Iter diagnostici e decisionali diversi per l'applicazione di ICD in prevenzione primaria nella Cardiomiopatia ischemica e non ischemica?

Modelli organizzativi nella Sanità di oggi

CARDIO FOCUS

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ASL TO1
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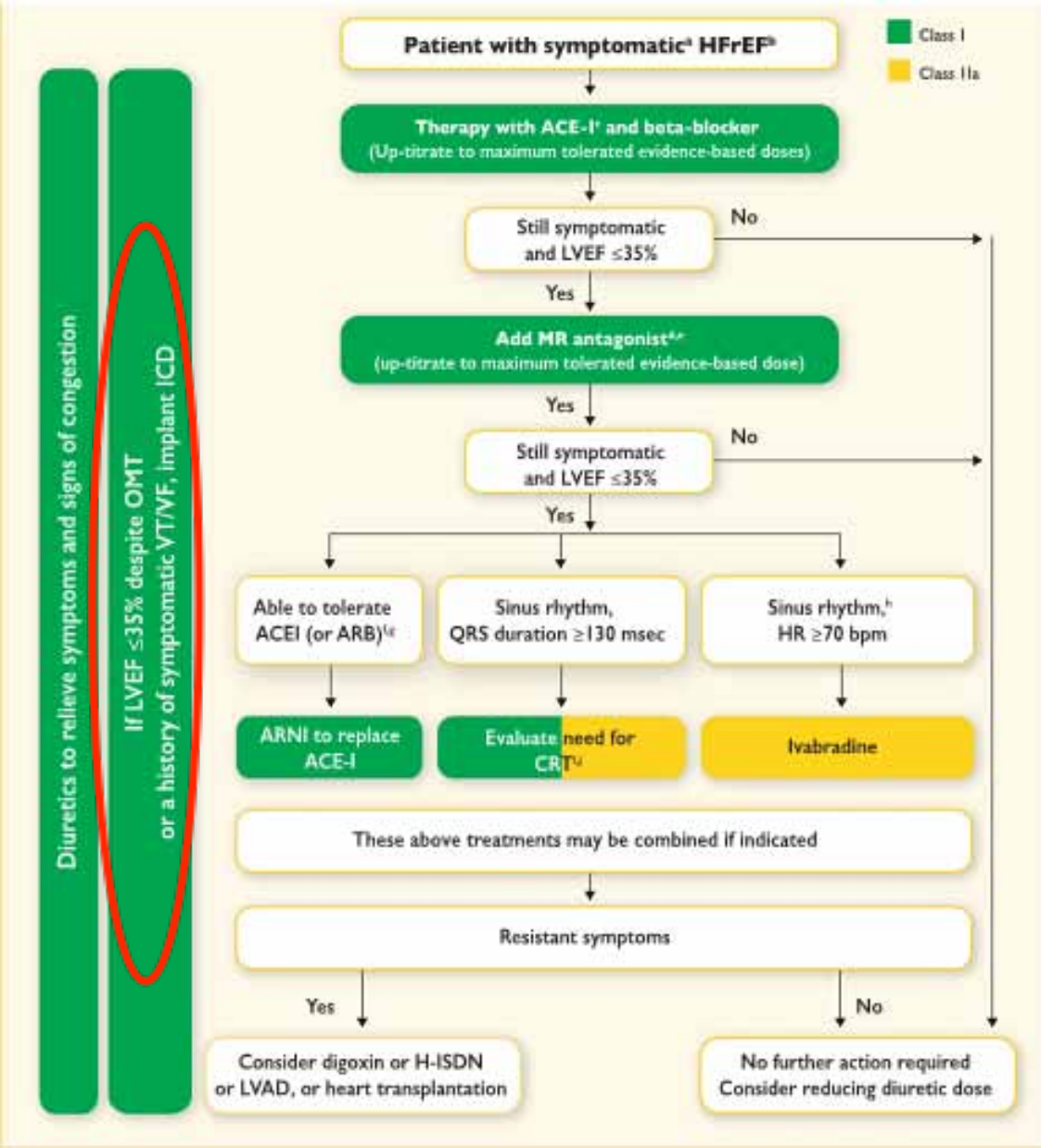
ASL TO2
Azienda Sanitaria
Locale Torino

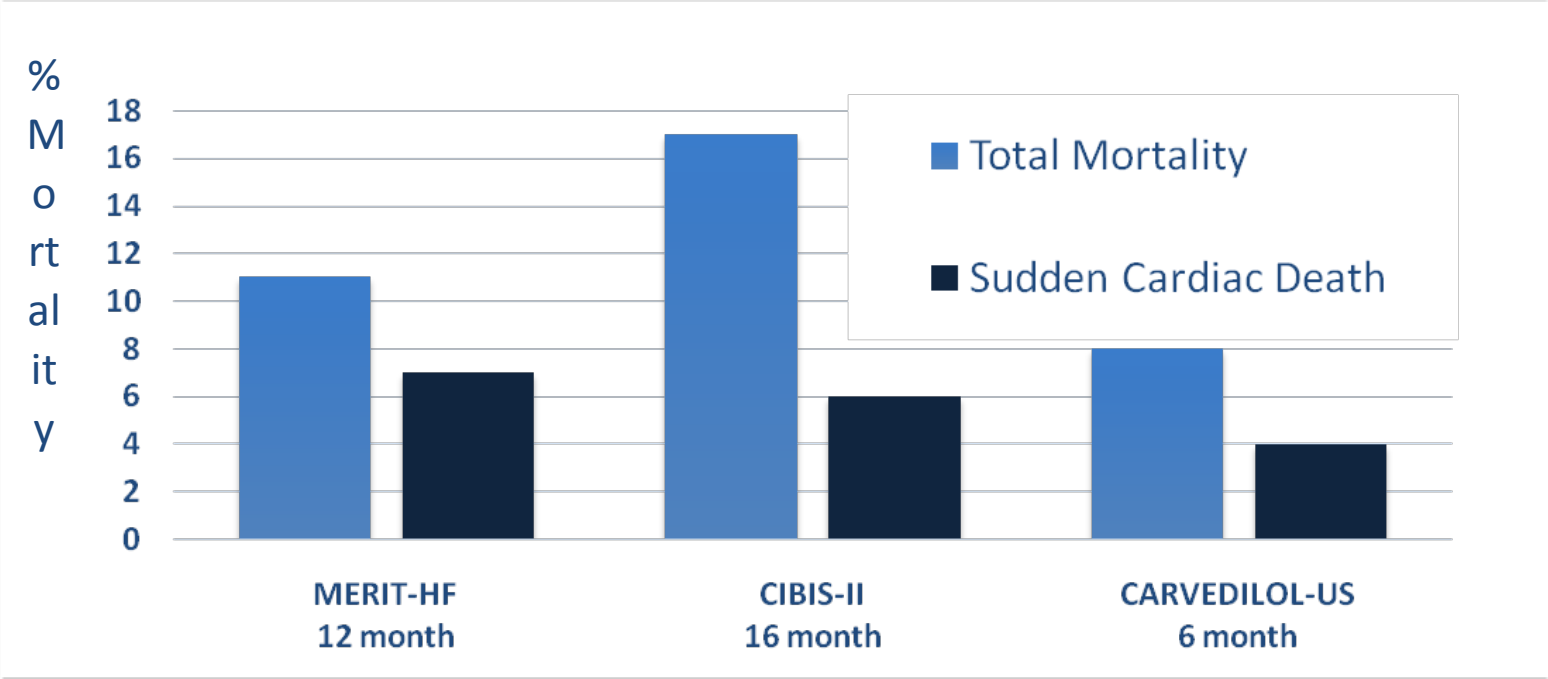
Azienda Sanitaria Locale "Citta' di Torino"

Le Linee guida attuali….



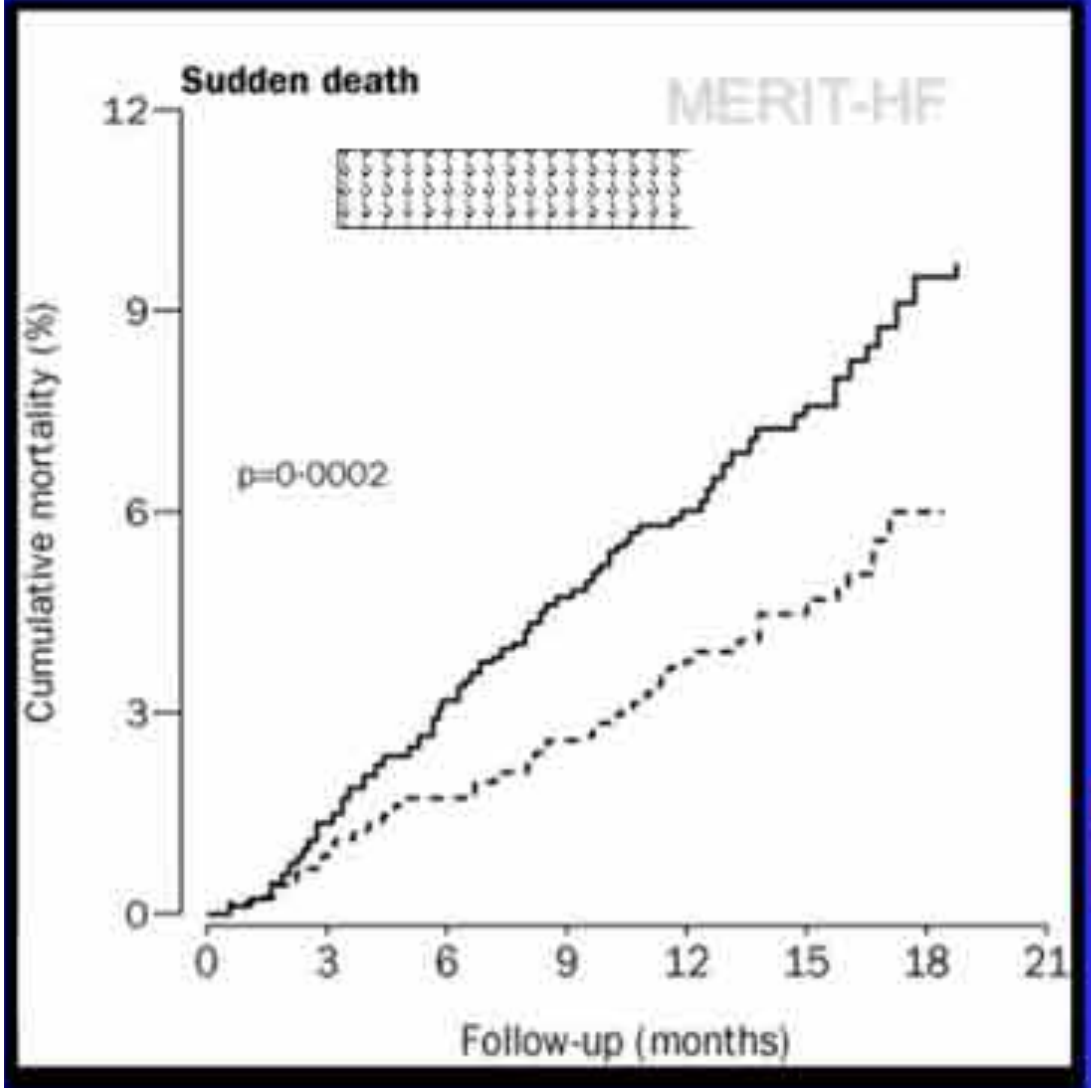
Pazienti con HF e bassa frazione di eiezione

- La Morte improvvisa è responsabile di ~50% (35-64%) della mortalità totale1,2,3
  - EF è il più importante fattore di rischio unico per SCA



1 Merit-HF Study Group. Effect of metoprolol CR/XL in chronic heart failure: Metoprolol CR/XL Randomized Intervention Trial in Congestive Heart Failure (MERIT-HF) *Lancet* 1999;353:2001-7.

Beta - Adrenergic Blocking Agents



SCD - Treated pts

MERIT-HF	3.6%
CIBIS II	4%
US Carvedilol	1.7%
MOCHA	2.3%

- AVERAGE SD decrease 33%

Lancet 1999; 353: 2001-7

	Starting dose (mg)	Target dose (mg)
ACE-I		
Captopril[a]	6.25 *t.i.d.*	50 *t.i.d.*
Enalapril	2.5 *b.i.d.*	10–20 *b.i.d.*
Lisinopril[b]	2.5–5.0 *o.d.*	20–35 *o.d.*
Ramipril	2.5 o.d.	10 *o.d.*
Trandolapril[a]	0.5 *o.d.*	4 *o.d.*
Beta-blockers		
Bisoprolol	1.25 *o.d.*	10 *o.d.*
Carvedilol	3.125 *b.i.d.*	25 *b.i.d.*[d]
Metoprolol succinate (CR/XL)	12.5–25 *o.d.*	200 o.d.
Nebivolol[c]	1.25 *o.d.*	10 *o.d.*
ARBs		
Candesartan	4–8 *o.d.*	32 *o.d.*
Valsartan	40 *b.i.d.*	160 *b.i.d.*
Losartan[b,c]	50 *o.d.*	150 *o.d.*
MRAs		
Eplerenone	25 *o.d.*	50 *o.d.*
Spironolactone	25 *o.d.*	50 *o.d.*
ARNI		
Sacubitril/valsartan	49/51 *b.i.d.*	97/103 *b.i.d.*
If-channel blocker		
Ivabradine	5 *b.i.d.*	7.5 *b.i.d.*

Diuretics	Initial dose (mg)		Usual daily dose (mg)	
Loop diuretics[a]				
Furosemide	20–40		40–240	
Bumetanide	0.5–1.0		1–5	
Torasemide	5–10		10–20	
Thiazides[b]				
Bendroflumethiazide	2.5		2.5–10	
Hydrochlorothiazide	25		12.5–100	
Metolazone	2.5		2.5–10	
Indapamide[c]	2.5		2.5–5	
Potassium-sparing diuretics[d]				
	+ACE-I/ ARB	-ACE-I/ ARB	+ACE-I/ ARB	-ACE-I/ ARB
Spironolactone/ eplerenone	12.5–25	50	50	100–200
Amiloride	2.5	5	5–10	10–20
Triamterene	25	50	100	200

European Heart Journal Advance Access published May 20, 2016

European Heart Journal
doi:10.1093/eurheartj/ehw128

ESC GUIDELINES

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

149 Moss MADIT N Engl J Med 2002; 346 (12):

Primary prevention

An ICD is recommended to reduce the risk of sudden death and all-cause mortality in patients with symptomatic HF (NYHA Class II–III), and an LVEF ≤35% despite ≥3 months of OMT provided they are expected to survive substantially longer than one year with good functional status, and they have:

- IHD (unless they have had an MI in the prior 40 days – see below). | I | A | 149, 156, 227
- DCM | I | B | 156, 157, 227

156 Desai AS, Fang JC, Maisel WH, Baughman KL. Implantable defibrillators for the prevention of mortality in patients with nonischemic cardiomyopathy: a meta-analysis of randomized controlled trials. JAMA 2004;292:2874–2879.

157 Kadish A, Dyer A, Daubert JP, Quigg R, Estes NAM, Anderson KP, Calkins H, Hoch D, Goldberger J, Shalaby A, Sanders WE, Schaechter A, Levine JH, Defibrillators in Non-Ischemic Cardiomyopathy Treatment Evaluation (DEFINITE) Investigators. Prophylactic defibrillator implantation in patients with nonischemic dilated cardiomyopathy. N Engl J Med 2004;350:2151–2158.

227 Bardy GH, Lee KL, Mark DB, Poole JE, Packer DL, Boineau R, Domanski M, Troutman C, Anderson J, Johnson G, McNulty SE, Clapp-Channing N, Davidson-Ray LD, Fraulo ES, Fishbein DP, Luceri RM, Ip JH. Amiodarone or an implantable cardioverter–defibrillator for congestive heart failure. N Engl J Med 2005;352:225–237.

STUDY DESIGN

BACKGROUND

SCD-HefT

Definite

Companion

- 1520 pazienti: CRT vs CRTD vs terapia medica, **NYHA III-IV, LVEF 24% βbl 69%**
- ↓ 50% di riduzione in all-cause death con CRT-D (p=0.015) vs terapia medica
- No significatività tra CRTP e CRTD

STUDY DESIGN

BACKGROUND

SCD-HefT

Definite

- 458 pazienti non ischemici, **LVEF 20%, βBl 85%**
- ↓ 35% di riduzione in all-cause death con ICDs (p=0.08) vs terapia medica; in **NYHA III (21%)** la riduzione diventa significativa
- ↓ 80% riduzione in morte improvvisa

Companion

- 1520 pazienti: CRT vs CRTD vs terapia medica, **NYHA III-IV, LVEF 24% βbl 69%**
- ↓ 50% di riduzione in all-cause death con CRT-D (p=0.015) vs terapia medica
- No significatività tra CRTP e CRTD

STUDY DESIGN

BACKGROUND

SCD-HefT

- 2521 pazienti; 50% non ischemico, **LVEF 20%, βbl 69% > 80%**
- ↓ 27% di riduzione in all-cause death con ICD (p = 0.06) vs terapia medica

Definite

- 458 pazienti non ischemici, **LVEF 20%, βBl 85%**
- ↓ 35% di riduzione in all-cause death con ICDs (p=0.08) vs terapia medica; in **NYHA III (21%)** la riduzione diventa significativa
- ↓ 80% riduzione in morte improvvisa

Companion

- 1520 pazienti: CRT vs CRTD vs terapia medica, **NYHA III-IV, LVEF 24% βbl 69%**
- ↓ 50% di riduzione in all-cause death con CRT-D (p=0.015) vs terapia medica
- No significatività tra CRTP e CRTD

Endpoints

DANISH

Primary endpoint:

- All-cause mortality

Secondary endpoints:

- CV mortality
- Sudden cardiac death

DANISH TRIAL
study design

DANISH= the Danish Study to Assess the Efficacy of ICDs in Patients with Non-ischemic Systolic Heart Failure on Mortality

- Randomized 1:1
- Parallel group
- Unblinded
- Pre specified study population size **1000 pts**

- randomization stratified by CRT indication (determined prior randomization)

	No ICD (50%)	ICD (50%)
CRT (58%)	CRT-P	CRT-D
No CRT (42%)	No device	ICD

- Events sample size: 246 endpoints
- to achieve 80% power to detect 25% reduction

- primary endpoint: all-cause death
- objective: **superiority**

- to ensure proportion CRT is same in ICD and control
- analysis was stratified by CRT indication and center

CRT GUIDELINES HISTORY

ESC2001 GUIDELINES FOR DIAGNOSIS & TREATMENT OF **CHF**

ESC2006 GUIDELINES FOR DIAGNOSIS TREATMENT OF **CHF**

ESC2007 GUIDELINES FOR **CARDIAC PACING & CRT**

ESC2008 GUIDELINES FOR DIAGNOSIS & TREATMENT OF **AHF &CHF**

ESC 2016 GUIDELINES FOR DIAGNOSIS & TREATMENT OF AHF & CHF

2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016

Feb 2008 **DANISH TRIAL Jun 2014**

ESC2008

SR	SR	I A
	HF & PM indication	IIa C
HF & PM indication		
Permanent AF		IIa C

ESC2010

SR	
HF & PM indication	
Permanent AF	

ESC2012

SR	I A	
	IIa A	
	I A	
	IIa A	
HF & PM indication	IIa C	
	IIb C	
Permanent	IIb	

ESC2013

SR		
HF & Upgrade from PM/ICD		
HF & PM indication		
Permanent or long-standing persistent AF		

2014 Study population sample size 1000 > 1150

SR		LVEF ≤ 35%, **NYHA Class II**, III, ambulatory IV, OMT and
	I A	LBBB **QRS>150ms**
	I B	**LBBB QRS: 120-150 ms**
	IIa B	NON LBBB QRS>150ms
	IIb B	**NON LBBB QRS: 120-150 ms**
	III	QRS<120ms
HF & **Upgrade from PM/ICD**	**I B**	LVEF ≤ 35%, NYHA Class III-ambulatory IV, OMT, **High %VP**
HF & PM indication	**IIa** B	LVEF ≤ 35%, **High expected %VP**
Permanent or long-standing persistent AF	**IIa** B	LVEF ≤ 35%, NYHA Class III-ambulatory IV, OMT, QRS >=120ms, Slow V rate and/or AVN Abl

Successiva

RESULTS
DANISH TRIAL

ICD 556
vs
Contr. 560,
58% with CRT in both groups

- **LVEF 25% (20-30%)**
- low on diabetes (19%),
- **high on permanent AF (22%)**
- **Median age 64 (56-72)**

- **Excellently medicated**

1. ACE/ARB **96%**
2. Beta-blocker **92%**
3. MRA 58%

Cross-overs: 14 + 30 from ICD to control, 27 from control to ICD
Loss: 0

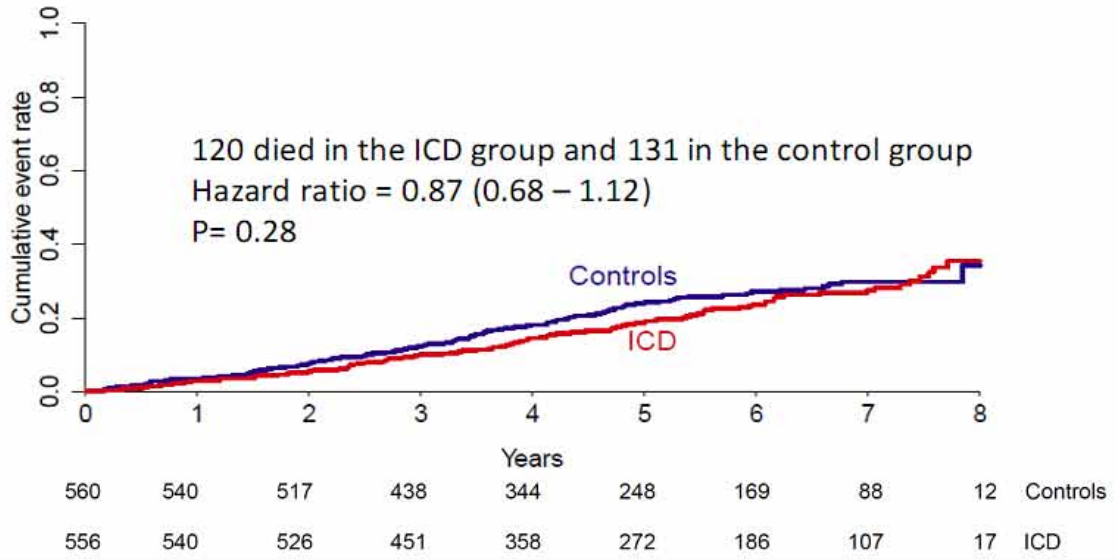
Denmark has a national death registry

Table 1. Characteristics of the Patients at Baseline.*

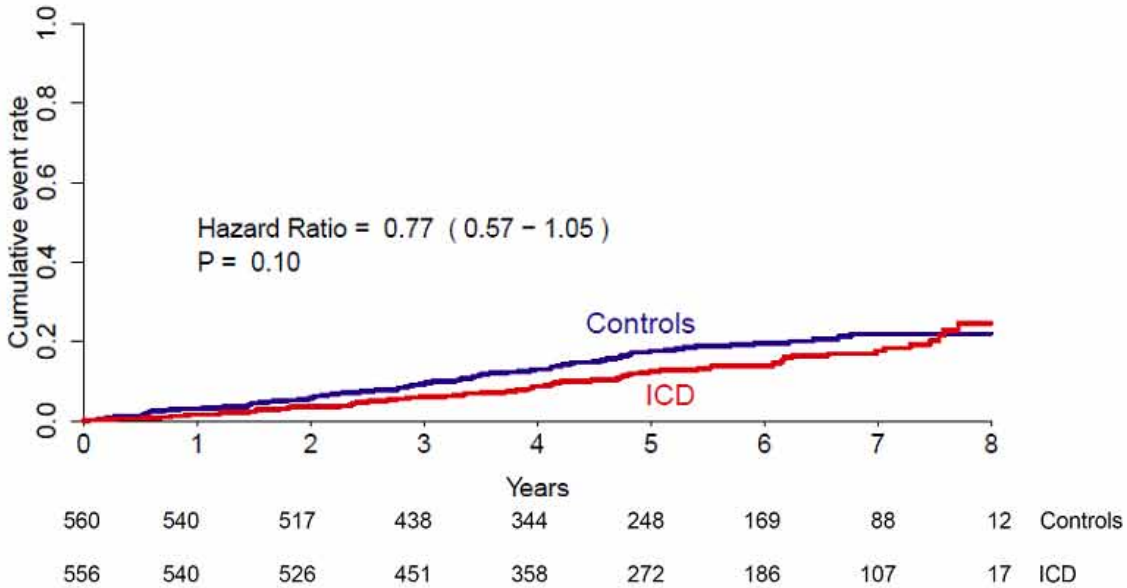
Characteristic	ICD Group (N = 556)	Control Group (N = 560)
Median age (IQR) — yr	64 (56–72)	65 (56–70)
Female sex — no. (%)	151 (27)	156 (28)
Median blood pressure (IQR) — mm Hg		
Systolic	123 (110–139)	124 (111–138)
Diastolic	74 (65–81)	74 (66–82)
Median body mass index (IQR)†	26.8 (23.9–30.5)	26.8 (23.8–30.1)
Median NT proBNP level (IQR) — pg/ml	1244 (616–2321)	1110 (547–2146)
Median QRS duration (IQR) — msec	146 (118–166)	145 (110–164)
Median left ventricular ejection fraction (IQR) — %	25 (20–30)	25 (20–30)
Median estimated GFR (IQR) — ml/min/1.73 m^2	74 (56–91)	73 (58–92)
NYHA class — no. (%)		
II	297 (53)	300 (54)
III	252 (45)	253 (45)
IV	7 (1)	7 (1)
Median duration of heart failure (IQR) — mo	20 (9–72)	18 (9–60)
Coexisting conditions — no. (%)		
Hypertension	181 (33)	167 (30)
Diabetes	99 (18)	112 (20)
Permanent atrial fibrillation	135 (24)	113 (20)
Means of exclusion of ischemic cause of heart failure — no. (%)		
Nuclear study	5 (1)	8 (1)
CT angiogram	18 (3)	11 (2)
Catheterization	533 (96)	541 (97)
Cause of heart failure — no. (%)		
Idiopathic	424 (76)	425 (76)
Valvular	20 (4)	23 (4)
Hypertensive	62 (11)	55 (10)
Other	50 (9)	58 (11)
Medications — no. (%)		
ACE inhibitor or ARB	534 (96)	544 (97)
Beta-blocker	509 (92)	517 (92)
Mineralocorticoid receptor antagonist	328 (59)	320 (57)
Amiodarone	54 (9)	52 (9)
CRT — no. (%)	322 (58)	323 (58)
Preexisting pacemaker or CRT pacemaker — no. (%)	56 (10)	46 (8)

Precedente

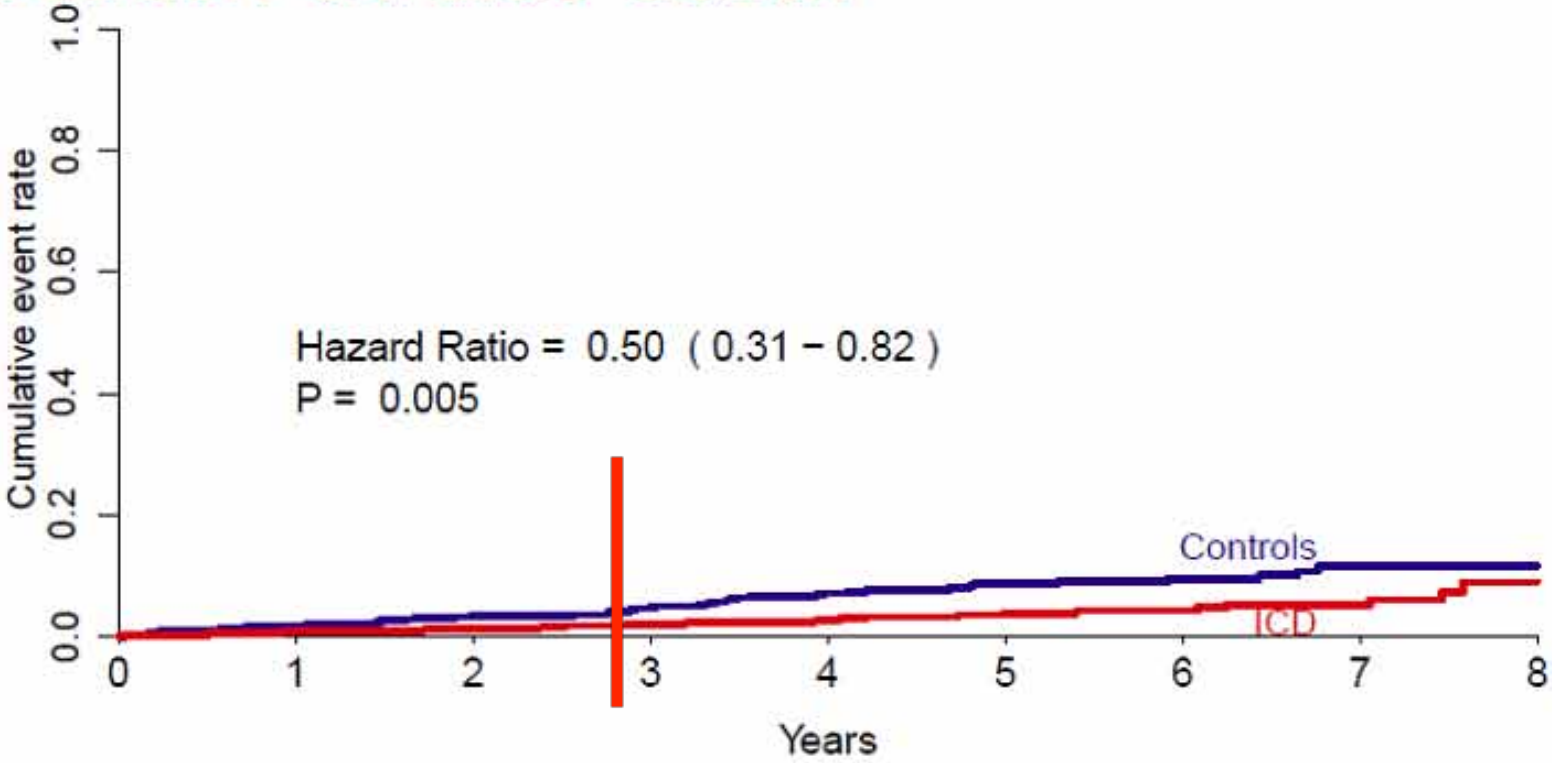
Primary outcome
– all-cause mortality



Secondary outcome
– cardiovascular mortality



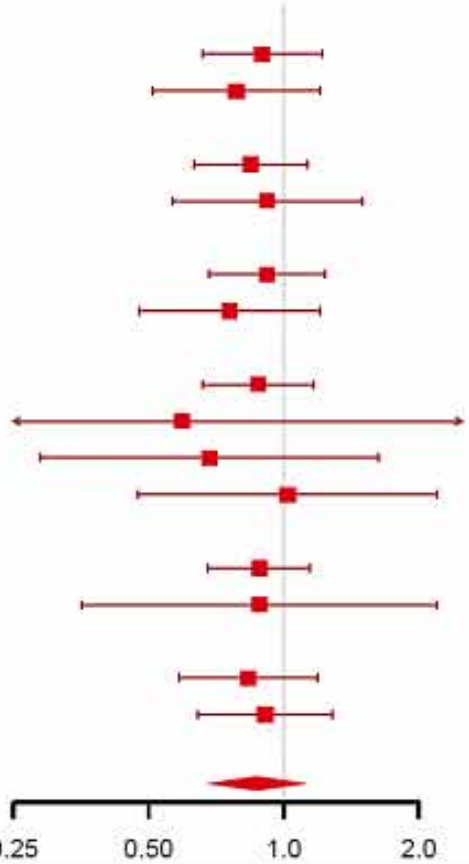
Secondary outcome – sudden cardiac death



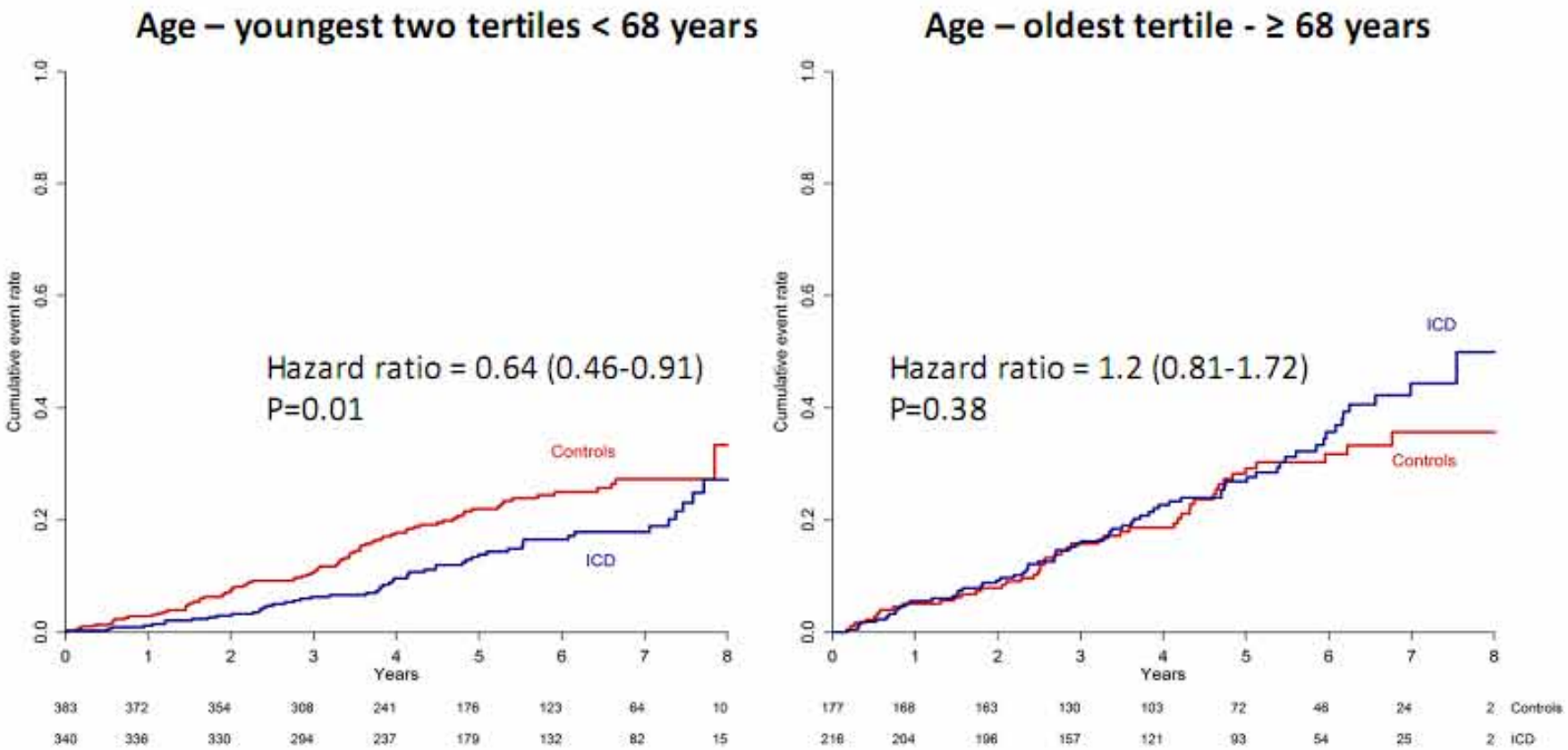
560	540	517	438	344	248	169	88	12	Controls
556	540	526	451	358	272	186	107	17	ICD

Subgroup analysis: all-cause mortality

Subgroup	ICD	Control	HR	P value	P value
Hypertension					**0.63**
No	78/375	87/392	0.90 (0.66–1.22)	0.48	
Yes	42/181	44/167	0.79 (0.51–1.21)	0.27	
Diabetes					**0.60**
No	87/457	95/448	0.85 (0.63–1.31)	0.26	
Yes	33/99	36/112	0.92 (0.57–1.50)	0.74	
Permanent atrial fibr.					**0.30**
No	83/421	91/447	0.92 (0.68–1.24)	0.58	
Yes	37/135	40/113	0.76 (0.48–1.20)	0.24	
Aetiology					**0.80**
Idiopathic	90/424	100/425	0.88 (0.66–1.17)	0.37	
Valvular	4/20	5/21	0.59 (0.13–2.71)	0.50	
Hypertension	13/62	12/55	0.68 (0.29–1.63)	0.39	
Other	13/50	14/59	1.02 (0.47–2.20)	0.96	
Pre-existing CRT-P or PM					**0.71**
No	108/500	120/514	0.88 (0.68–1.14)	0.34	
Yes	12/56	11/46	0.88 (0.36–2.20)	0.79	
CRT					**0.73**
No	58/234	65/237	0.83 (0.58–1.19)	0.31	
Yes	62/322	66/323	0.91 (0.64–1.29)	0.59	
Overall			**0.87 (0.68–1.12)**	**0.28**	



All- cause mortality by age



Linee Guida ESC 2015 VA e SCD

prevenzione primaria: ICD e MI

ICD e MI

Timing of implantable cardioverter defibrillator placement after myocardial infarction. Assessment of left ventricular ejection fraction

Recommendations	Class[a]	Level[b]	Ref.[c]
Early (before discharge) assessment of LVEF is recommended in all patients with acute myocardial infarction.	I	C	286–288
Re-evaluation of LVEF 6–12 weeks after myocardial infarction is recommended to assess the potential need for primary prevention ICD implantation.	I	C	286–288
ICD implantation for the primary prevention of SCD is generally not indicated <40 days after myocardial infarction.	III	A	274, 275

ICD e HF

Implantable cardioverter defibrillator in patients with left ventricular dysfunction

Recommendations	Class[a]	Level[b]	Ref.[c]
ICD therapy is recommended to reduce SCD in patients with symptomatic HF (NYHA class II–III) and LVEF ≤35% after ≥3 months of optimal medical therapy who are expected to survive for at least 1 year with good functional status			

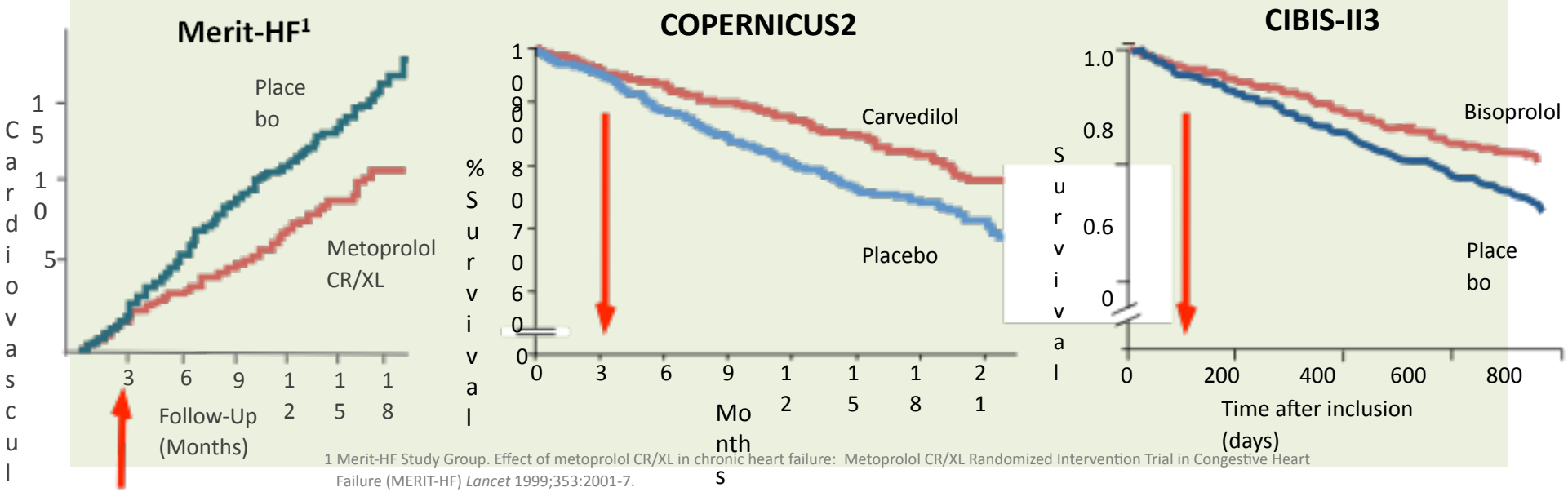
ICD e DCM

An ICD is recommended in patients with DCM, symptomatic HF (NYHA class II–III) and an ejection fraction ≤35% despite ≥3 months of treatment with optimal pharmacological therapy who are expected to survive for >1 year with good functional status.	I	B

OMT per 3 mesi

Ottimizzazione della terapia: proteggere il paziente dal rischio di SCA

- L'ottimizzazione della terapia medica richiede almeno 3 mesi
- Una terapia efficace con beta bloccanti si ottiene spesso dopo 8-12 settimane ed è in grado di ridurre il rischio di mortalità



1 Merit-HF Study Group. Effect of metoprolol CR/XL in chronic heart failure: Metoprolol CR/XL Randomized Intervention Trial in Congestive Heart Failure (MERIT-HF) *Lancet* 1999;353:2001-7.
2 Packer M, et al. Effect of Carvedilol on survival in severe chronic heart failure. NEJM 2001;344:1651-8.
3 CIBIS-II Investigators. The Cardiac Insufficiency Bisoprolol Study II (CIBIS-II). Lancet 1999;353:9-13.

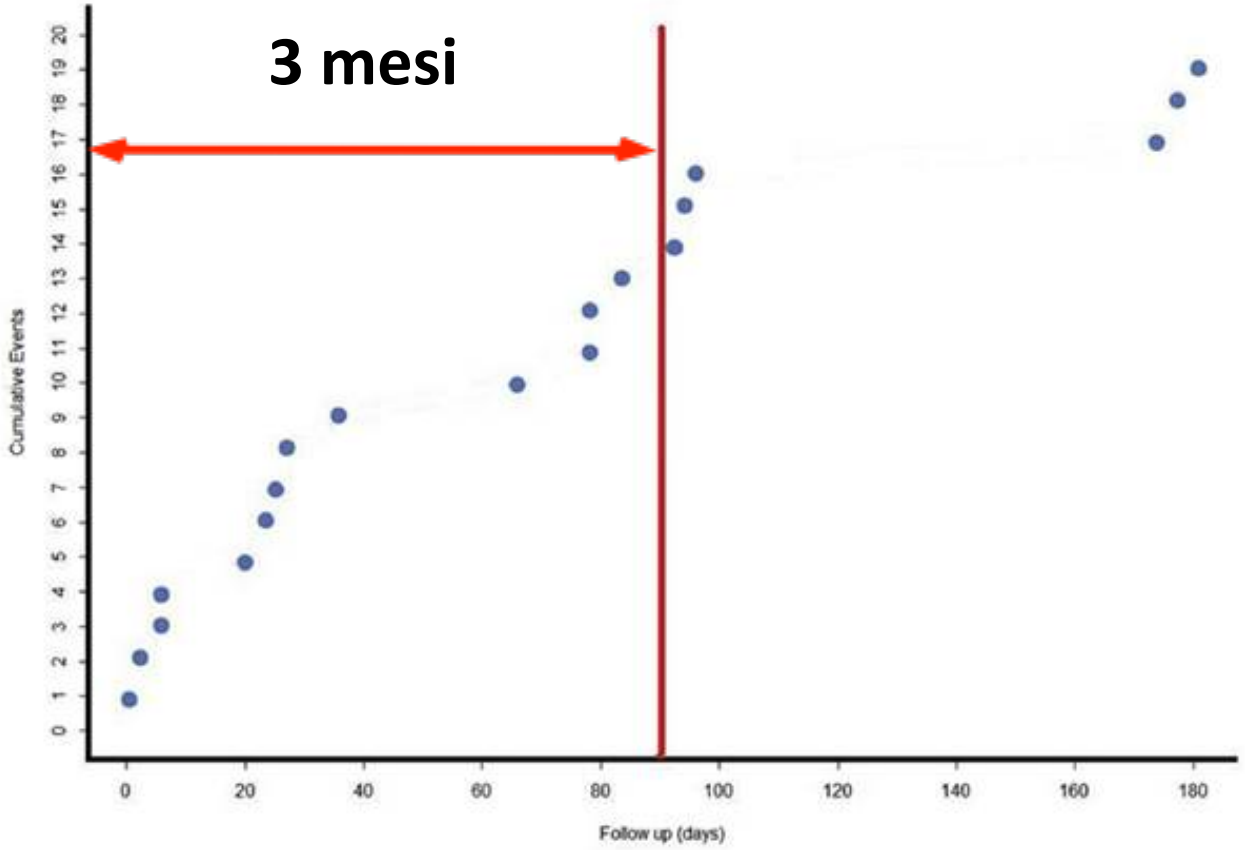
Rischio di Morte improvvisa nelle Cardiomiopatie dilatative Non ischemiche

- Dal 1988 al 2014, 952 pazienti con DCM sono stati inclusi nel **Registro Malattie del Muscolo Cardiaco di Trieste.**
- LVEF <50%
- Criteri di esclusione:
  - storia di ipertensione sistemica severa (>160/100 mm Hg),
  - alcolismo (sopra i 100 g/giorno),
  - malattia valvolare severa,
  - malattie cardiache congenite
  - malattie sistemiche avanzate

Early Arrhythmic Events in
Idiopathic Dilated Cardiomyopathy, P. Losurdo et al., (J Am Coll Cardiol EP 2016;2:535–43)

Outcome di 952 pazienti

- 20 pazienti (2.1% della popolazione totale) ha avuto un evento. 13 SCD, 7 MVA.
- 14 su 20 eventi (70%) si sono verificati nei primi 90 giorni dall'arruolamento



The time distribution of the primary outcome showed that 70% of early sudden cardiac death/major ventricular arrhythmias occurred within the first 90 days **(red line)**.

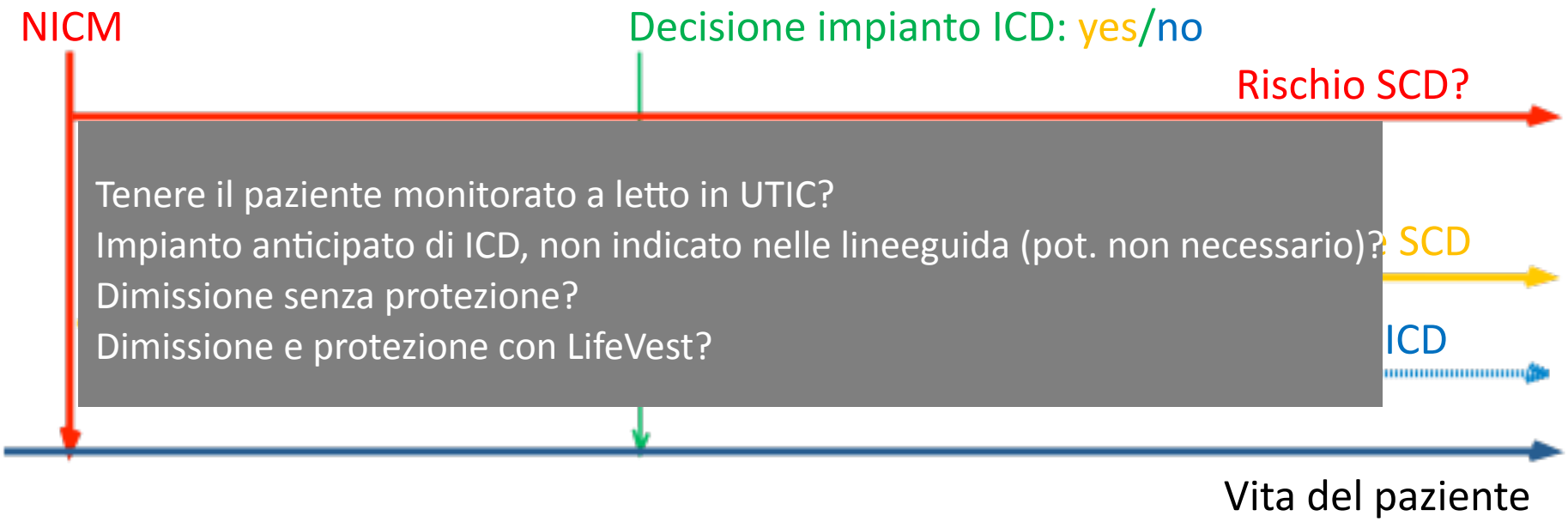
- Durata QRS
- LVESVI

Fattori indipendenti di Morte improvvisa a 6 mesi.

Early Arrhythmic Events indiopathic Dilated Cardiomyopathy, P. Losurdo et al., (J Am Coll Cardiol EP 2016;2:535–43)

Rischio SCD e protezione
NICM, HF e LVEF <=35%

Ottimizzazione terapia farmacologica, Convalescenza (min. 3 mesi)



RISPETTO DELLE LINEE GUIDA

Utilizzo di WCD nei pazienti con HF di recente diagnosi

- Studio prospettico
- 156 pazienti

	Baseline (n=156)	3 Months Follow-up (n=153)	P Value
NYHA	2.8±0.7	2.0±0.5	<0.001
LVEF, %	24±7	35±10	<0.001
LVEF ≤35%, n (%)	167 (100)	89 (58)	
Δ LVEF from baseline, %	—	11±11	
Rhythm, n (%)			0.486
Sinus	136 (87)	138 (90)	
AF	19 (13)	13 (8)	
Other	1 (1)	2 (1)	
Heart rate, bpm	80±18	69±14	<0.001
QRS, ms	112±26	115±27	0.081

Beta-blocker			
N (%)	149 (96)	145 (95)	1.000
Dosage (% from target dose)	47±26	63±30	<0.001
RAS antagonist			
N (%)	151 (97)	152 (99)	0.250
Dosage (% from target dose)	45±25	65±29	<0.001
MRA			
N (%)	140 (90)	136 (89)	0.791
Dosage (% from target dose)	49±21	55±27	0.001
Diuretics, n (%)	130 (83)	123 (80)	0.388
Ivabradine			
N (%)	37 (24)	31 (20)	0.146
Dosage (% from target dose)	78±12	76±14	0.274
Digitalis, n (%)	19 (12)	14 (9)	0.227

Avoiding Untimely Implantable Cardioverter/Defibrillator Implantation by Intensified Heart Failure Therapy Optimization Supported by the Wearable Cardioverter/Defibrillator—The PROLONG Study, D. Duncker et al, J Am Heart Assoc. 2017;6:e004512. DOI: 10.1161/JAHA.116.004512

Ut nti

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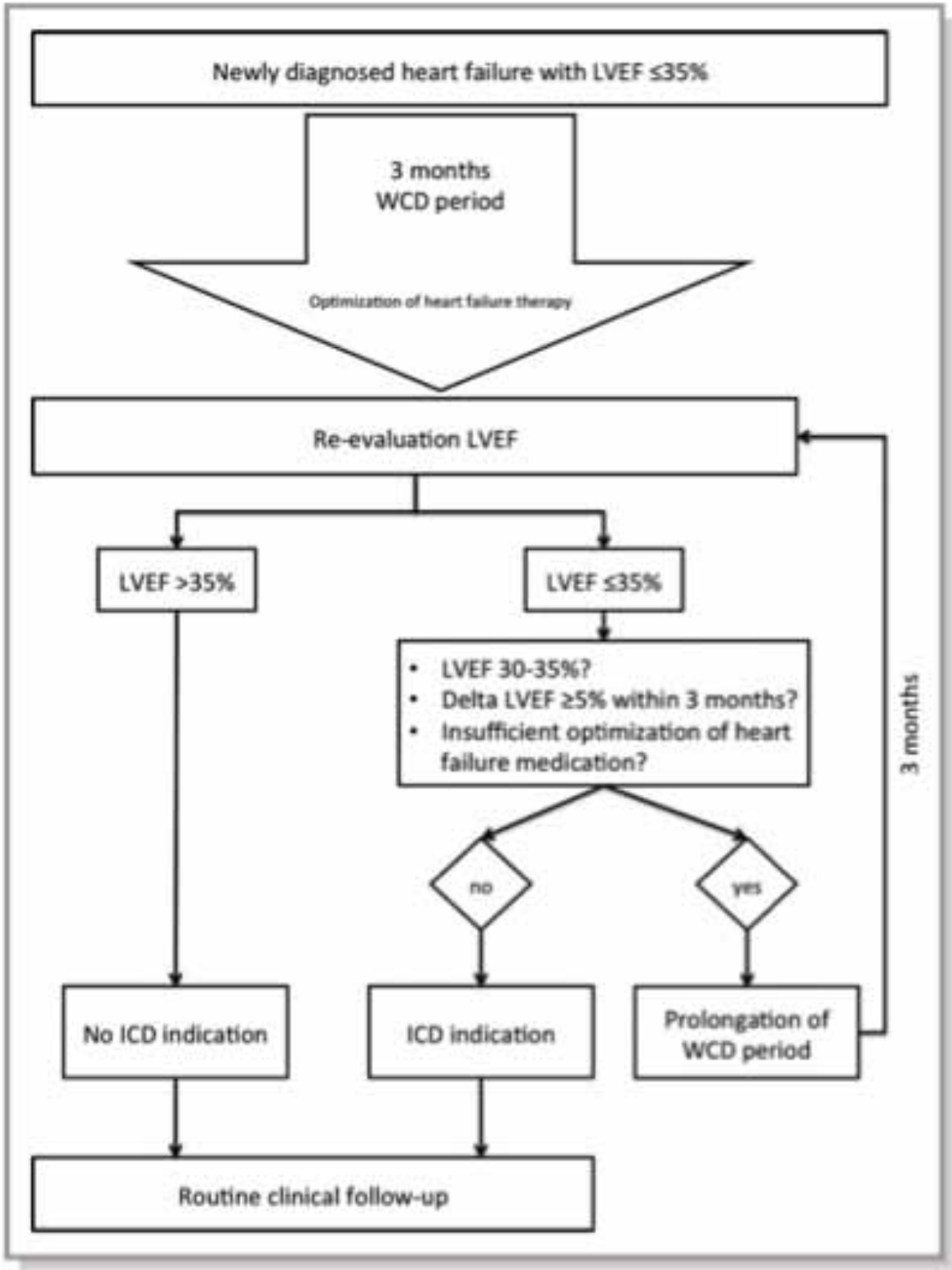

Newly diagnosed heart failure with LVEF ≤35%
3 months
WCD period
Optimization of heart failure therapy
Re-evaluation LVEF
LVEF >35%
LVEF ≤35%
• LVEF 30-35%?
• Delta LVEF ≥5% within 3 months?
• Insufficient optimization of heart failure medication?
no
yes
3 months
No ICD indication
ICD indication
Prolongation of WCD period
Routine clinical follow-up

Utilizzo di WCD nei pazienti con HF di recente diagnosi

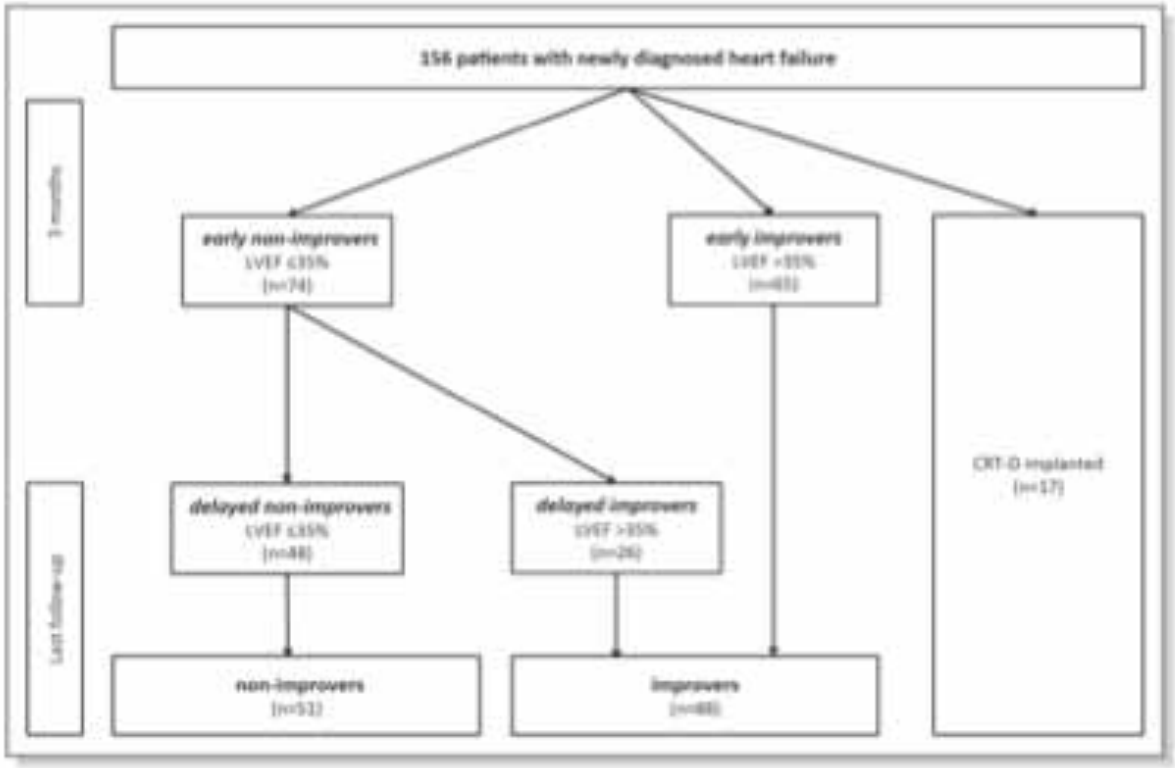


Figure 2. Investigational plan and outcome with respect to different subgroups. CRT-D indicates cardiac resynchronization therapy defibrillator; LVEF, left ventricular ejection fraction.

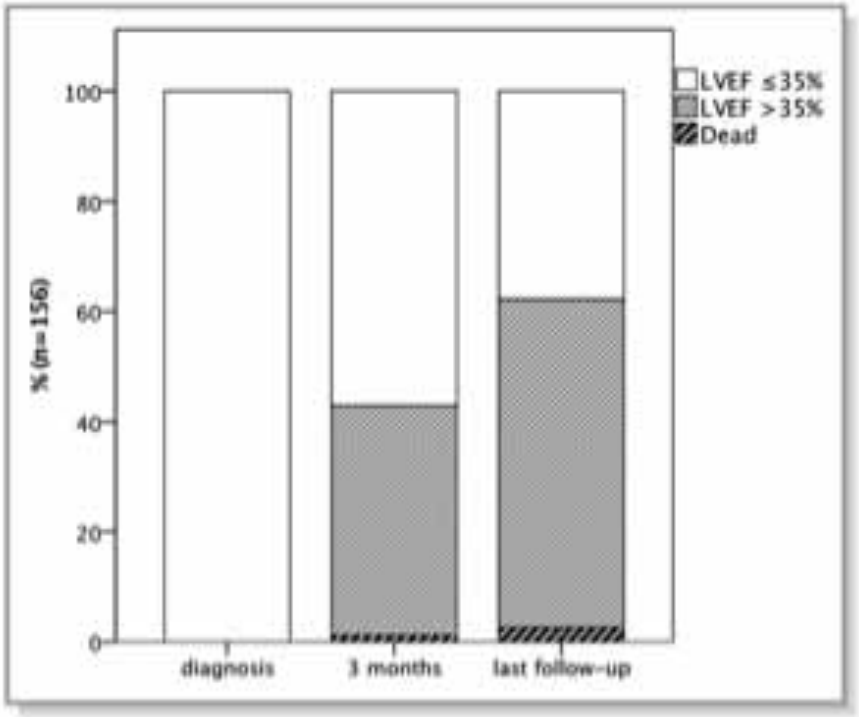


Figure 4. Evolution of the proportion of patients with left ventricular ejection fraction (LVEF) ≤35% versus >35% over time.

REGISTRO TEDESCO

- Registro prospettico
- Germania: 6.043 pazienti (Aprile 2010-Ottobre 2013)
- Il primo registro nazionale fuori dagli USA che testimonia l'utilizzo del WCD in un diverso sistema sanitatrio nel quale le strategie di trattamento sono diverse
- La prima analisi Europea a supporto delle linee guida ESC e quelle dell'associazione cardiologica tedesca sull'uso del WCD.

- Eziologia:

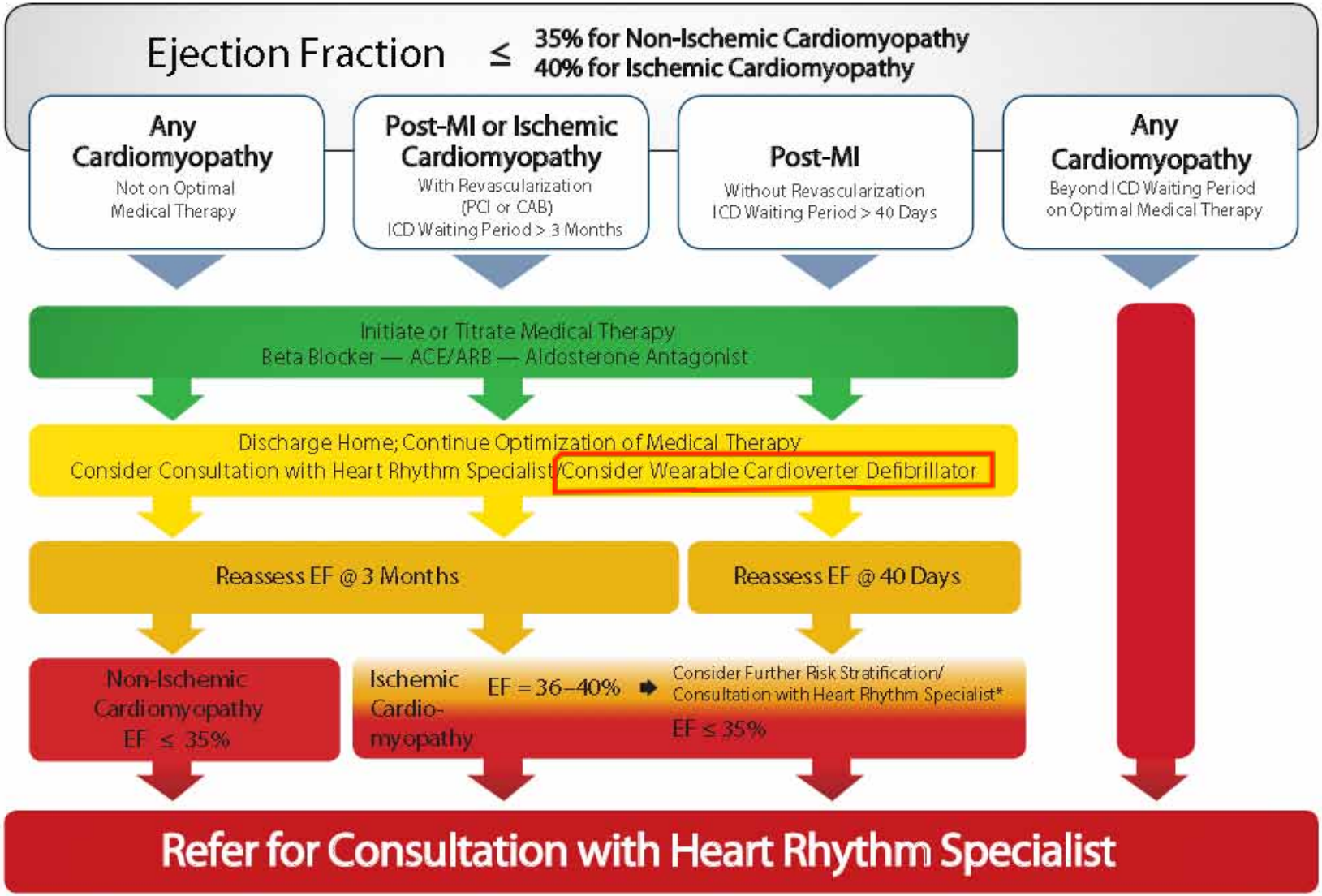
	Total* 6.043 (100%)
Demographic, Median [IQR]	
Age	57 [48, 68]
Primary cardiac indication, N (%)[1]	
DCM	2,220 (36.7%)
ICM	1,625 (26.9%)
NICM	735 (12.2%)
ICD Explant	717 (11.9%)
Myocarditis	595 (9.8%)
Genetic Disease	86 (1.4%)
HTX	40 (0.7%)
CHF	25 (0.4%)

Experience with the Wearable Cardioverter-Defibrillator in Patients at High Risk for Sudden Cardiac Death, N. Wäßnig et al., 10.1161/CIRCULATIONAHA.115.019124

REGISTRO TEDESCO
Risultati

Indication*	Treated Patients (N)	Population (N)	Wear (days)	Frequency x100 [95%CI]	Incidence per 100 patient years [95%CI]
WCD treatment					
German National Cohort	94	6,043	410,185	1.6 [1.3, 1.9]	8.4 [6.8, 10.2]
WCD treatment by gender[1]					
Male	74	4,740	318,211	1.6 [1.2, 2.0]	8.5 [6.7, 10.7]
Female	20	1,296	91,904	1.5 [0.9, 2.4]	7.9 [4.8, 12.3]
WCD use by age quartile					
<=48 years	24	1,628	128,044	1.5 [0.9, 2.2]	6.8 [4.4, 10.2]
49 to 57 years	19	1,486	103,107	1.3 [0.8, 2.0]	6.7 [4.0, 10.5]
58 to 68 years	19	1,508	97,632	1.3 [0.8, 2.0]	7.1 [4.3, 11.1]
>68 years	32	1,421	80,623	2.3 [1.5, 3.2]	14.5 [9.9, 20.5]
WCD treatment by primary cardiac indication					
DCM	29	2,220	109,057	1.3 [0.9, 1.9]	9.7 [6.5, 13.9]
ICM	23	1,625	99,113	1.4 [0.9, 2.1]	8.5 [5.4, 12.7]
NICM	7	735	55,570	1.0 [0.4, 2.0]	4.6 [1.8, 9.5]
ICD Explant	23	717	43,426	3.2 [2.0, 4.8]	19.3 [12.2, 29.0]
Myocarditis	8	595	44,508	1.3 [0.6, 2.6]	6.6 [2.8, 12.9]
Genetic Disease	2	86	5,205	2.3 [0.3, 8.1]	14.0 [1.7, 50.7]
HTX	1	40	2,863	2.5 [0.1, 13.2]	12.7 [0.3, 71.0]
CHF	1	25	1,467	4.0 [0.1, 20.4]	24.9 [0.6, 138.6]

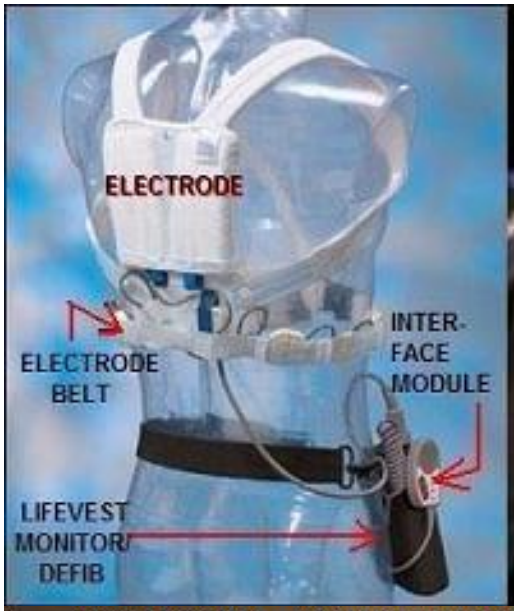
Experience with the Wearable Cardioverter-Defibrillator in Patients at High Risk for Sudden Cardiac Death, N. Wäßnig et al., 10.1161/CIRCULATIONAHA.115.019124

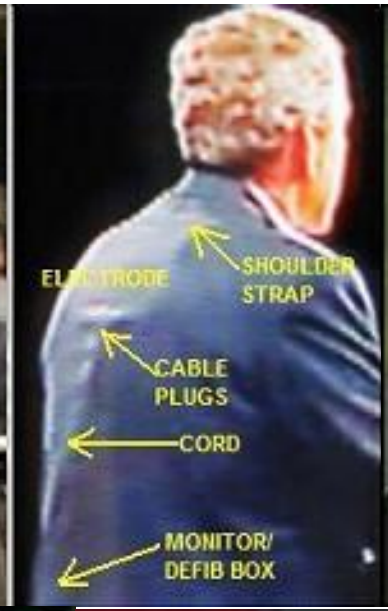


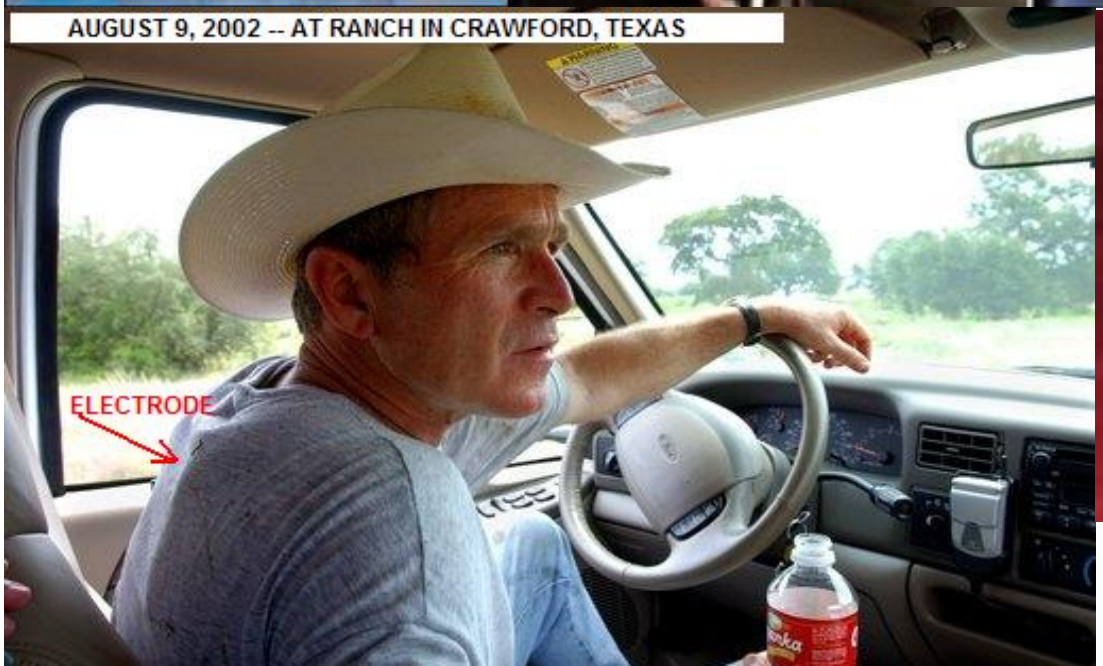
* Buxton AE, Lee KL, Fisher JD, Josephson ME, Prystowsky EN, Hafley G. A randomized study of the prevention of sudden death in patients with coronary artery disease. Multicenter Unsustained Tachycardia Trial Investigators. N Engl J Med. December 16, 1999;341(25):1882-1890.

Recommended by SCA Prevention Protocols Working Group (**Version 2; Revised: 9/10/2012;** Review date: 9/10/2013) All Rights Reserved. Copyright © 2012 Heart Rhythm Society

LifeVest: non e' un giubbotto antiproiettile







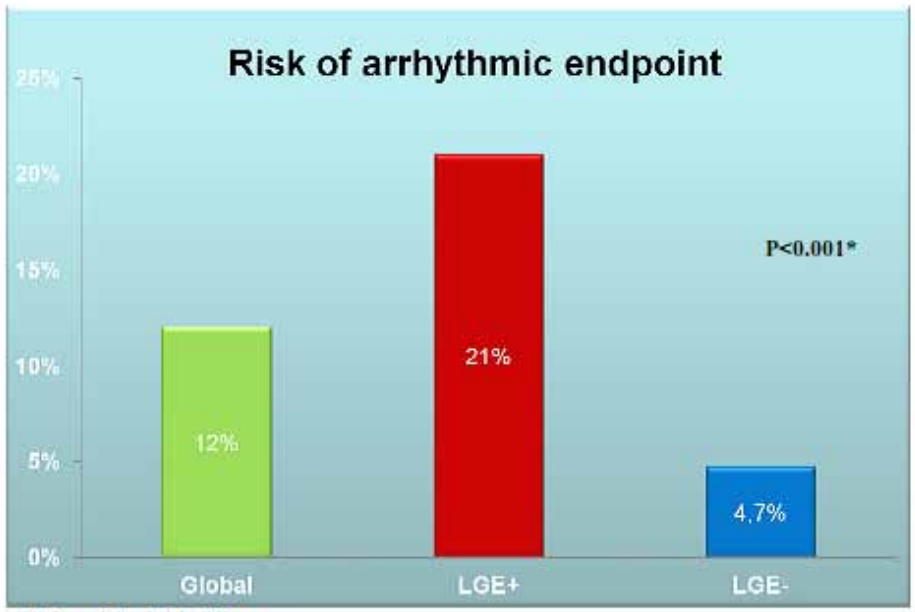
Ruolo della Risonanza Magnetica

Association between late gadolinium enhancement and sudden death or ventricular arrhythmias in patients with non ischemic dilated cardiomyopathy: systematic review and metaanalysis.

Andrea Di Marco[1], Ignasi Anguera[1], Peter Mckenna[2], Paolo Dallaglio[1], Xavier Sabaté, Ángel Cequier Fillat[1]

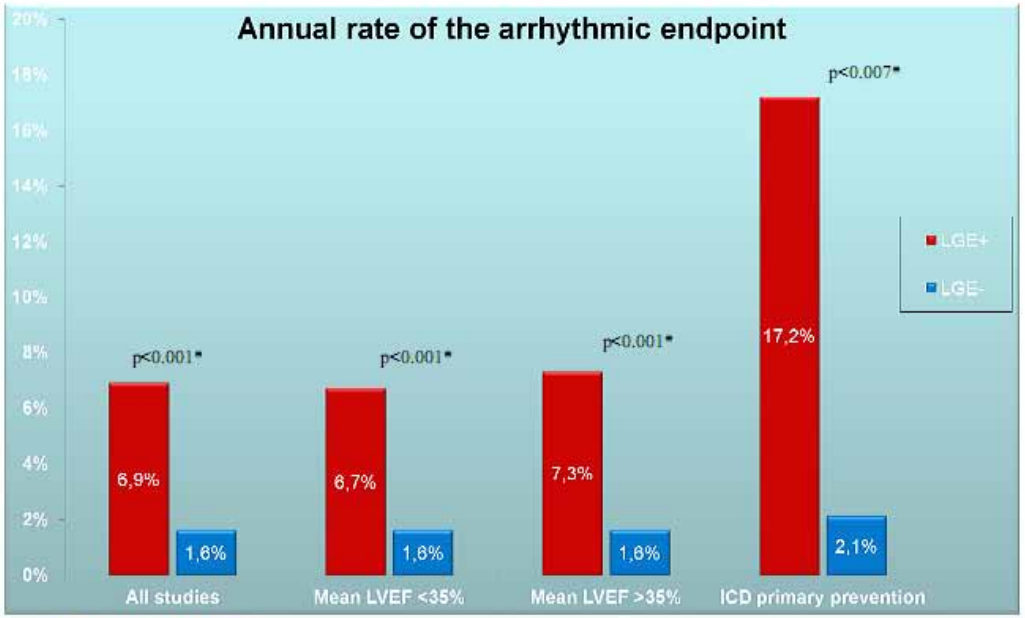
[1]Arrhythmia Unit, Heart Disease Institute, Bellvitge University Hospital, Barcelona, Spain, [2]Benito Menni Hospital, Barcelona, Spain

LGE and the arrhythmic endpoint



* P for weighted risk difference

3. Sub-group and multivariate analysis



* P for weighted risk difference

Conclusioni (1)

- La piu' efficace prevenzione della Morte Improvvisa nella CM dilatativa non ischemica e' data dalla terapia Betabloccante
- L'ICD e' indicato secondo le LG solo se non si ottiene un miglioramento della FE oltre il 35% dopo OMT con o senza CRT
- Considerare il Life West per eseguire una ottimale titolazione dei farmaci con paziente protetto

Conclusioni (2)

- La mortalita' totale nei pazienti > 70 aa e' verosimilmente e fortemente influenzata da patologie concomitanti che il cui rischio sovrasta la protezione dell'ICD dalla morte improvvisa
- La presenza di fibrosi estesa rivelata dal Late Gadolinium Enhancement puo' essere, insieme alla FE ridotta, un importante marcatore per identificare i pazienti con CM dilatativa non ischemica a rischio di morte improvvisa

Iter diagnostici e decisionali diversi per l'applicazione di ICD in prevenzione primaria nella Cardiomiopatia ischemica e non ischemica?

Modelli organizzativi nella Sanità di oggi

CARDIO FOCUS

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