



Congresso
**Novas Fronteiras
em Cardiologia**

8 a 10 fevereiro.2013

Hotel Vila Galé Ericeira



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Custo-Eficácia da Ressincronização Cardíaca

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Hdia Insuf Cardíaca, CHLN

Impacto Económico da Insuficiência Cardíaca

- Apesar de ser difícil definir valores reais de doentes com insuficiência cardíaca, genericamente podemos dizer:
 - Afecta cerca de 900000 pessoas no UK (Nice, 2003)
 - 7 Milhões de Europeus (2005)
 - >1 Milhão hospitalizações EUA

Impacto Económico da Insuficiência Cardíaca

- Como diagnostico principal da alta hospitalar—verificamos um aumento de 40-70%, no Canada, Espanha, Escócia e Suécia¹
- Na Europa, aproximadamente 5% das admissões Hospitalares (agudos) estão relacionados com Insuficiência Cardíaca ^{2,3}

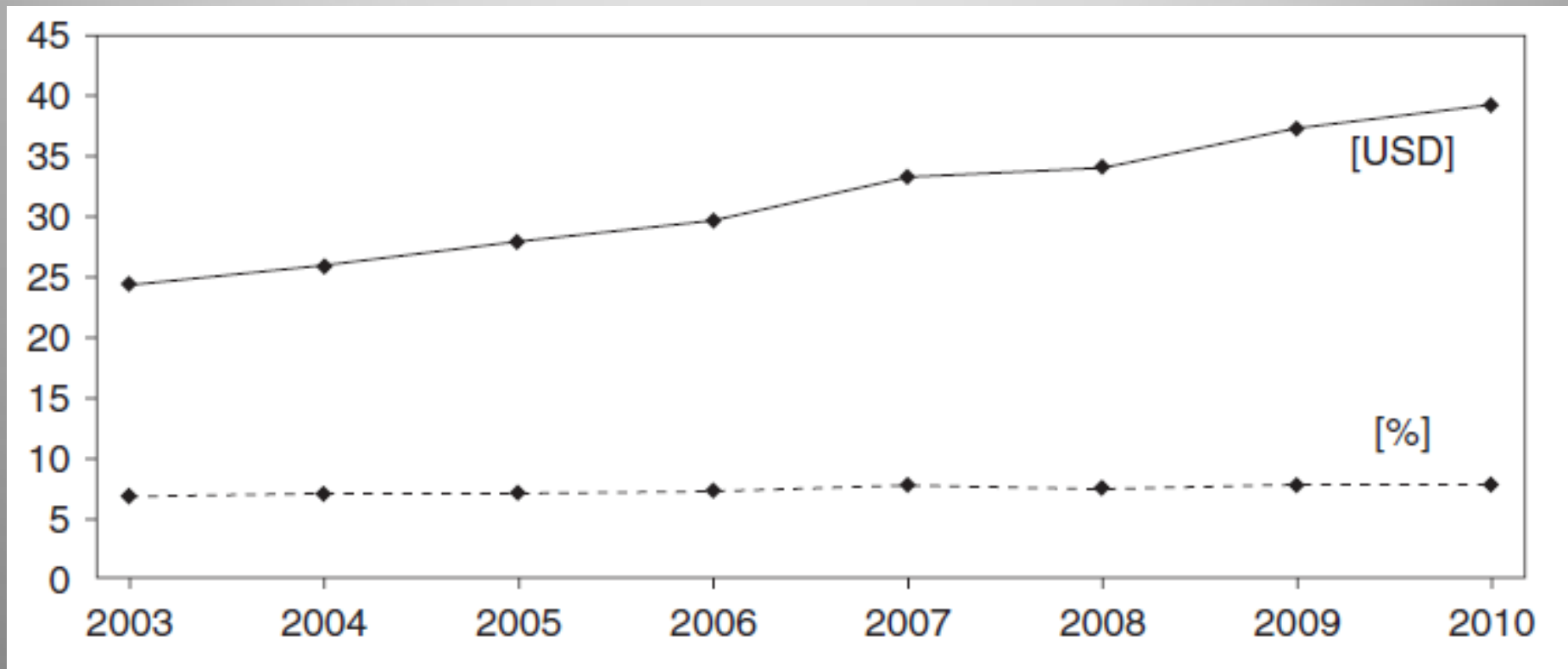
(1) Liao L, et Al Pharmacoeconomics 2008; 26: 447-62

(2) Rodriguez-Artalejo et al Eur Heart J 1997; 18: 1771-9

(3) Cowie MR, Eur Heart J 2002; 23: 877-85.

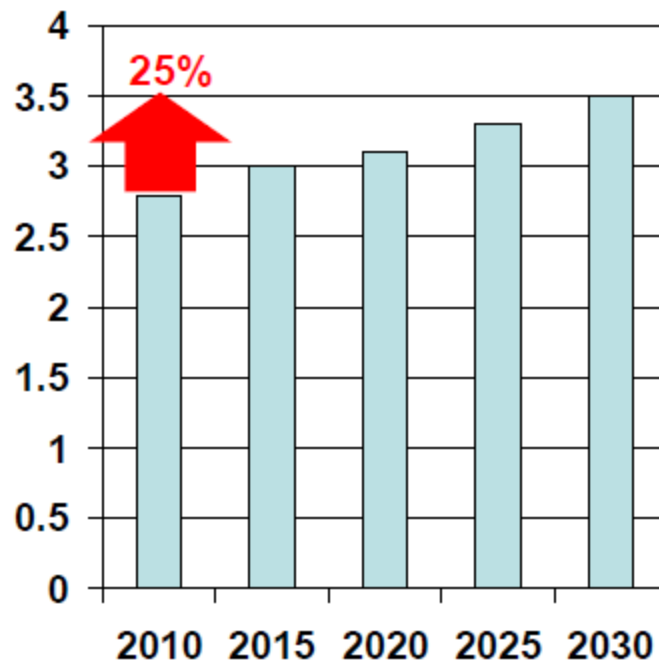
Impacto Económico da Insuficiência Cardíaca

Custos em Insuficiência Cardíaca nos EUA de 2003-2010

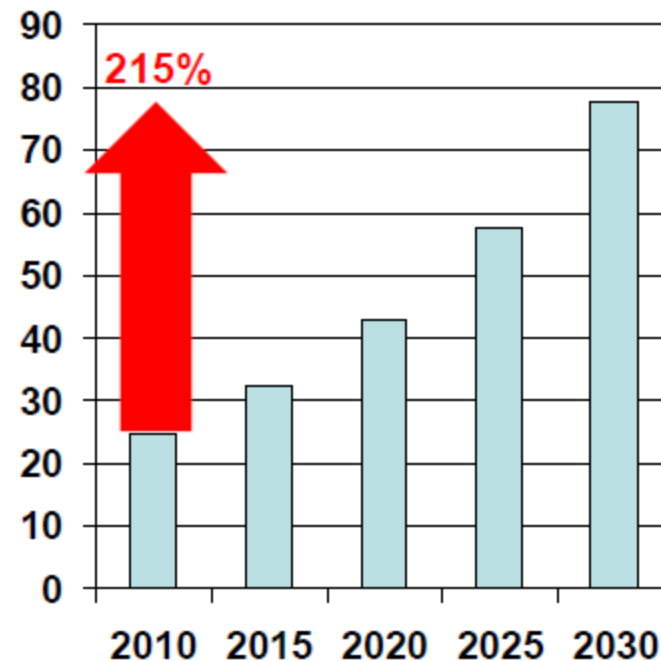


Projected US Heart Failure Prevalence and Direct Cost

Projected US Prevalence of Heart Failure (%)



Projected US Direct Costs for Heart Failure (billions 2008\$)



Adapted from Heidenreich PA et al. Circulation. 2011;123:933-944
AHA Statement: Forecasting the future of CV disease in US

Impacto Económico da Insuficiência Cardíaca

60% dos Custos - Hospitalização

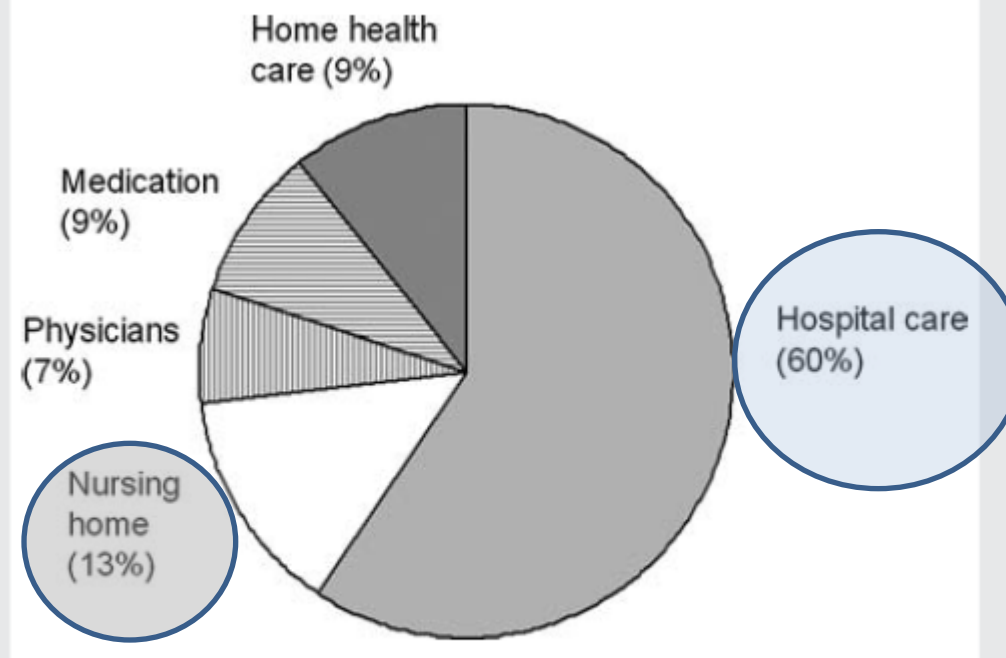


Figure 2 Distribution of costs for heart failure treatment in the USA. Data taken from reference.³

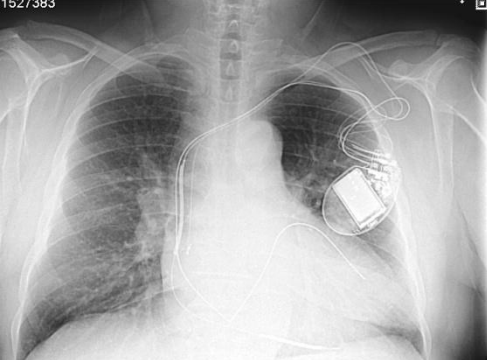
- Improvement of NYHA class (≥ 1 class reduction)
- Improvement of exercise capacity at 6 min walk test (by 20–30%)
- Improvement of VO_2 peak at cardiopulmonary exercise testing (by 10–40%)
- Improvement of central haemodynamic parameters
- Reduction of ventricular volumes and of mitral regurgitation
- Improvement of quality of life (by 30–60%)
- Reduction of heart failure hospitalizations
- Improvement in overall survival

Eficácia Clínica Da Ressincronização Cardíaca

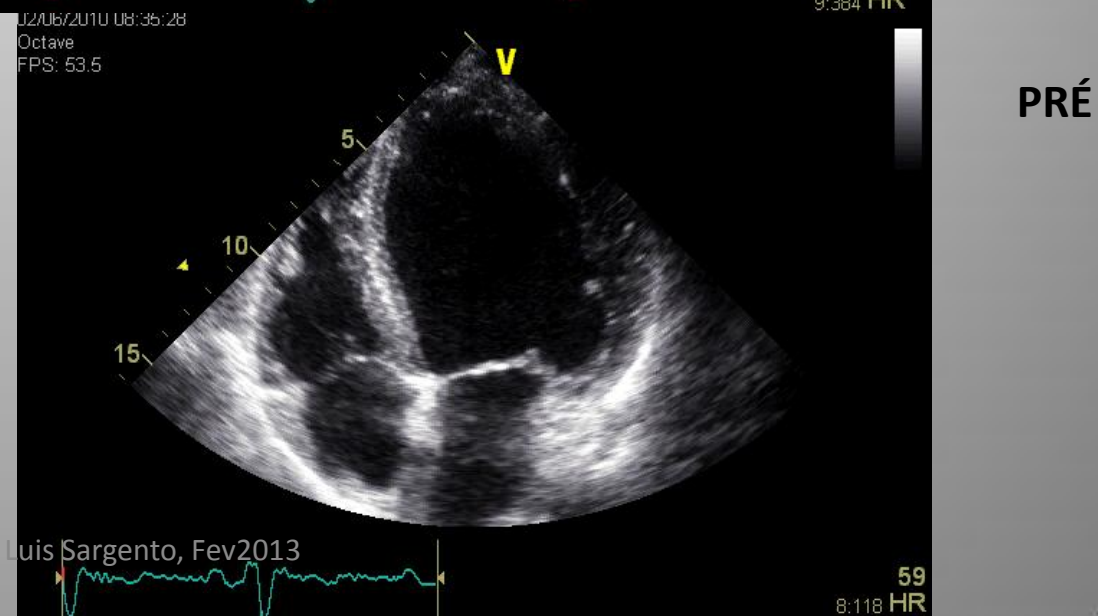
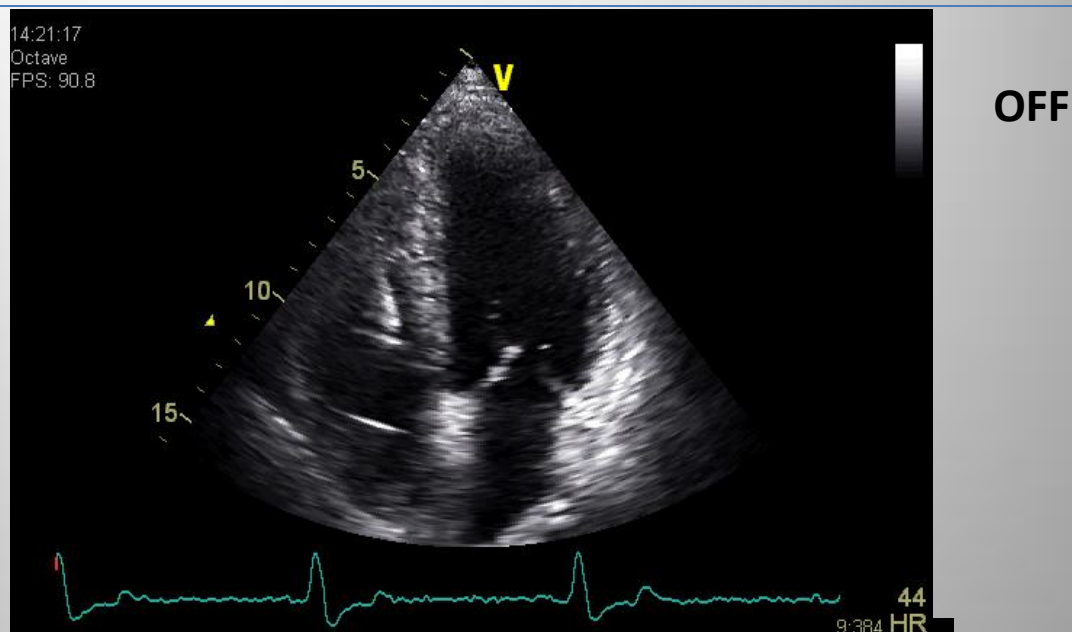
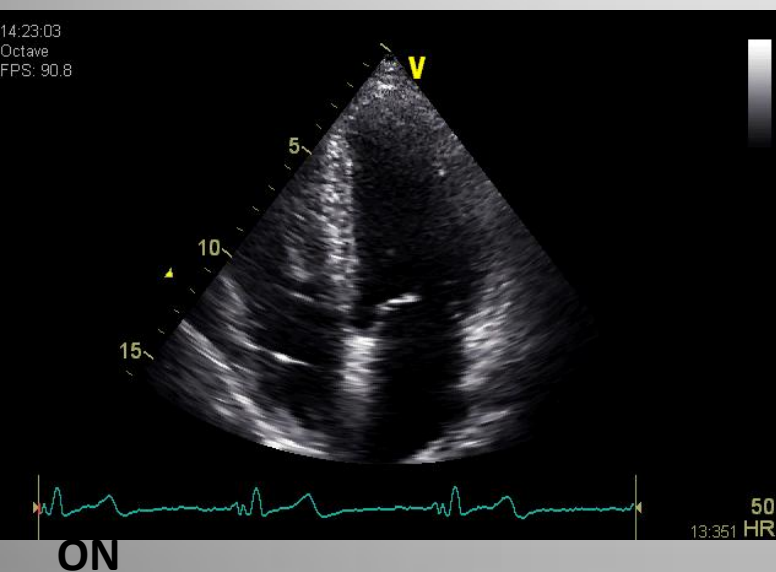
- Mortalidade
- Necessidade de Hospitalização
- Qualidade de Vida

O que é RESSINCRONIZAÇÃO

- Visão do EEF
- Visão do Dessincronista
- Visão do Cardiologista Geral / Especialista IC
- Visão do Economista



RESSINCRONIZAÇÃO



RESSINCRONIZAÇÃO

Visão do Cardiologista Geral / Especialista IC

+ 2005	01.Jan	
+ 2006	01.Jan	
- 2007	01.Jan	
	17.Jul	Internado em Cardiologia (Uc Especiais), Cardiologia (UC Especiais) (Cardiologia (UC Especiais)), Cardiologia (Uc I
	15.Dez	Internado em Cardiologia (UC Intermédios) (Cardiologia (UC Intermédios)) -> Alta, Para Consulta Externa Do Hos
- 2008	01.Jan	
	19.Abr	Internado em Medicina II (U Internamento B) (Medicina II (U Internamento B)), Cardiologia (UC Especiais), Cardic
	11.Mai	Internado em Medicina I (U Internamento D) (Medicina I (U Internamento D)) -> Alta, Para Consulta Externa Do I
	21.Mai	Internado em Medicina I (U Internamento D) (Medicina I (U Internamento D)) -> Alta, Para Consulta Externa Do I
	25.Jun	Internado em Medicina I (U Internamento D) (Medicina I (U Internamento D)) -> Alta, Para O Domicilio, a 07.Jul
	26.Jul	Internado em Cardiologia (U Internamento) (Cardiologia (U Internamento)), Cardiologia (UC Intermédios), Cardiol
	12.Ago	Internado em Cardiologia (U Internamento) (Cardiologia (U Internamento)) -> Alta, Para O Domicilio, a 22.Ago
- 2009	01.Jan	
- 2010	01.Jan	
- 2011	01.Jan	
	05.Mai	Internado em Medicina III - U Internamento A (Cardiologia II - U Internamento) -> Alta, Falecido, a 07.Mai
	03.Fev	Internado em Medicina III - U Internamento D, Medicina III - U Internamento D -> Alta, Para Consulta Externa

CRT

Visão do Economista

É eficaz, mas será rentável?

- Há a idéia, que devido aos custos iniciais de implantação do dispositivo como CDIs ou CRT, estas modalidades de tratamento são caros e não podem ser oferecidas pelos sistemas de cuidados da saúde
- Desde os anos 90 que foram introduzidos por diversos Sistema de Saude Europeus a avaliação económica
- Os recursos económicos são escassos, sendo necessário alocar em tecnologias que maximizam o benefício da População em Geral
- Análise Custo-eficácia é mandatória

Visão do Economista

É eficaz, mas será rentável?

- 7 a 20% dos doentes observados por cardiologistas, devido a IC, poderão ter indicação para ressincronização
- Cerca de 50% destes → talvez CDI

Avaliação Económica

A análise de Custo-eficácia e Custo-benefício tentar identificar qual o melhor tratamento alternativo

- Custo-eficácia- Estima o resultado clínico em termos de “Anos Ganhos de Vida”

- Custo-utilidade- Anos de vida ajustada à QoL

- Custo-benefício- Atribui diretamente um valor monetário para os benefícios terapêuticos

Análise Custo-Eficácia

Como e o Que Analizar

- Os devices colocam desafios diferentes e únicos no processo de decisão, relativamente aos fármacos
- A metodologia está estabelecida, no entanto a aplicação da metodologia difere
- Divisão por quadrantes

Novo Tratamento **Mais Caro**

Rejeitar

Novo Tratamento
Mais caro e Menos Eficaz

Mais Caro
Mais Eficaz

Potencial?

... Menos Eficaz

...Mais eficaz

Potencial?

Mais Barato
Menos Eficaz

Mais Barato
Mais Eficaz

ACEITE

...Custo Menor

Razão Incremento Custo-Eficácia (ICER)

CUSTO (nova terapeutica – Tratamento actual)

Eficácia (nova terapeutica – Tratamento actual)

Custos:

- Médicos
- Não médicos
- Indirectos
(produtividade)

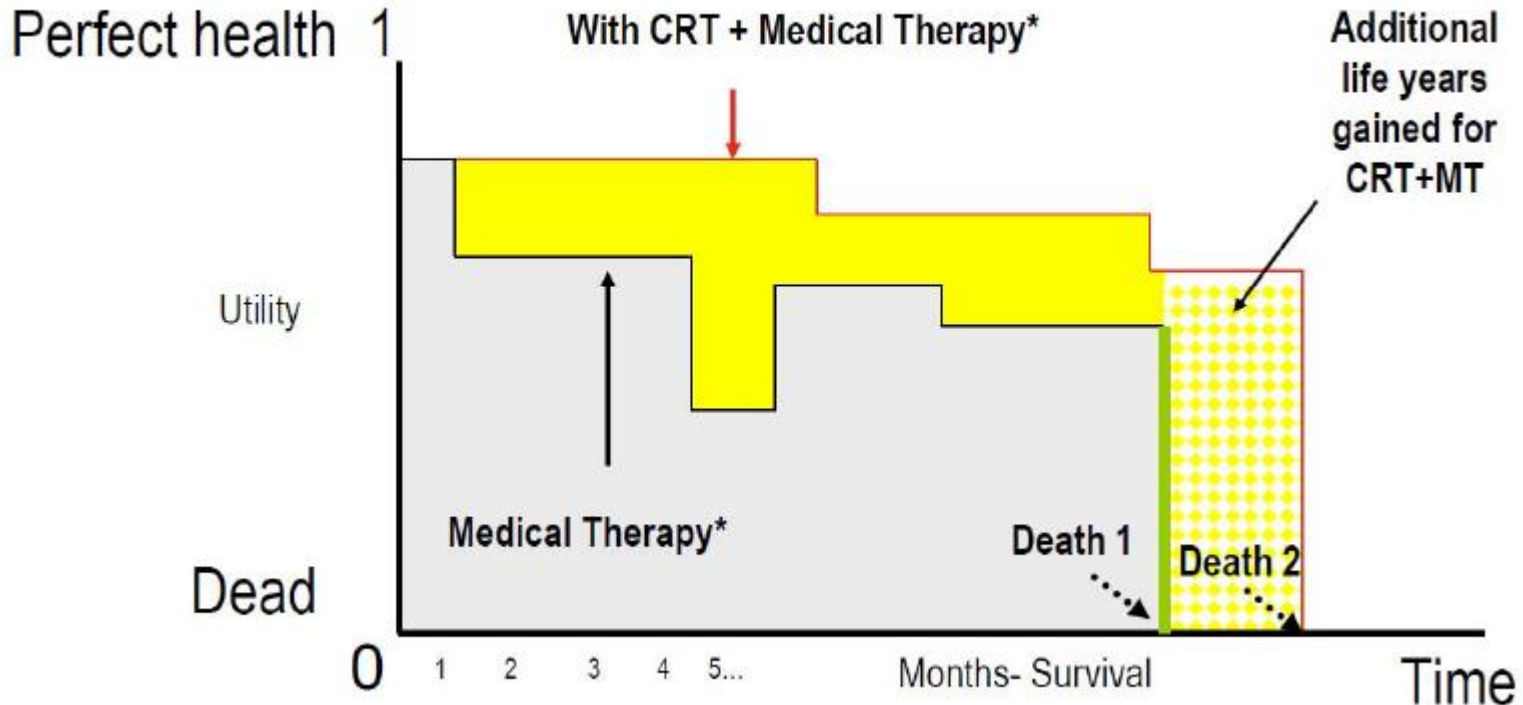
Eficácia

- Especificos da doença (Ex. TA)
- Anos de vida ganhos
- Qualidade de Vida
- Anos de vida ajustados à
qualidade de vida (QALY)

Porquê usar QALY

- Medida mais genérica que combina sobrevida com morbilidade
- Utilizar em estudo com end-point combinado, em que tanto a sobrevida como a Qol são importantes
- Permite a comparação de terapêuticas
- Uma só medida permite caracterizar os efeitos de um tratamento

TEMPO



Exemplo: Se a utility index for 0.5 para a IC então 2 anos são 1QALY. Se o device melhorar para 0.75 o index então a longo prazo de 5 anos ganha-se 1,25 QALY.

Horizonte Temporal

- A eficácia clínica é muitas vezes medida em análises interinas (interrupção precoce de ensaio) ou no final do estudo
- Na avaliação Custo-Eficácia o tempo não pára com o fim do ensaio. Daí ser necessário a extrapolação temporal e criar modelos complexos
- Problema dos Modelos: Fonte dos dados? Suposições subjacentes? Validade do modelo
- Modelo mais usado: Markov model with Monte Carlo Simulation

Porquê Desenhar Modelos Económicos Não Chegaria Ensaios Clínicos

Ensaio Clínico

Os ensaios são curtos

População muito seleccionada

O comparador é determinado no início do ensaio pela geografia, investigadores

Dados obtidos apenas do CRF

A utilização do fármaco é protocolo-dependente

Avaliação económica

Os pagadores estão interessados no longo prazo e o impacto económico mantém-se além tempo do ensaio

Pagadores estão interessados na população que recebe o tratamento

Pagadores comparam com a terapêutica que vai ser substituída

Dados- obtidos de bases nacionais

Clinical practice health care utilisation

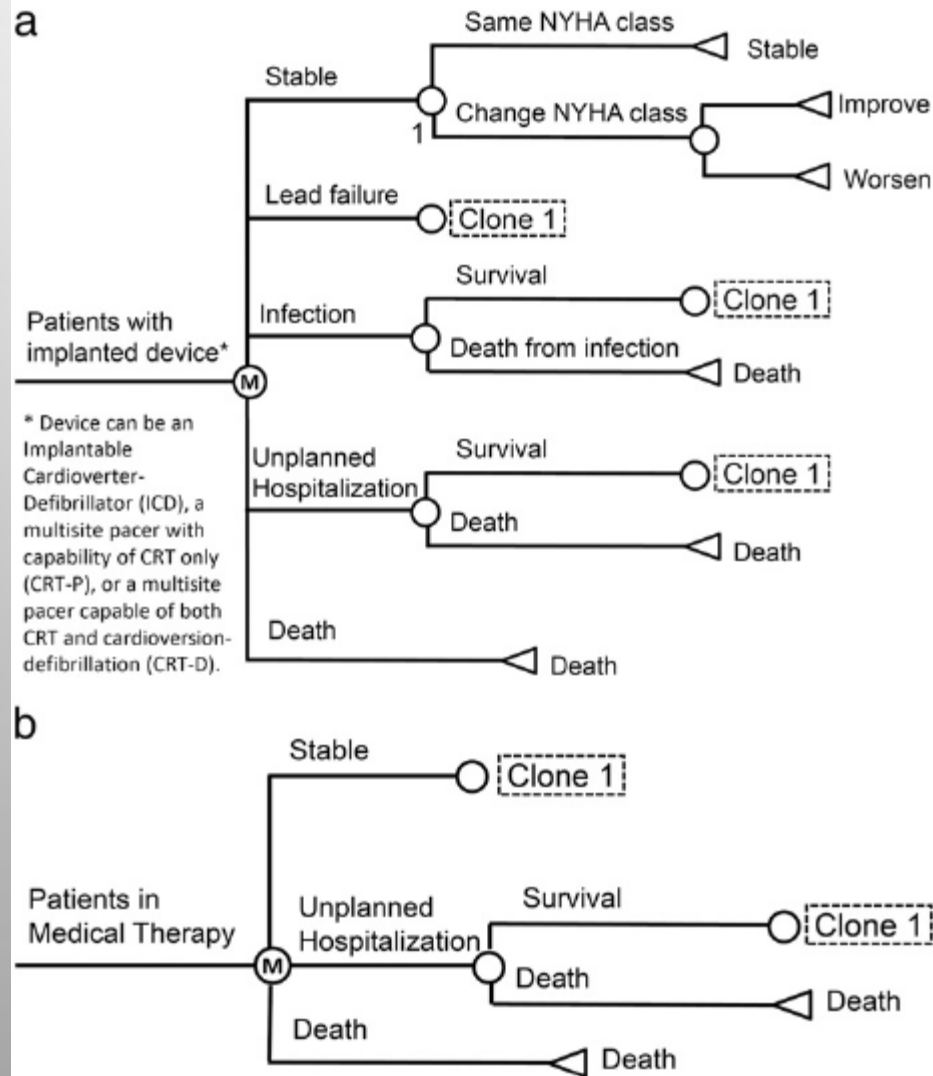
CARE-HF

Fig. 2. a and b. Long-Term (Markov) model for patients in NYHA III heart failure. Patients in different NYHA classes have the same structure, with different transition probabilities. "Clone 1" is represented by the number 1, in the top probability node.

Limiar de quanto se está disposto a pagar (por QALY)

No geral:

Atractivo - <€20000 /QALY

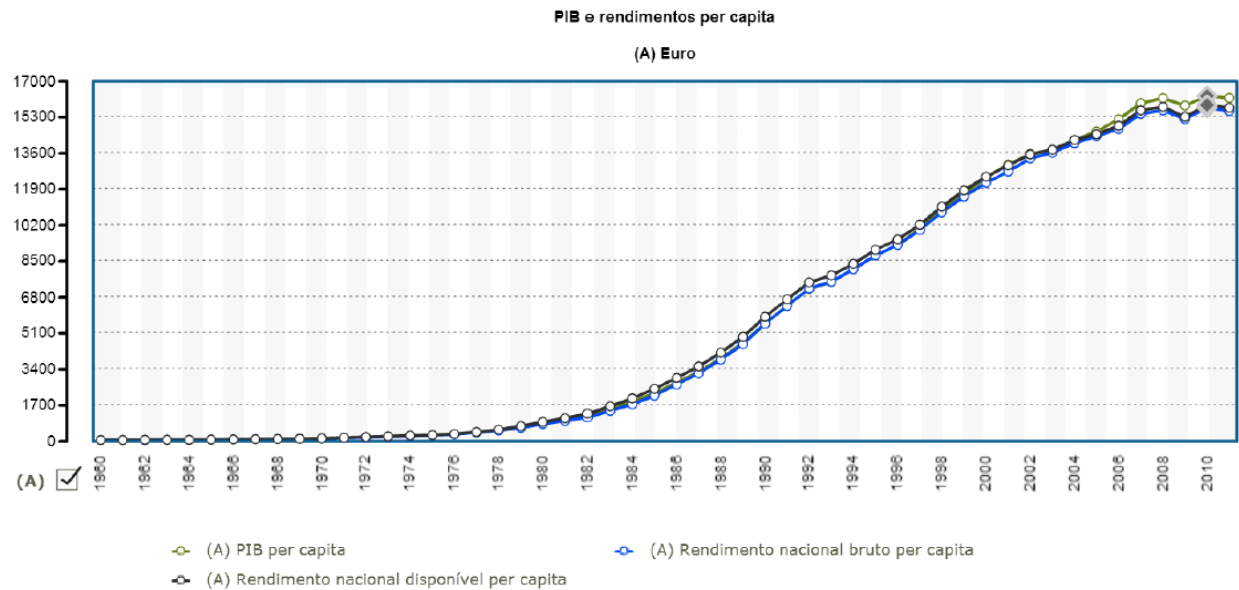
+/- - €20-40000

borderline - €40-60000

Desfavorável - €60 -100,000

Limiar de quanto se está disposto a pagar (por QALY)

- OMS: 3x PIB per capita
- Portugal: €16000 x 3 = €48000 euros



Luis Sargento, Feb2013

CRT- Custo ou Investimento

Visão Médico Económica

- VÁRIOS ENSAIOS
- ANÁLISE DO NICE

Estudos Com CRT e Avaliação Custo-Eficácia

Table 2 Studies from the literature reporting estimates of costs, cost utility, or cost effectiveness of cardiac resynchronization therapy (with devices with or without defibrillation capabilities)

Author, year	Setting, patients	Methods	Results Notes	Incremental cost-utility and cost-effectiveness estimates	
				Per QALY gained	Per LY gained
Nichol <i>et al.</i> , 2004 ²⁴	Systematic review of studies on CRT	Markov model with Monte Carlo simulation in a lifetime horizon from a US perspective		\$107 800 for CRT-P vs. control	
Feldman <i>et al.</i> , 2005 ²⁵	1520 HF patients (NYHA III–IV) enrolled in COMPANION trial and randomized to CRT-P or CRT-D vs. control	Assessment of costs at 2-year follow-up and modelling to predict CE at 7 years	Hospitalizations in a 2-year follow-up	\$19 600 for CRT-P vs. control \$43 000 for CRT-D vs. control	\$28 100 for CRT-P vs. control \$46 700 for CRT-D vs. control
Calvert <i>et al.</i> , 2005 ²⁶	813 HF patients (NYHA III–IV) enrolled in CARE HF trial and randomized to CRT-P vs. control	Assessment of post-implant cost during a mean follow-up of 29.4 months	CRT-P associated with increased costs, survival and QALYs	€19 319	€43 596
Banz <i>et al.</i> , 2005 ²⁷	Modelling study on a decision analytic model	Decision analytic model, based on data from data sets, trials, and expert opinion. Estimates at 1 year from a German perspective	At 1 year	€36 600 for CRT-P vs. control	
Fattore <i>et al.</i> , 2005 ²⁸	Modelling study on a decision analytic model	Decision analytic model, based on data from data sets, trials, and expert opinion. Estimates at 1, 2 and 3 years from an Italian perspective	At 1 year At 2 years At 3 years	€63 225 for CRT-P vs. control €30 343 for CRT-P vs. control €21 720 for CRT-P vs. control	€306 545 for CRT-P vs. control €71 986 for CRT-P vs. control €43 628 for CRT-P vs. control
Caro <i>et al.</i> , 2006 ²⁹	Simulation of 1000 HF patients (NYHA III–IV) receiving CRT-P vs. 1000 control patients with a similar profile, on the basis of CAREHF data	Discrete event simulation model for a 5-year time horizon from a UK perspective	5-year perspective	£15 247 for CRT-P vs. control	
Yao <i>et al.</i> , 2007 ³⁰	Economic model based on HF patients (NYHA III–IV) enrolled in CARE HF trial. Survival data for CRT-D from the COMPANION trial	Markov model with Monte Carlo simulation to assess CE of CRT-P and CRT-D for a lifetime horizon from a UK perspective	In a 65-year-old patient	€7538 for CRT-P vs. control €47 909 for CRT-D vs. control	€7011 for CRT-P vs. control €35 864 for CRT-D vs. control
Fox <i>et al.</i> , 2007 ³¹	Systematic review and meta-analysis of clinical trials on CRT	Markov model on the basis of a meta-analysis from five RCTs (3434 patients). Estimate of CE of CRT-P and CRT-D for a lifetime horizon	Estimates for a mixed age cohort	£16 735 for CRT-P vs. control £40 160 for CRT-D vs. CRT-P	
Bentkover <i>et al.</i> , 2007 ³²	72 HF patients (NYHA III–IV) randomized to ICD vs. CRT-D in Canada	Assessment of post-implant costs during a 6-month follow-up	Post-implant cost for CRT-D lower than ICD with a mean saving of Canadian \$2000–2400 in a 6-month follow-up		
Aidelsburger <i>et al.</i> , 2008 ³³	HF patients (NYHA III–IV), similar to COMPANION patients, implanted with CRT-D	Decision analytic model, based on cost and resources utilized in Germany in 2005, and on CRT-D effectiveness derived from COMPANION for a 2-year perspective	2-year perspective with a device longevity of 2 years 2-year perspective with a device longevity of 5 years	€88 143 vs. control €24 650 vs. control	€193 996 vs. control €33 116 vs. control
Blomström <i>et al.</i> , 2008 ³⁴	Simulation of HF patients (NYHA III–IV) in Scandinavian University Hospitals, on the basis of data from CARE HF	Bootstrap resampling of data from CARE HF in a time horizon equal to patient's expected lifetime, considering costs in Denmark, Finland, and Sweden	No CRT benefits assumed after 6 years. Device longevity of 6 years	€3600–6700 vs. control	

FASTTRACK Cost-effectiveness of cardiac resynchronization therapy: results from the CARE-HF trial

Table 2 Incremental costs, effects, and cost-effectiveness of CRT

	Medical therapy alone (<i>n</i> = 404)	CRT (<i>n</i> = 409)	Mean difference (95% CI ^a)
Cost per patient € mean (interquartile range)	15 795 (3 684–18 185)	20 110 (9 443–22 540)	4 316 (1 327–7 485)
Mean life-years (interquartile range)	1.92 (1.51–2.52)	2.02 (1.62–2.53)	0.10 (–0.01–0.21)
Mean QALYs (interquartile range)	1.19 (0.65–1.73)	1.42 (1.01–1.92)	0.22 (0.13–0.32)
Incremental cost-effectiveness			
Cost per QALY gained	€19 319 (5 482–45 402)		
Cost per life-year gained	€43 596 (–146 236–223 849)		

^aBootstrapped 95% CI.

The long-term cost-effectiveness of cardiac resynchronization therapy with or without an implantable cardioverter-defibrillator

Table 6 ICERs per QALY for the base case assumptions

Strategy	Cost	Incremental in cost	QALYs	Incremental QALYs	ICER (per QALYs)
MT	€39 060		4.08		
CRT-P + MT (vs. MT)	€53 996	€14 935	6.06	1.98	€7538 (€5325–€11 784)
CRT-ICD + MT (vs. CRT-P + MT)	€87 350	€33 354	6.75	0.7	€47 909 (€35 703–€79 438)
CRT-ICD + MT (vs. MT)	€87 350	€48 288	6.75	2.68	€18 017 (€14 500–€25 070)

Table 7 ICERs per LYG for the base case assumptions

Strategy	Cost	Incremental cost	Life year	Incremental life years	ICER (per life year)
MT	€39 060		6.10		
CRT-P + MT (vs. MT)	€53 996	€14 935	8.23	2.13	€7011 (€5346–€10 003)
CRT-ICD + MT (vs. CRT-P + MT)	€87 350	€33 354	9.16	0.93	€35 864 (€26 709 to €56 353)
CRT-ICD + MT (vs. MT)	€87 350	€48 288	9.16	3.06	€15 780 (€12 955–€20 728)

Conclusão:

- (1) CRT-P é custo-eficiente comparado com a terapeutica médica
- (2) Do ponto de vista de perspectiva tempo-vida, com o aumento do tempo De vida o CRT-D poderá ser considerado custo-eficaz relativamente ao CRT-P

ZONA CINZENTA

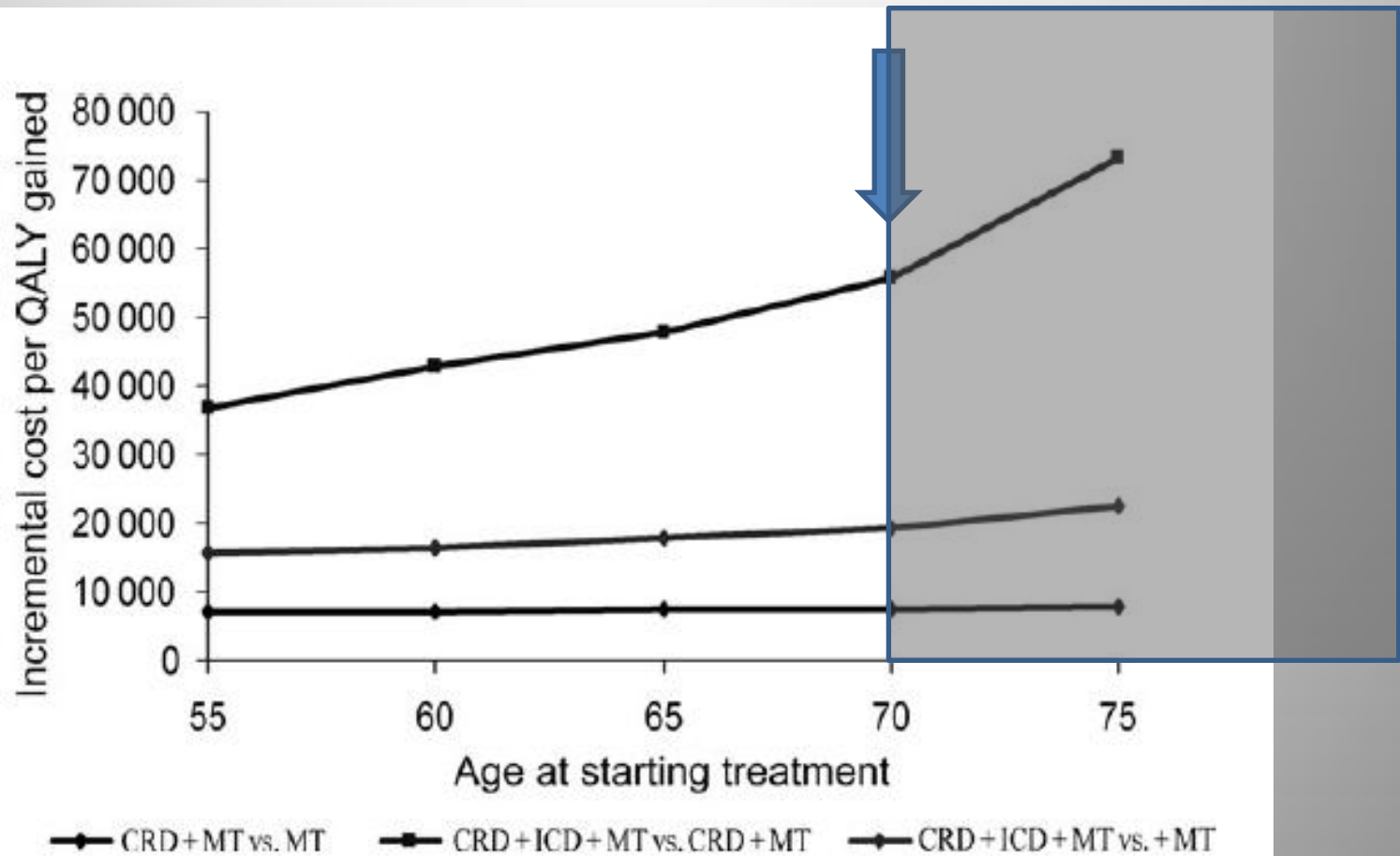


Figure 5 Incremental cost per QALY gained by different starting age at treatment (in EUROS).

Cost Effectiveness of Cardiac Resynchronization Therapy in the Comparison of Medical Therapy, Pacing, and Defibrillation in Heart Failure (COMPANION) Trial

Vol. 46, No. 12, 2005
ISSN 0735-1097/05/\$30.00
doi:10.1016/j.jacc.2005.08.033

Over two years, follow-up hospitalization costs were reduced by 29% for CRT-D and 37% for CRT-P. Extending the cost-effectiveness analysis to a seven-year base-case time period, the ICER for CRT-P was \$19,600 per QALY and the ICER for CRT-D was \$43,000 per QALY relative to OPT.

For the COMPANION trial patients, the use of CRT-P and CRT-D was associated with a cost-effectiveness ratio below generally accepted benchmarks for therapeutic interventions of \$50,000 per QALY to \$100,000 per QALY. This suggests that the clinical benefits of CRT-P and CRT-D can be achieved at a reasonable cost. (J Am Coll Cardiol 2005;46: 2311-21) © 2005 by the American College of Cardiology Foundation

P. Aidelburger
K. Grabein
V. Klaus
J. Wasem

**Cost-effectiveness
of cardiac resynchronization therapy
in combination with an implantable
cardioverter defibrillator (CRT-D)
for the treatment of chronic heart failure
from a German health care system perspective**

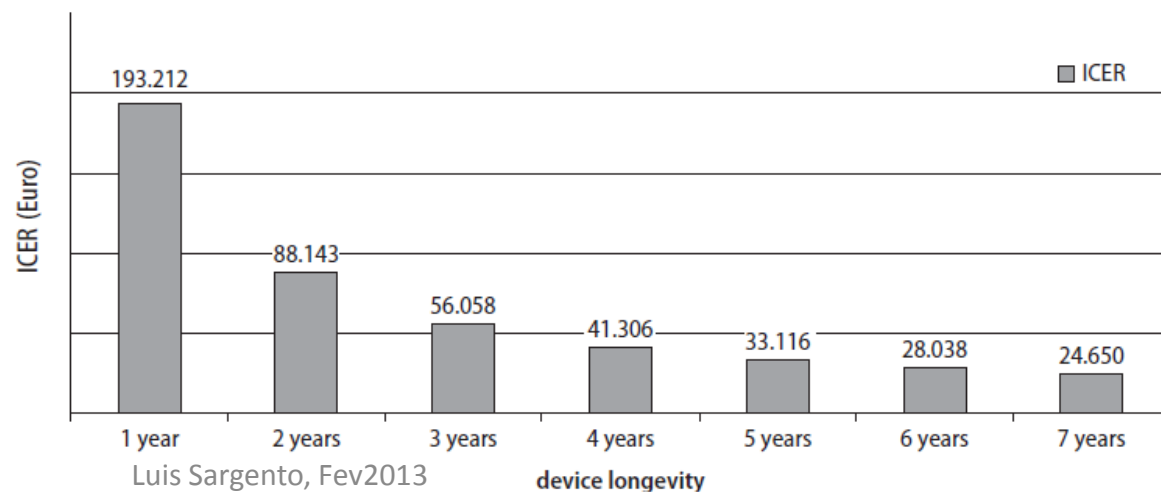
ALEMANHA

Table 4 Results of base case analysis – 2-year time horizon

	OPT	CRT-D+ OPT	Difference
Accumulated discounted QALYs	0.958	1.261	0.303
Accumulated discounted cost (Euro)	4618	31 292	26 674
Decrease in the risk of death (%)			13.8
Incremental cost per QALY gained (Euro)			88 143
Incremental cost per life year gained (Euro)			193 996

ICER diminuir com o Tempo

7 anos de bateria!?



Cost-effectiveness of cardiac resynchronisation therapy for patients with moderate-to-severe heart failure: a lifetime Markov model

Neyt M, Stroobandt S, Obyn C, *et al.* *BMJ Open* 2011;1:e000276. doi:10.1136/bmjopen-2011-000276

BÉLGICA

Results: Compared with optimal medical treatment, on average 1.31 quality-adjusted life-years (QALY) are gained with CRT-P at an additional cost of €14 700, resulting in an incremental cost-effectiveness ratio (ICER) of about €11 200/QALY. As compared with CRT-P, CRT-D treatment adds on average an additional 0.55 QALYs at an extra cost of €30 900 resulting in an ICER of €57 000/QALY. This result was very sensitive to the incremental clinical benefit of the defibrillator function on top of CRT.

CRT-P ICER €11200

CRT-D vs CRT-P → 0.55 QALY: ICER €57000

Cost-effectiveness of cardiac resynchronization therapy in patients with heart failure

The perspective of a middle-income country's public health system ☆☆☆

Eduardo G. Bertoldi ^{a,1}, Luis E. Rohde ^{b,d,1}, Leandro I. Zimmerman ^{c,1},
Maurício Pimentel ^{c,1}, Carisi A. Polanczyk ^{d,*,1}

Int J Cardiol (2011), doi:10.1016/j.ijcard.2011.06.046

BRASIL

Conclusions: CRT is cost-effective for HF patients in the Brazilian public health system scenario. In patients eligible for CRT, upgrade to CRT + ICD has an ICER above the World Health Organization willingness-to-pay threshold of three times the nation's Gross Domestic Product per Capita (Int\$ 31,689 for Brazil). However, for ICD eligible patients, upgrade to CRT + ICD is marginally cost-effective.

Table 3

Base-case results per quality-adjusted life-year gained.

Strategy	Cost	Incremental cost	QALYs	Incremental QALYs	ICER (per QALY gained)
OMT	Int\$ 9615	–	4.4	–	–
CRT-P (vs. OMT)	Int\$ 34,615	Int\$ 25,000	5.99	1.59	Int\$ 15,723
ICD (vs. OMT)	Int\$ 60,897	Int\$ 51,282	5.97	1.57	Int\$ 32,663
CRT-D (vs. ICD)	Int\$ 82,692	Int\$ 21,794	6.56	0.59	Int\$ 36,940
CRT-D (vs. CRT-P)	Int\$ 82,692	Int\$ 48,076	6.56	0.57	Int\$ 84,345

PIB/percapita= 31689

Evaluación económica de la terapia de resincronización cardiaca

Rev Esp Cardiol. 2010;63(11):1235-43

Results. Overall, ODT, CRT and CRT with a defibrillator resulted in gains of 2.11, 2.8 and 3.19 QALYs, respectively, at a cost of € 11,722, € 31,629 and € 52,592, respectively. Consequently, each QALY gained with CRT relative to ODT involved the consumption of € 28,612 of additional resources. Similarly, the use of CRT with a defibrillator cost an additional € 53,547 per QALY relative to CRT without a defibrillator.

Conclusions. The use of CRT without a defibrillator could be a cost-effective alternative to ODT for treating heart failure in a carefully selected group of patients. The study results were sensitive to uncertainties in many of the variables used in the model.

TABLA 2. Resultados caso base

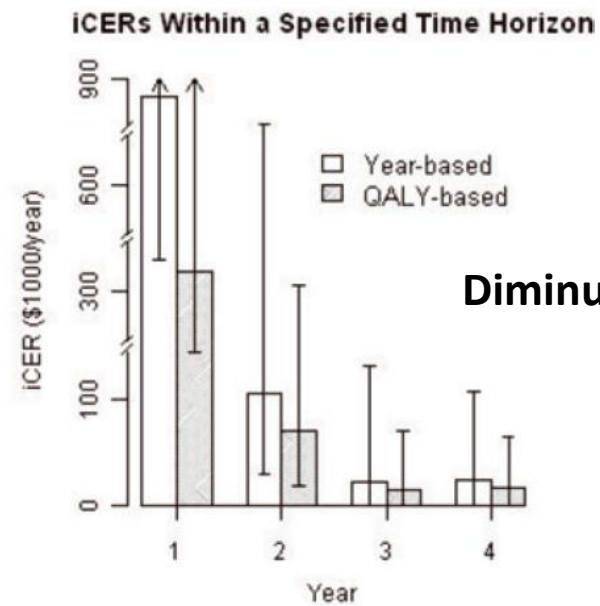
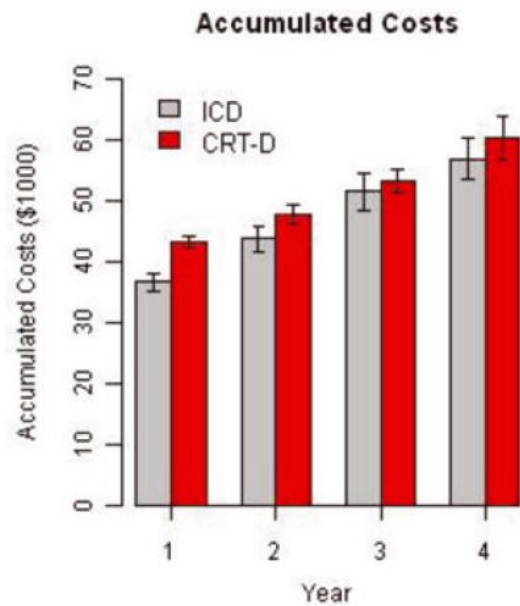
	Coste (euros)	Δ coste	Años de vida	Δ años de vida	AVAC	Δ AVAC	Coste por año de vida ganado (euros)	Coste por AVAC (euros)
Cohorte mixta								
TF0	11.722		3,86		2,11			
TRC+TF0	31.629	19.906	4,71	0,85	2,8	0,69	23.419	28.612
TRC-D+TF0	52.593	20.963	5,36	0,65	3,19	0,39	32.250	53.547

Cost-Effectiveness of Cardiac Resynchronization Therapy in the MADIT-CRT Trial

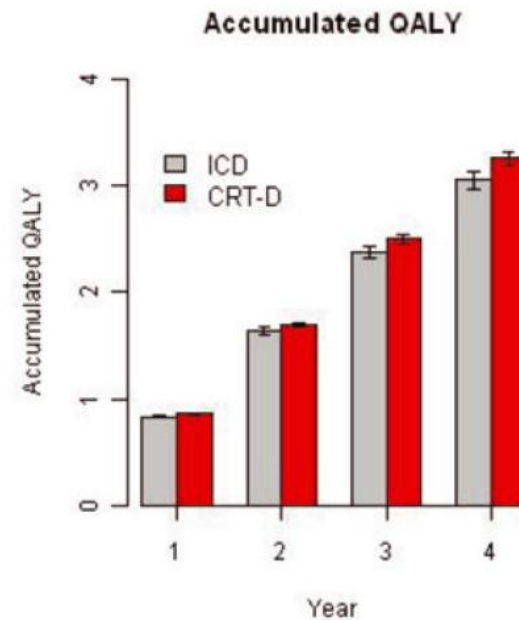
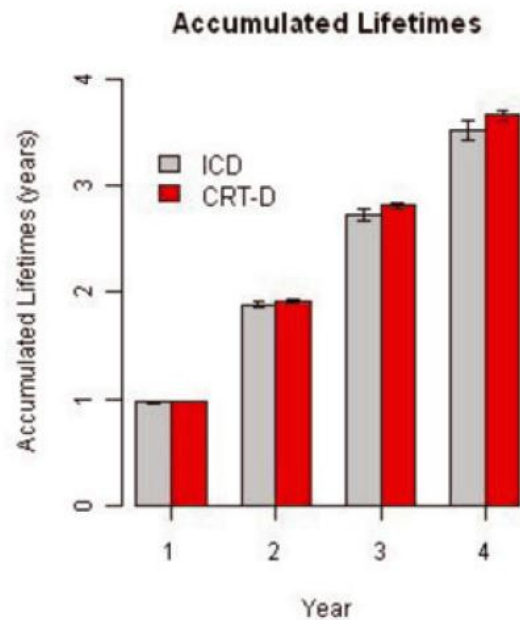
(J Cardiovasc Electrophysiol, Vol. 24, pp. 66–74,

Results: Average 4-year healthcare expenditures in CRT-ICD patients were higher than costs of ICD patients (\$62,600 vs 57,050, $P = 0.015$), mainly due to the device and implant-related costs. The incremental cost-effectiveness ratio of CRT-ICD compared to ICD was \$58,330/quality-adjusted life years (QALY) saved. The cost effectiveness improved with longer time horizon and for the LBBB subgroup (\$7,320/QALY), with no cost-effectiveness benefit being evident in the non-LBBB group.

\$58330/QALY



Diminui com Tempo



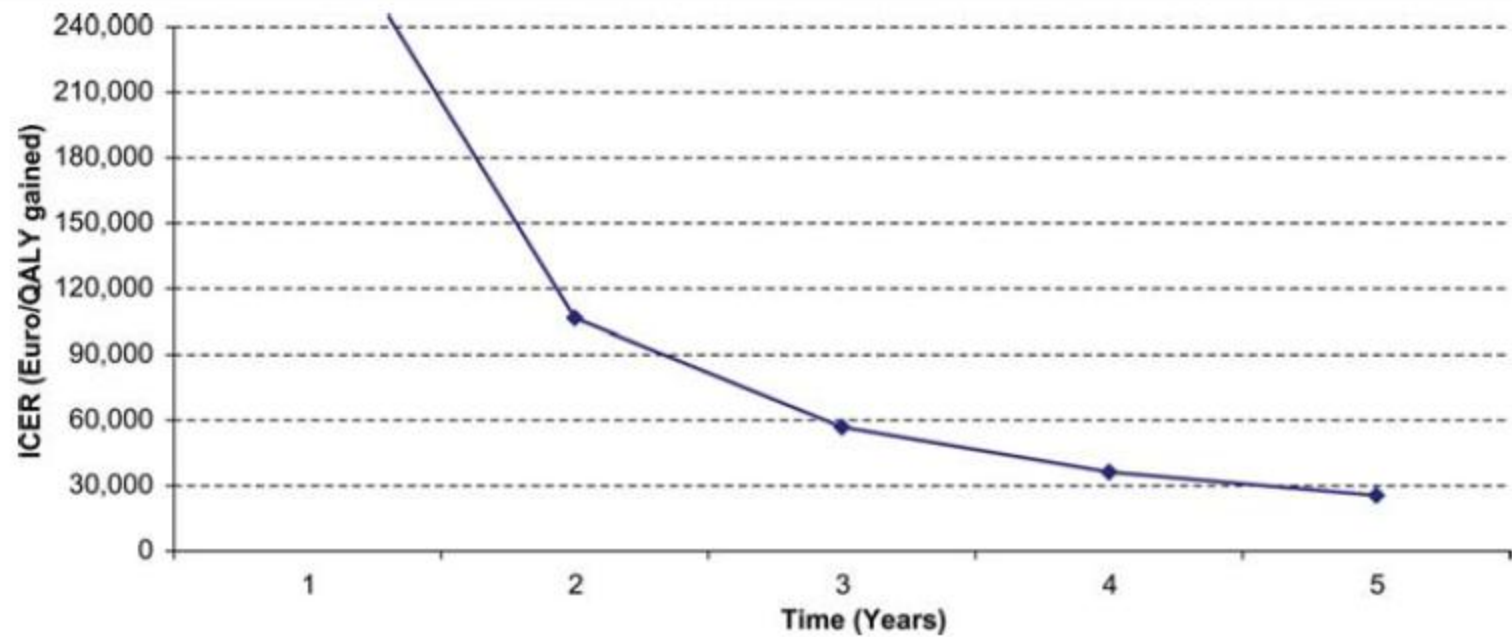
Cost-effectiveness of cardiac resynchronization therapy in patients with asymptomatic to mild heart failure: insights from the European cohort of the REVERSE (Resynchronization Reverses remodeling in Systolic Left Ventricular Dysfunction)

lyses were performed. Compared with CRT-OFF, 0.94 life years or 0.80 QALYs were gained in the CRT ON group at an additional cost of €11 455, yielding an incremental cost-effectiveness ratio of €14.278 per quality-adjusted life year (QALY) gained. At a threshold of €33 000 (£30 000) per QALY gained, the probability that CRT is cost-effective is 79.6%. Cardiac resynchronization therapy becomes cost effective after ~4.5 years. Cardiac resynchronization therapy needs only to demonstrate a modest impact on all cause mortality (hazard ratio = 0.82) in order to demonstrate cost-effectiveness. The results are robust to changes in all other parameters.

Cardiac resynchronization therapy is a cost-effective intervention for patients with mildly symptomatic HF and for asymptomatic patients with left ventricular dysfunction and previous HF symptoms.

CRT-ON:

- Ganhou 0.8QALY/ 0.94life years
- Limiar 33000Euros/QALY custo-eficácia em 79.6%
- CRT custo-eficaz ao fim de 4.5 anos



The clinical effectiveness and cost-effectiveness of cardiac resynchronisation (biventricular pacing) for heart failure: systematic review and economic model

M Fox, S Mealing, R Anderson, J Dean, K Stein, A Price and RS Taylor



November 2007

Health Technology Assessment
NHS R&D HTA Programme
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**National Institute for
Health and Clinical Excellence**

Issue date: May 2007

Review date: July 2010

**Cardiac resynchronisation
therapy for the treatment of
heart failure**

NICE technology appraisal guidance 120

TABLE 24 Summary of published economic evaluations of CRT

Study	Study type	Analysis type	Country and price year	Comparators	Perspective
Banz, 2005 ¹¹¹	Decision model	CUA	Germany, 2002	CRT-P vs OPT	Payer and society
McAllister <i>et al.</i> , 2004 ¹¹⁴	Decision model	CUA	USA, 2003	CRT-P vs OPT	Payer
Nichol <i>et al.</i> , 2004 ¹¹²	Decision model	CUA	USA, 2003	CRT-P vs OPT	Payer
Feldman <i>et al.</i> , 2005 ¹¹⁰ (abstract)	Trial + modelling extension of COMPANION trial, data to 5 years	CEA	USA (no price year)	CRT-P vs OPT CRT-D vs OPT	Payer (Medicare)
Fattore <i>et al.</i> , 2005 ¹¹³	Decision model	CUA	Italy, 1997	CRT-P vs OPT	NHS (SSN ^a)
Feldman <i>et al.</i> , 2005 ¹⁰⁹	Trial + modelling extension of COMPANION trial, data to 7 years	CUA	USA, 2004	CRT-P vs OPT CRT-D vs OPT	Payer (Medicare)
Calvert <i>et al.</i> , 2005 ¹⁰⁸	Trial-based (CARE-HF)	CUA and CEA	Europe (12 countries), but UK costs (no price year)	CRT-P vs OPT	Payer

TABLE 26 The joint submission summarised four different analyses (see below)

Submission	Analyses presented	Analysis type	Source of effectiveness and resource use	Reported elsewhere?
Joint submission	1. CRT-P vs OPT	Within trial (19.4 months)	CARE-HF trial	Calvert <i>et al.</i> , 2005 ¹⁰⁸
	2. CRT-P vs OPT	Modelling-based trial extension (5 years)	CARE-HF trial and case series from Good Hope Hospital, Birmingham	Leyva <i>et al.</i> (draft paper)
	3. CRT-D and CRT-P vs OPT	Modelling-based trial extension (5 years)	COMPANION trial, US DRG unit cost data	Feldman <i>et al.</i> , 2005 ¹⁰⁹
	4. CRT-D and CRT-P vs OPT ^a	Modelling-based trial extension (5 years)	COMPANION trial data, but with UK HRG unit costs	No
Guidant submission	CRT-D and CRT-P vs OPT ^a	Modelling-based trial extension (5 years)	COMPANION trial data, but with UK HRG unit costs	No

DRG, Diagnosis Related Group; HRG, Healthcare Resource Group.

^a These two analyses are identical, except for being reported in different levels of detail.

Custo-eficácia a longo prazo de CRT-P vs CRT-D

Como a Indústria não apresentou análise válida, o NICE criou um modelo de análise

- Modelo de Markov com simulação de Monte Carlo **avaliando custos, anos de vida, QALY**, para a realidade UK

- A Classe NYHA e transições, associado a índices de saúde, taxa e causa de hospitalização/morte (estimado do **CARE-HF**)

- Benefício adicional de vida a partir do **COMPANION**.

CRT-P e CRT-D vs Terap Medica

TABLE 58 Discounted base case cost-effectiveness results per patient for CRT-P compared with OPT (lifetime time horizon), by age and mixed age cohort

Start age (years)	OPT costs (£)	OPT QALYs	CRT-P costs (£)	CRT-P QALYs	Incremental costs (£)	Incremental QALYs	ICER (£/QALY)
30	17,673	5.52	34,861	6.70	17,188	1.17	14,630
40	17,422	5.45	34,320	6.59	16,898	1.14	14,843
50	16,601	5.22	32,716	6.27	16,116	1.04	15,374
60	13,863	4.44	28,180	5.33	14,317	0.89	16,073
70	10,030	3.31	22,212	4.07	12,182	0.76	16,027
80	7,422	2.52	17,872	3.13	10,448	0.61	17,143
90	5,933	2.07	15,178	2.53	9,245	0.46	20,333
Mixed	9,367	3.10	20,997	3.80	11,630	0.70	16,735

TABLE 64 Discounted base case cost-effectiveness results per person for CRT-D compared with OPT (lifetime time horizon), by age and mixed age cohort

Start age (years)	OPT costs (£)	OPT QALYs	CRT-D costs (£)	CRT-D QALYs	Incremental costs (£)	Incremental QALYs	ICER (£/QALY)
30	17,673	5.52	48,568	7.21	30,895	1.69	18,289
40	17,422	5.45	47,907	7.09	30,485	1.63	18,666
50	16,601	5.22	45,976	6.71	29,375	1.49	19,677
60	13,863	4.44	40,808	5.71	26,945	1.26	21,356
70	10,030	3.31	34,129	4.40	24,099	1.08	22,231
80	7,422	2.52	29,125	3.39	21,703	0.86	25,110
90	5,933	2.07	26,015	2.71	20,082	0.64	31,186
Mixed	9,367	3.10	32,687	4.09	23,320	0.99	23,650

CRT-P vs CRT-D

TABLE 69 Discounted base case cost-effectiveness results per patient for CRT-D compared with CRT-P (lifetime time horizon)

Start age (years)	CRT-P costs (£)	CRT-P QALYs	CRT-D costs (£)	CRT-D QALYs	Incremental costs (£)	Incremental QALYs	ICER (£/QALY)
30	34,861	6.70	48,568	7.21	13,707	0.51	26,645
40	34,320	6.59	47,907	7.09	13,587	0.49	27,462
50	32,716	6.27	45,976	6.71	13,260	0.44	29,819
60	28,180	5.33	40,808	5.71	12,627	0.37	34,044
70	22,212	4.07	34,129	4.40	11,917	0.32	36,786
80	17,872	3.13	29,125	3.39	11,254	0.25	44,172
90	15,178	2.53	26,015	2.71	10,837	0.18	59,391
Mixed	20,997	3.80	32,687	4.09	11,689	0.29	40,160

QALY diminui com a idade

CRT-P vs Terap Medica

- Altamente custo-eficaz, para qualquer idade.
- Confere 0.70 QALY adicional → ICER 16735/QALY

CRT-D vs Terap Medica

- 0.99/QALY

CRT-P vs CRT-D

- 0.29 QALY adicional / ICER £40.160

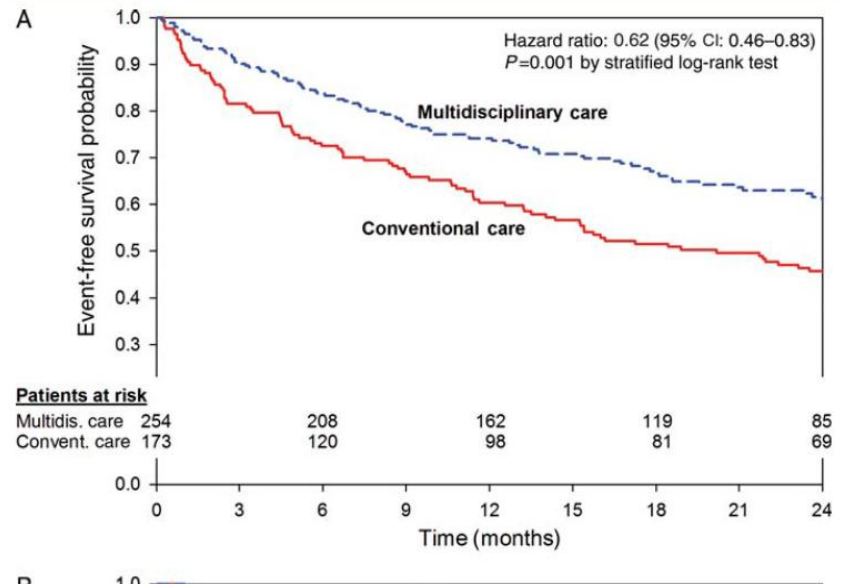
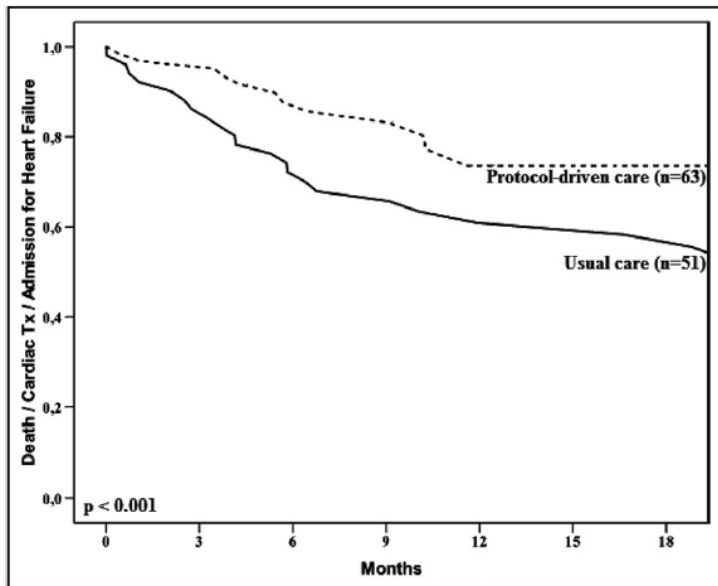
CONCLUSÃO

- O tratamento com CRT-P e CRT-D a longo prazo são custo-eficaz, relativamente terapeutica médica
- A associação de desfibrilhador (CRT-P vs CRT-D) é custo-eficaz, mas em menor extensão. Está condicionado à esperança de vida do doente / idade de implantação do doente, longevidade da bateria e custo do aparelho
- O custo-eficácia da ressincronização é ainda válida em doentes em IC “moderada” (classe II?).

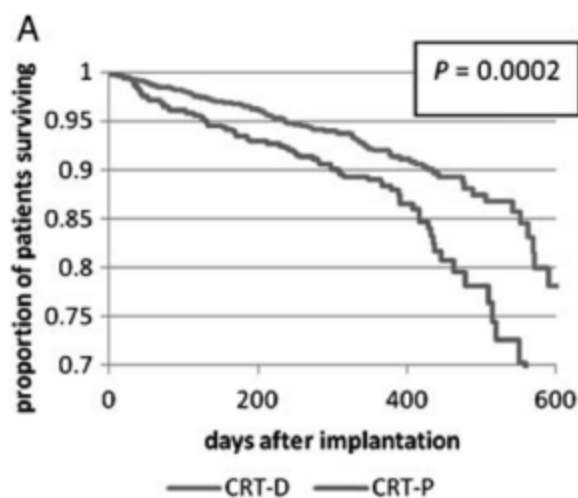
MAS,

- SERÁ O FINAL DA HISTÓRIA?
- O Cardiologista especialista em IC “convence” o EEF a implantar CRT -→ que convece o Economista! E agora? Será necessário otimizar mais o Custo Eficácia? Após a implantação.

Avaliação Multidisciplinar Após Implantação?



The European CRT Survey: 1 year (9–15 months) follow-up results



141 centros (Nov-2008 a Jun-2009)
13 países
1 ano de seguimento médio

2438 doentes incluídos
87% de seguimento completo

Resultados:
81% de resposta clínica
10% de mortalidade (1 ano)

Factores preditores de mortalidade:
Classe NYHA avançada
Fibrilhação auricular
Etiologia isquémica
CRT-P

Ambulatório

Hospital de Dia

Internamento

- Apoio Domiciliário
- Contacto Telefónico
pos Internamento

Consultas Médicas Integradas

- Diabetologia
- Psiquiatria

Especialidades de Apoio

- Pneumologia
- Cir. Vascular
- Medicina Interna

Consulta Nutrição

Consulta Psicologia

Técnicas Integradas

- PE Consumo O2
- Ecocardiografia

**Técnicas
Apoio**

Coronariografi

a

Cat Dto

Endo 4555

Cardiologia (3) + Enfermagem (4)

Sessão e Consulta especializada

Salas de Internamento
Preferencial em IC (2-3)

Unidade Cuidados
Especiais

Reabilitação Fase I

DOENTE

Terapeutica ev

- Programa furosemido ev
- Ferro ev
- Darbopoietina

Luis Sargento, Fev2013