

# Epidemiologia i impacte econòmic de la fibril·lació auricular

*Dr Jaume Francisco Pascual  
Unitat d'Arritmies. Servei de Cardiologia.  
Hospital Universitari Vall d'Hebron*

# Agenda

- *El cambio en la FA*
- *Algunos datos epidemiológicos*
- *Impacto económico actual*
- *Dónde actuar*



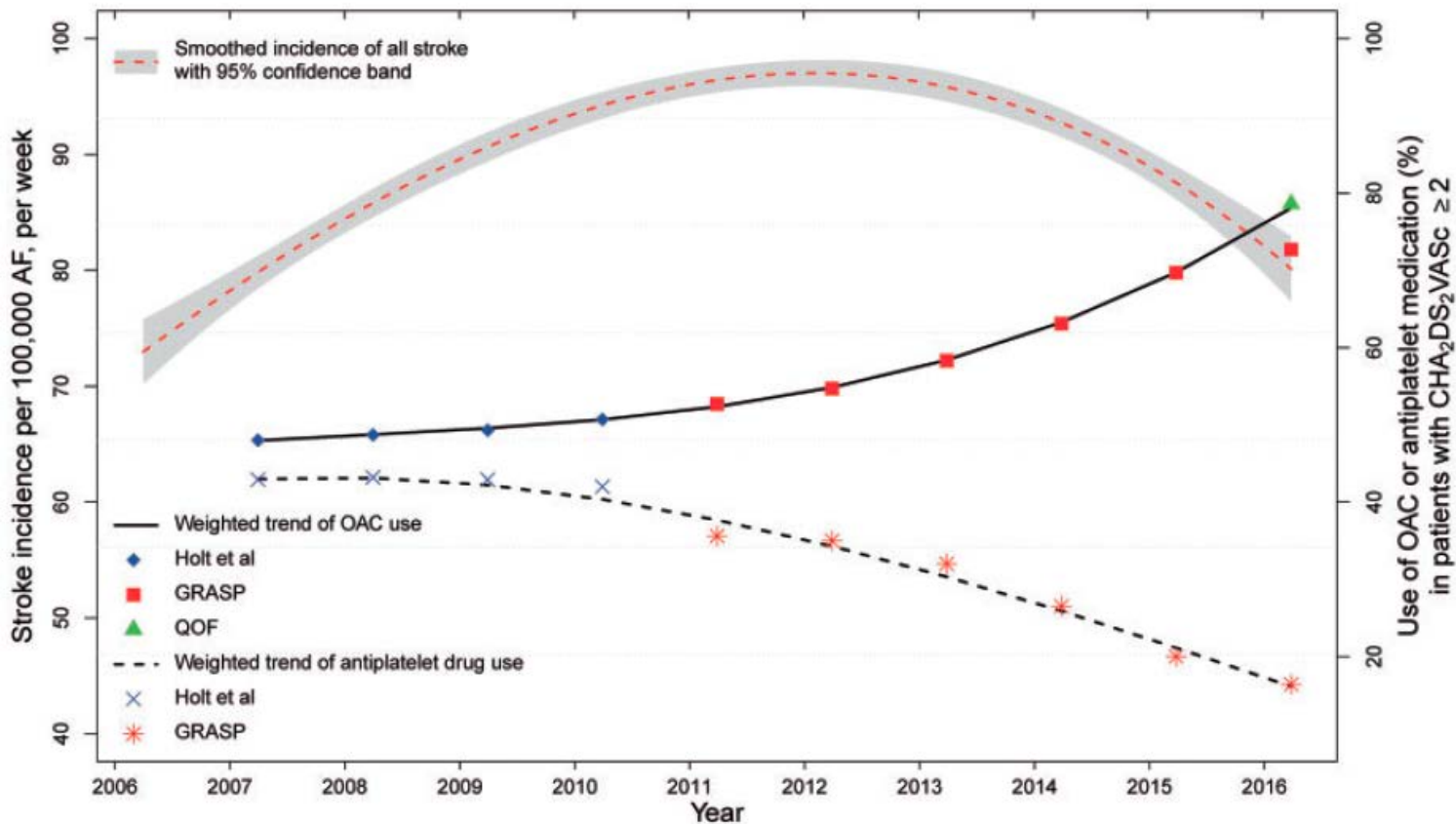
# Cambios



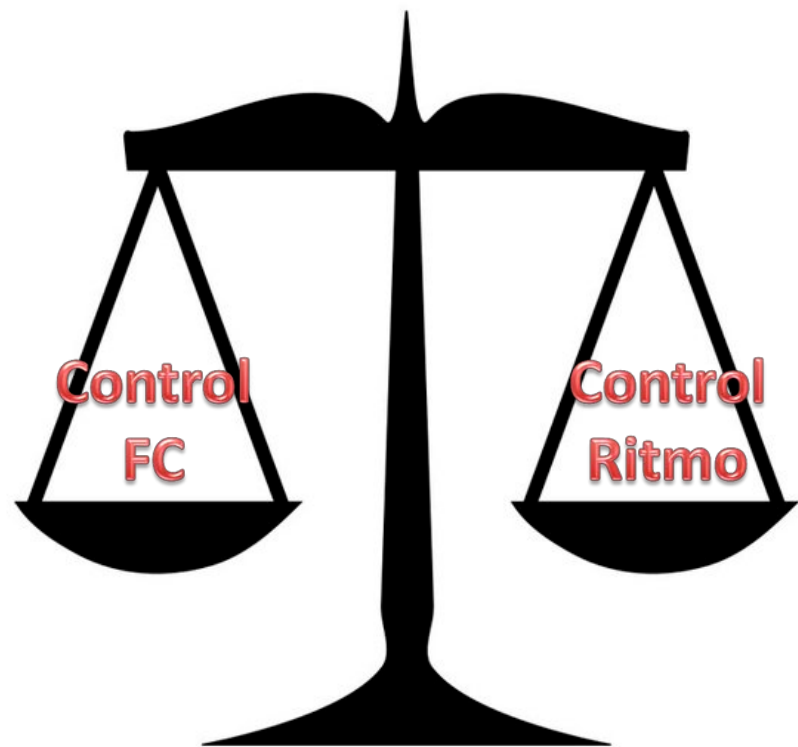
# Cambios



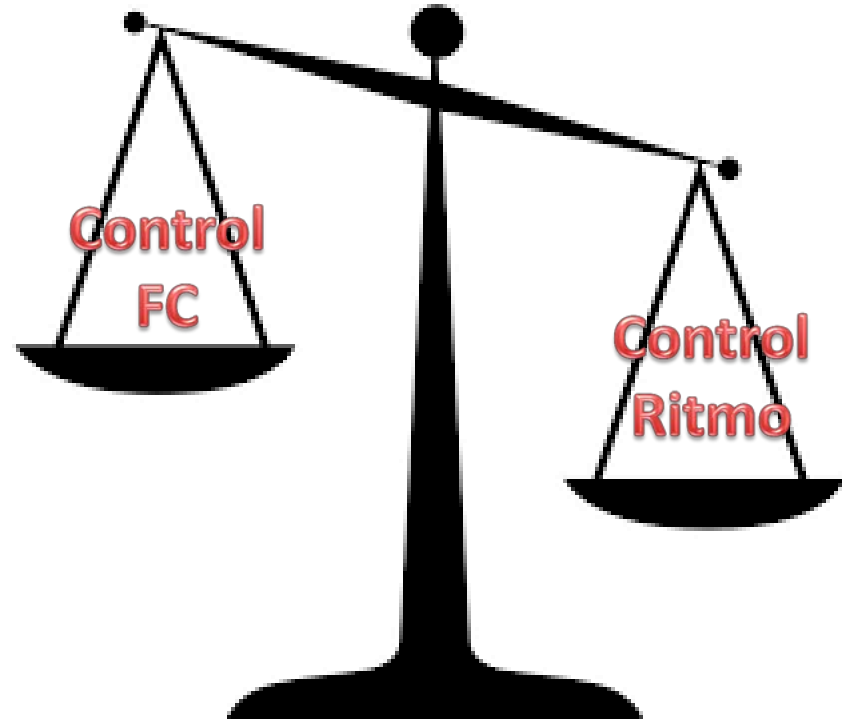
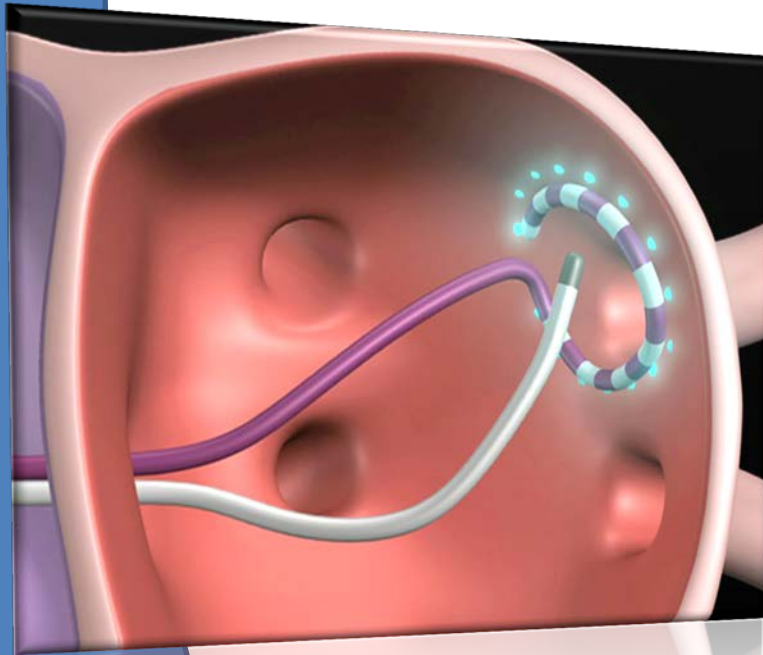
# Cambios



# Futuros cambios



# Futuros cambios





An iceberg floating in a blue ocean. The visible tip above the water is labeled 'FA clínica', and the much larger submerged part below the water is labeled 'FA subclínica'.

FA clínica

FA subclínica

# FA subclínica

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

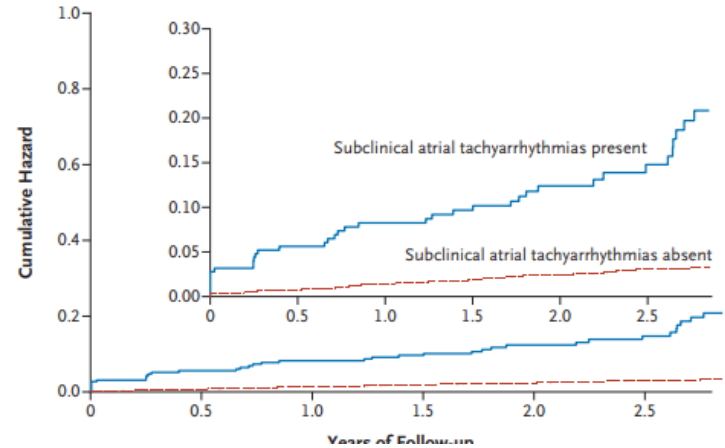
## Subclinical Atrial Fibrillation and the Risk of Stroke

Jeff S. Healey, M.D., Stuart J. Connolly, M.D., Michael R. Gold, M.D.

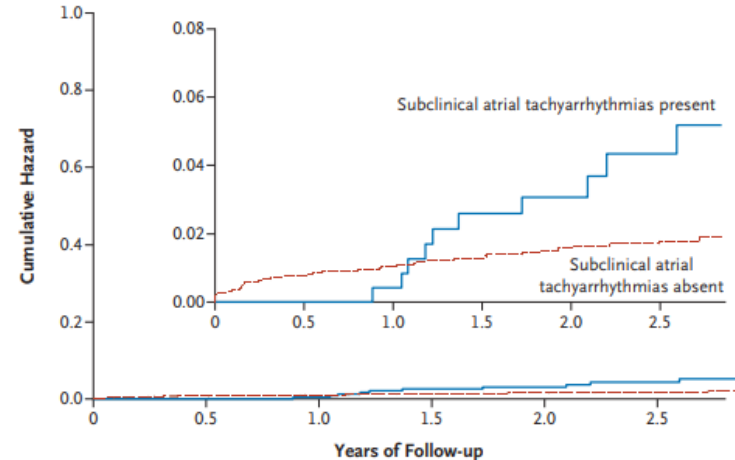
and the Risk of Stroke

*N Engl J Med* 2012; 366:120-129

**A Risk of Clinical Atrial Tachyarrhythmias**



**B Risk of Ischemic Stroke or Systemic Embolism**



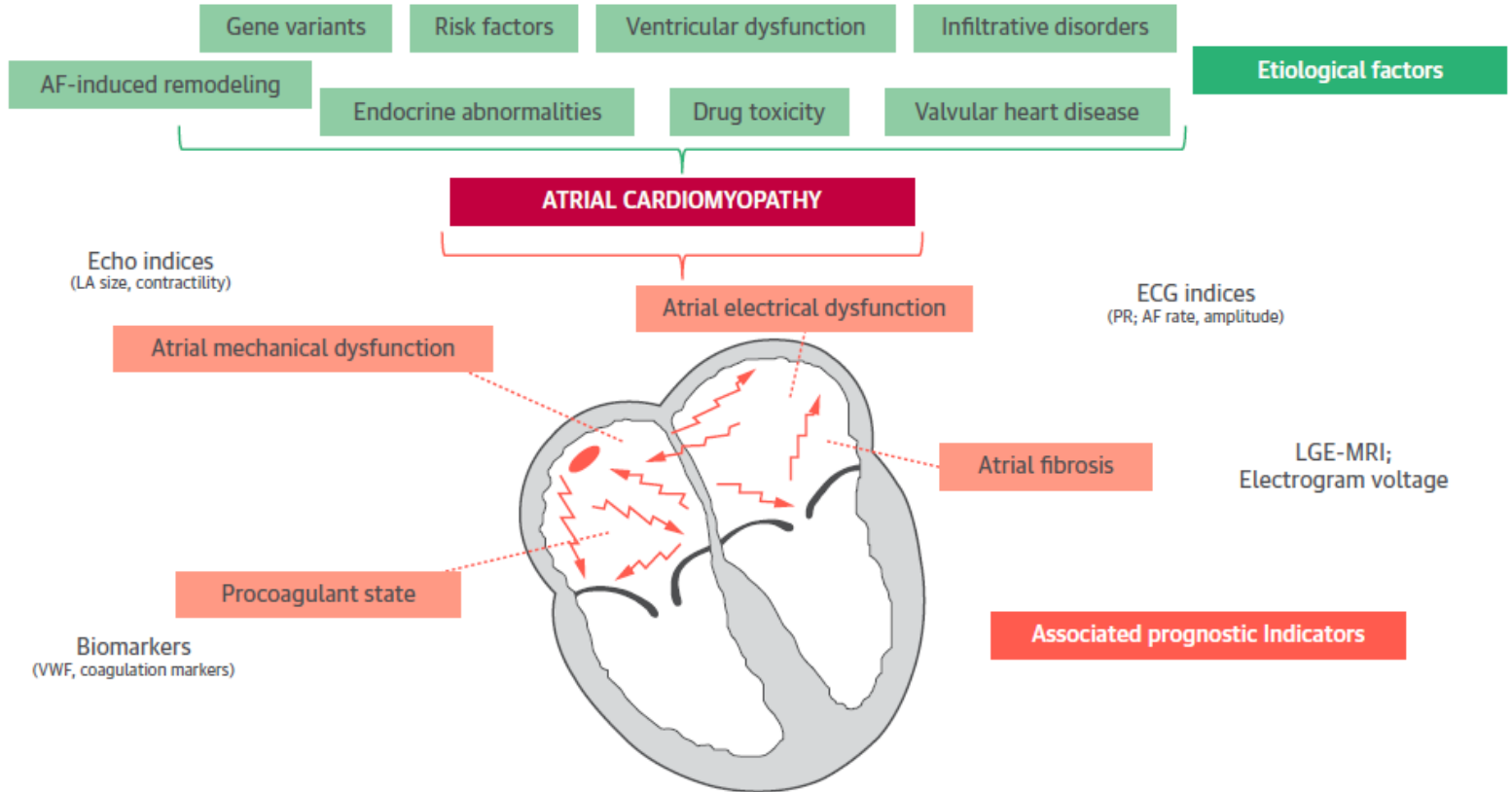
An iceberg floating in a blue ocean. The tip of the iceberg is above the water line, and the much larger base is submerged. The text 'FA clínica' is positioned above the water line, 'FA subclínica' is below the water line, and 'Miocardiopatía Auricular' is at the bottom of the submerged part of the iceberg.

FA clínica

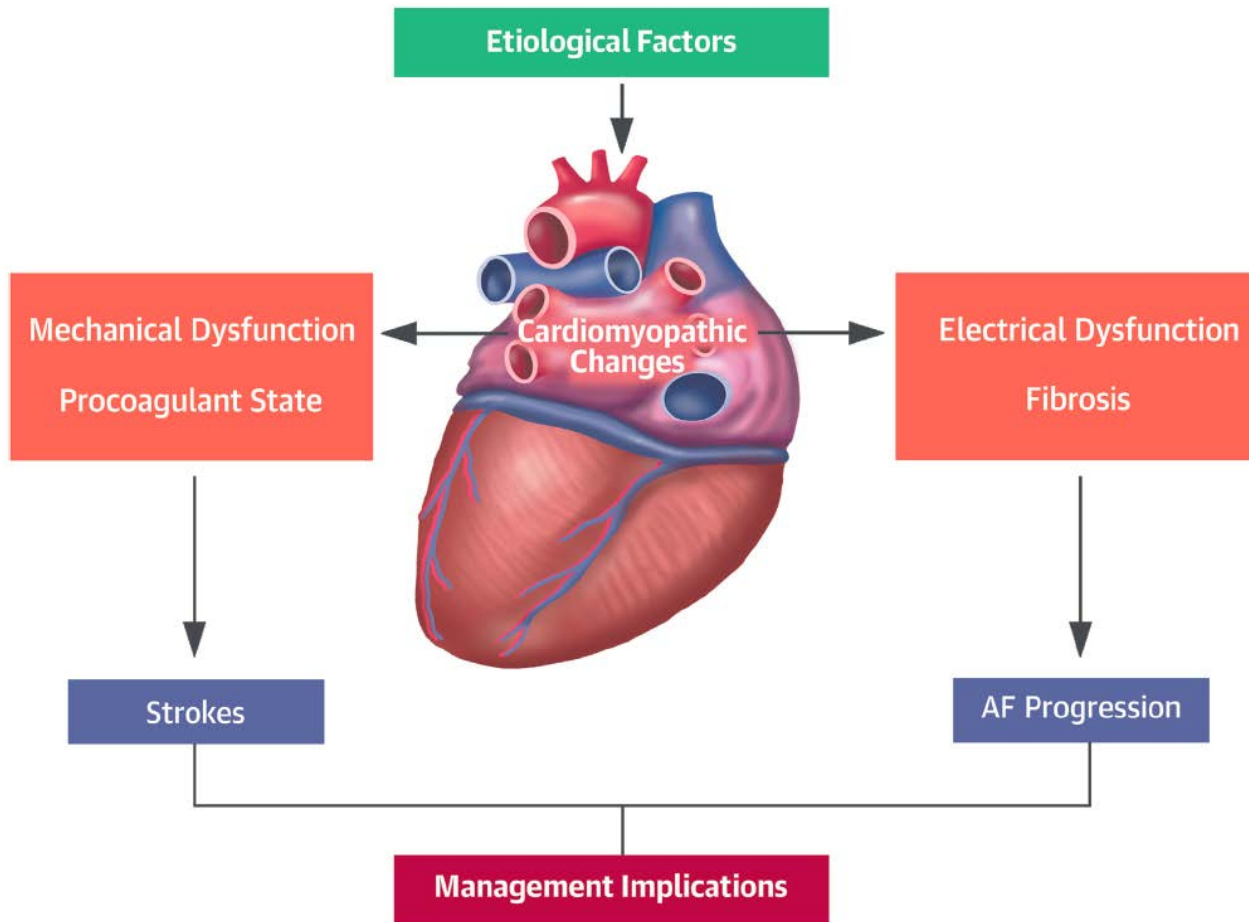
FA subclínica

Miocardiopatía  
Auricular

# Clasificación relevancia clínica



ECFEM (Etiological/Coagulation/Fibrosis/Electrical/Mechanical) Classification



Guichard, J.-B. et al. J Am Coll Cardiol. 2017;70(6):756-65.

# Definición

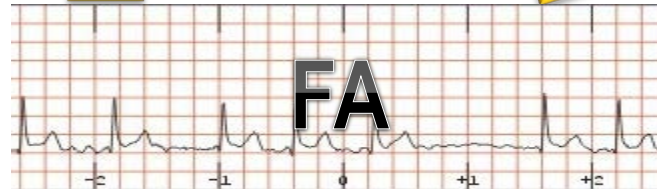
## F. Riesgo Comorbilidades

- Edad
- HTA
- Cardiopatías
- Enfermedades tiroides
- Obesidad
- IRC
- EPOC
- SAHS
- ...

- ↑ P auricula
- + SNA
- + Neurohormonas
- + inflamación
- ...

## Fibrosis

- Alt estructural
- Alt molecular
- Alt iónicas
- Alt eléctricas



# Algunos datos epidemiológicos

Artículo original

## Prevalencia de fibrilación auricular en España. Resultados del estudio OFRECE

Juan José Gómez-Doblas<sup>a,\*</sup>, Javier Muñoz<sup>b</sup>, Joaquín J. Alonso Martín<sup>c</sup>, Gustavo Rodríguez-Roca<sup>d</sup>, José María Lobos<sup>e</sup>, Paula Awamleh<sup>c</sup>, Gaietà Permanyer-Miralda<sup>f</sup>, Francisco Javier Chorro<sup>g</sup>, Manuel Anguita<sup>h</sup> y Eulalia Roig<sup>i</sup>, en representación de los colaboradores del estudio OFRECE

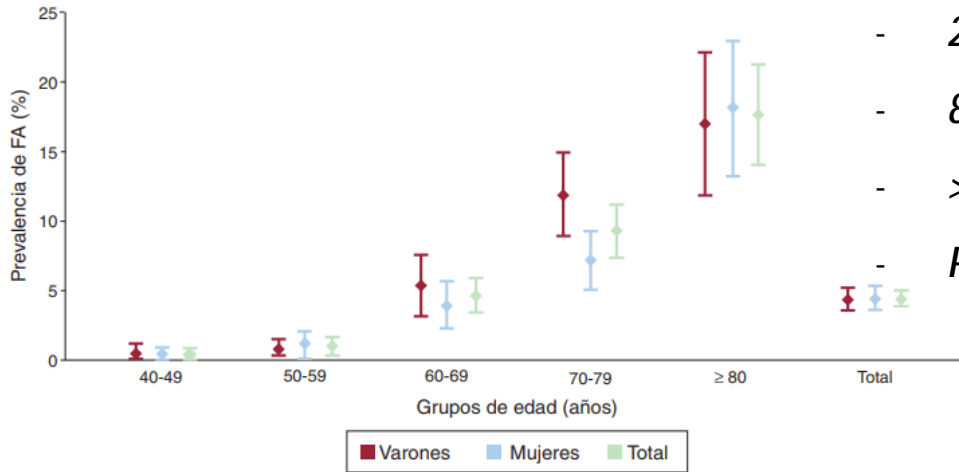


Figura 2. Prevalencias de fibrilación auricular por sexo y grupos de edad con intervalos de confianza del 95%. FA: fibrilación auricular.

- Estudio transversal en AP
- 2013 todas las comunidades autónomas
- 8300 personas
- > 40 años
- P global 4,4% (IC<sub>95%</sub>: 3,6-5,3%)



## Artículo original

## Prevalencia de fibrilación auricular en España. Resultados del estudio OFRECE

Juan José Gómez-Doblas<sup>a,\*</sup>, Javier Muñoz<sup>b</sup>, Joaquín J. Alonso Martín<sup>c</sup>, Gustavo Rodríguez-Roca<sup>d</sup>, José María Lobos<sup>e</sup>, Paula Awamleh<sup>c</sup>, Gaietà Permanyer-Miralda<sup>f</sup>, Francisco Javier Chorro<sup>g</sup>, Manuel Anguita<sup>h</sup> y Eulalia Roig<sup>i</sup>, en representación de los colaboradores del estudio OFRECE

Odds ratio, ajustadas por edad y sexo, de tener fibrilación auricular para cada factor de riesgo cardiovascular y cada antecedente, y modelo multivariable final

	OR (IC95%)	p
<i>Factores de riesgo cardiovascular</i>		
Obesidad	1,65 (1,22-2,23)	0,001
Sobrepeso	0,71 (0,51-0,98)	0,038
Obesidad central	1,78 (1,32-2,40)	< 0,001
Hipercolesterolemia	1,60 (1,17-2,19)	0,004
Diabetes mellitus	1,42 (1,03-1,94)	0,032
Fumador	0,44 (0,23-0,83)	0,012
HTA	1,55 (1,05-2,29)	0,029
<i>Antecedentes</i>		
Arteriopatía periférica	1,81 (1,02-3,21)	0,042
Enfermedad pulmonar crónica	1,88 (1,21-2,92)	0,005
Enfermedad tiroidea	1,90 (1,27-2,85)	0,002
Implantación de marcapasos	9,31 (4,76-18,22)	< 0,001
Cardiopatía isquémica	2,59 (1,68-4,00)	< 0,001
Diagnóstico de IC previo	8,73 (5,27-14,45)	< 0,001
<i>Modelo multivariable</i>		
Edad	1,08 (1,06-1,10)	< 0,001
Sexo femenino	0,61 (0,43-0,86)	0,005
Obesidad central	1,70 (1,24-2,33)	0,001
Fumador	0,47 (0,24-0,92)	0,028
Enfermedad tiroidea	1,69 (1,11-2,58)	0,016
Implantación de marcapasos	5,50 (2,11-14,36)	0,001
Diagnóstico de IC previo	7,72 (4,44-13,41)	< 0,001

HTA: hipertensión arterial; IC: insuficiencia cardiaca; IC95%: intervalo de confianza del 95%; OR: odds ratio.

## Worldwide Epidemiology of Atrial Fibrillation A Global Burden of Disease 2010 Study

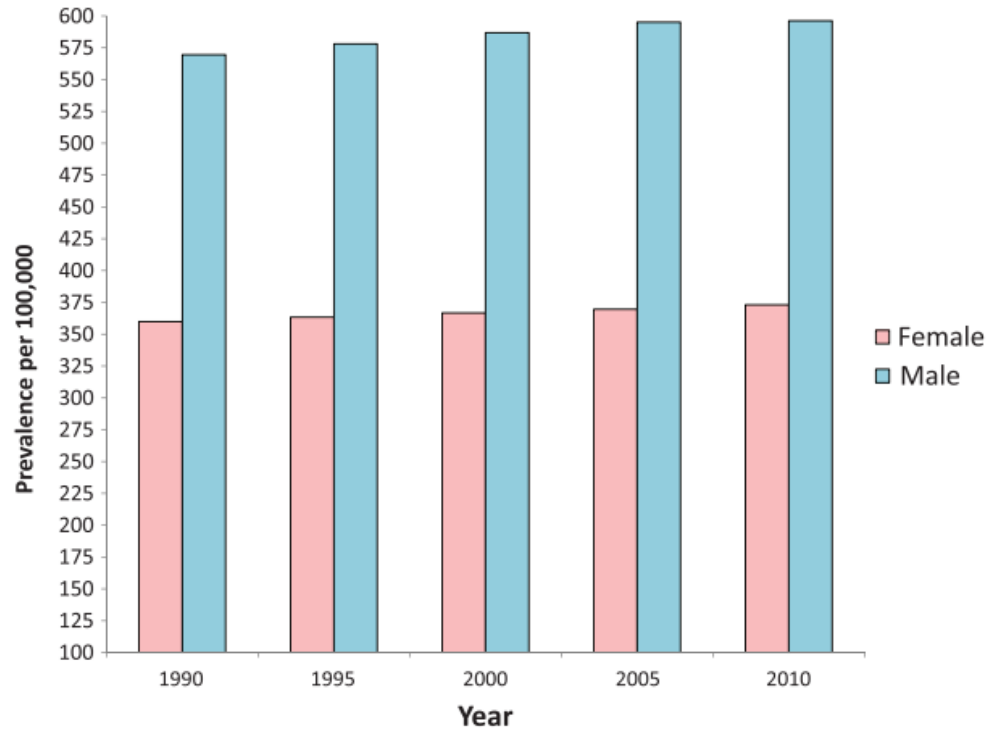
Sumeet S. Chugh, MD; Rasmus Havmoeller, MD, PhD; Kumar Narayanan, MD;

- *Revisión sistemática de estudios poblacionales*
  - *33,5 millones de personas con FA*
    - *20,9 m de hombres*
    - *12,6 m de mujeres*

*Circulation. 2014;129:837-847.*

# Epidemiología

*P mundial ajustada por edad*

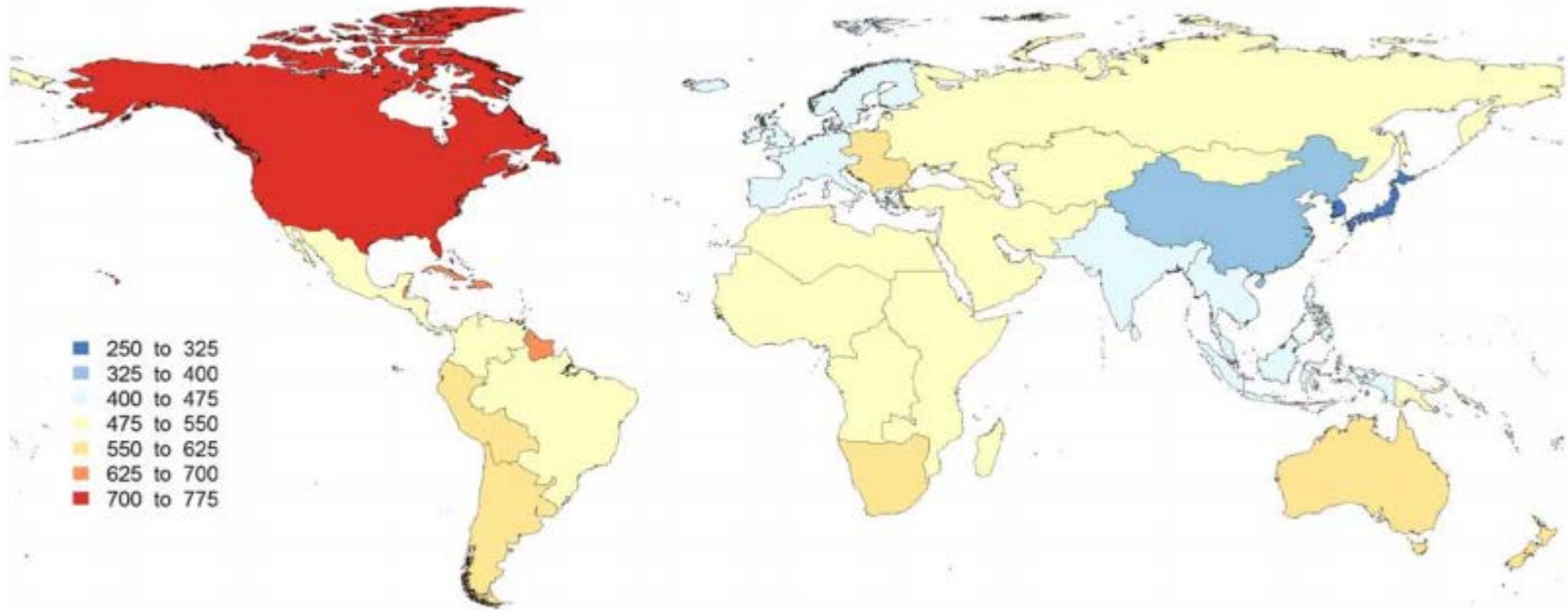


**Figure 3.** Prevalence of atrial fibrillation: 1990 to 2010. Estimated age-adjusted global prevalence of atrial fibrillation (per 100000 population) for men and women from 1990 to 2010.

*Circulation. 2014;129:837-847.*

# Epidemiología

Prevalence of atrial fibrillation and flutter (per 100,000) by region, 2010

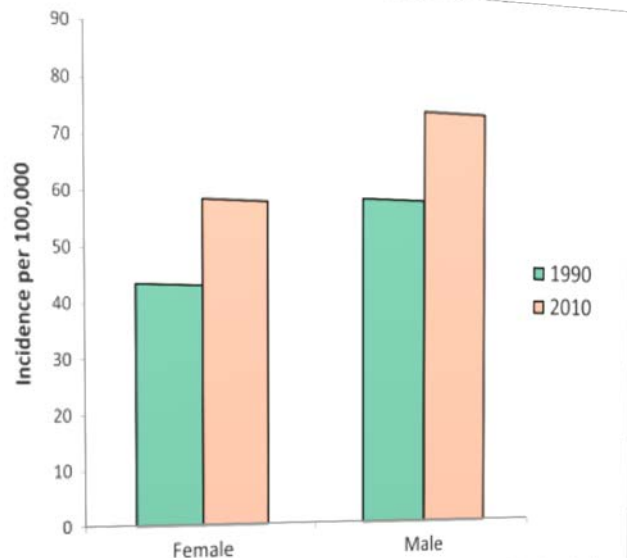


**Figure 2.** World map showing the age-adjusted prevalence rates (per 100000 population) of atrial fibrillation in the 21 Global Burden of Disease regions, 2010.

*Circulation.* 2014;129:837-847.

# Epidemiología

## Incidencia mundial ajustada por edad

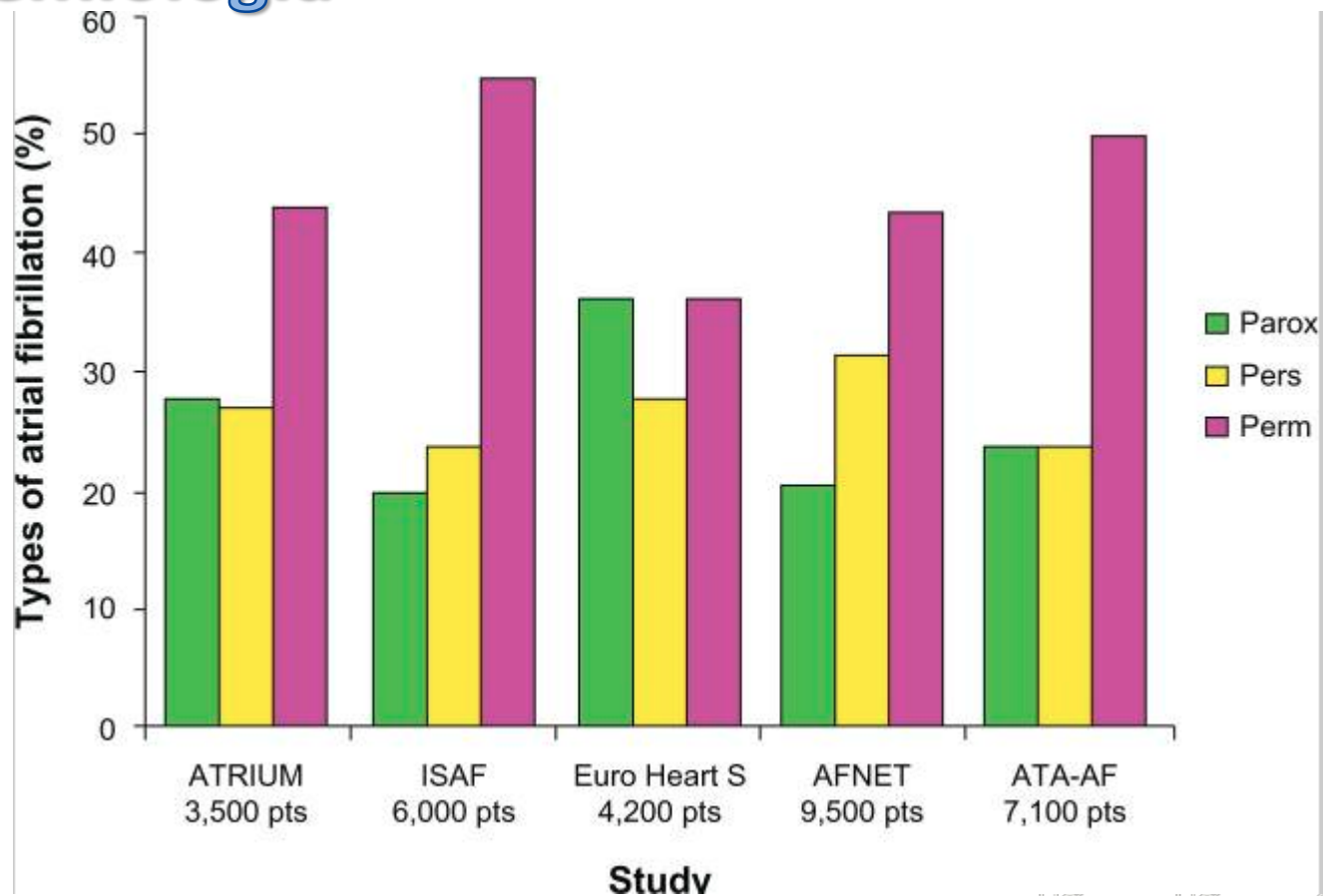


**Figure 4.** Incidence of atrial fibrillation: 1990 and 2010. Estimated age-adjusted global incidence (per 100 000 person-years) for men and women for 1990 and 2010.

**Table 2.** Estimated Age-Adjusted Incidence Rates with 95% Uncertainty Intervals of Atrial Fibrillation (per 100 000 Person-years) for Men and Women

	1990	2010
<b>Men</b>		
Global, all ages	60.7 (49.2–78.5)	77.5 (65.2–95.4)
Age ≥35 y	141.0 (114.6–182.6)	181.2 (152.6–222.8)
Developed countries	78.4 (67.5–91.9)	123.4 (107.6–141.5)
Developing countries	50.0 (33.8–76.8)	53.8 (38.7–79.8)
<b>Women</b>		
Global, all ages	43.8 (35.9–55.0)	59.5 (49.9–74.9)
Age ≥35 y	102.0 (83.9–127.9)	139.7 (117.1–175.3)
Developed countries	52.8 (45.0–62.9)	90.4 (77.8–104.5)
Developing countries	36.0 (24.5–54.7)	40.0 (27.2–62.6)

# Epidemiología



*Clin Epidemiol. 2014; 6: 213–220.*

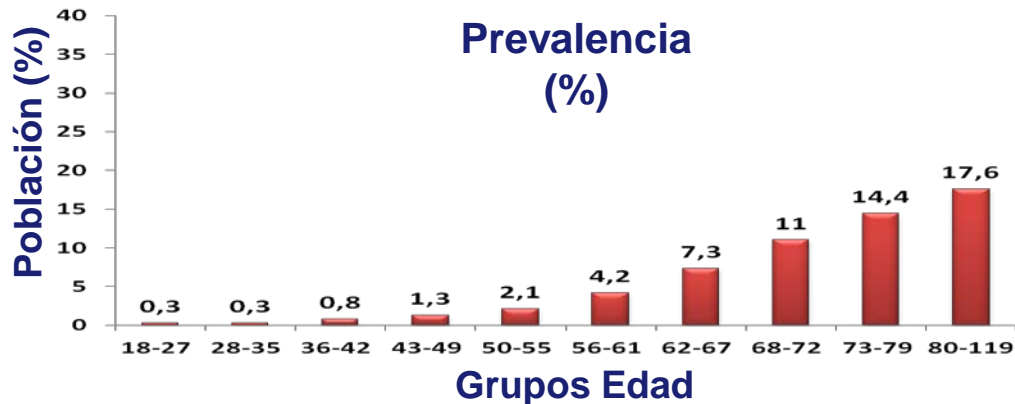
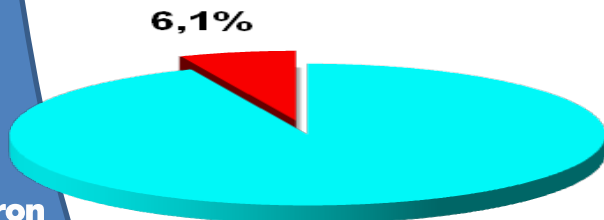
# Fibrilación Auricular: prevalencia y magnitud en atención primaria

•  $N = 121.676$  • Edad media:  $55,2 \pm 18,1$  años • Mujeres: 56,4%

Prevalencia FA en AP: 6,1%

Mayor prevalencia en varones:

7,3% vs. 5,2%



# Epidemiología Catalunya

- Població 7,400,000 persones
- P 4,4%

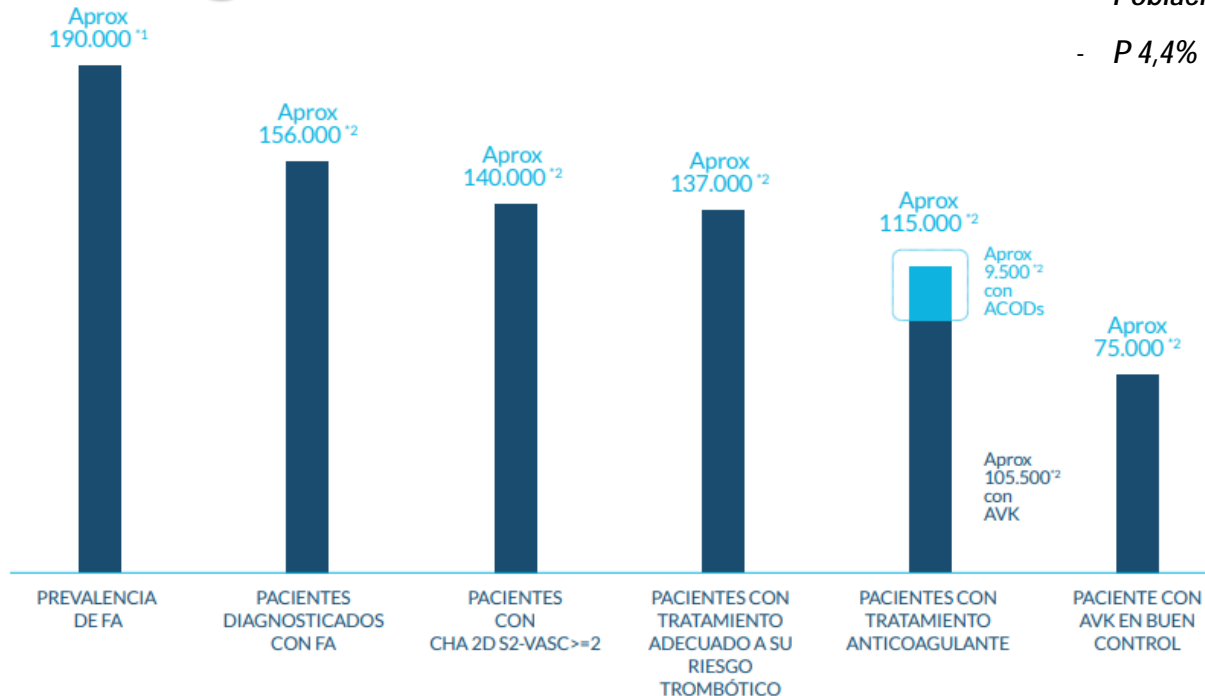


Gráfico elaborado por SI-Health en base a los siguientes datos bibliográficos:

\* Extrapolación de los datos proporcionados en el informe del Manejo del riesgo trombótico en la fibrilación auricular a la atención primaria de l'ICS. Nota d'avaluació assistencial del grup d'Avaluació Estratègica (SIDIAP). 01/2015 que abarca al 50,4% de la població catalana.

<sup>1</sup> Cálculo construido a través de los datos de pacientes no diagnosticados procedentes de la Ruta asistencial de la fibrilación auricular a Catalunya. Julio de 2014 y la población diagnosticada del documento de Manejo del riesgo trombótico en la fibrilación auricular a la atención primaria de l'ICS. Nota d'avaluació assistencial del grup d'Avaluació Estratègica (SIDIAP). 01/2015.

<sup>2</sup> Manejo del riesgo trombótico en la fibrilación auricular a la atención primaria de l'ICS. Nota d'avaluació assistencial del grup d'Avaluació Estratègica (SIDIAP). 01/2015.



# Epidemiología

- *Tendencia* → ↑
  - ↑ *FRCV*
  - ↑ *supervivencia otras enfermedades CV*

## Projections on the number of individuals with atrial fibrillation in the European Union, from 2000 to 2060

Bouwe P. Krijthe<sup>1,2</sup>, Anton Kunst<sup>3</sup>, Emelia J. Benjamin<sup>4,5,6</sup>, Gregory Y.H. Lip<sup>7</sup>, Oscar H. Franco<sup>1</sup>, Albert Hofman<sup>1</sup>, Jacqueline C.M. Witteman<sup>1,2</sup>, Bruno H. Stricker<sup>1,2,8\*</sup>, and Jan Heeringa<sup>1</sup>

- *Tendencia* → ↑

- ↑ *FRCV*

- ↑ *supervivencia otras enfermedades CV*

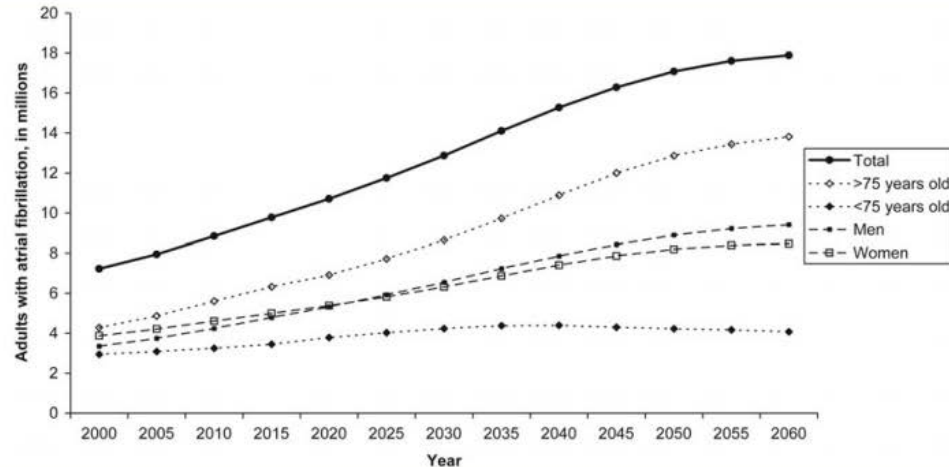
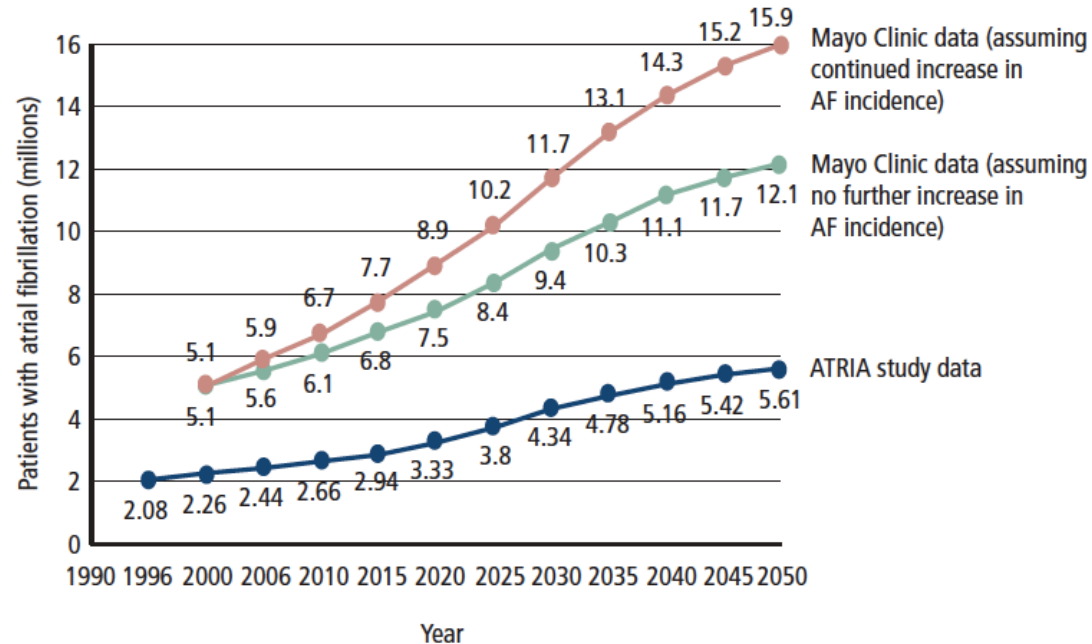


Figure 2 Projected number of adults with atrial fibrillation in the European Union between 2000 and 2060.

# Epidemiología

## - Tendencia USA

Figure 1: Projected Number of Adults with Atrial Fibrillation in the US by 2050



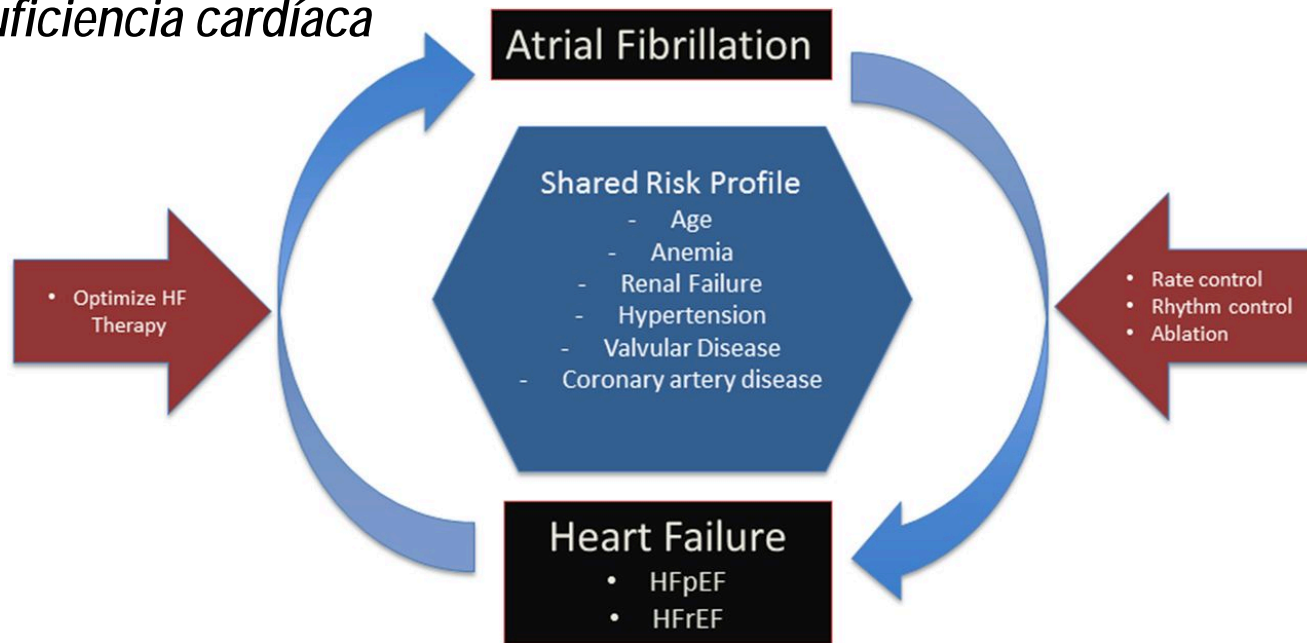
# Consecuencias FA

*(más allá del propio trastorno del ritmo)*

- *Insuficiencia cardíaca /SCA*
- *Ictus*
- *Mortalidad*

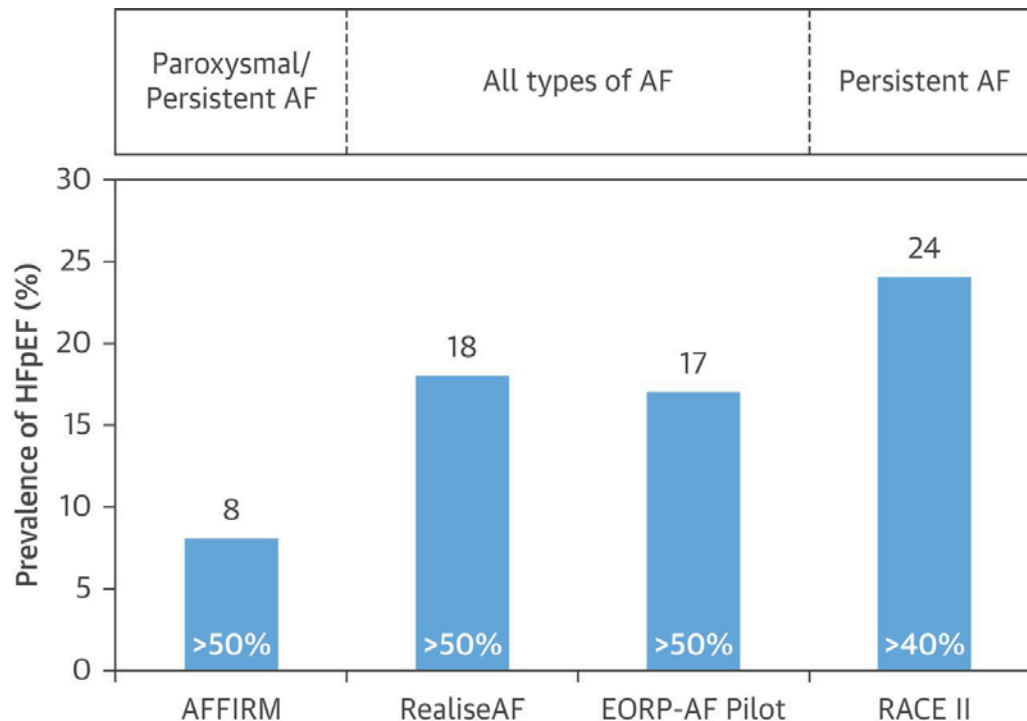
# Consecuencias FA

- *Insuficiencia cardíaca*



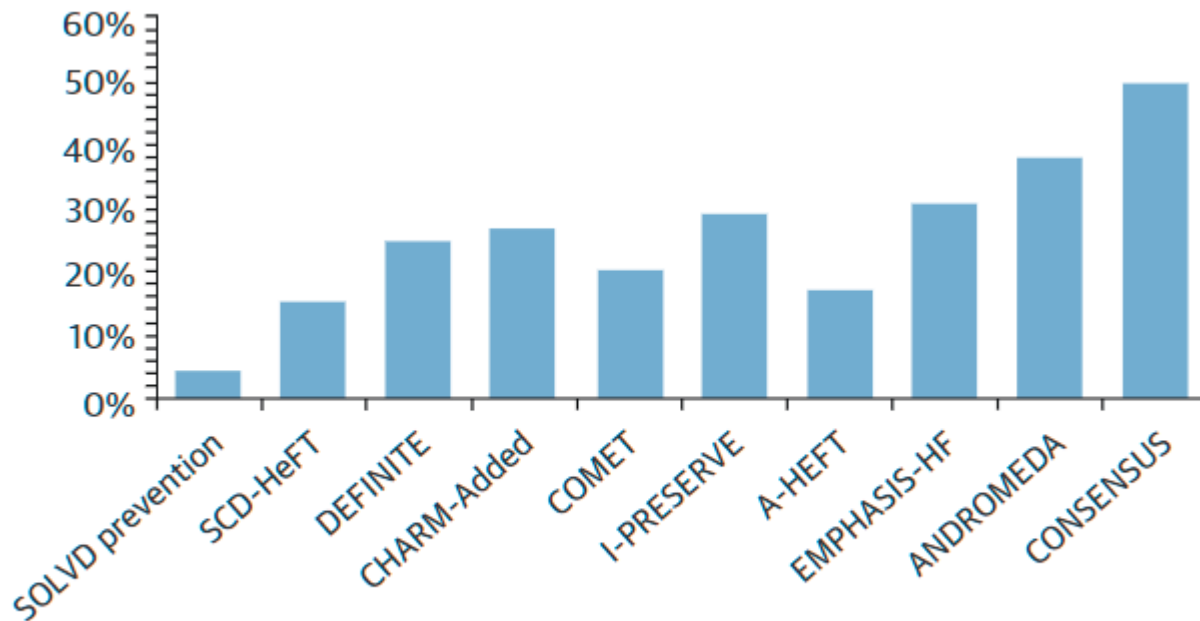
# Consecuencias FA

- *Insuficiencia cardíaca – FEVI conservada*



# Consecuencias FA

- *Insuficiencia cardíaca - FEVI reducida*

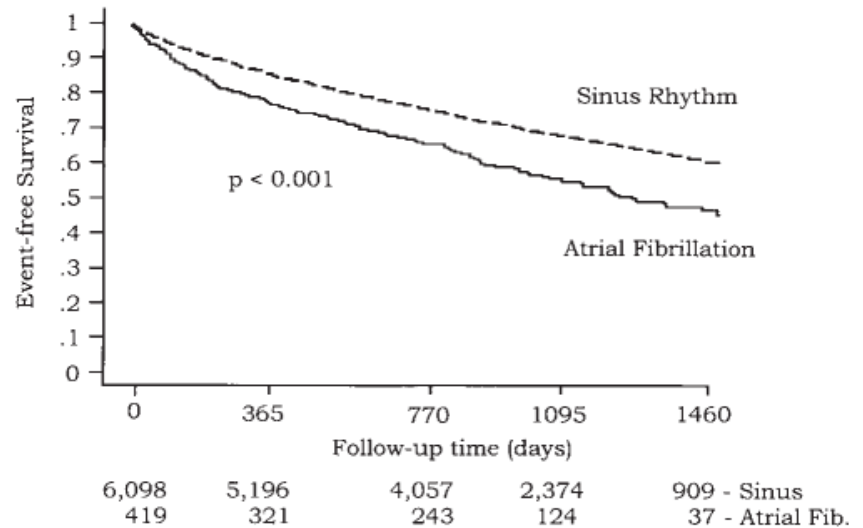
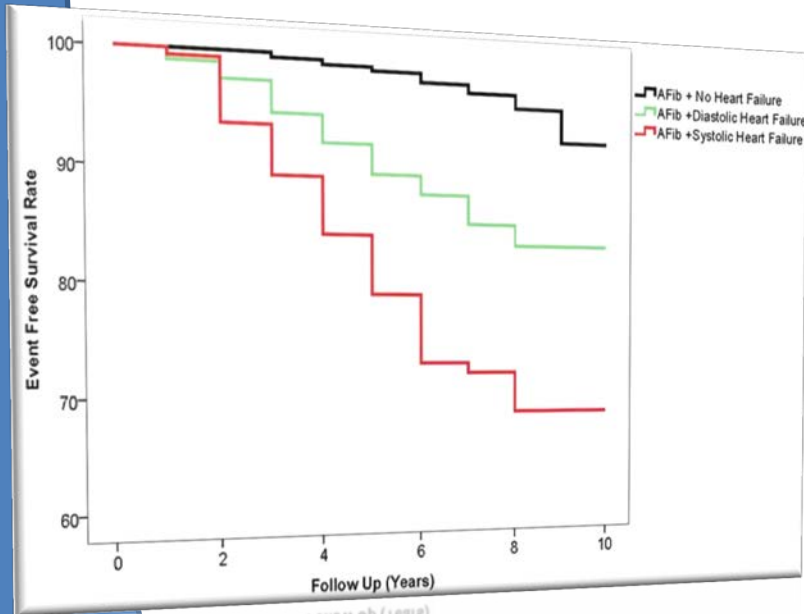


**FIGURE 2** Prevalence of AF in Patients Enrolled in HF Studies

*J Am Coll Cardiol.* 2014 Aug 19;64(7):710-21

# Consecuencias FA

- *Insuficiencia cardíaca*



**Figure 2:** Kaplan-Meier event-free survival curves for the composite endpoint of death or hospitalization for heart failure from the SOLVD trial based on presence/absence of atrial fibrillation (AF). In SOLVD, patients with left ventricular ejection fraction (LVEF)  $\leq 35\%$  and symptomatic or



# Consecuencias FA

## - Ictus

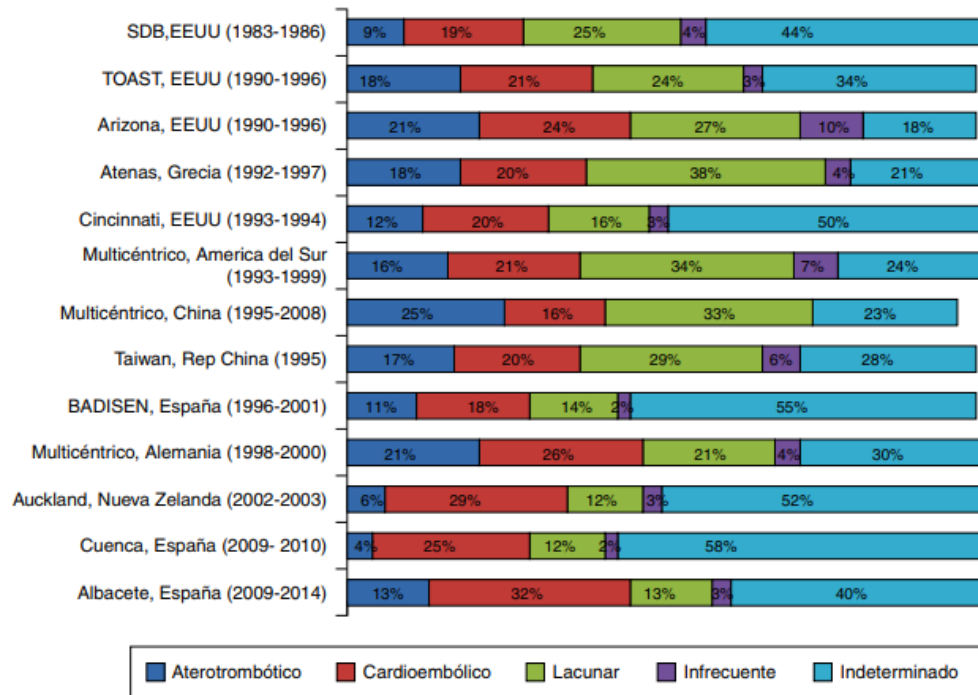


Figura 1 Registros hospitalarios de ictus. Distribución porcentual de los subtipos (TOAST) de ictus isquémicos en Albacete, comparados con otros registros hospitalarios.

# Consecuencias FA

Contents lists available at ScienceDirect

ELSEVIER

International Journal of Cardiology

journal homepage: [www.elsevier.com/locate/ijcard](http://www.elsevier.com/locate/ijcard)

**Yield of atrial fibrillation detection with Textile Wearable Holter from the acute phase of stroke: Pilot study of Crypto-AF registry**

Jorge Pagola <sup>a,\*,1</sup>, Jesus Juega <sup>a,1</sup>, Jaume Francisco-Pascual <sup>b,1</sup>, Angel Moya <sup>b,1</sup>, Mireia Sanchis <sup>a,1</sup>, Alejandro Bustamante <sup>c,1</sup>, Anna Penalba <sup>c,1</sup>, Maria Usero <sup>d,1</sup>, Elisa Cortijo <sup>d,1</sup>, Juan F. Arenillas <sup>d,1</sup>, Ana I. Calleja <sup>d,1</sup>, Maria Sandin-Fuentes <sup>e,1</sup>, Jeronimo Rubio <sup>e,1</sup>, Fernando Mancha <sup>f,1</sup>, Irene Escudero-Martinez <sup>f,1</sup>, Francisco Moniche <sup>f,1</sup>, Reyes de Torres <sup>f,1</sup>, Soledad Pérez-Sánchez <sup>f,1</sup>, Carlos E. González-Matos <sup>f,1</sup>, Ángela Vega <sup>f,1</sup>, Alonso A. Pedrote <sup>g,1</sup>, Eduardo Arana-Rueda <sup>g,1</sup>, Joan Montaner <sup>f,1</sup>, Carlos A. Molina <sup>a,1</sup>, On behalf of CryptoAF investigators:

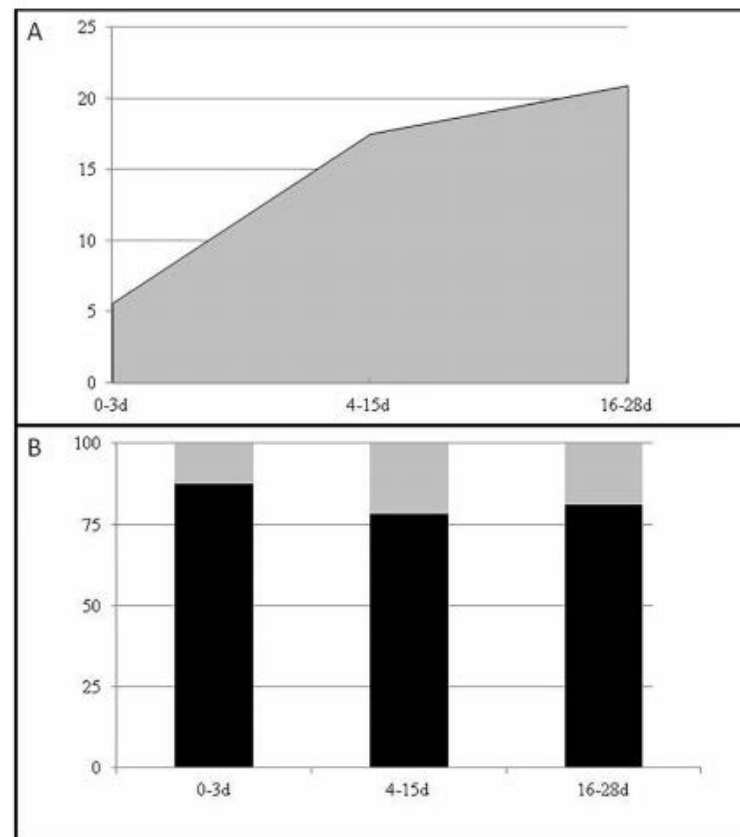
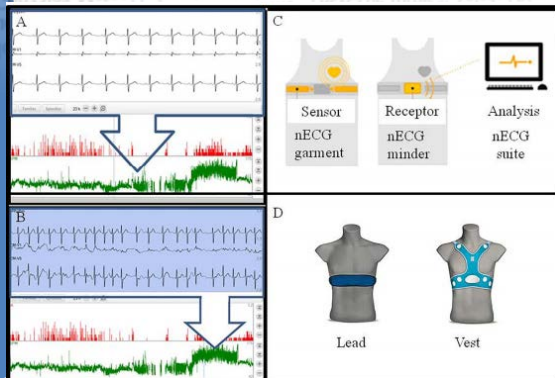


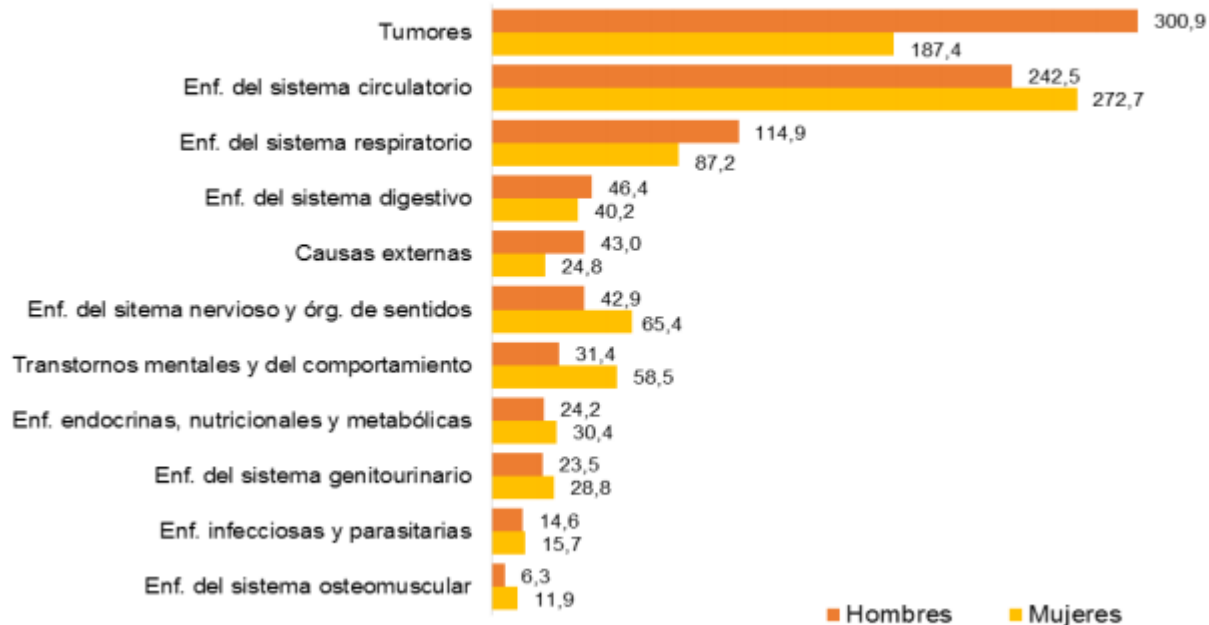
Fig. 3. Timing of AF detection within the first 28 days from stroke onset. A. Above, cumulative percentage of AF detection. B. Below, percentage of AF detection in each period. Gray bar means percentage of AF only detected within the period. Black bar is the percentage of AF also detected in the other periods.



# Consecuencias FA

## - Ictus

Tasas brutas por 100.000 habitantes según causa de muerte por capítulos de la CIE-10 y sexo. Año 2016

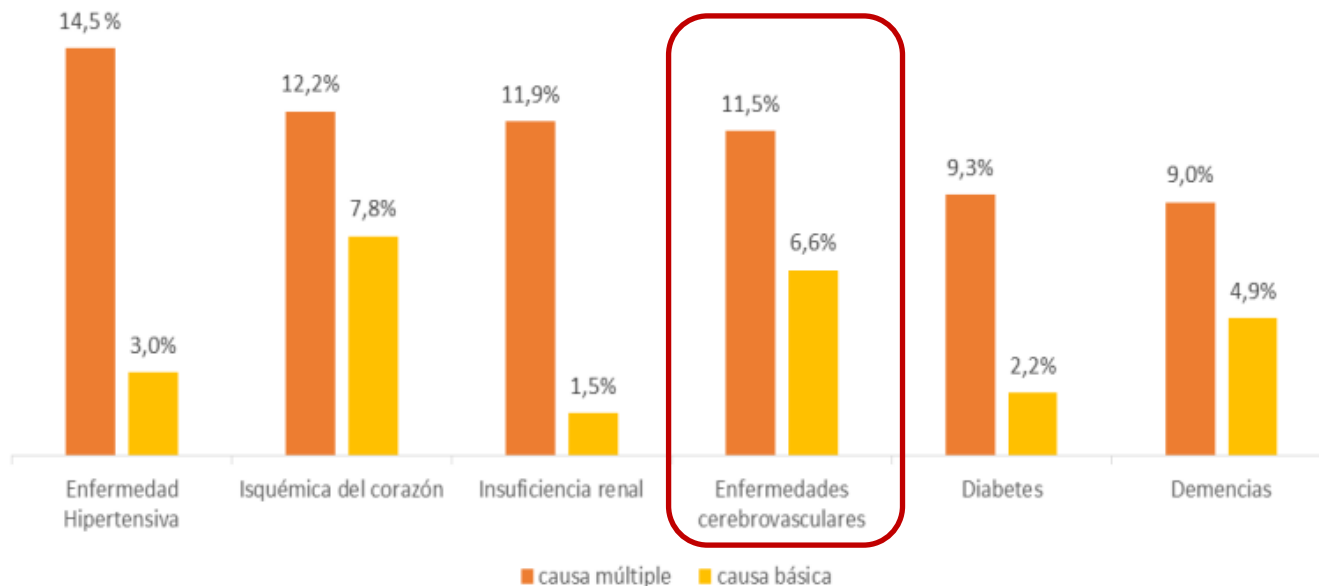


# Consecuencias FA

## - Ictus

### Causas múltiples más frecuentes

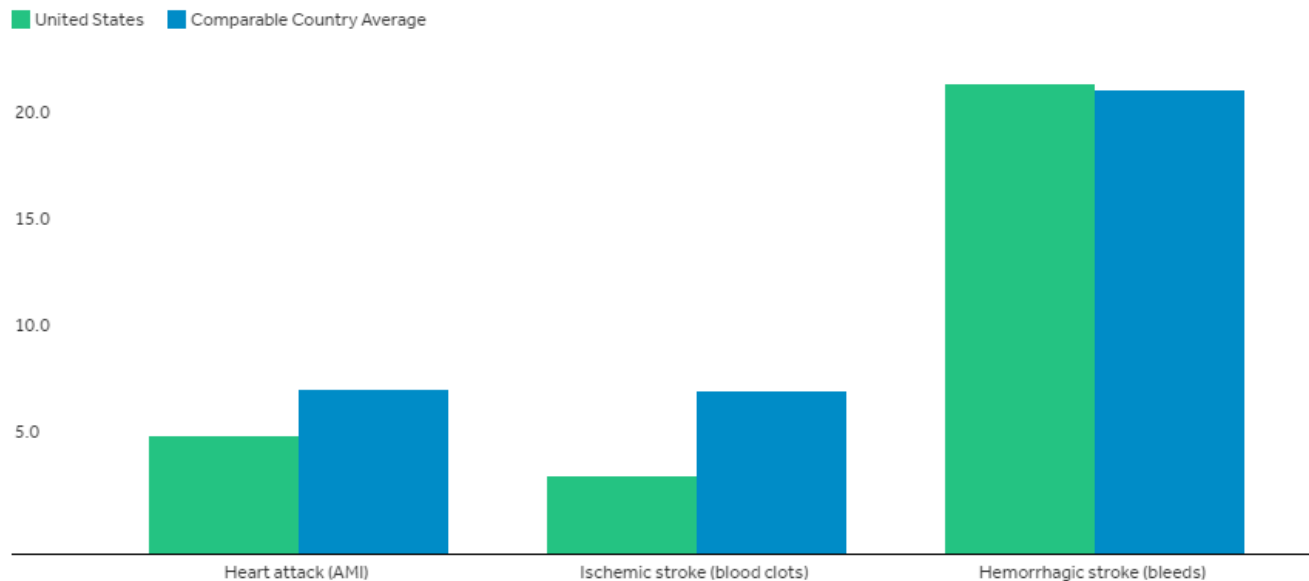
Porcentaje de causa múltiple y causa básica sobre total de fallecidos. Año 2016



# Consecuencias FA

## - Ictus

Admission-based age standardized 30 day in-hospital mortality rate per 100 hospital discharges for acute myocardial infarction, ischemic stroke, and hemorrhagic stroke, ages 45 and older, 2012



Source: Kaiser Family Foundation analysis of data from OECD (2017),

# Consecuencias FA

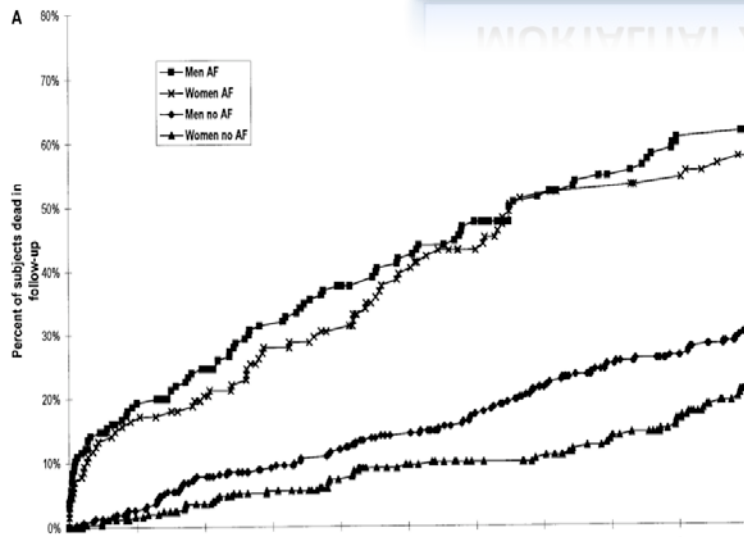
## - Mortalidad

**Methods and Results**—We examined the mortality of subjects 55 to 94 years of age who developed AF during 40 years of follow-up of the original Framingham Heart Study cohort. Of the original 5209 subjects, 296 men and 325 women (mean ages, 74 and 76 years, respectively) developed AF and met eligibility criteria. By pooled logistic regression, after adjustment for age, hypertension, smoking, diabetes, left ventricular hypertrophy, myocardial infarction, congestive heart failure, valvular heart disease, and stroke or transient ischemic attack, AF was associated with an OR for death of 1.5 (95% CI, 1.2 to 1.8) in men and 1.9 (95% CI, 1.5 to 2.2) in women. The risk of mortality conferred by AF did not significantly vary by age. However, there was a significant AF-sex interaction: AF diminished the female advantage in survival. In secondary multivariate analyses, in subjects free of valvular heart disease and preexisting cardiovascular disease, AF remained significantly associated with excess mortality, with about a doubling of mortality in both sexes.

**Conclusions**—In subjects from the original cohort of the Framingham Heart Study, AF was associated with a 1.5- to 1.9-fold mortality risk after adjustment for the preexisting cardiovascular conditions with which AF was related. The decreased survival seen with AF was present in men and women and across a wide range of ages. (*Circulation*. 1998;98:946-952.)

## Impact of Atrial Fibrillation on the Risk of Death : The Framingham Heart Study

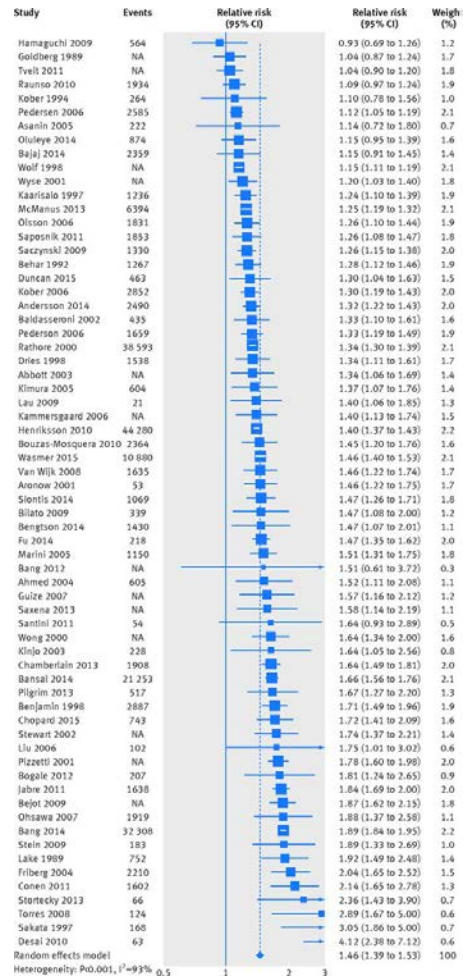
INCREMENT DE MORTALITAT X 2-4



# Consecuencias FA

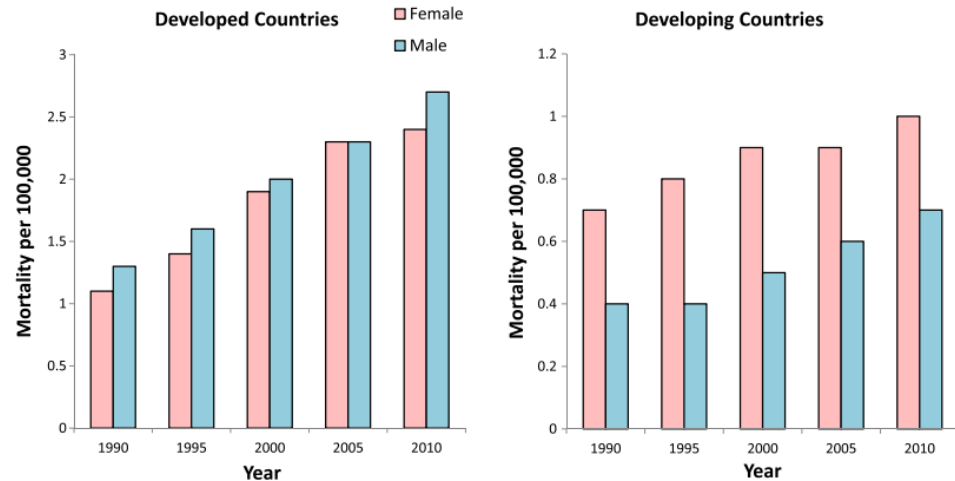
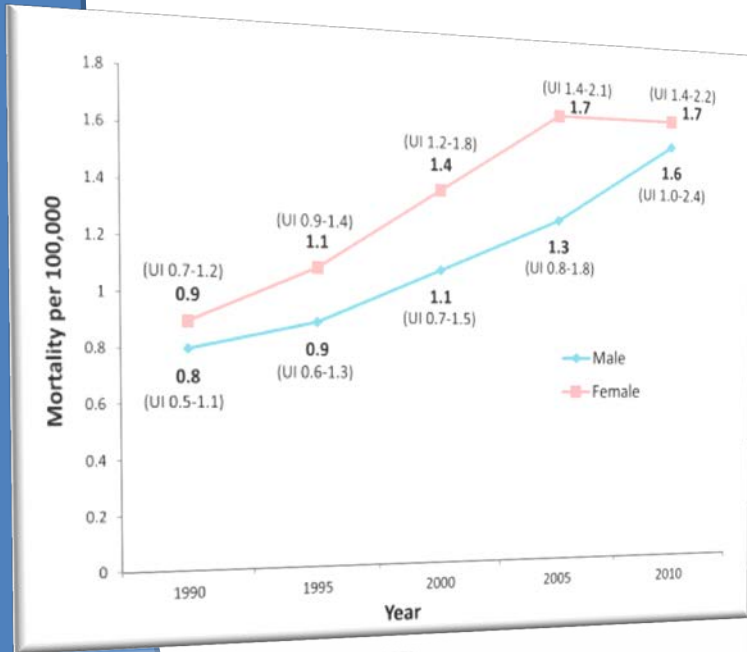
## - Mortalidad

Fig 3 Association between atrial fibrillation and all cause mortality.



# Epidemiología

## - Mortalidad

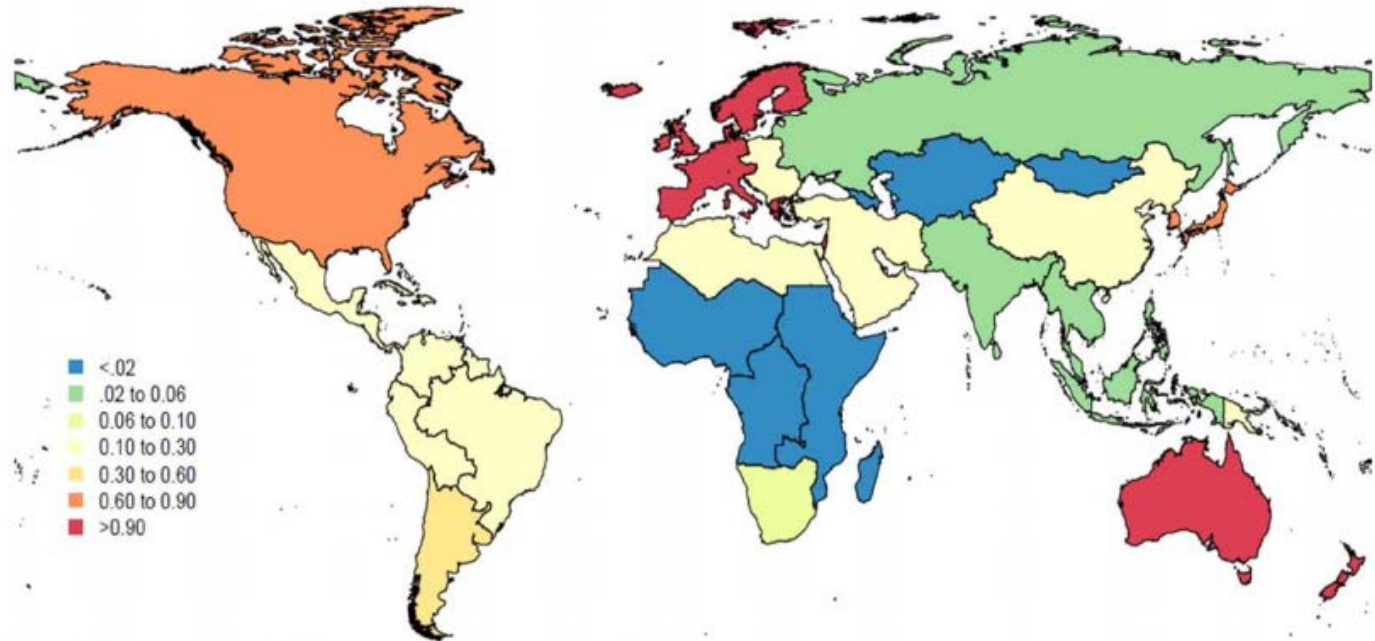


**Figure 6.** Mortality associated with atrial fibrillation (AF) stratified by sex and type of region (developed vs developing). Mortality associated with AF was higher in men and women in the developed regions. The significantly higher mortality in women in the developing regions is responsible for the overall higher AF-related mortality among women compared with men.



# Epidemiología

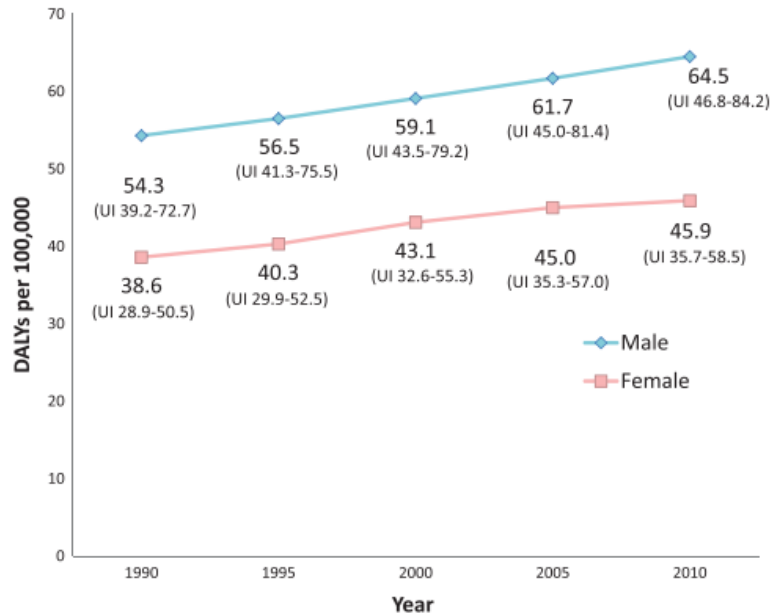
Percent deaths attributable to atrial fibrillation and flutter by region, 2010



**Figure 7.** Proportion of global deaths associated with atrial fibrillation in 2010. The map shows color-coded proportions (in percentages) of global deaths in 2010 associated with atrial fibrillation.

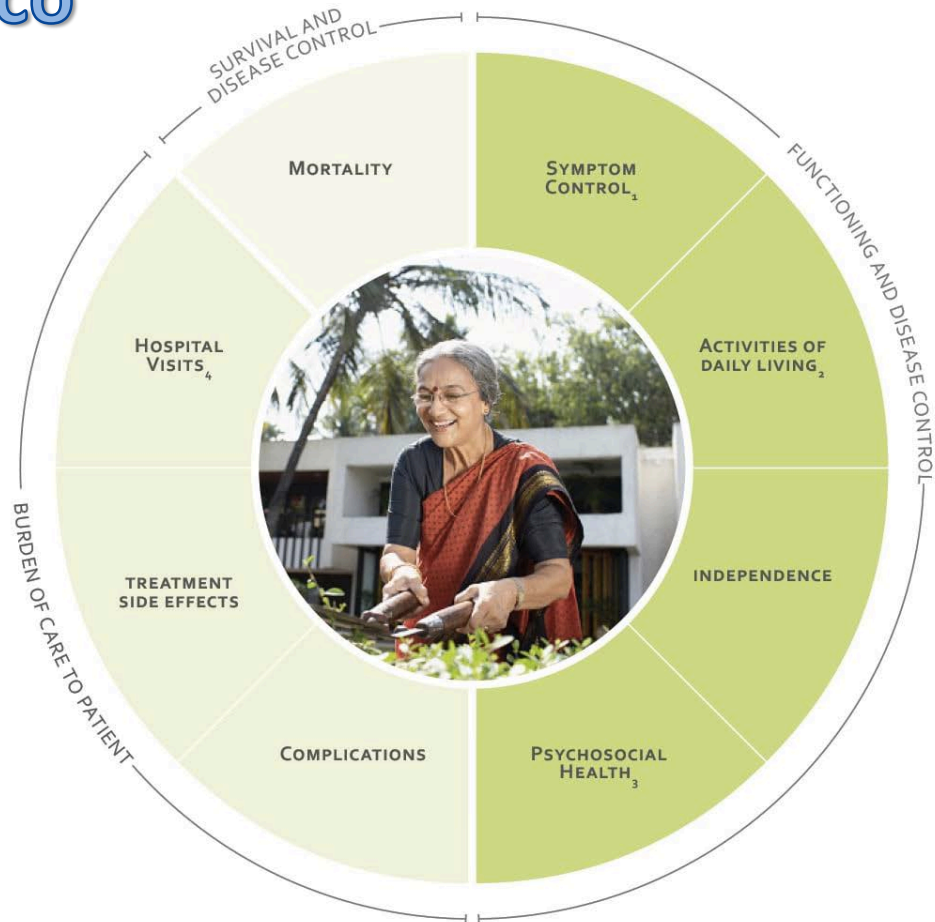
# Epidemiología

## - Morbilidad



**Figure 8.** Disability-adjusted life-years (DALYs) related to atrial fibrillation. Estimated age-adjusted DALYs (per 100 000) related to atrial fibrillation: 1990 to 2010. UI indicates uncertainty index.

# Impacto económico



# Impacto e

**Table I Direct (medical and non-medical) and indirect costs of atrial fibrillation and of complications**

Direct medical costs of AF

Hospitalization (inpatient care)

Electrical cardioversion

AF ablation

Atrioventricular node-ablation including pacemaker therapy

Maze surgery

Other surgery for AF

Hospital-based ambulatory and outpatient care

Visit to a specialist

Electrical cardioversion

Pacemaker interrogation and monitoring

Visit to a general practitioner

AF as secondary diagnosis

Pharmaceuticals

Anticoagulation monitoring

Direct costs of complications (stroke, heart failure, and acute coronary syndromes)

Indirect costs of AF

Production loss

Indirect costs of complications (stroke, heart failure, and acute coronary syndromes)

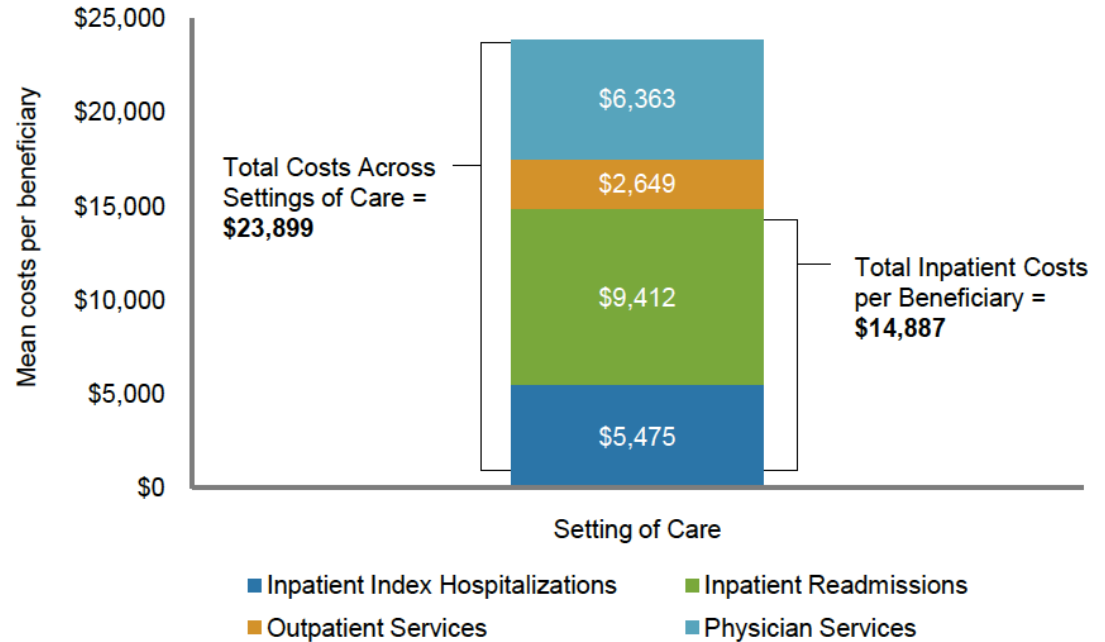
Production loss

# Impacto económico

Table 4 Index hospitalization characteristics

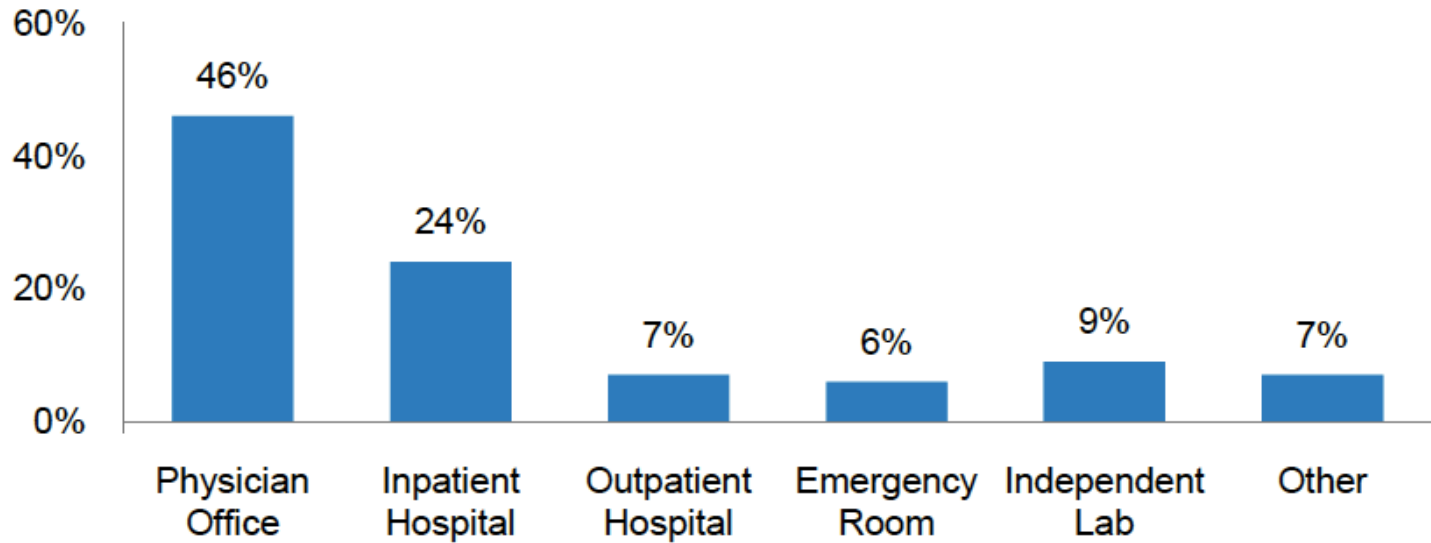
Characteristic	AFib Cohort (n= 14,174)
Average Length of Stay (number of days)	3.68 days
Average Cost of Index Hospitalization	\$5,475
Year of Index Hospitalization (%)	
2005	35.80
2006	33.00
2007	31.21

Figure 5 Total average medical costs by site of service



# Impacto económico

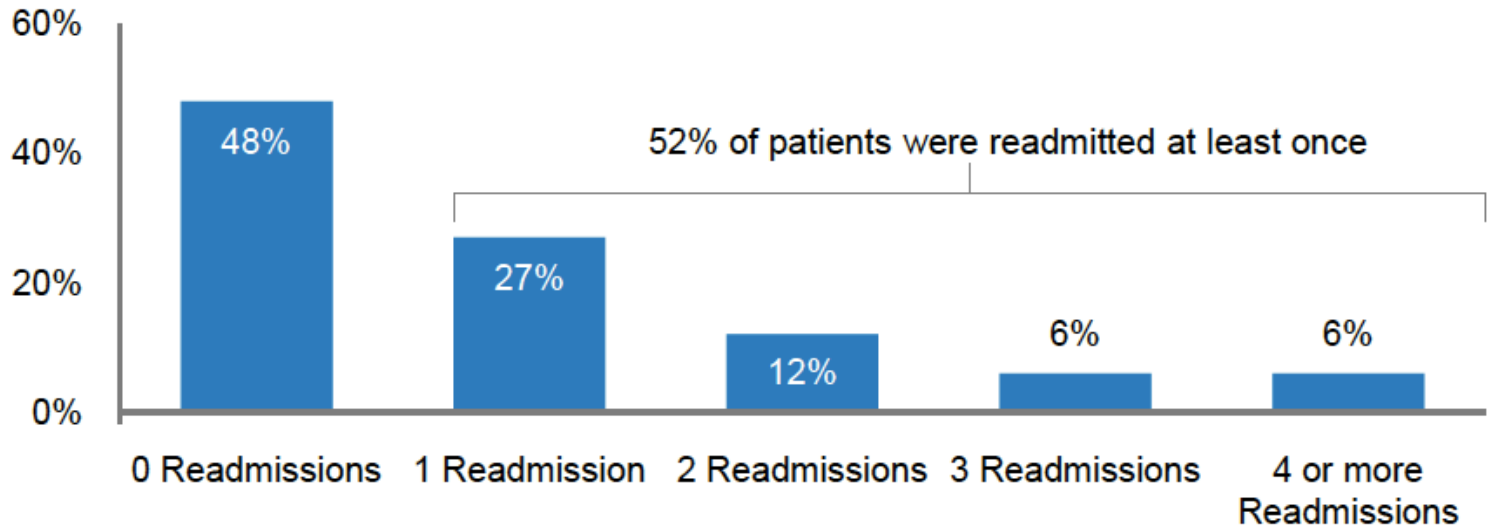
Figure 6 Physician encounters by site of service during the follow-up period



Note: "Other" includes settings such as ambulance, skilled nursing facility, and ambulatory surgical center.

# Impacto económico

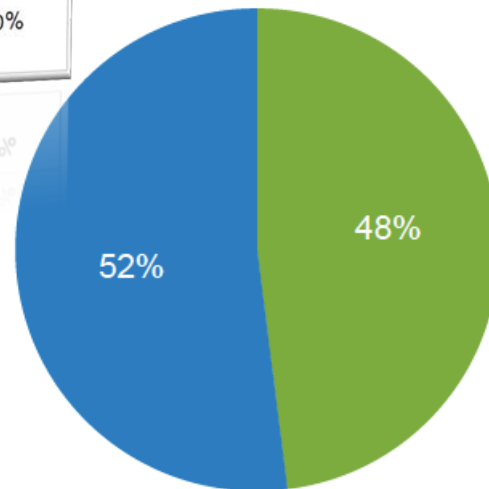
Figure 7 Number of readmissions during the follow-up period



# Impacto económico

Table 8 DRG assignments for AFib patient readmissions

DRG code	DRG description	Percent of total
138	Cardiac Arrhythmia & Conduction Disorders W CC	10.43%
127	Heart Failure & Shock	9.81%
139	Cardiac Arrhythmia & Conduction Disorders W/O CC	4.53%
089	Simple Pneumonia & Pleurisy Age >17 W CC	3.27%
552	Other Permanent Cardiac Pacemaker Implant W/O Major CV DX	2.60%



- Cardiovascular readmissions
- Non-cardiovascular readmissions



RESEARCH ARTICLE

Open Access



# Cost of illness of atrial fibrillation: a nationwide study of societal impact

Søren Paaske Johnsen<sup>1\*</sup>, Lene Worsaae Dalby<sup>2</sup>, Tomas Täckström<sup>3</sup>, Jens Olsen<sup>4</sup> and Anina Fräschke<sup>3</sup>

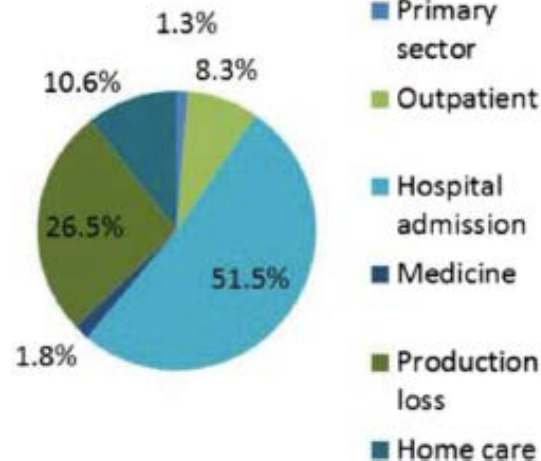
**Table 3** Total<sup>a</sup> and attributable<sup>b</sup> average cost per individual in years 1–3 after a first

	Cost, year 1 (N = 15,237 AF patients)		Cost, year 2 (N = 11,403 AF patients)	
	Total	Attributable	Total	Attributable
Primary sector costs	222	206	121	103
Outpatient costs	1708	1533	567	388
Hospital admission costs	6657	6336	5457	5398
Medicine costs	169	143	186	155
Productivity loss	2012	824	2697	191
Home care costs	1237	992	1241	819
Total	12,005	10,034	10,268	7055

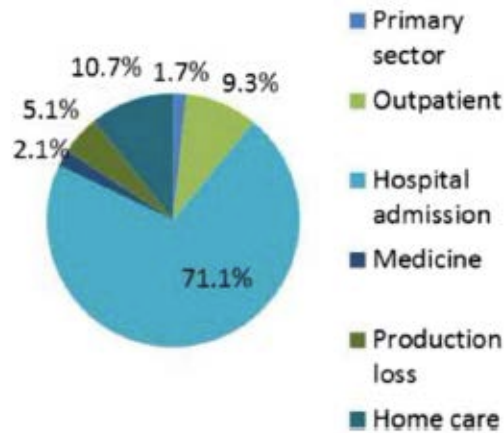
<sup>a</sup>Total costs after AF diagnosis was defined as the average cost per AF-patient 1st, 2nd and 3rd year af outpatient, hospital admission, medicine, productivity loss and home care) minus the average cost per

<sup>b</sup>The total costs of AF minus the total costs among the controls. Data are from the latest available year atrial fibrillation in 2010. All costs are in euros and based on 2013 prices

## Total cost



## Attributable cost



## Costs of atrial fibrillation in five European countries: results from the Euro Heart Survey on atrial fibrillation

Anna Ringborg<sup>1,2\*</sup>, Robby Nieuwlaat<sup>3</sup>, Peter Lindgren<sup>1,2</sup>, Bengt Jönsson<sup>4</sup>, Dogan Fidan<sup>5</sup>,  
Aldo P. Maggioni<sup>6</sup>, Jose Lopez-Sendon<sup>7</sup>, Janina Stepinska<sup>8</sup>, Dennis V. Cokkinos<sup>9</sup>, and  
Harry J.G.M. Crijns<sup>3</sup>

Table 4 Mean (SD) costs of admission, by country and setting

Resource	Greece	Italy	Poland	Spain	The Netherlands
Inpatient setting	(n = 272)	(n = 509)	(n = 226)	(n = 464)	(n = 280)
Diagnostics	56 (34)	81 (108)	72 (270)	87 (67)	155 (352)
Interventions	508 (2678)	431 (1497)	252 (729)	744 (2209)	1081 (4149)
Drug therapy	10 (17)	10 (22)	10 (22)	29 (49)	29 (94)
Inpatient care	721 (427)	4632 (3651)	1946 (1654)	5362 (4583)	5099 (4948)
Work loss	68 (147)	98 (327)	42 (121)	138 (502)	81 (619)
Total cost	1363 (2739)	5252 (4317)	2322 (1995)	6360 (5748)	6445 (7531)
Outpatient setting	(n = 51)	(n = 334)	(n = 41)	(n = 384)	(n = 430)
Diagnostics	35 (23)	21 (49)	4 (5)	45 (52)	44 (116)
Interventions	1 (1)	481 (1751)	208 (936)	138 (878)	32 (470)
Consultation	22 (-)	21 (-)	12 (-)	21 (-)	25 (-)
Work loss	11 (21)	17 (30)	5 (7)	13 (21)	13 (31)
Total cost	68 (29)	540 (1759)	229 (936)	217 (883)	114 (520)

## Costs of atrial fibrillation in five European countries: results from the Euro Heart Survey on atrial fibrillation

Anna Ringborg<sup>1,2\*</sup>, Robby Nieuwlaat<sup>3</sup>, Peter Lindgren<sup>1,2</sup>, Bengt Jönsson<sup>4</sup>, Dogan Fidan<sup>5</sup>, Aldo P. Maggioni<sup>6</sup>, Jose Lopez-Sendon<sup>7</sup>, Janina Stepinska<sup>8</sup>, Dennis V. Cokkinos<sup>9</sup>, and Harry J.G.M. Crijns<sup>3</sup>

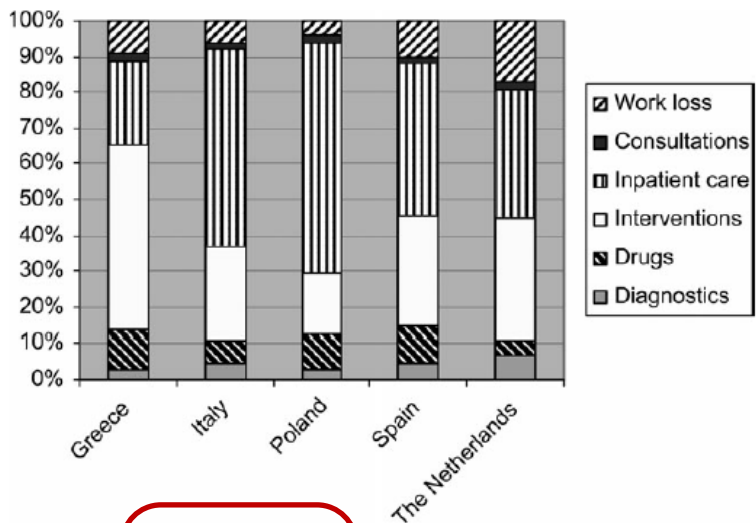


Table 6 Mean (SD) annual costs of AF patients, by resource category and country

Resource	Greece (n = 251)	Italy (n = 645)	Poland (n = 203)	Spain (n = 720)	The Netherlands (n = 685)
Diagnostics	45 (121)	147 (223)	28 (153)	104 (140)	160 (384)
Interventions	780 (3091)	851 (2441)	172 (456)	708 (2547)	798 (3488)
Drug therapy	159 (296)	199 (311)	96 (325)	237 (358)	87 (150)
Consultations	37 (46)	44 (88)	24 (26)	37 (67)	57 (56)
Inpatient care	352 (2248)	1778 (4075)	651 (1271)	987 (2234)	834 (3036)
Work loss	135 (999)	206 (1395)	39 (186)	242 (2253)	391 (3596)
Total annual cost	1507 (5238)	3225 (5975)	1010 (1667)	2315 (4931)	2328 (6834)

All costs are expressed in year 2006 Euros.  
SD, standard deviation.

# Impacto económico

## - Importancia FA en ictus

### Clinical and Economic Implications of AF Related Stroke

Ali N Ali<sup>1</sup>, Dr Ahmed Abdelhafiz<sup>2</sup>

<sup>1</sup>Sheffield NHS Teaching Hospitals Foundation Trust, UK. <sup>2</sup>Rotherham General Hospital NHS Foundation Trust, UK.

#### AF vs SR

Author (Year)	Country	Age (yrs)	Study Design	ECG	Assessment and imaging	N	%	IP stay	IP direct costs excluding physician fees	IP indirect costs	Total IP costs	Notes
Diringer et al (1999) <sup>95</sup>	USA 1996 Tertiary centre	70 yrs	Prospective hospital cohort	ECG	Assessment and imaging	191	7.3%	IP stay	-	-	-	AF independently associated with IP cost. High use of ICU (16%) but low proportion of patients with AF. Average IP cost of stroke £3,871 (\$4408)
Luengo-Fernandez et al (2006) <sup>94</sup>	UK 2002	75 yrs	Population based prospective cohort	ECG	Assessment and imaging	346	21%	1 year	Direct health and social costs	£9667	£5824	Association of AF with 1 year costs lost significance in multivariate analysis.
Bruggenjürgen et al (2007) <sup>93</sup>	Germany 2001 Tertiary centre	74 yrs	Prospective cohort	ECG	Assessment and imaging	367	19.3%	1 year	Direct indirect Total	€11,979 €3125 €14,924	€88117 €4513 €13330	AF independent predictor of acute care costs. Indirect costs for patients with SR > AF. Excluded patients that died (7.5%)
Ghatnekar & Glader (2008) <sup>92</sup>	Sweden 2001	74 yrs	Retrospective evaluation of national registry data - top down	ECG	ICD - 10 codes 161/163/164	6611	24.5%	1 year	DRG related direct health costs	€ 9012	€ 8447	Direct costs for first year significantly higher for AF patients but not for second or third year. At 3 years, still significant difference overall.
								3 year	As above	€10,192	€ 9374	
Hannon et al (2014) <sup>91</sup>	Ireland 2006	71 yrs	Prospective population cohort	ECG, clinical records	Assessment and imaging	568	31%	IP stay	Direct costs 'bottom up'	\$15,025	\$11,196	cost differences were statistically significant (p<0.005). Proportion of patients in work significantly lower among patients with AF prior to index stroke. Indirect costs included.
								2 yrs	Direct and indirect costs 'bottom up'	\$36,865	\$18,691	
Ali et al (2015) <sup>95</sup>	UK 2012	75 yrs	Prospective hospital cohort	ECG, clinical record, exam	Assessment and imaging	213	37.3%	IP and OP care costs	Direct costs 'bottom up'	£9,083	£5,729	Significant differences in direct costs (p<0.001). Adjusted independent effect of AF was an additional £2,173.
Wang et al (2015) <sup>96</sup>	US 2010-12	54 yrs	Retrospective evaluation of national commercial claims data	DRG code	DRG code of follow up events	33,500	7.2	IP stay - first stroke	Direct costs 'top down'	\$23,770	\$18,779	Cost differences statistically significant (p<0.002). Excluded patients aged > 65 yrs, therefore likely underestimate of costs differences. Adjusted independent effect of AF was an additional \$4,905 for first time stroke & \$3,315 for repeat stroke.
								IP stay - repeat strokes	Direct costs 'top down'	\$24,199	\$20,929	

**Table 2: Incremental Cost-effectiveness Ratios of Different Treatment Strategies for Atrial Fibrillation Stratified by Ischemic Stroke Risk (Markov Model)**

Stroke Risk	Strategy	Cost	QALYs	ICER (US\$/QALY)
Moderate, age 65 years	Rate control + warfarin	US\$39,391	10.81	Reference
	Amiodarone + warfarin	US\$43,358	10.75	Dominated
	LACA + warfarin	US\$52,369	11.06	US\$51,800
Moderate, age 55 years	Rate control + warfarin	US\$50,509	14.80	Reference
	Amiodarone + warfarin	US\$55,795	14.75	Dominated
	LACA + warfarin	US\$59,380	14.88	US\$28,700
Low	Rate control + aspirin	US\$25,540	11.21	Reference
	Amiodarone + aspirin	US\$38,425	11.02	Dominated
	LACA + aspirin	US\$43,036	11.40	US\$98,900

An ICER of US\$50,000 per QALY is used to determine whether therapies are considered cost-effective.

ICER = incremental cost-effectiveness ratio; LACA = left atrial catheter ablation; QALY = quality-adjusted life years.

Modified from Chan PS et al.<sup>33</sup>

[J Am Heart Assoc.](#) 2017 Aug; 6(8): e006043.

PMCID: PMC5586445

Published online 2017 Jul 27. doi: [10.1161/JAHA.117.006043](https://doi.org/10.1161/JAHA.117.006043)

PMID: [28751544](https://pubmed.ncbi.nlm.nih.gov/28751544/)

## The Impact of Cryoballoon Versus Radiofrequency Ablation for Paroxysmal Atrial Fibrillation on Healthcare Utilization and Costs: An Economic Analysis From

[K. R. Julian Chun, M](#)

[Arrhythm Electrophysiol Rev.](#) 2014 Nov; 3(3): 177–183.

PMCID: PMC4711535

Published online 2014 Nov 29. doi: [10.15420/aer.2014.3.3.177](https://doi.org/10.15420/aer.2014.3.3.177)

PMID: [26835088](https://pubmed.ncbi.nlm.nih.gov/26835088/)

## Evaluating th

[Andrew Y Chang, 1](#)

[Int J Vasc Med.](#) 2013; 2013: 262809.

PMCID: PMC3781920

Published online 2013 Sep 8. doi: [10.1155/2013/262809](https://doi.org/10.1155/2013/262809)

PMID: [24089640](https://pubmed.ncbi.nlm.nih.gov/24089640/)

## Cost-Effectiveness of Catheter Ablation for Rhythm Control of Atrial Fibrillation

[Gord Blaz](#) [Curr Cardiol Rev.](#) 2012 Nov; 8(4): 368–373.

PMCID: PMC3492820

Published online 2012 Nov. doi: [10.2174/157340312803760730](https://doi.org/10.2174/157340312803760730)

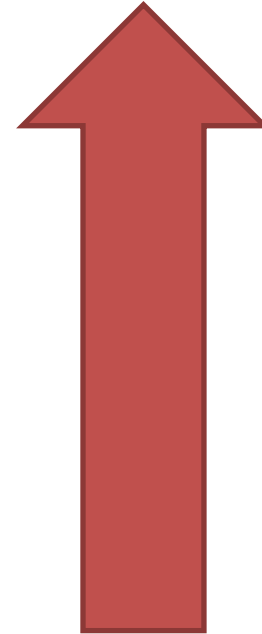
PMID: [22920478](https://pubmed.ncbi.nlm.nih.gov/22920478/)

## Cost of Atrial Fibrillation: Invasive vs Non-Invasive Management in 2012

[Yaariv Khaykin\\*](#) and [Yana Shamiss](#)

# Impacto económico

- *Previsión impacto*
- $\uparrow$  **Prevalencia**
- $\uparrow$  *Tratamientos complejos*



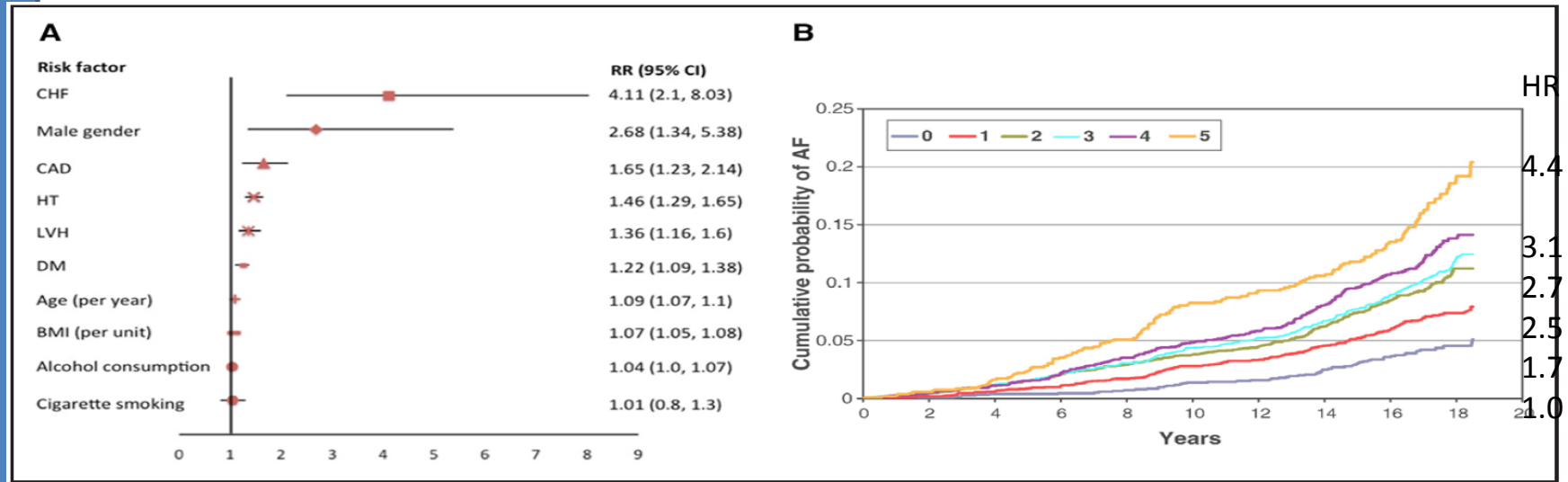
# ¿Dónde actuar?



# ¿Dónde actuar?

METAANÁLISIS ESTUDIOS OBSERVACIONALES

COHORTE PROSPECTIVA – 15000P / >15 AÑOS



15094 pacientes (45-64 años)



15 años

1238 casos de FA

- HTA
- Obesidad
- Hipertrigliceridemia
- ↓HDLc
- Glicemia basal alterada

## Artículo original

## Prevalencia de fibrilación auricular en España. Resultados del estudio

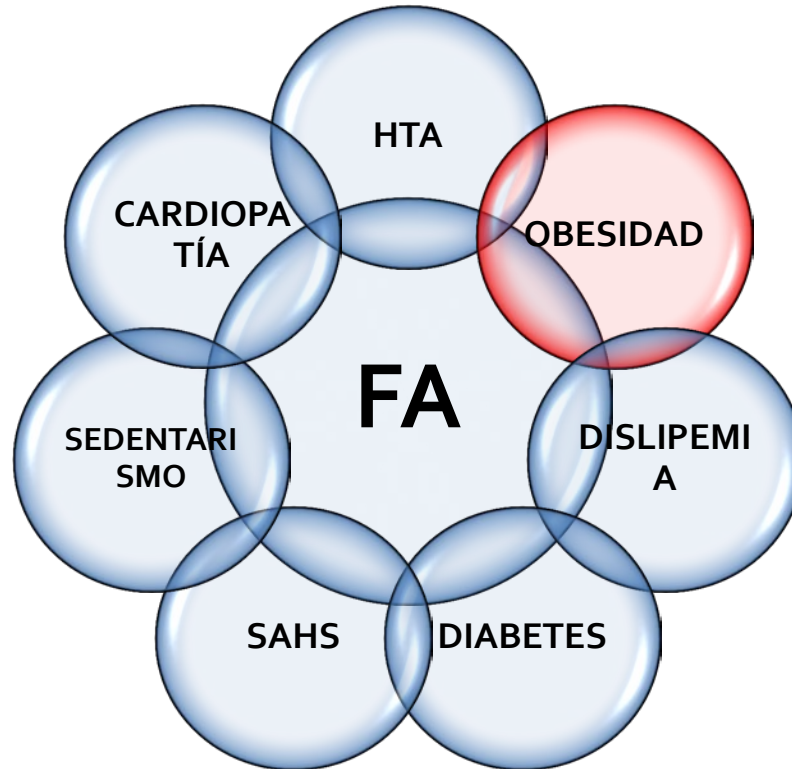
Juan José Gómez-Doblas<sup>a,\*</sup>, Javier Muñiz<sup>b</sup>, Joaquín J. Alonso Martín<sup>c</sup>, Gustavo Rodríguez-Frutos<sup>d</sup>, José María Lobos<sup>e</sup>, Paula Awamleh<sup>c</sup>, Gaietà Permanyer-Miralda<sup>f</sup>, Francisco Javier Chorro<sup>g</sup>, Manuel Anguita<sup>h</sup> y Eulalia Roig<sup>i</sup>, en representación de los colaboradores del estudio OFRE

Odds ratio, ajustadas por edad y sexo, de tener fibrilación auricular para cada factor de riesgo cardiovascular y cada antecedente, y modelo multivariable final

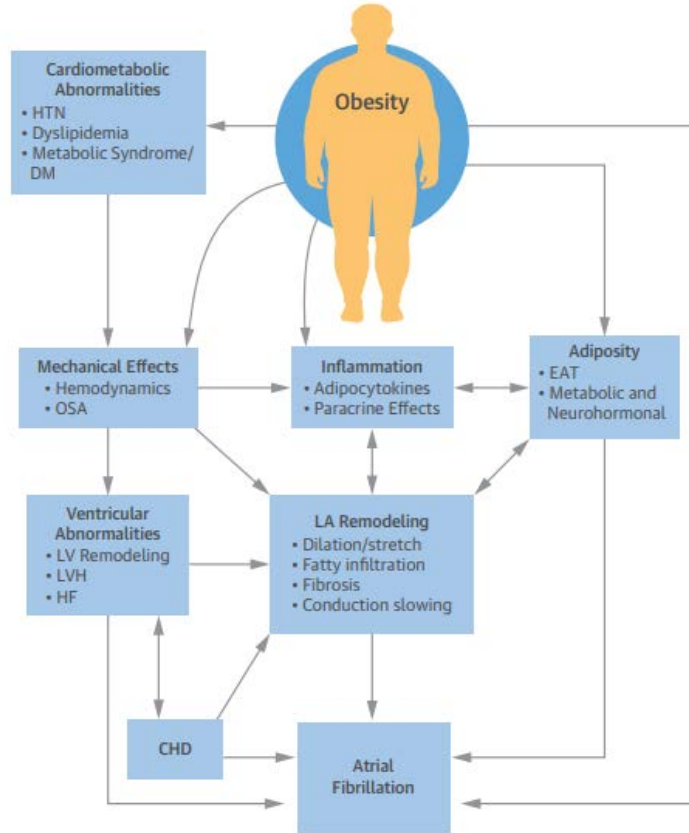
	OR (IC95%)	p
<i>Factores de riesgo cardiovascular</i>		
Obesidad	1,65 (1,22-2,23)	0,001
Sobrepeso	0,71 (0,51-0,98)	0,038
Obesidad central	1,78 (1,32-2,40)	< 0,001
Hipercolesterolemia	1,60 (1,17-2,19)	0,004
Diabetes mellitus	1,42 (1,03-1,94)	0,032
Fumador	0,44 (0,23-0,83)	0,012
HTA	1,55 (1,05-2,29)	0,029
<i>Antecedentes</i>		
Arteriopatía periférica	1,81 (1,02-3,21)	0,042
Enfermedad pulmonar crónica	1,88 (1,21-2,92)	0,005
Enfermedad tiroidea	1,90 (1,27-2,85)	0,002
Implantación de marcapasos	9,31 (4,76-18,22)	< 0,001
Cardiopatía isquémica	2,59 (1,68-4,00)	< 0,001
Diagnóstico de IC previo	8,73 (5,27-14,45)	< 0,001
<i>Modelo multivariable</i>		
Edad	1,08 (1,06-1,10)	< 0,001
Sexo femenino	0,61 (0,43-0,86)	0,005
Obesidad central	1,70 (1,24-2,33)	0,001
Fumador	0,47 (0,24-0,92)	0,028
Enfermedad tiroidea	1,69 (1,11-2,58)	0,016
Implantación de marcapasos	5,50 (2,11-14,36)	0,001
Diagnóstico de IC previo	7,72 (4,44-13,41)	< 0,001

HTA: hipertensión arterial; IC: insuficiencia cardiaca; IC95%: intervalo de confianza del 95%; OR: odds ratio.

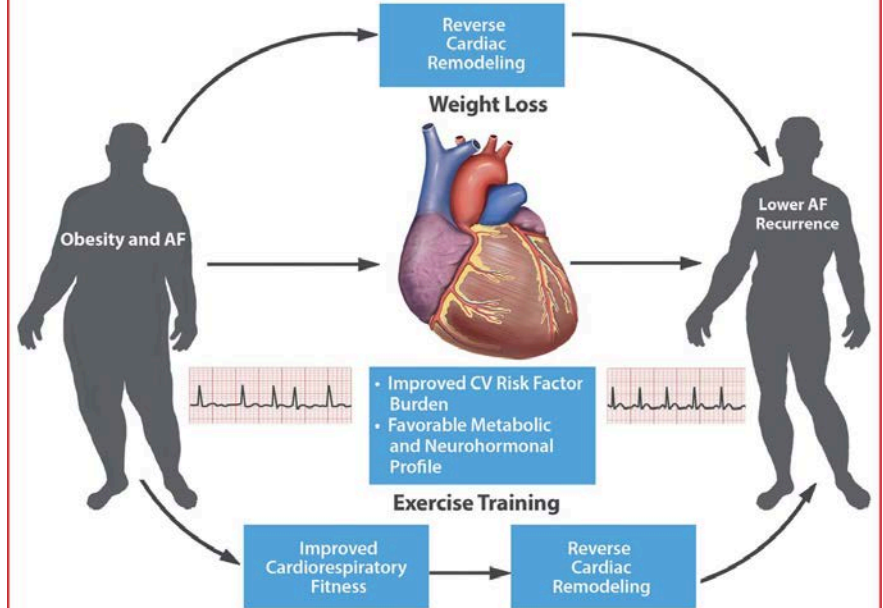
# ¿Dónde actuar?



# Prevención



## CENTRAL ILLUSTRATION: Obesity, Weight Loss, and Exercise in AF

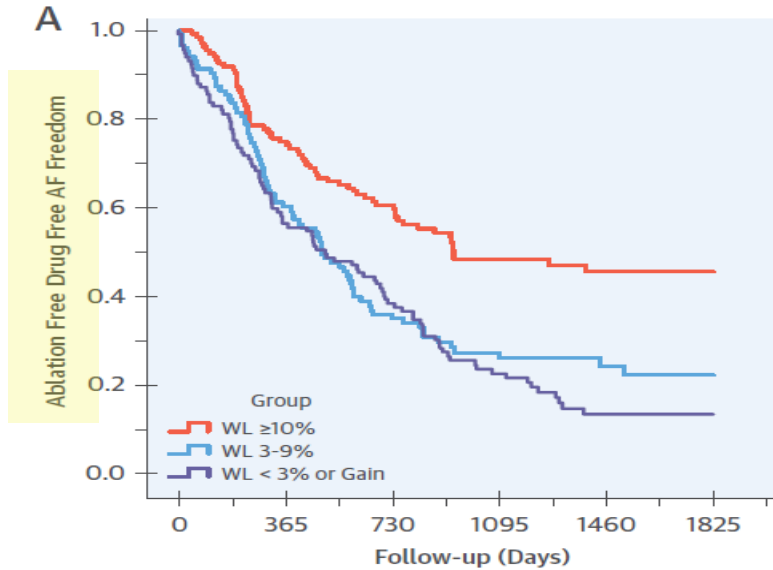


Lavie, C.J. et al. J Am Coll Cardiol. 2017;70(16):2022-35.

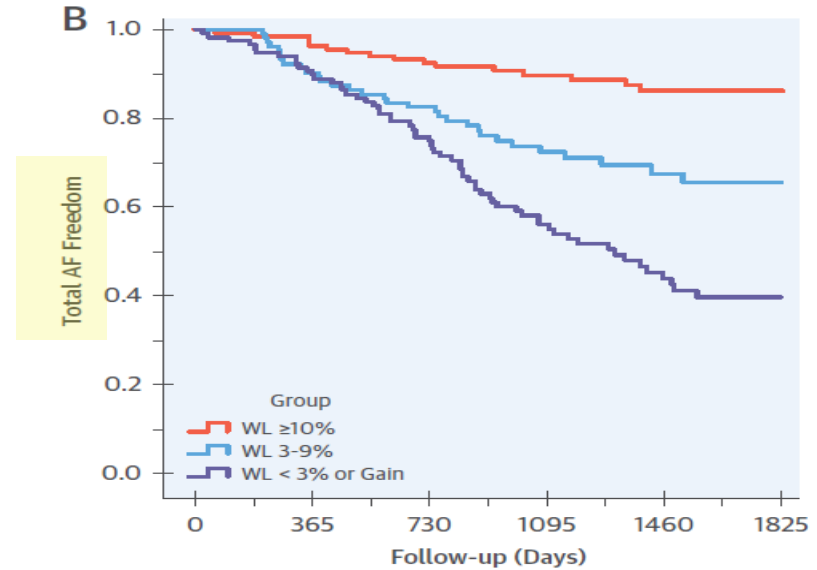


# ¿Dónde actuar?

## LEGACY Study



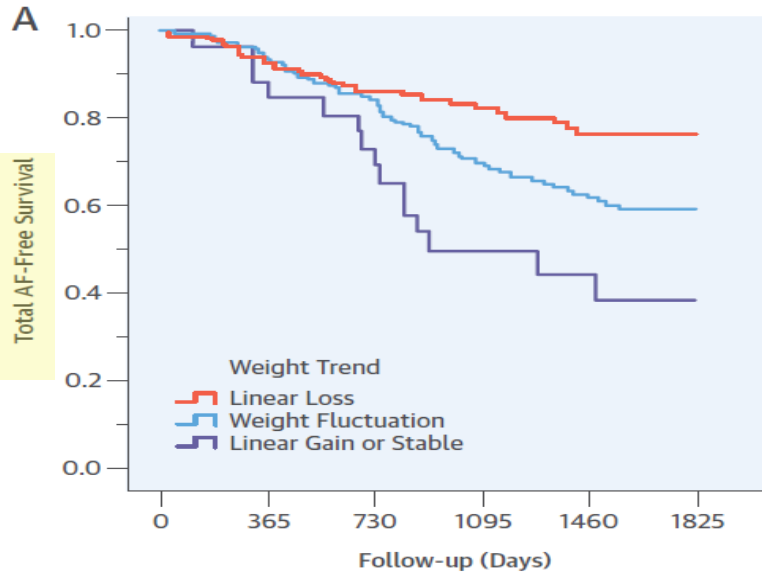
Time (Days)	0	365	730	1095	1460	1825
$\geq 10$ WL	135	101	72	42	31	18
3-9% WL	103	62	36	22	13	7
<3% WL or gain	117	66	44	22	11	9



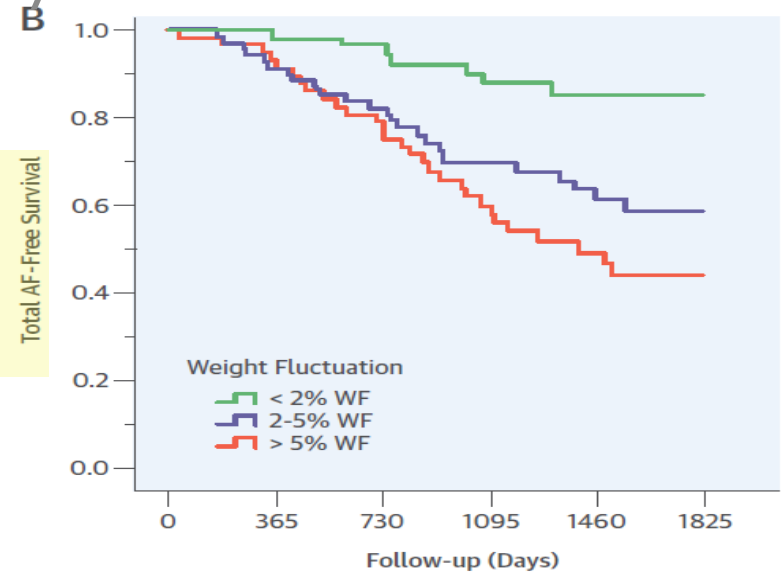
Time (Days)	0	365	730	1095	1460	1825
$\geq 10$ WL	135	130	114	86	67	36
3-9% WL	103	93	83	57	35	22
<3% WL or gain	117	105	85	53	32	22

# ¿Dónde actuar?

## LEGACY Study



Time (Days)	0	365	730	1095	1460	1825
Linear Loss	141	130	122	80	52	29
Fluctuation	179	165	140	99	71	44
Linear Gain	24	20	18	12	8	5



Time (Days)	0	365	730	1095	1460	1825
< 2% WF	54	52	49	39	33	19
2-5% WF	68	62	54	39	27	15
> 5% WF	57	53	45	31	19	14

- Relación *dosis-dependiente*
- Efecto deletéreo de la fluctuación de peso

# ¿Dónde actuar?

## Cost-Effectiveness and Clinical Effectiveness of the Risk Factor Management Clinic in Atrial Fibrillation

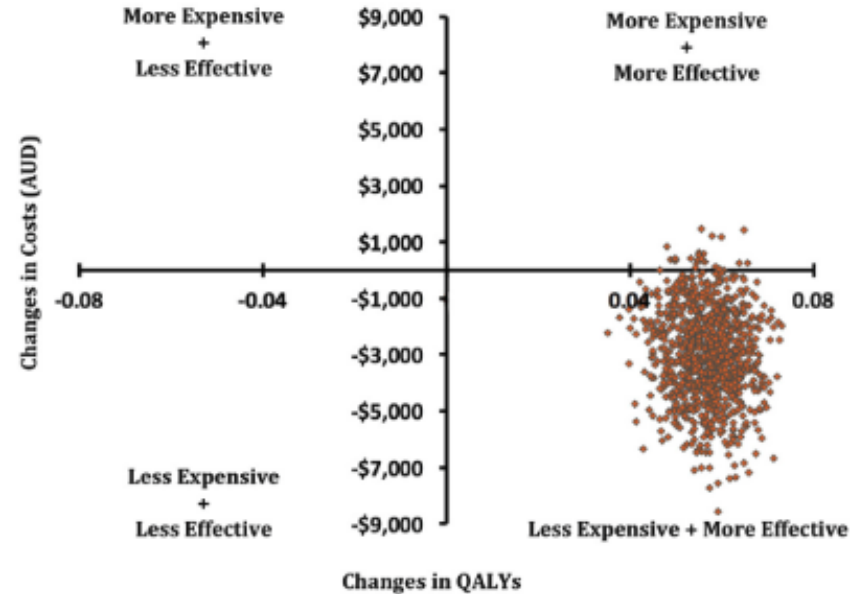
The CENT Study

Rajeev K. Pathak, MBBS, PhD,<sup>a</sup> Michelle Evans, MHLiEc&Pol,<sup>a</sup> Melissa E. Middeldorp,<sup>a</sup>

*Aleatorizado. 355pc*

*(control peso y FRCV vs control)*

FIGURE 3 Incremental Cost-Effectiveness Plane (Bootstrapped Model)



RFM group had an increase of 0.1930 quality-adjusted life years and a cost saving of \$12,094 (incremental cost-effectiveness ratios of \$62,653 saved per quality-adjusted life years gained)



# Conclusiones

- *La FA (y en definitiva la miocardiopatía auricular) representa una auténtica epidemia sanitarias del S XXI, que a pesar de las mejoras del diagnóstico y tratamiento no se espera reducir su prevalencia, sino todo lo contrario.*
- *Eso conlleva un alto impacto económico en los sistemas sanitarios*
- *A parte de las innovaciones terapéuticas, es imprescindible que los sistemas sanitarios inviertan en programas de prevención, en especial sobre los FRCV emergentes que son evitables,*