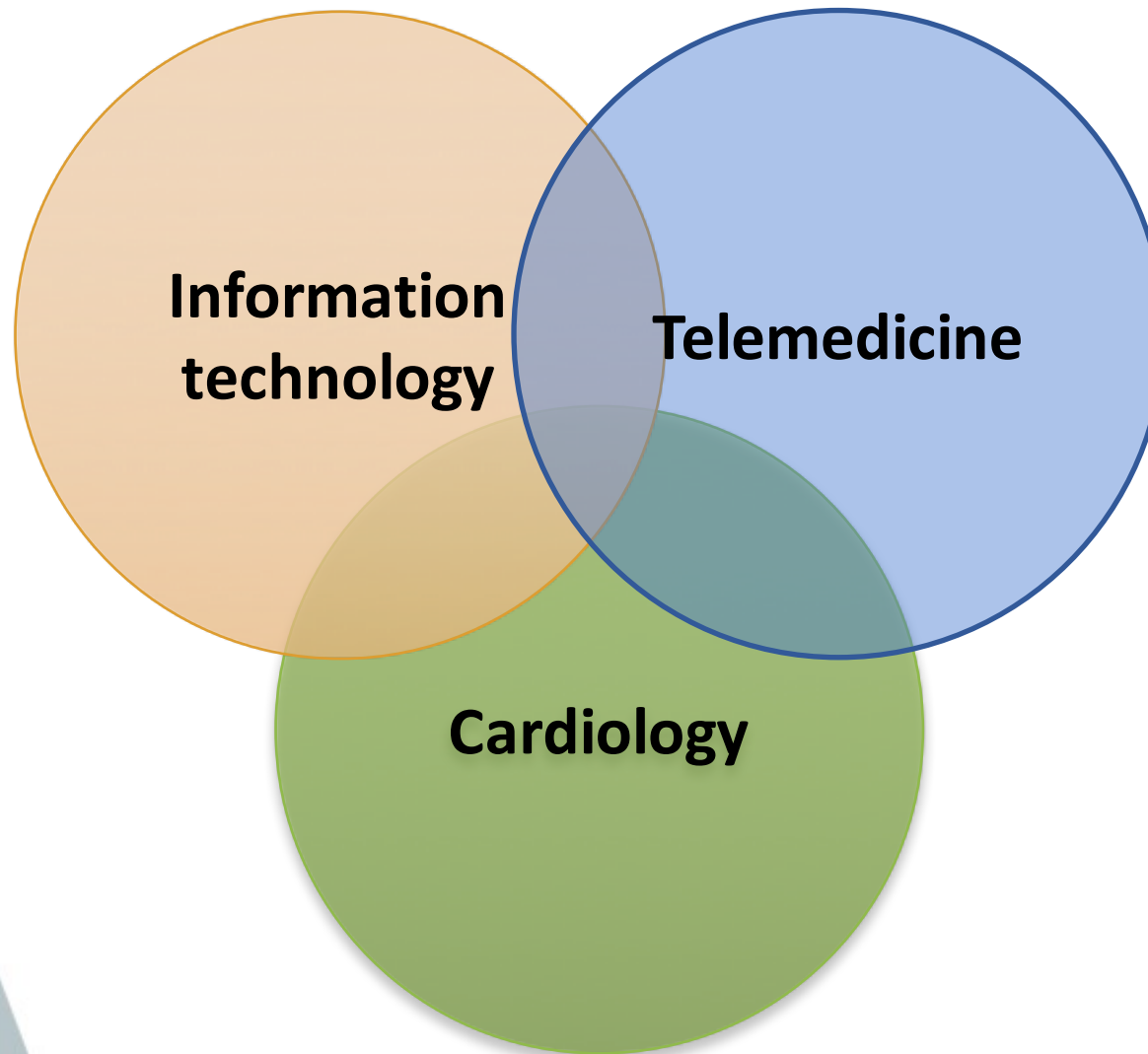
- Multidisciplinary HF management programs



Can we reach all HF patients?



Heart Failure telemonitoring



Heart Failure telemonitoring

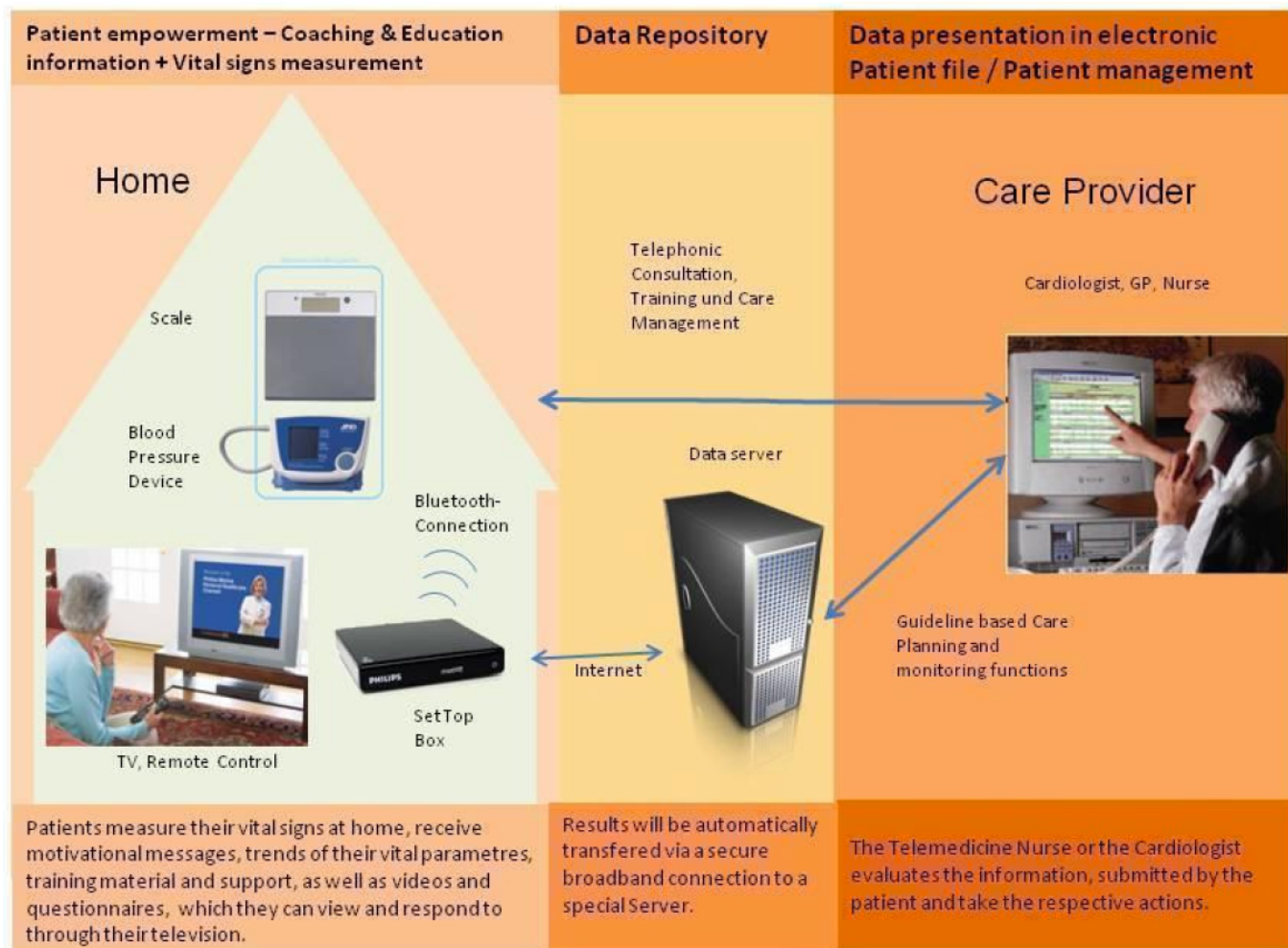


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Models and Results

**Structured telephone
support**

**Non-invasive
telemonitoring
programmes**

**Invasive telemonitoring
programmes**

Models and Results

Recommendations	Class ^a	Level ^b	Ref ^c
It is recommended that regular aerobic exercise is encouraged in patients with HF to improve functional capacity and symptoms.	I	A	321, 618–621
It is recommended that regular aerobic exercise is encouraged in stable patients with HFrEF to reduce the risk of HF hospitalization.	I	A	618, 619
It is recommended that patients with HF are enrolled in a multidisciplinary care management programme to reduce the risk of HF hospitalization and mortality.	I	A	622–625
Referral to primary care for long-term follow-up may be considered for stable HF patients who are on optimal therapy to monitor for effectiveness of treatment, disease progression and patient adherence.	IIb	B	626, 627
Monitoring of pulmonary artery pressures using a wireless implantable haemodynamic monitoring system (CardioMems) may be considered in symptomatic patients with HF with previous HF hospitalization in order to reduce the risk of recurrent HF hospitalization.	IIb	B	628, 629
Multiparameter monitoring based on ICD (IN-TIME approach) may be considered in symptomatic patients with HFrEF (LVEF ≤35%) in order to improve clinical outcomes.	IIb	B	630

Models and Results

**Structured telephone
support**

**Non-invasive
telemonitoring
programmes**

HF - telephone support

ORIGINAL ARTICLE

Telemonitoring in Patients with Heart Failure

Sarwat I. Chaudhry, M.D., Jennifer A. Mattera, M.P.H., Jephtha P. Curtis, M.D.,
John A. Spertus, M.D., M.P.H., Jeph Herrin, Ph.D., Zhenqiu Lin, Ph.D.,
Christopher O. Phillips, M.D., M.P.H., Beth V. Hodshon, M.P.H., J.D., R.N.,
Lawton S. Cooper, M.D., M.P.H., and Harlan M. Krumholz, M.D.

N ENGL J MED 363;24 NEJM.ORG DECEMBER 9, 2010

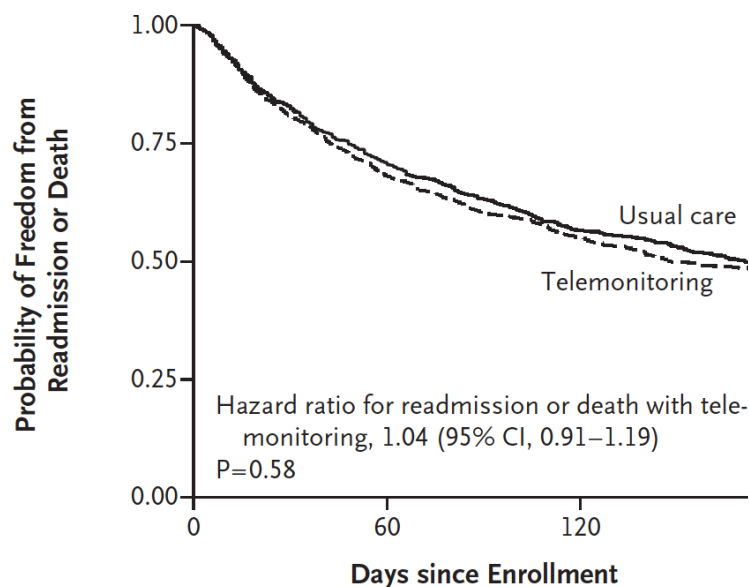
Tele-HF study

- N=1653 randomised 1:1, ♂ 58%, 61y
- HF discharged $\leq$ 30d
- Adherence 90.2% $\rightarrow$ 55.1%; FUP 6mo.

HF - telephone support

- No significant difference in ↓ readmissions and death.

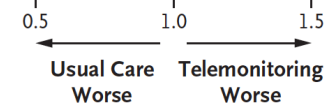
A Readmission for Any Reason or Death from Any Cause



No. at Risk

Usual care	827	587	468
Telemonitoring	826	564	454

Subgroup	Telemonitoring no. of patients	Usual Care no. of patients	Telemonitoring no. of events	Usual Care no. of events	Hazard Ratio (95% CI)	P Value
All patients	826	827	432	426	1.04 (0.91–1.19)	0.58
Age						
<65 yr	496	521	261	259	1.11 (0.93–1.32)	0.24
≥65 yr	330	306	171	167	0.93 (0.75–1.15)	0.51
Sex						
Male	467	491	264	249	1.18 (0.99–1.41)	0.06
Female	359	336	168	177	0.87 (0.70–1.07)	0.18
Race						
White	414	401	227	215	1.05 (0.87–1.27)	0.59
Black	314	330	160	167	1.03 (0.83–1.28)	0.81
Other	98	96	45	44	1.00 (0.66–1.51)	0.99
LVEF						
≥40%	234	239	125	122	1.07 (0.83–1.37)	0.60
<40%	572	563	298	286	1.05 (0.90–1.24)	0.52
NYHA class						
I or II	349	358	153	174	0.88 (0.71–1.09)	0.25
III or IV	477	469	279	252	1.15 (0.97–1.37)	0.10
Per-site enrollment						
<100 patients	306	311	161	174	0.94 (0.76–1.17)	0.60
≥100 patients	520	516	271	252	1.10 (0.93–1.31)	0.26



HF - telephone support

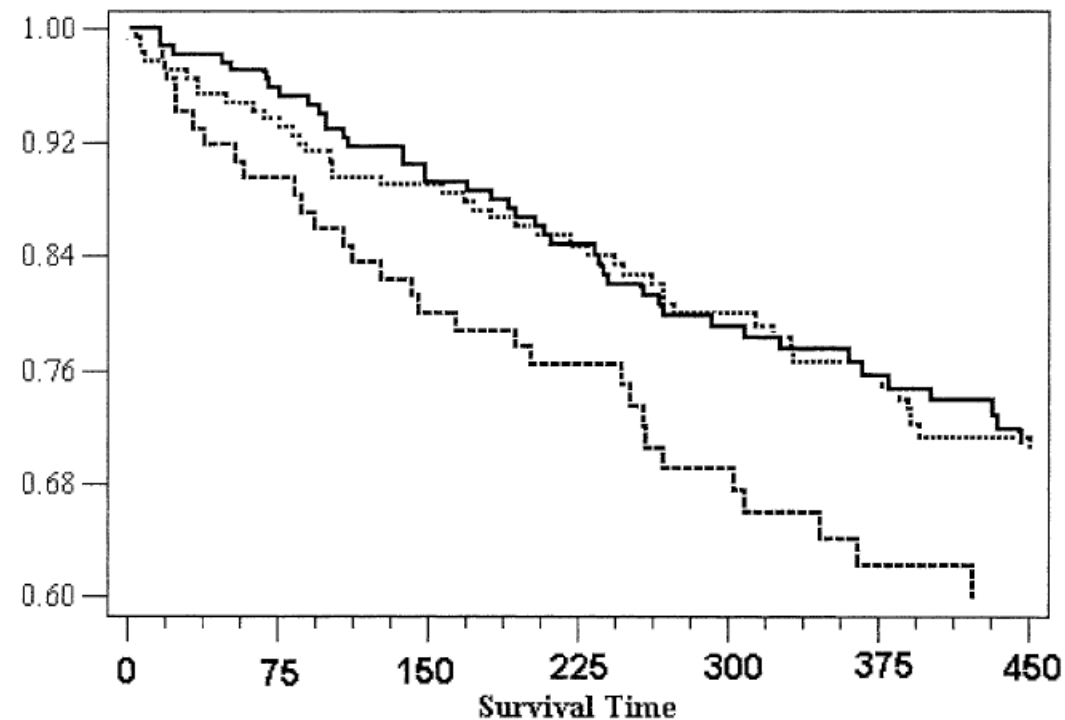


HF - telephone support

TEN-HMS study

- N=426 randomised 2:2:1, ♂ 80%, 67y
- HF discharged ≤ 6w, LVEF < 40%. FUP 8mo

Survival Distribution Function



Models and Results

Structured telephone
support

Non-invasive
telemonitoring
programmes

HF – non-invasive telemonitoring

Impact of Remote Telemedical Management on Mortality and Hospitalizations in Ambulatory Patients With Chronic Heart Failure

The Telemedical Interventional Monitoring in Heart Failure Study

Friedrich Koehler, MD; Sebastian Winkler, MD; Michael Schieber, MD; Udo Sechtem, MD; Karl Stangl, MD; Michael Böhm, MD; Herbert Boll, MD; Gert Baumann, MD; Marcus Honold, MD; Kerstin Koehler, MD; Goetz Gelbrich, PhD; Bridget-Anne Kirwan, PhD; Stefan D. Anker, MD, PhD;
on behalf of the Telemedical Interventional Monitoring in Heart Failure Investigators

Clinical Trial Registration:—URL: <http://www.ClinicalTrials.gov>. Unique identifier: NCT00543881.
(*Circulation*. 2011;123:1873-1880.)

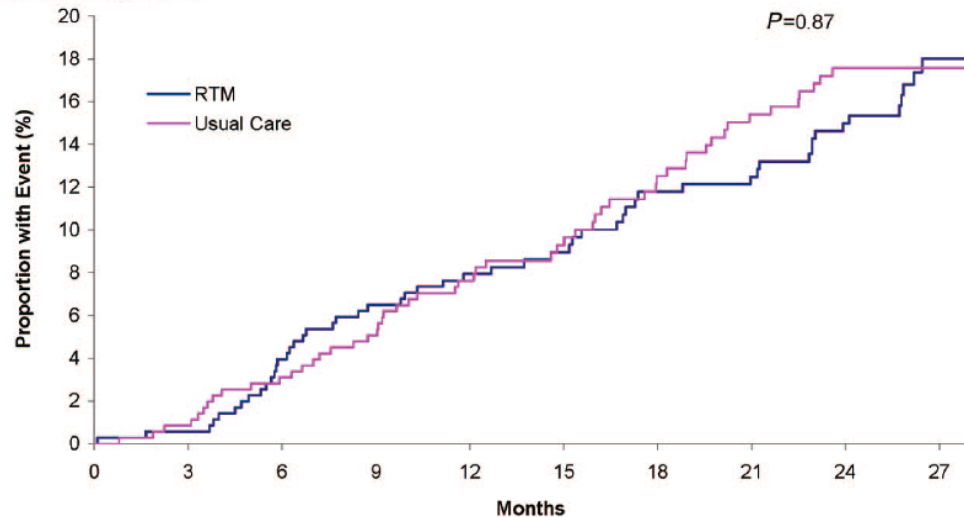
TIM-HF STUDY

- N = 710 randomised 1:1; ♂ 81%, 67y
- HF ≤ 35%, decompensation ≤ 2y or LVEF ≤ 25%
- FUP 26mo

HF – non-invasive telemonitoring

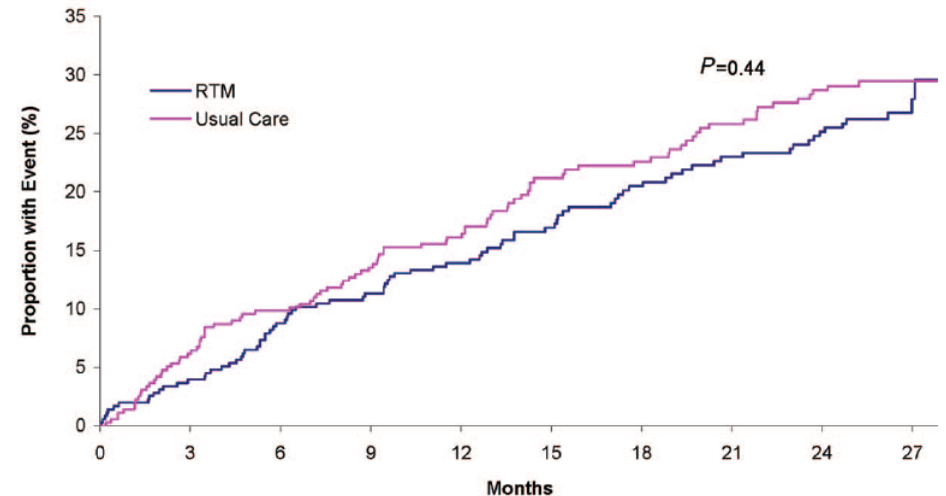
- No significant difference in ↓ all-cause mortality or death + hospitalisation.

A Death from Any Cause



No. at Risk									
RTM	354	352	340	330	307	249	239	64	
Usual Care	356	352	344	336	305	243	229	60	

B Cardiovascular Death or Hospitalization for Heart Failure



No. at Risk :									
RTM	354	340	322	311	283	223	209	56	
Usual Care	356	333	318	304	275	217	198	53	

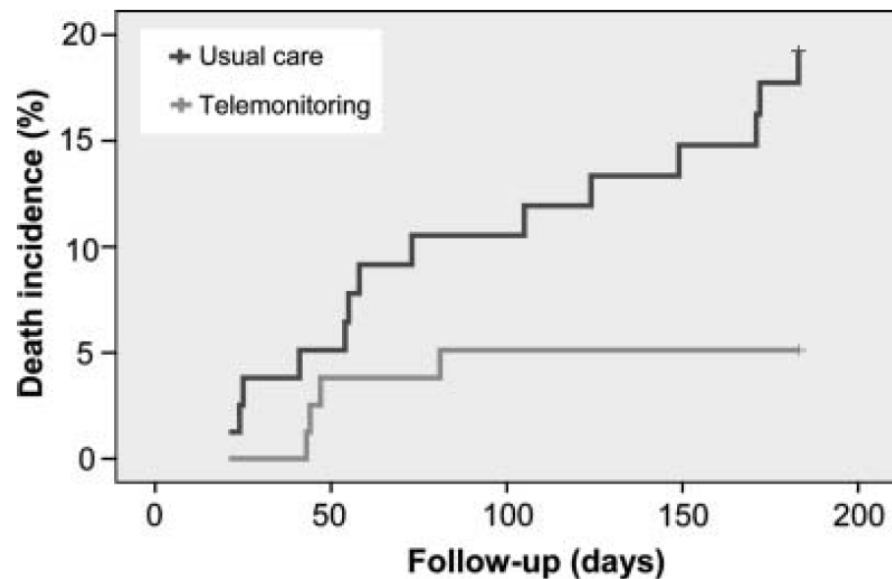
HF – non-invasive telemonitoring



HF – non-invasive telemonitoring

TEMA-HF1 STUDY

- N = 160 randomised 1:1; ♂ 65%, 76y
- HF decompensated, after discharge
- FUP 6mo



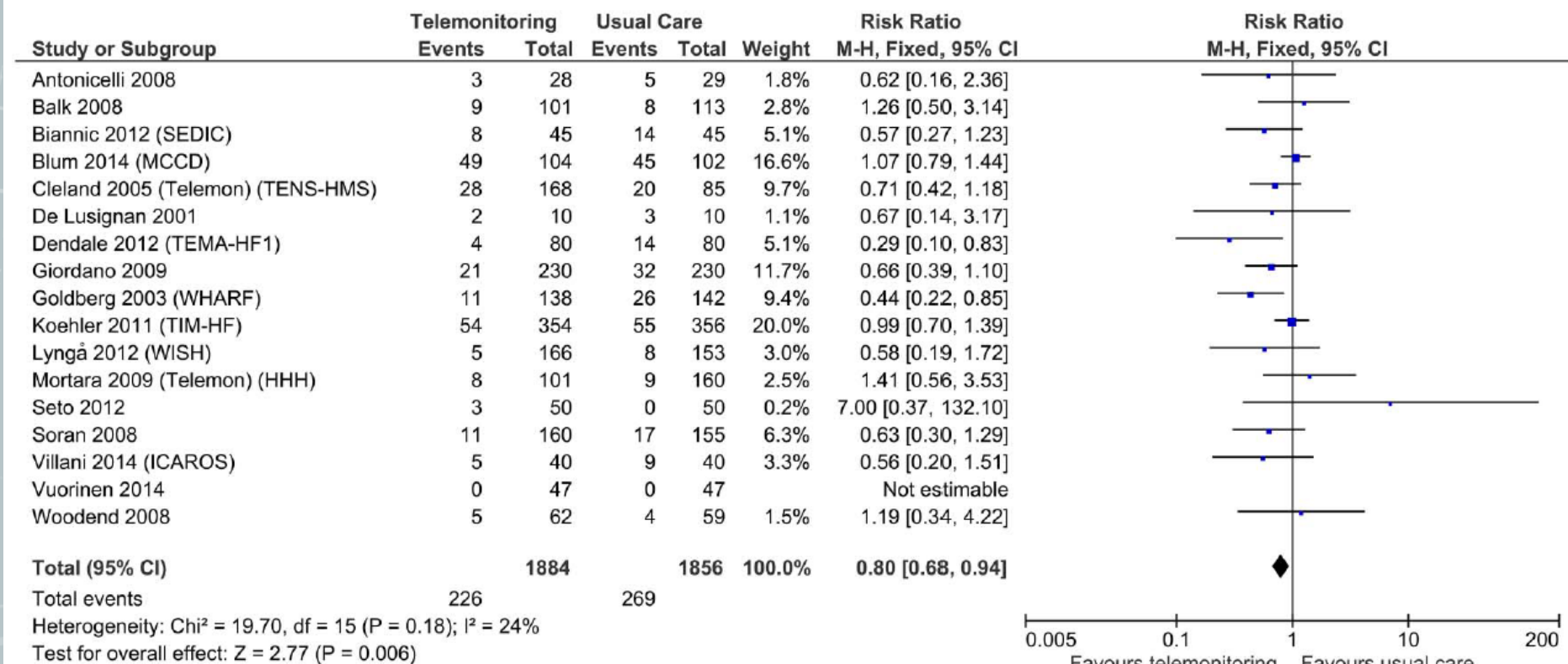
Models and Results

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HF – Telemonitoring

- Structured telephone support and TM significantly ↓ all-cause mortality and ↓ all-cause hospitalisations



HF – Other lessons from TM

- ↑ Health-related quality of life

INH study. Circ Heart Fail. 2012; 5:25-35

- Better patient education: ↑ self-care abilities and sense of self-efficacy

TEHAF study. European Journal of CV Nursing 2014, Vol. 13(3) 243-252

- ↑ adherence for TM vs STS

N Engl J Med 363; 24

J Am Coll Cardiol 2005; 45:1654-64

- Cost –effectiveness seems to favour TM

Archives of Internal Medicine 2003;163(7):809–17

Wakefield et al, Telemedicine Journal and E-Health 2008;4(8):753–61

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RICA-HF_{team} Telemonitoring

- **Inclusion criteria:**

- HF decompensated $\leq 12\text{mo}$
- LVEF $\leq 45\%$

- **Biometrics measurement + medical management**

- 24/7 on call schedule (medical HF team)

- **Expectations:**

- Enrolment of 21 more patients in 2018

- **Sample description**

- N = 9, ♂ 56%, median age $68 \pm 6\text{y}$, FUP $67 \pm 3\text{d}$;
- OMT 100%
- HF aetiology: DCM 56%, Ischemic 44%; Median LVEF 28,6 %.

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CONCLUSIONS

- Telemonitoring in HF ↓ all-cause mortality and ↓ hospitalisations
- Best models to be further evaluated



- Define population, biometrics, FUP → “Patient-centered”
- Incorporate invasive and non-invasive data → HF multidisciplinary team
- RCTs on-going: TIM-HFII, ITEC-CHF, TEC4Home...



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