Finding the Silent Danger: Who, When and How for AF Screening

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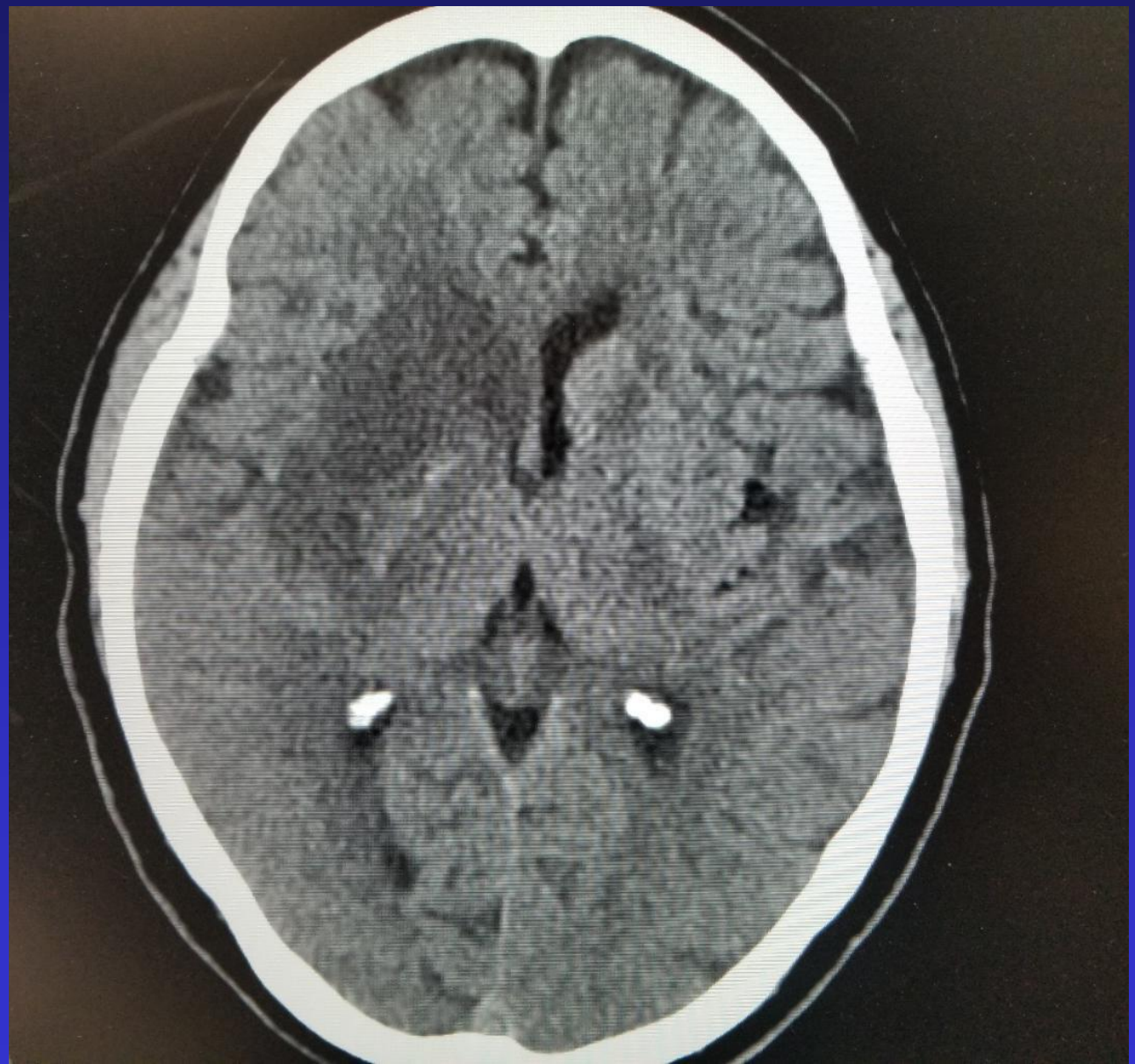
History

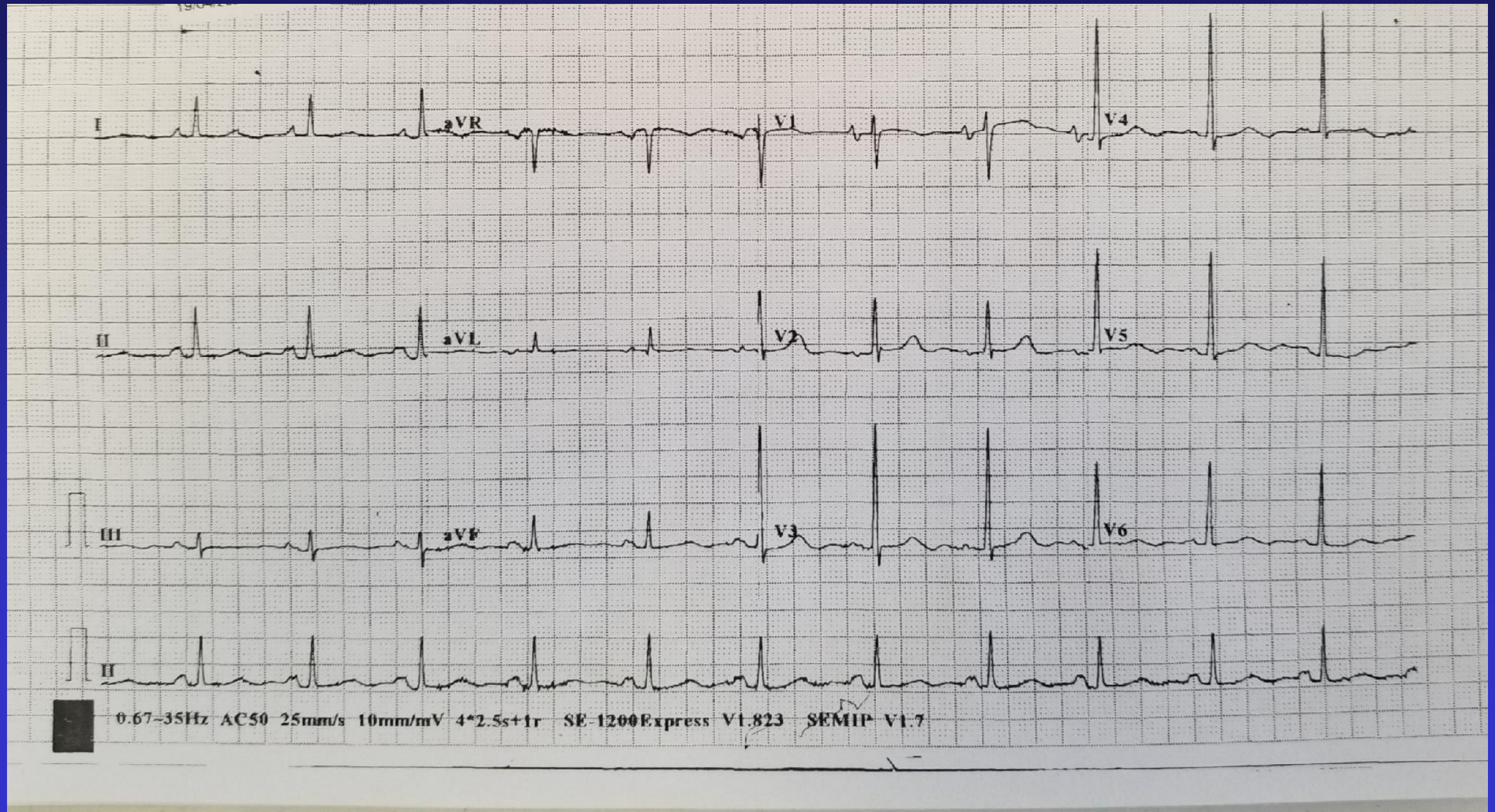
- 72-year-old man
- Known HT, DM and gout
- Found lying on floor by son in the morning, left sided weakness and slurred speech
- 1/5 power on left side
- Limb power worsened to 0/5 and remained the same after rehabilitation

CT Brain

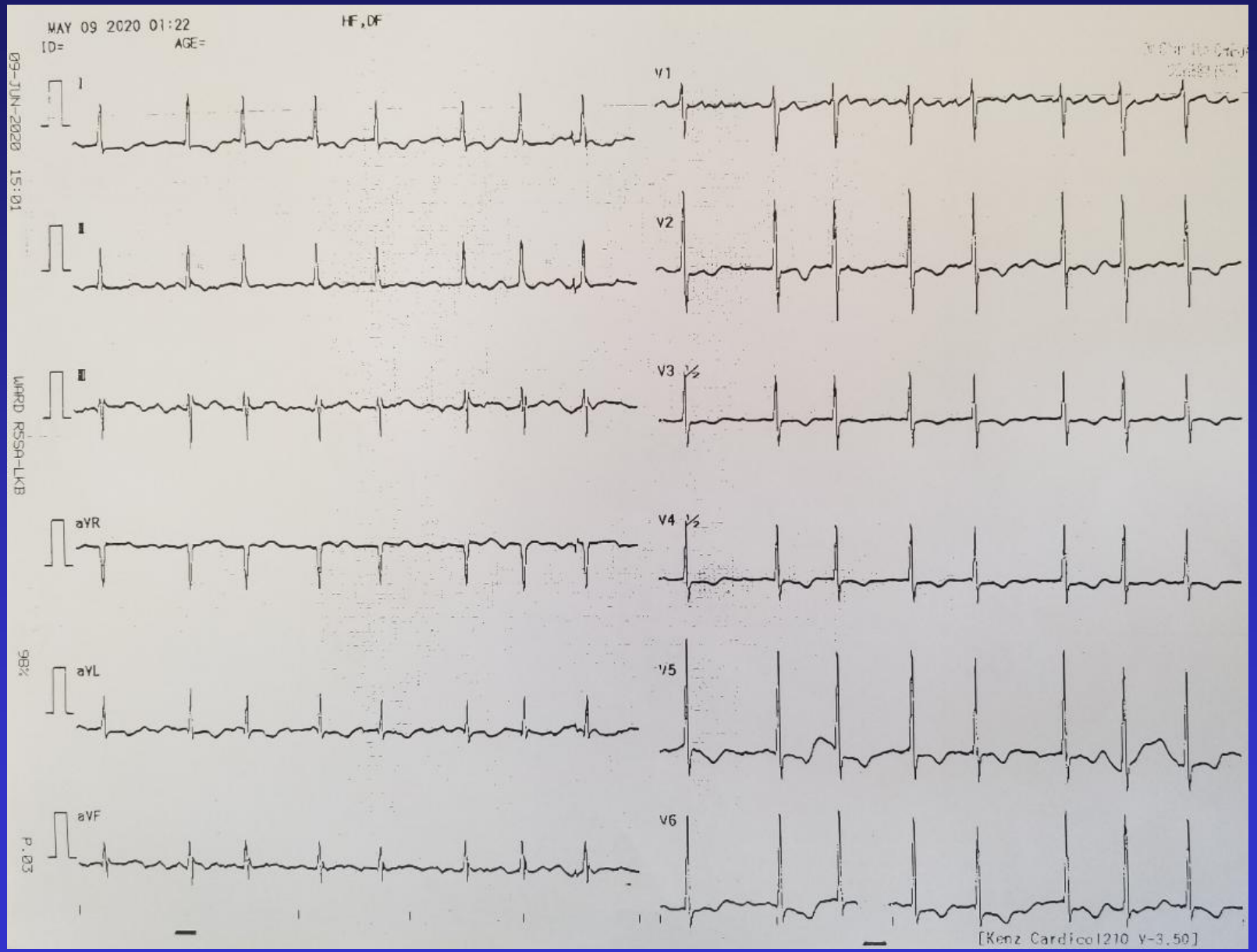


CT Brain

1st ECG


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
0.67~35Hz AC50 25mm/s 10mm/mV 4*2.5s+1r SE-1200Express V1.823 SEMIP V1.7

ECG Documented AF 19 days After Admission

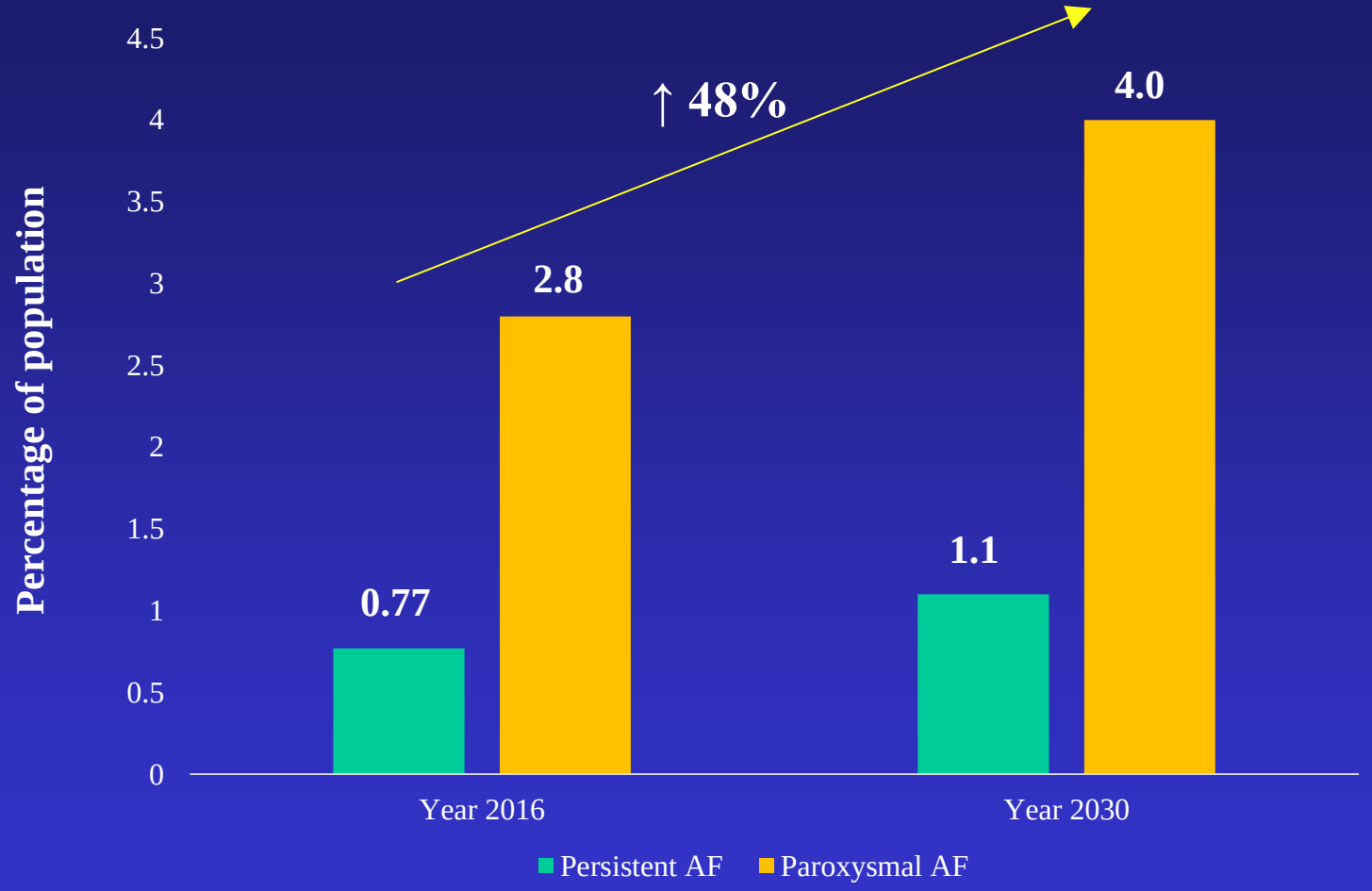


Atrial Fibrillation is Evasive

- 1/3 of patients with AF are asymptomatic[1]
- 1/3 of patients with AF-related stroke were not aware of having AF before stroke[2]

1. Siontis K et al. Typical, atypical and asymptomatic presentations of new-onset atrial fibrillation in the community: characteristics and prognostic implications. Heart Rhythm 2016;13:1418-24.
2. Soo Y et al. Age-specific trends of atrial fibrillation-related ischaemic stroke and transient ischaemic attack, anticoagulant use and risk factor profile in Chinese population: a 15-year study. J Neurol Neurosurg Psychiatry 2017;88:744-8.

Prevalence of Atrial Fibrillation With an Ageing Population



Chan NY. Systematic screening for atrial fibrillation in the community: evidence and obstacles. Arrhythm Electrophysiol Rev 2018;7(1):39-42.

Chan NY et al. Screening for atrial fibrillation in 13122 Hong Kong citizens with smartphone electrocardiogram. Heart 2017;103(1):24-31

Is Atrial Fibrillation Suitable for Screening?

Table 1: Suitability of Atrial Fibrillation for Screening According to World Health Organization Criteria

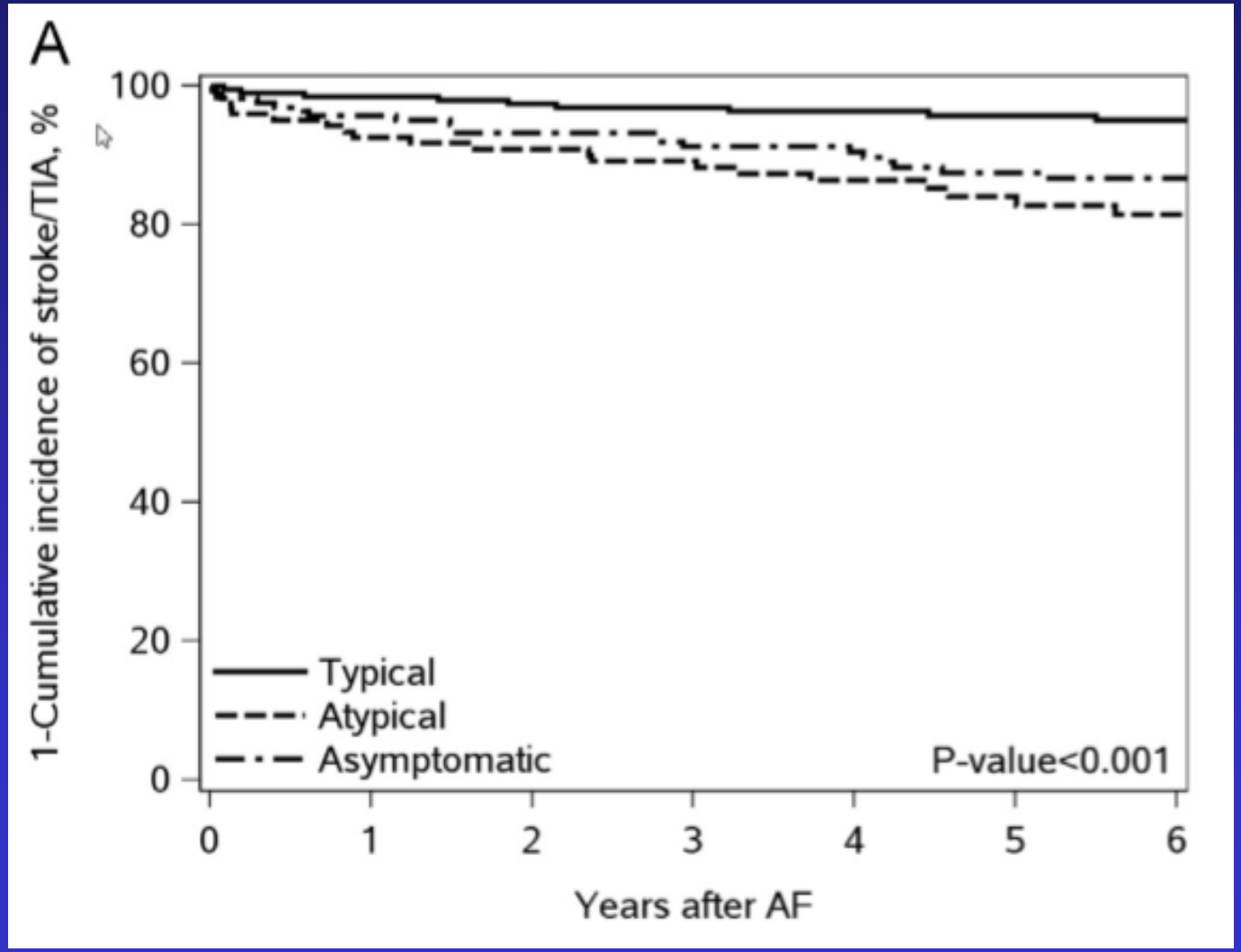
Criteria	Suitability
Important health problem with an accepted treatment	+
Facilities for diagnosis and treatment	+
Latent and symptomatic stage	+
Natural history is understood	±
Agreed policy on whom to treat	+
Cost of finding the condition is economically balanced with overall health benefits of treatment	±
Case-finding is a continuous process	+
Screening test is suitable and acceptable to the population	+

+ = *suitable;* ± = *uncertain.*

Chan NY. Systematic screening for atrial fibrillation in the community: evidence and obstacles. Arrhythm Electrophysiol Rev 2018;7(1):39-42.

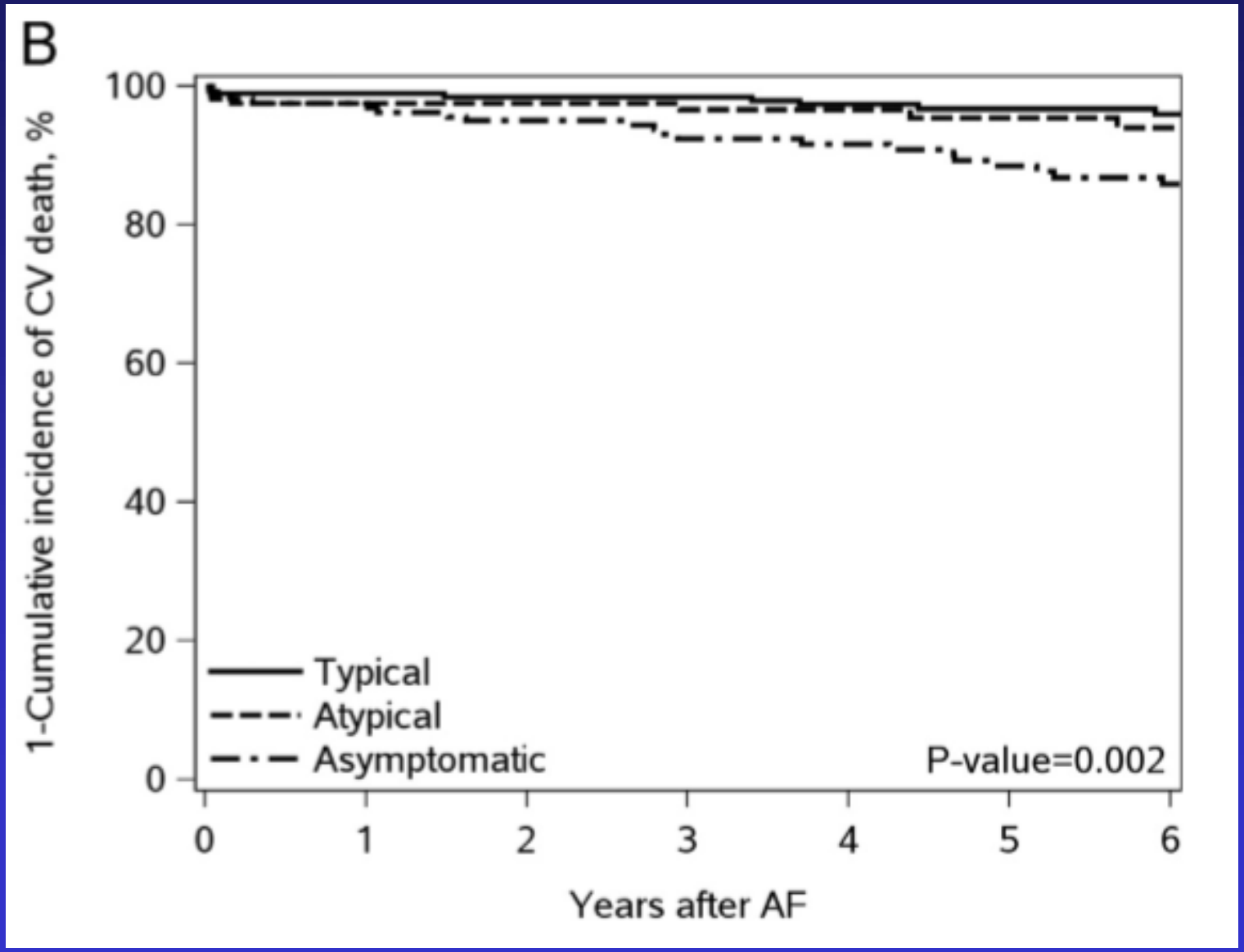
Prognosis of Asymptomatic Atrial Fibrillation

N=476 with incident AF in Olmsted County , Minnesota randomly selected (2000-10)
193 had typical, 122 had atypical and 161 had no symptoms
Adjustment for CHA_2DS_2VASc score, age, warfarin use and comorbidities



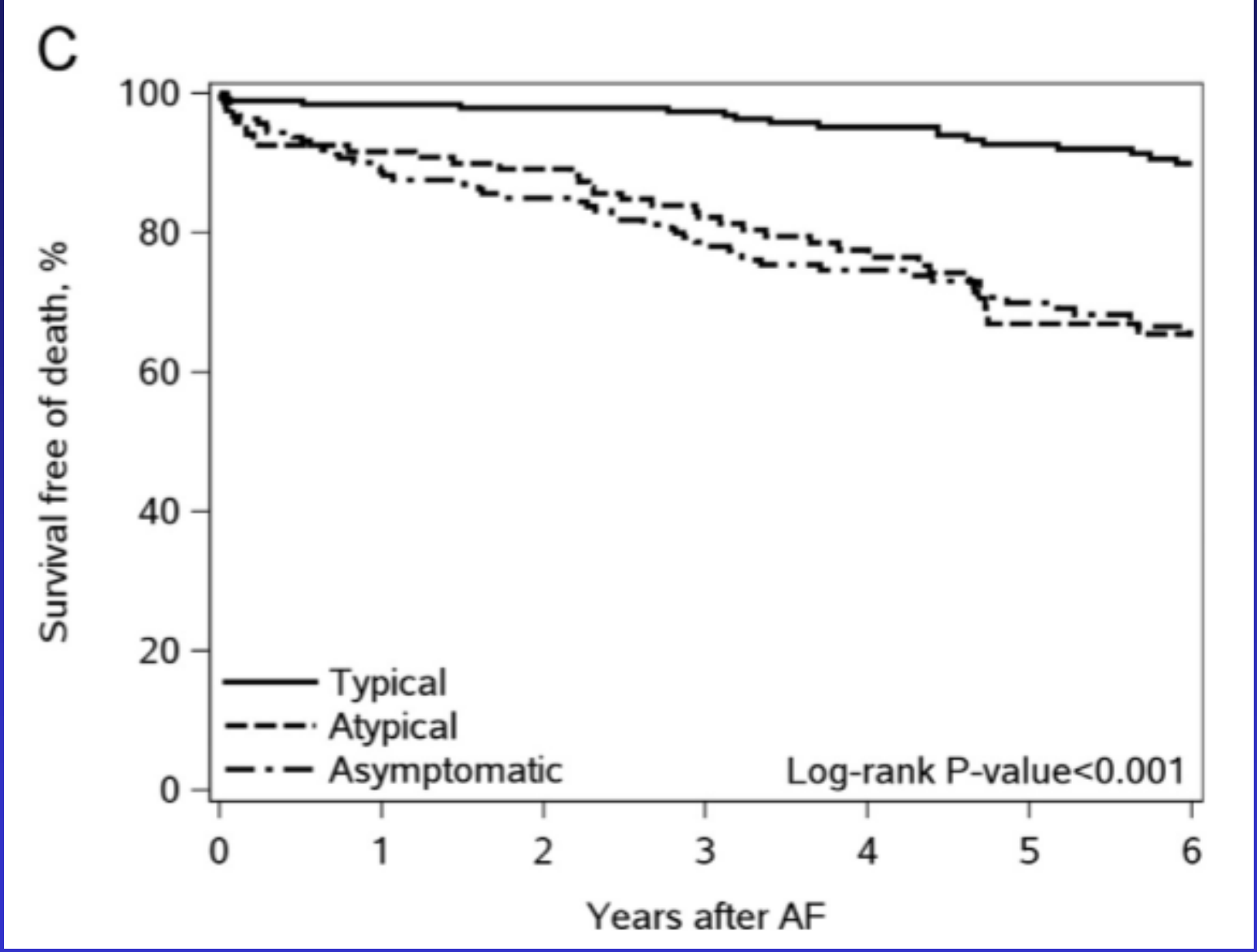
Siontis K et al. Typical, atypical and asymptomatic presentations of new-onset atrial fibrillation in the community: characteristics and prognostic implications. Heart Rhythm 2016;13:1418-24.

Prognosis of Asymptomatic Atrial Fibrillation



Siontis K et al. Typical, atypical and asymptomatic presentations of new-onset atrial fibrillation in the community: characteristics and prognostic implications. Heart Rhythm 2016;13:1418-24.

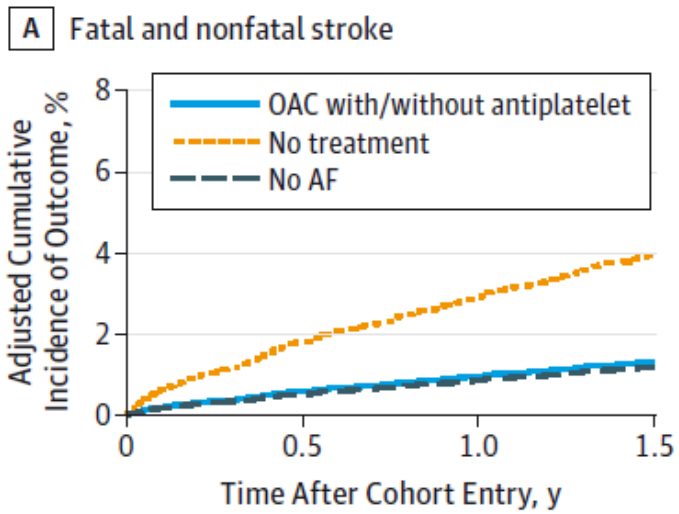
Prognosis of Asymptomatic Atrial Fibrillation

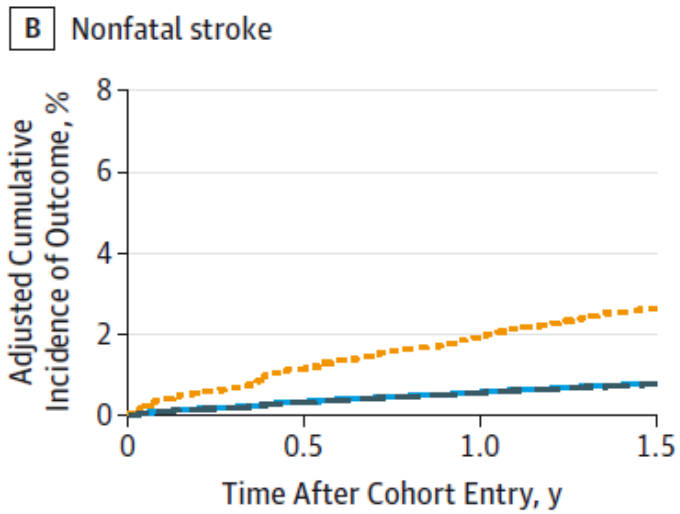


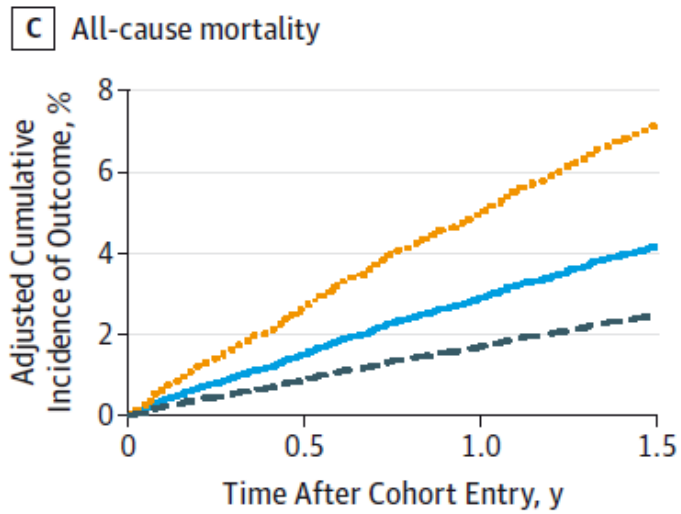
Siontis K et al. Typical, atypical and asymptomatic presentations of new-onset atrial fibrillation in the community: characteristics and prognostic implications. Heart Rhythm 2016;13:1418-24.

Prognosis and Response to Treatment of Incidentally Detected Ambulatory AF

Data from UK Clinical Practice Research Datalink re-analyzed
5555 patients with incidentally detected ambulatory AF: 2492 receiving warfarin, 1603 received an antiplatelet and 1460 received no antithrombotic
Compared with 24705 age and sex matched cohort patients without AF seen in general practice on the same day





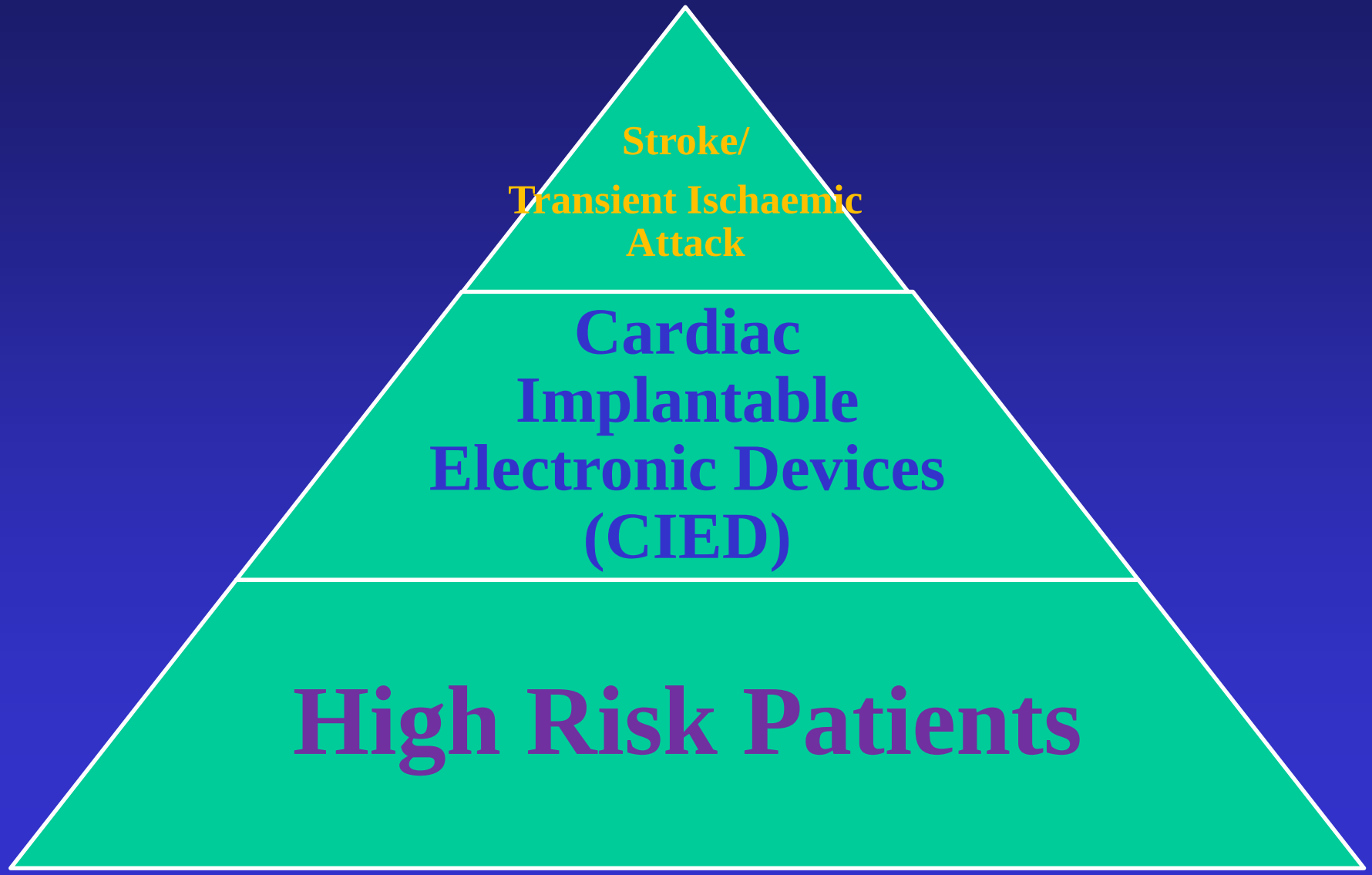


No. at risk

AF: OAC with/without antiplatelet	552	881	642	492	552	881	642	492	552	893	653	499
AF: No treatment	2712	926	674	552	2712	926	674	552	2712	928	675	553
No AF	24 705	24 086	23 401	22 317	24 705	24 086	23 401	22 317	24 705	24 171	23 544	22 499

Freedman B et al. Residual risk of stroke and death in anticoagulant-treated patients with atrial fibrillation. JAMA Cardiology 2016;1:366-8

Screening for Atrial Fibrillation



Current Guidelines

Recommendations	Class[a]	Level[b]	Ref[c]
Opportunistic screening for AF is recommended by pulse taking or ECG rhythm strip in patients >65 years of age.	I	B	130, 134, 155
In patients with TIA or ischaemic stroke, screening for AF is recommended by short-term ECG recording followed by continuous ECG monitoring for at least 72 hours.	I	B	27, 127
It is recommended to interrogate pacemakers and ICDs on a regular basis for atrial high rate episodes (AHRE). Patients with AHRE should undergo further ECG monitoring to document AF before initiating AF therapy.	I	B	141, 156
In stroke patients, additional ECG monitoring by long-term non-invasive ECG monitors or implanted loop recorders should be considered to document silent atrial fibrillation.	IIa	B	18, 128
Systematic ECG screening may be considered to detect AF in patients aged >75 years, or those at high stroke risk.	IIb	B	130, 135, 157

Kirchhof P et al. 2016 ESC guidelines for the management of AF developed in collaboration with EACTS. EHJ 2016;37:2893-962.

International Guidelines

Guidelines	Screening approach	Screening method	Recommendations
NICE	N/A	N/A	N/A
NHFA/CSANZ	Opportunistic	Pulse palpation or Point-of-care ECG (ECG preferred)	≥65 years
KHRS	Opportunistic/ systematic	Pulse palpation/ ECG	Opportunistic for age >65 years Systematic may be considered for age >75 years or high stroke risk
ACC/AHA/HRS	N/A	N/A	N/A

USPSTF-Screening for AF With ECG

Population	Older adults
Recommendation	No recommendation. Grade: I (insufficient evidence)

Risk Assessment	Atrial fibrillation is strongly associated with older age and obesity. Other risk factors include high blood pressure, diabetes, heart failure, prior cardiothoracic surgery, current smoking, prior stroke, sleep apnea, alcohol and drug use, and hyperthyroidism.
Screening Tests	The USPSTF found inadequate evidence to assess whether screening with electrocardiography identifies older adults with previously undiagnosed atrial fibrillation more effectively than usual care.
Treatments and Interventions	Treatment of atrial fibrillation has 2 components: managing arrhythmia and preventing stroke. In general, these treatment goals are independent of each other. Arrhythmia can be managed by controlling the heart rate to minimize symptoms (usually through medication) or by restoring a normal rhythm. Treatment with anticoagulant therapy reduces the incidence of stroke in patients with symptomatic atrial fibrillation and high stroke risk.
Other Relevant USPSTF Recommendations	The USPSTF has made recommendations on many factors related to stroke prevention, including screening for high blood pressure, use of statins, counseling on smoking cessation, counseling to promote healthful diet and physical activity, and use of low-dose aspirin for certain persons at increased risk of cardiovascular disease.

Curry SJ, et al. Screening for atrial fibrillation with electrocardiography. US Preventive Services Task Force recommendation statement. JAMA 2018;320(5):478-84

AF Screening in Cryptogenic Stroke

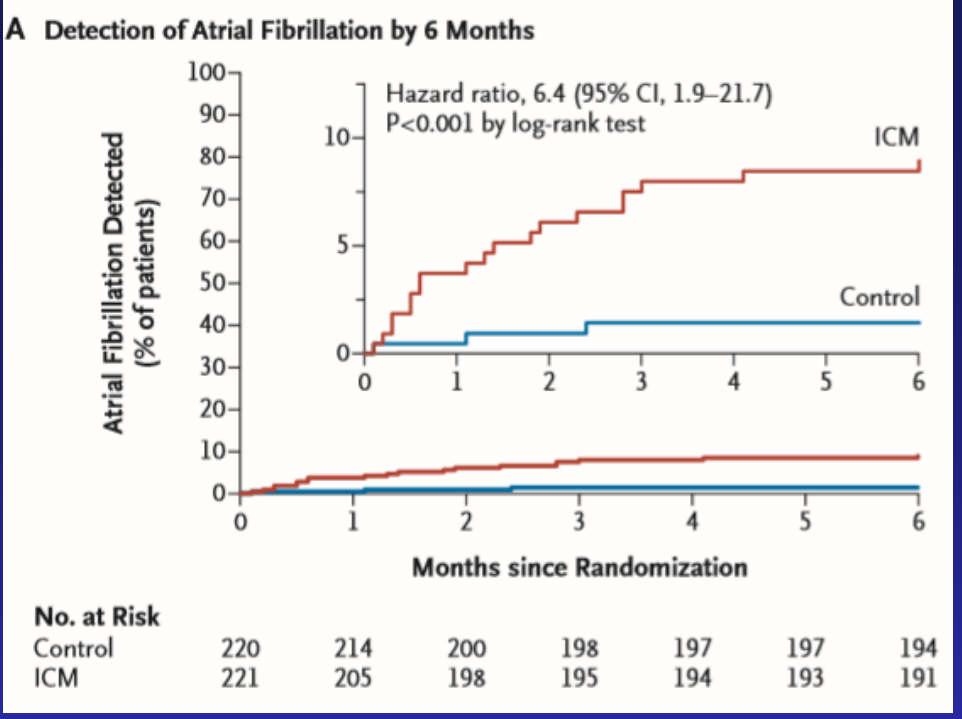
N=441 patients with cryptogenic stroke randomized to ICM for AF screening and control

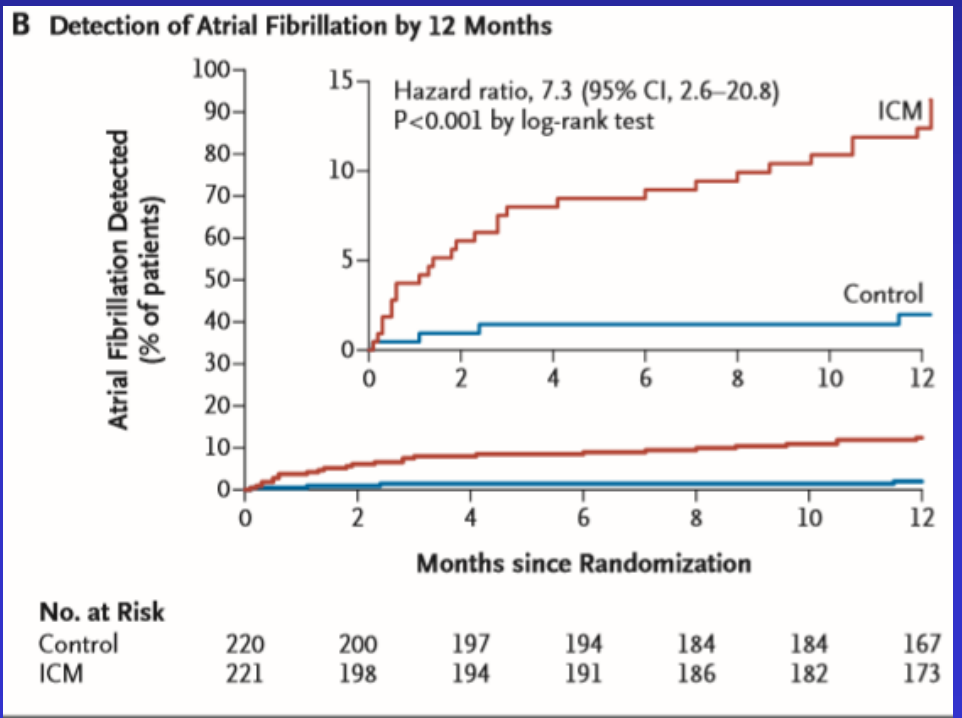
Primary endpoint: time to 1st AF detection (lasting >30s) within 6 months

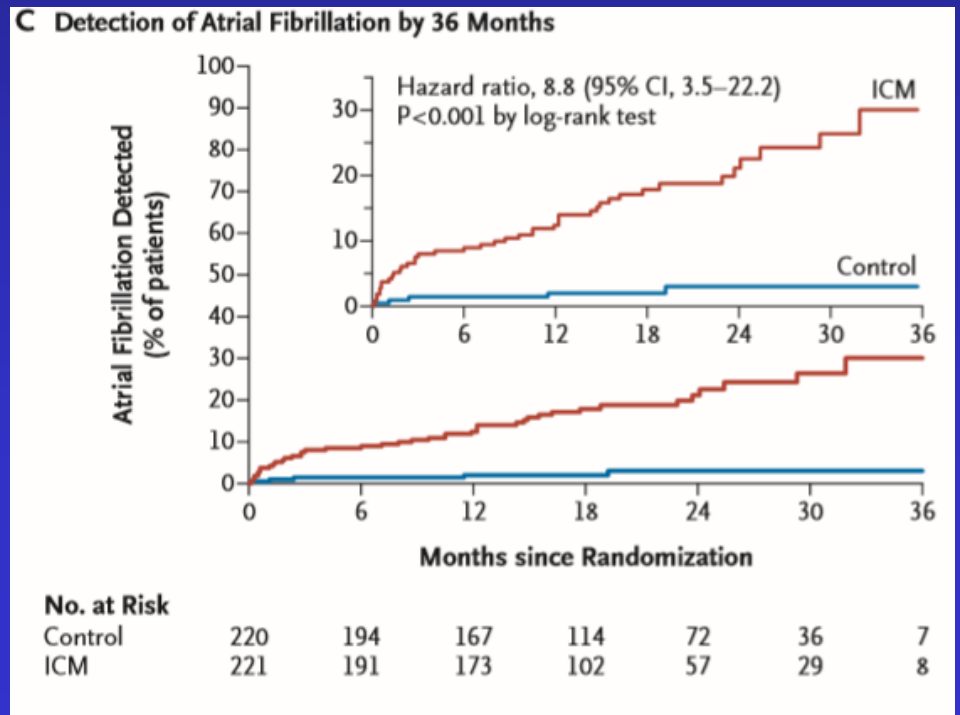
6 months: 8.9 vs 1.4%

12 months: 12.4 vs 2%

36 months: 30 vs 3%



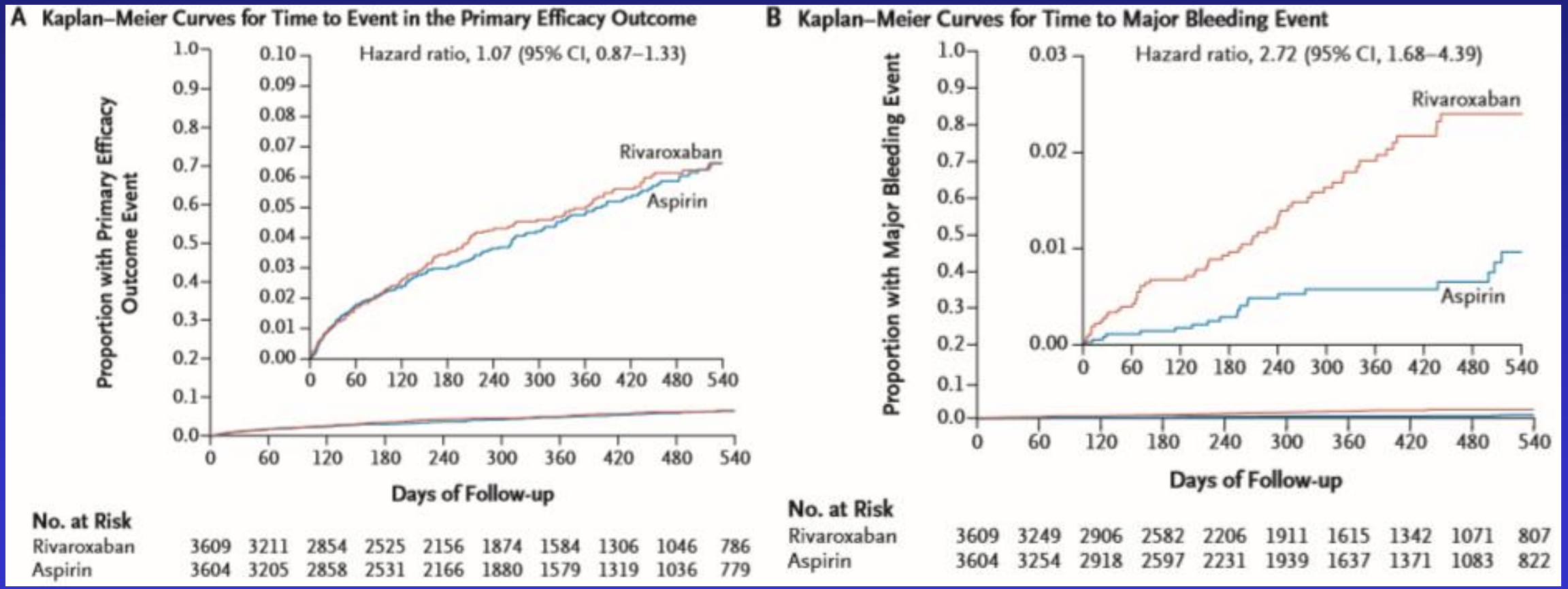




Sanna T et al. Cryptogenic stroke and underlying atrial fibrillation. NEJM 2014;370:2478-86

Empirical Rivaroxaban Treatment for Embolic Stroke of Undetermined Source

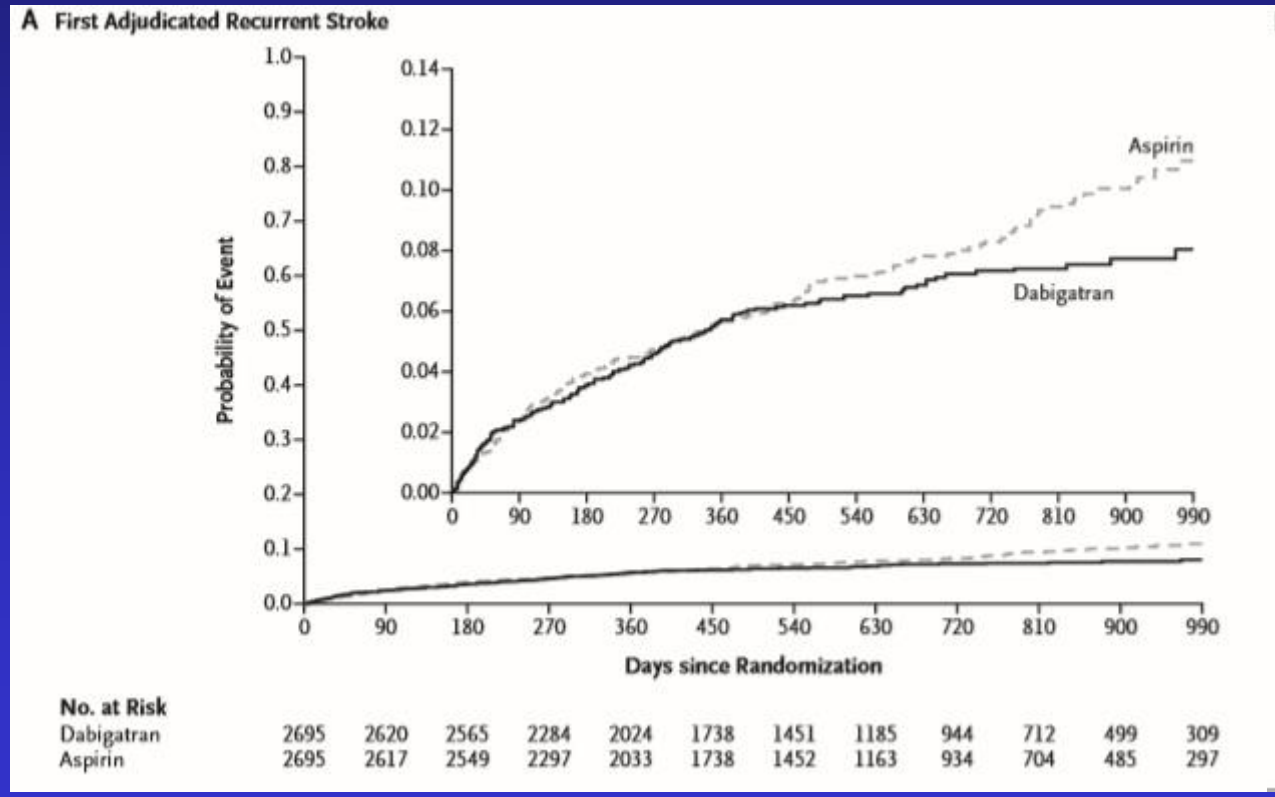
N=7213 patients randomized to receive Rivaroxaban (15mg daily) or Aspirin (100mg daily)
Prematurely terminated because of lack of effect
Primary efficacy outcome: 1st recurrence of ischaemic or haemorrhagic stroke or systemic embolism
Primary safety outcome: rate of major bleeding

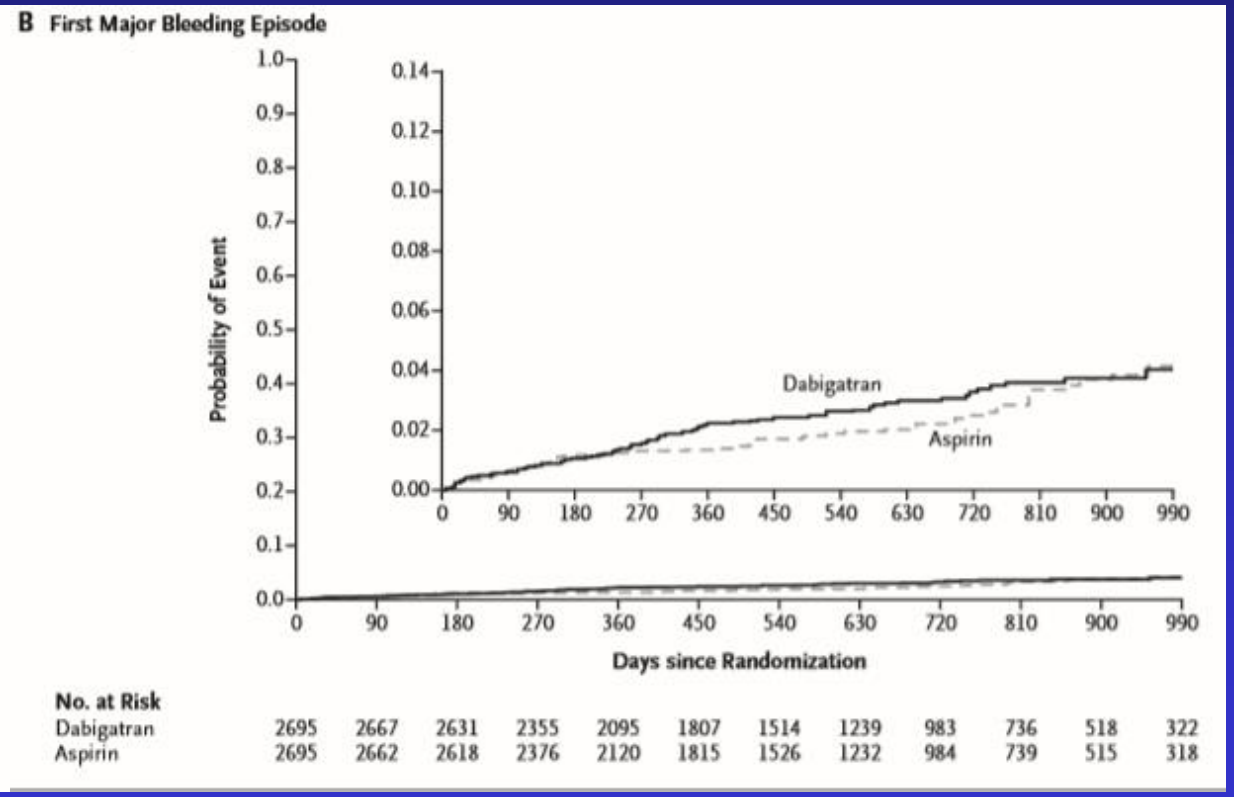


Hart RG et al. Rivaroxaban for stroke prevention after embolic stroke of undetermined source. NEJM 2018;378:2191-201

Empirical Dabigatran Treatment for Embolic Stroke of Undetermined Source

N=5390 patients randomized to receive Dabigatran (150 or 110mg BD) or Aspirin (100mg daily)
Prematurely terminated because of lack of effect
Primary outcome: Recurrent stroke
Primary safety outcome: rate of major bleeding





Diener HC et al. Dabigatran for prevention of stroke after embolic stroke of undetermined source. NEJM 2019;380:1906-17.

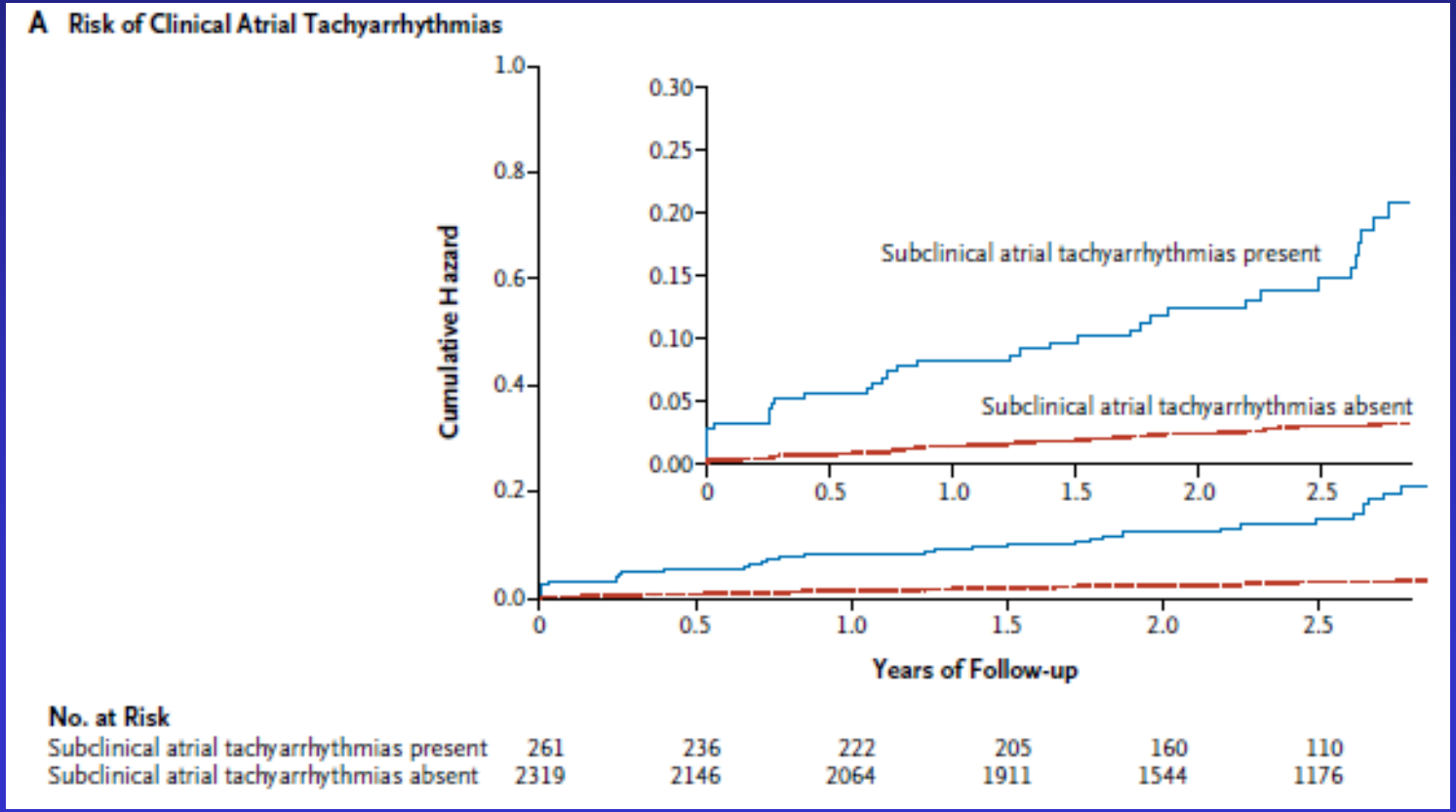
Significance of CIED-detected Subclinical Atrial Tachyarrhythmias

N=2580 patients with hypertension and no history of AF, with a pacemaker or ICD recently implanted

Patients were monitored for 3 months to detect subclinical atrial arrhythmias (episodes of atrial rate >190 beats per minute for more than 6 minutes)

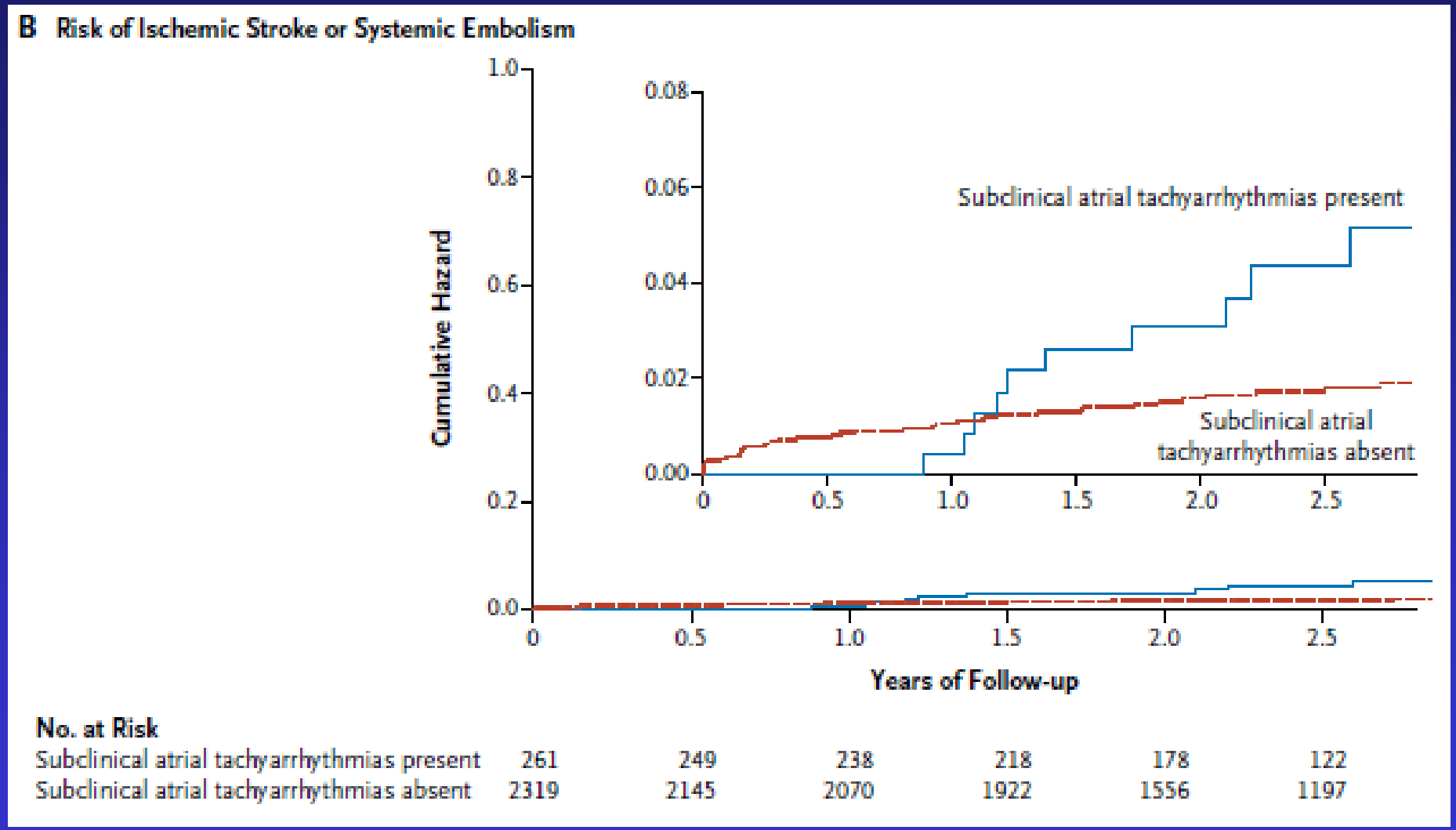
FU for a mean of 2.5 years

Primary outcome: Ischemic stroke or systemic embolism



Healey JS et al. Subclinical atrial fibrillation and the risk of stroke. NEJM 2012;366:120-9.

Significance of CIED-detected Subclinical Atrial Tachyarrhythmias



Healey JS et al. Subclinical atrial fibrillation and the risk of stroke. NEJM 2012;366:120-9.

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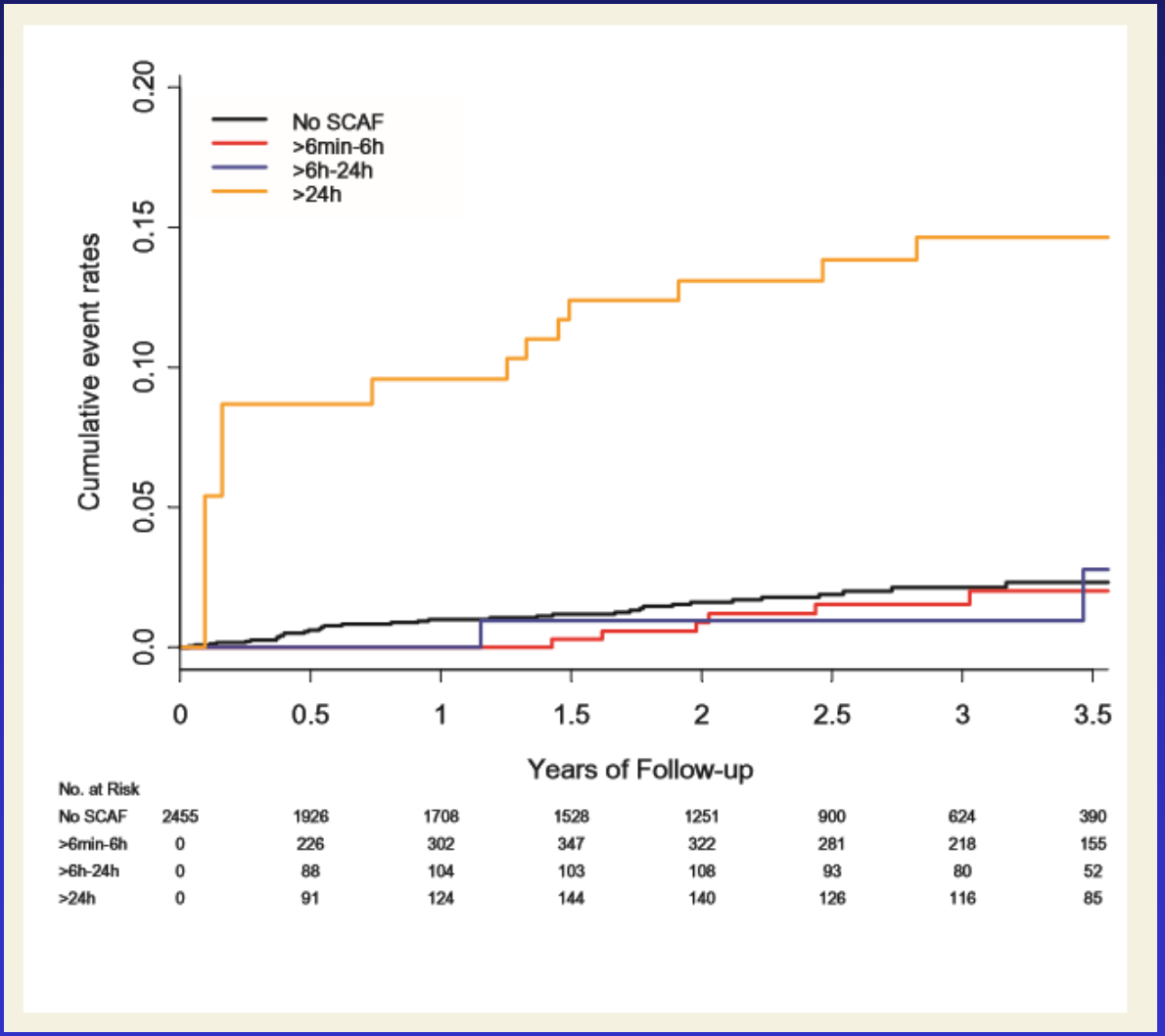


Van Gelder IC et al. Duration of device-detected subclinical atrial fibrillation and occurrence of stroke in ASSERT. Eur Heart J 2017;38:1339-44

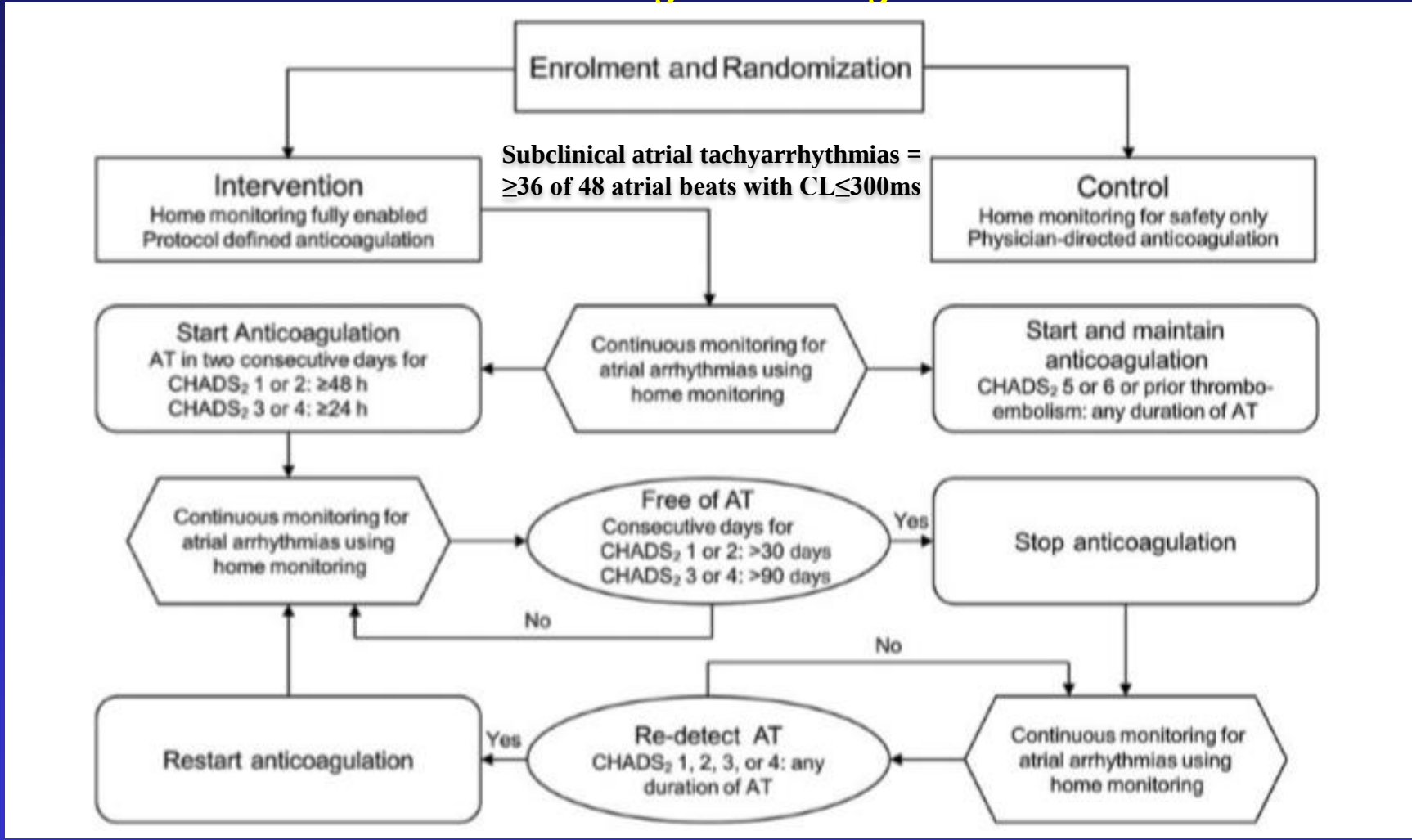
Significance of CIED-detected Subclinical Atrial Tachyarrhythmias

AT/AF=atrial rate >175/min lasting ≥20s

AT/AF Burden Subset	Annualized TE Rate (95% CI), %	Annualized TE Rate Excluding TIAs (95% CI), %
Zero AT/AF burden	1.1 (0.8–1.6)	0.5 (0.3–0.9)
Low AT/AF burden (<5.5 h)	1.1 (0.4–2.8)	1.1 (0.4–2.8)
High AT/AF burden (≥5.5 h)	2.4 (1.2–4.5)	1.8 (0.9–3.8)

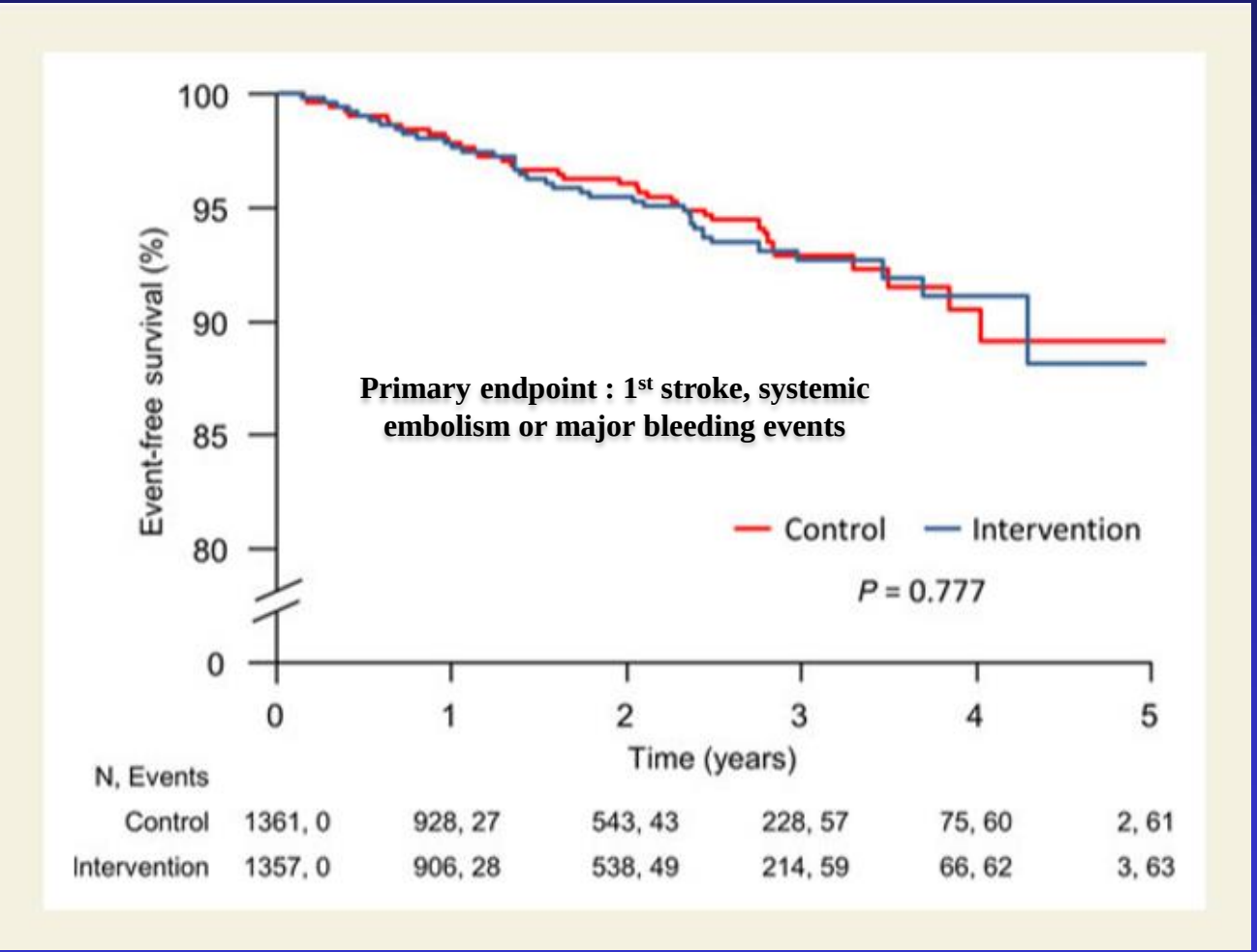
Glotzer TV et al. The relationship between daily atrial tachyarrhythmia burden from implantable device diagnostics and stroke risk. Circulation: Arrhythm and Electrophysiol 2009;2:474-80

Treatment Response of CIED-detected Subclinical Atrial Tachyarrhythmias



Martin DT, et al. Randomized trial of atrial arrhythmia monitoring to guide anticoagulation in patients with implanted defibrillator and cardiac resynchronization devices. Eur Heart J 2015;36:1660-8

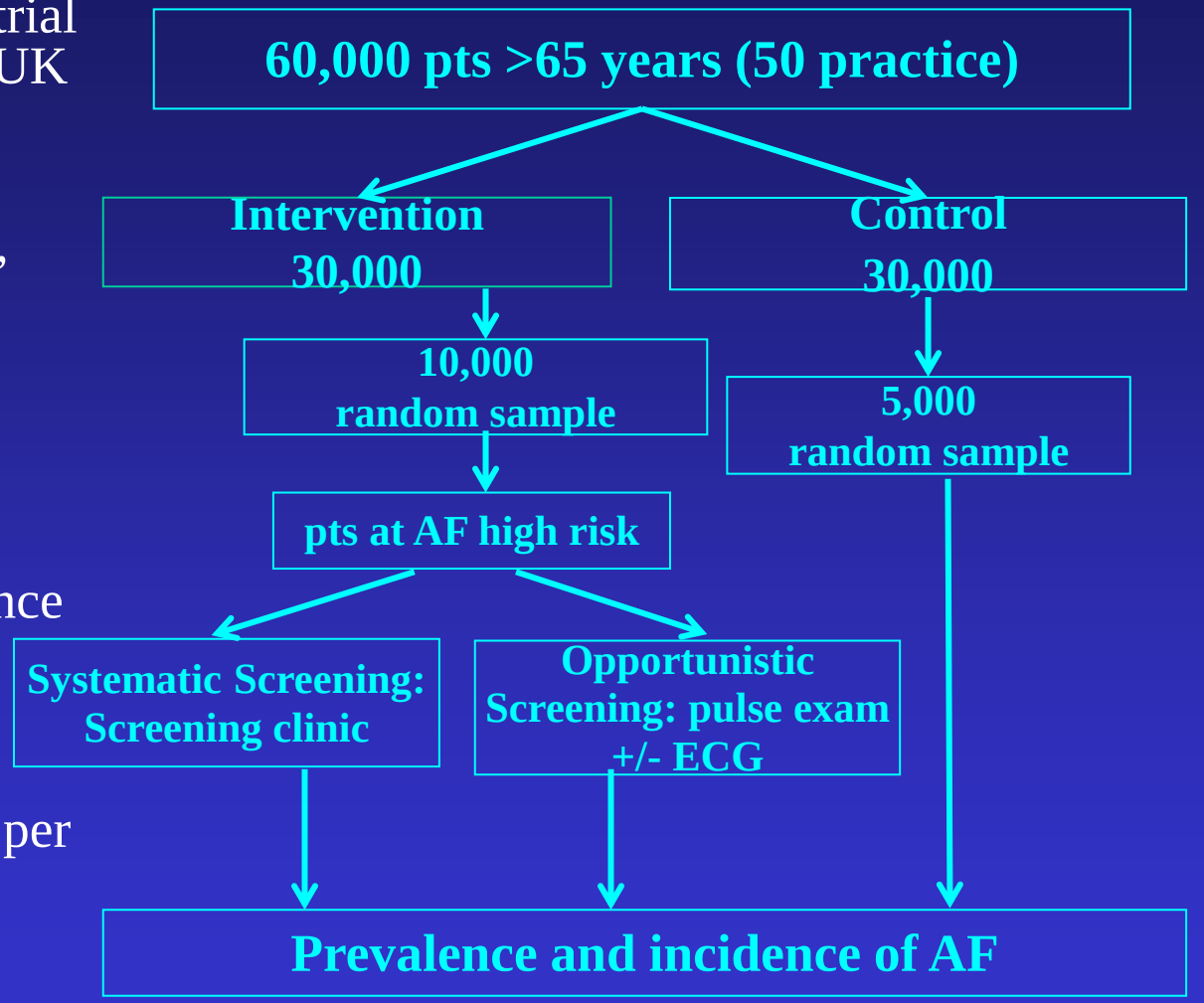
Treatment Response of CIED-detected Subclinical Atrial Tachyarrhythmias



Martin DT, et al. Randomized trial of atrial arrhythmia monitoring to guide anticoagulation in patients with implanted defibrillator and cardiac resynchronization devices. Eur Heart J 2015;36:1660-8

Atrial Fibrillation Screening at Primary Care in UK: SAFE Study

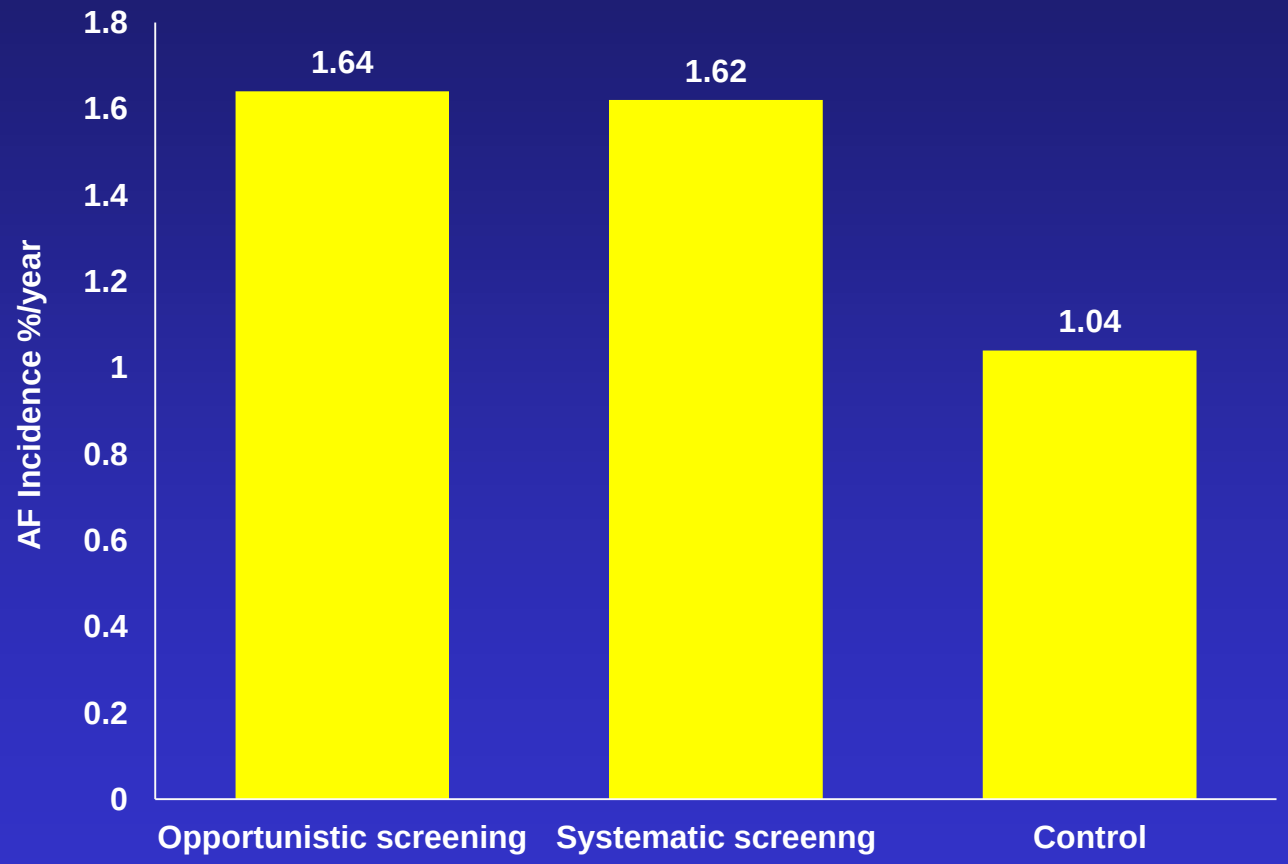
- A randomized controlled trial at primary care setting in UK
- 50 primary care centers across the West Midlands, UK.
- Patients > 65 years
- To determine baseline prevalence and the incidence of AF
- To compare 2 screening strategies in terms of cost per case identified



Hobbs FD et al. A randomized controlled trial and cost-effectiveness study of systematic screening (targeted and total population screening) versus routine practice for the detection of atrial fibrillation in people aged 65 and over: the SAFE study. Health Technol Assess 2005;9:iii-iv, ix.

Atrial Fibrillation Screening at Primary Care in UK: SAFE Study

- Baseline prevalence of AF: 7.2%
- Incidence of AF/year
  - Opportunistic: 1.64%
  - Systematic: 1.62%
  - Control: 1.04%
- AF screening program in patients>65, the only strategy that improved on routine practice was opportunistic screening
- Annual opportunistic screening was cost-effective



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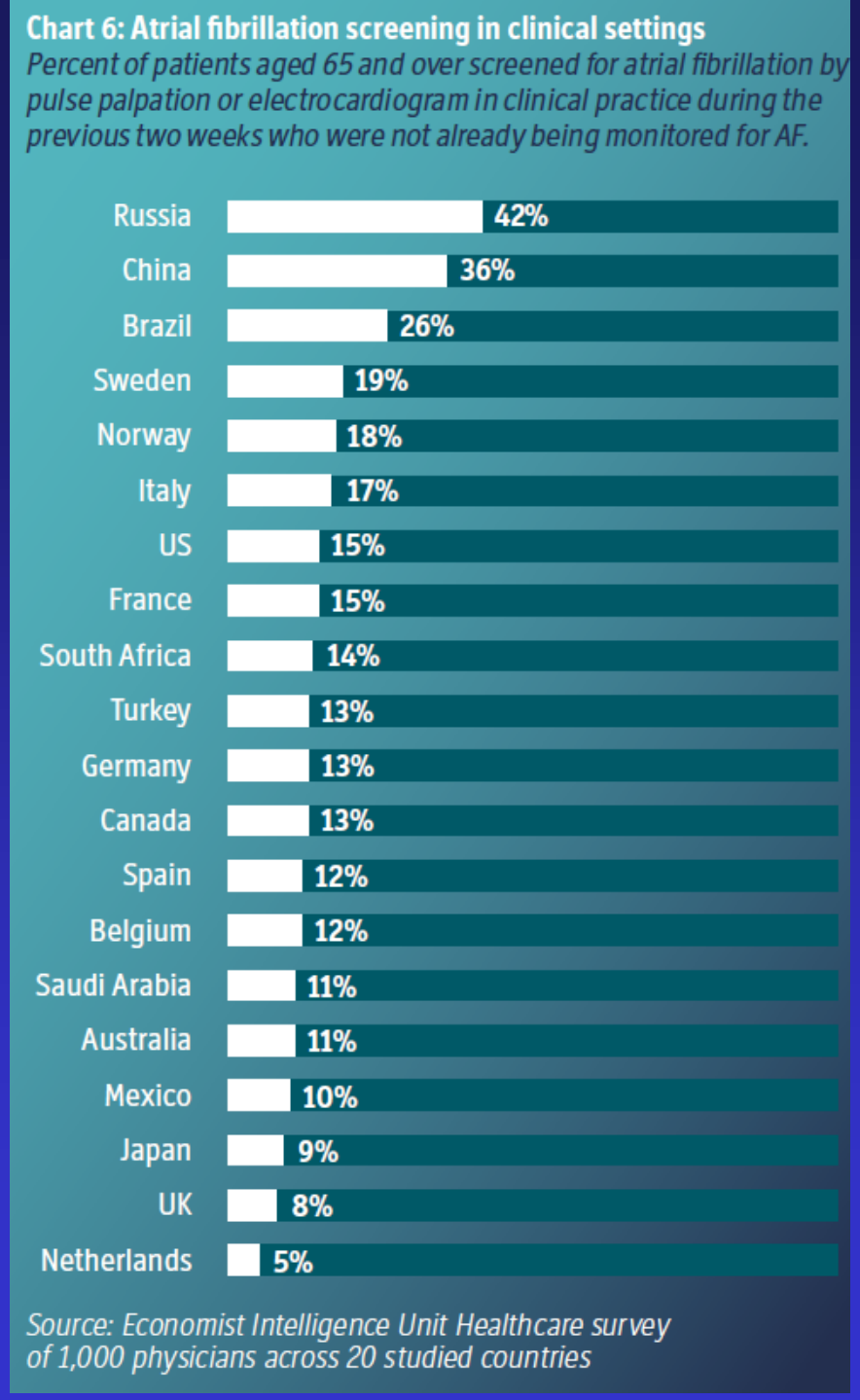
Real-World Compliance to Opportunistic Screening for Atrial Fibrillation



Impact of a Large-scale Territory-wide Social Media-based Program on Atrial Fibrillation Awareness and Screening Behaviour

Aims: To study the impact of a large-scale, territory-wide and social media-based program (AFAP) on awareness and compliance to guideline-recommended opportunistic screening for AF.

Methods: AFAP was conducted from November 2017 to May 2018 in Hong Kong. A dedicated website was established, short videos and printed booklets on AF were made. A Guinness record-breaking activity for AF screening was organized. Emphasis was placed on promotion via social media and the theme was on AF screening and stroke prevention. Professional educational sessions were also organized. Telephone survey was conducted on elderly citizens above 65 years of age before and 4 months after AFAP.

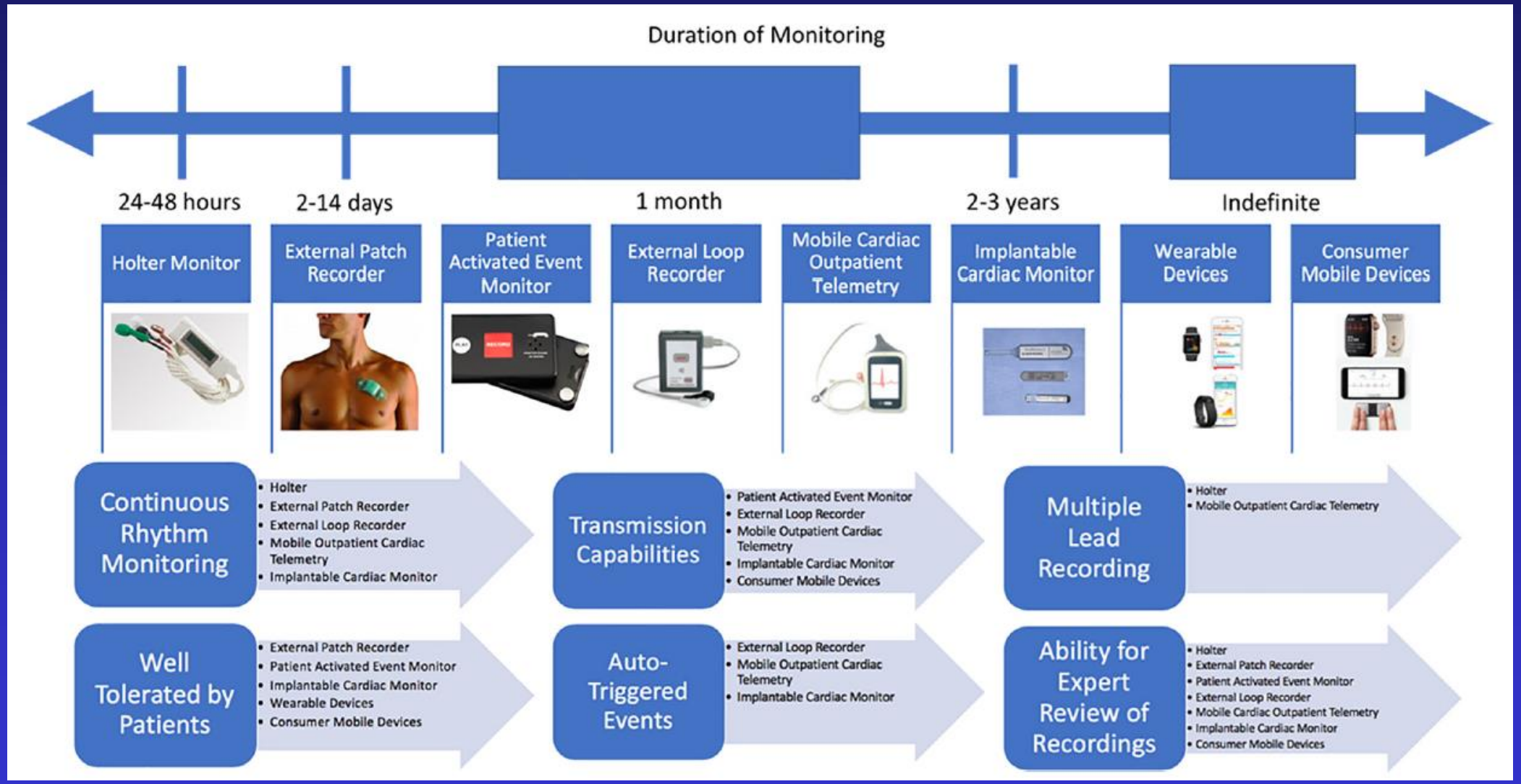
Chan NY et al. Impact of a large-scale territory-wide social-media-based program on atrial fibrillation awareness and screening behaviour. AsiaPrevent 2019, Osaka, Japan

Impact of a Large-scale Territory-wide Social Media-based Program on Atrial Fibrillation Awareness and Screening Behaviour

	Pre-AFAP (n=844)	Post-AFAP (n=813)	p-value
Sex (women %)	69.2	66	0.270
Age	73.9±7.2	74.8±7.2	0.019
Heard of AF before? (Yes %)	41.5	45	0.301
AF can be asymptomatic? (Yes %)	14.5	14	0.801
Stroke is a complication? (Yes %)	53.1	50.2	0.238
Heart failure is a complication? (Yes %)	40	39.5	0.153
Oral anticoagulation is a treatment? (Yes %)	23.1	21.4	0.405
Pulse check or ECG performed on consultation in past 12 months? (Yes %)	65	52.3	<0.001

Chan NY et al. Impact of a large-scale territory-wide social-media-based program on atrial fibrillation awareness and screening behaviour. AsiaPrevent 2019, Osaka, Japan

Screening Tools for Atrial Fibrillation



Pokorney SD et al. Atrial fibrillation: what do we know about screening and what do we not know about treatment? Heart 2019;105(11):817-9

Screening Tools for Atrial Fibrillation

Device	Method of Interpretation	Sensitivity (%)	Specificity (%)	Reference
Pulse palpation		94 (84–97)	72 (69–75)	Cooke et al[55]
Handheld single-lead ECGs				
AliveCor (Kardia) heart monitor	Algorithm only (based on presence of P wave and RR irregularity)	98 (89–100)	97 (93–99)	Lau et al[56]
Merlin ECG event recorder	Cardiologist interpretation	93.9	90.1	Kearley et al[57]
Mydiagnostick	Algorithm only (based on RR irregularity)	94 (87–98)	93 (85–97)	Tieleman et al[58]
				Vaes et al[59]
Omron HCG-801	Algorithm only (based on RR irregularity)	98.7 (93.2 –100)	76.2(73.3 –78.9)	Kearley et al[57]
Omron HCG-801	Cardiologist interpretation	94.4	94.6	Kearley et al[57]
Zenicor EKG	Cardiologist interpretation	96	92	Doliwa et al[60]
Modified blood pressure monitors				
Microlife BPA 200 Plus	Algorithm only (based on pulse irregularity)	92	97	Marazzi et al[61]
Microlife BPA 200	Algorithm only (based on pulse irregularity)	97 (81.4 –100)	90 (83.8 –94.2)	Wiesel et al[62]
Omron M6	Algorithm only (based on pulse irregularity)	100	94	Marazzi et al[61]
Omron M6 comfort	Algorithm only (based on pulse irregularity)	30 (15.4 –49.1)	97 (92.5 –99.2)	Wiesel et al[62]
Microlife WatchBP	Algorithm only (based on pulse irregularity)	94.9 (87.5 –98.6)	89.7 (87.5 –91.6)	Kearley et al[57]
Plethysmographs				
Finger probe	Algorithm only (based on pulse irregularity)	100	91.9	Lewis et al[63]
iPhone photo-plethysmograph	Algorithm only (based on pulse irregularity)	97.0	93.5	McManus et al[64*]

Freedman B et al. Screening for atrial fibrillation: a report of the AF-SCREEN international collaboration. Circulation 2017;135(19):1851-67.

Facial PPG for AF Screening

Each participant sat in front of an iPhone placed upright on a desk around 30cm away

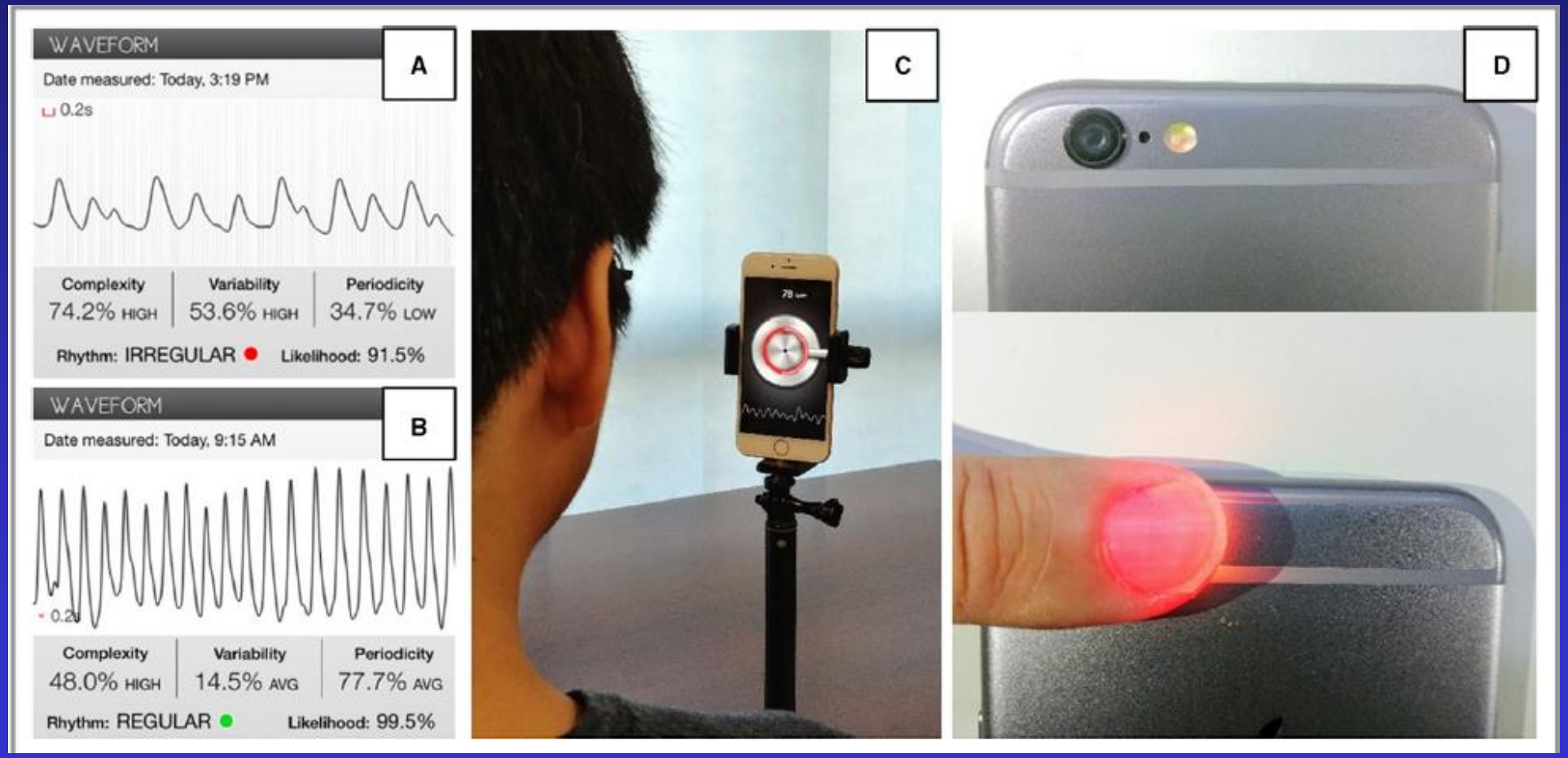
A large circle displaced on the front camera's field of view

The participant was instructed to position his/her entire face within the circle during measurement session

Continuous pulsatile PPG signal from the face was obtained during measurement

3 consecutive 20-second measurements were performed

Sensitivity 95%, specificity 96%, PPV 92%, NPV 97%



Yan BP et al. Contact-free screening of atrial fibrillation by a smartphone using facial pulsatile photoplethysmographic signals. J Am Heart Assoc 2018;7:e008585.

Number-Needed-To-Screen for One Newly Diagnosed Atrial Fibrillation

Study	Number of participants	Target population	Mean age (years)	Response rate (%)	Screening tool	Confirmation with 12-lead ECG	Total AF detected, n (%)	Previously undiagnosed AF detected, n (%)	Patients* indicated and given OAC, n (%)	NNS
Furberg et al. 1994[10]	5,151	Random sample of citizens from Medicare eligibility lists from four US communities	N/A (≥65)	57.6	12-lead ECG	N/A	277 (5.4)	77 (1.49)	N/A	67
Meschia et al. 2010[11]	29,861	Black Americans and residents of the southeastern 'stroke belt region' in the US	74.0 (median)	49.0	7- or 12-lead ECG	N/A	432 (1.4)	174 (0.58)	85 (48.9)	172
Schnabel et al. 2012[12]	5,000	Persons aged 35–74 from the city of Mainz and Mainz-Bingen region in Germany	52.2	60.4	12-lead ECG	N/A	161 (3.2)	25 (0.5)	N/A	200
Frewen et al. 2013[13]	4,890	Community-dwelling citizens aged ≥50 years in the Republic of Ireland	63.8	37.1	3-lead ECG	No	118 (2.4)	45 (0.92)	N/A	109

Chan NY. Systematic screening for atrial fibrillation in the community: evidence and obstacles. Arrhythm Electrophysiol Rev 2018;7(1):39-42.

Number-Needed-To-Screen for One Newly Diagnosed Atrial Fibrillation

Study	Number of participants	Target population	Mean age (years)	Response rate (%)	Screening tool	Confirmation with 12-lead ECG	Total AF detected, n (%)	Previously undiagnosed AF detected, n (%)	Patients* indicated and given OAC, n (%)	NNS
Svennberg et al. 2015[14]	7,173	75–76-year-old population in Stockholm county or the Halland region in Sweden	N/A	53.8	1-lead ECG	No	884 (12.3) with history plus ECG	218 (3)	203 (93)	Single ECG: 200 Twice daily ECG for 2 weeks: 33
Chan et al. 2016[2]	13,122	Untargeted voluntary participation by Hong Kong citizens aged ≥18 years	64.7	N/A	1-lead ECG	No	239 (1.8)	101 (0.8)	N/A	129
Proietti et al. 2016[15]	65,747	Untargeted voluntary participation by Belgian citizens	58.0 (median)	N/A	1-lead ECG	Yes when 1-lead ECG unclear	911 (1.4)	603 (0.92)	N/A	109
Chan et al. 2017[16]	10,735	Untargeted voluntary participation by Hong Kong citizens aged ≥50 years	78.6	N/A	1-lead ECG	No	244 (2.3)	74 (0.69)	17 (24)	145

Chan NY. Systematic screening for atrial fibrillation in the community: evidence and obstacles. Arrhythm Electrophysiol Rev 2018;7(1):39-42.

CA Colon Screening Program in Hong Kong

- Started in August 2018
- Phase I: age 61-75; phase II: age 56-75, phase II: age 50-75
- Till September 2019

  166,000 screened with FOB

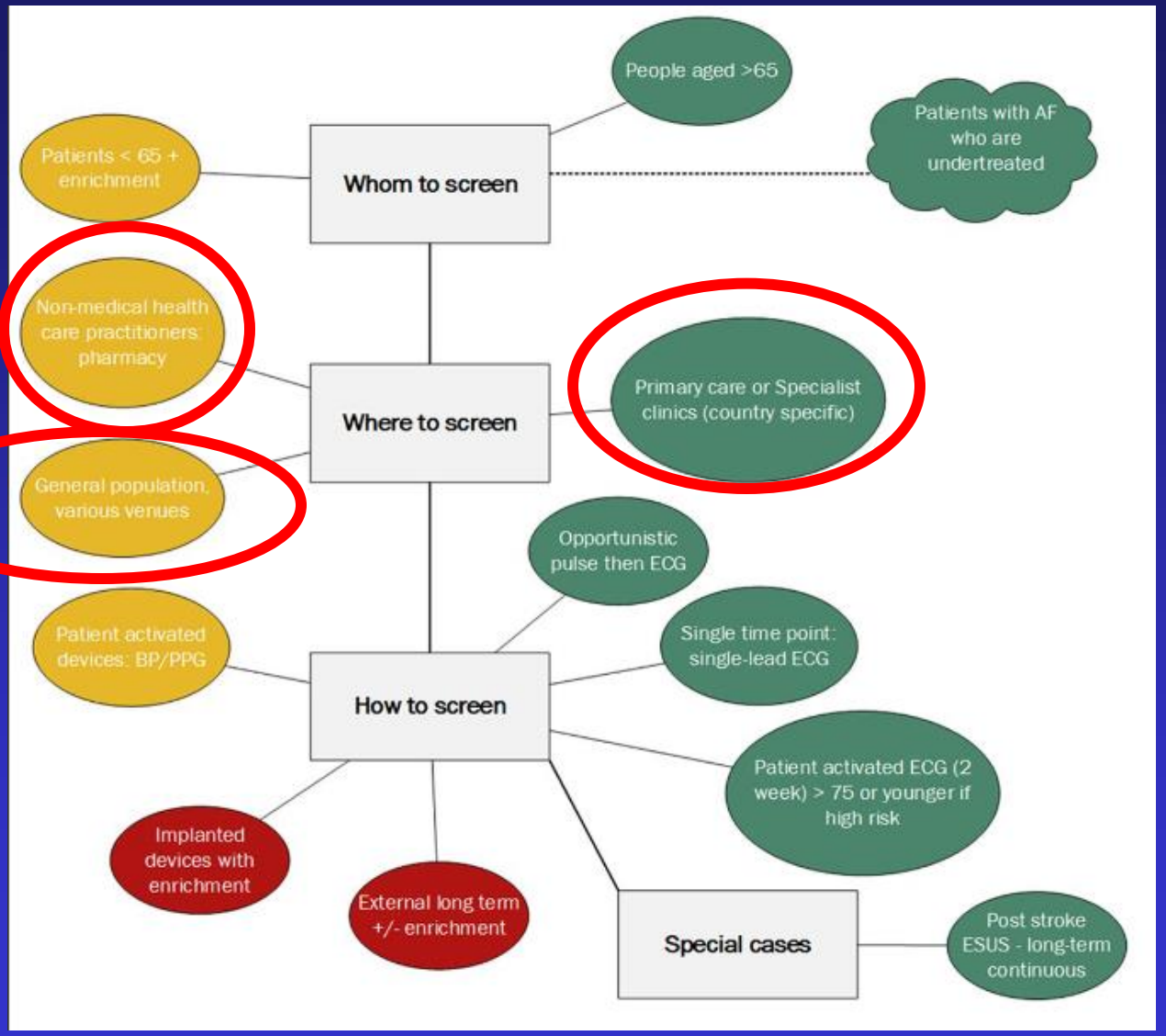
  19500 (12.6%) FOB+ve

  11900 (66.7%) colonic adenoma (<5% will progress to CA colon over 7-10 years)

  1170 (6.6%) CA colon
- NNS for detecting one CA colon: 142

  NNS for detecting one colonic adenoma: 14
- Recommended bi-annual screening

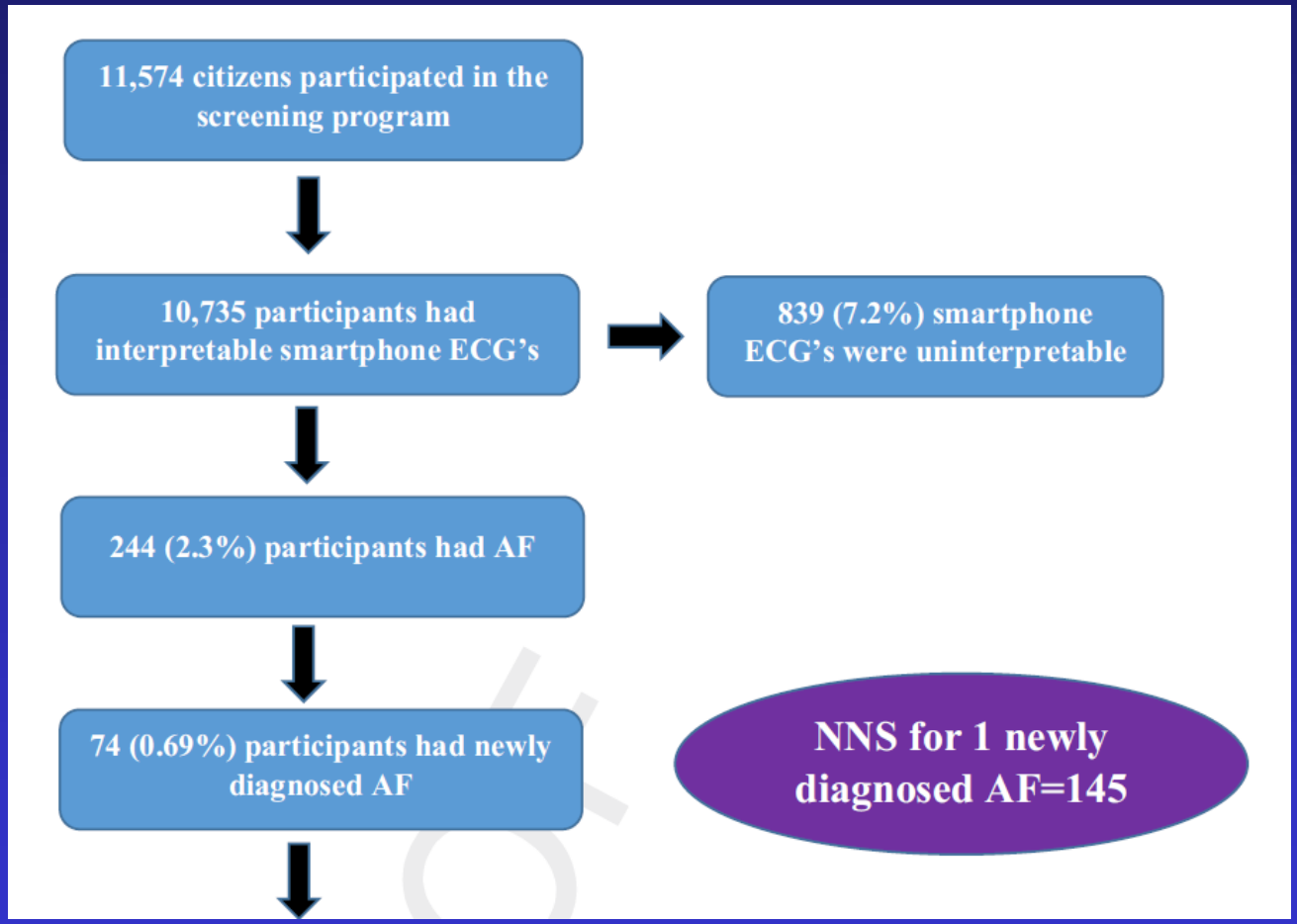
Settings for AF Screening



Freedman B et al. Screening for atrial fibrillation: a report of the AF-SCREEN international collaboration. Circulation 2017;135(19):1851-67.

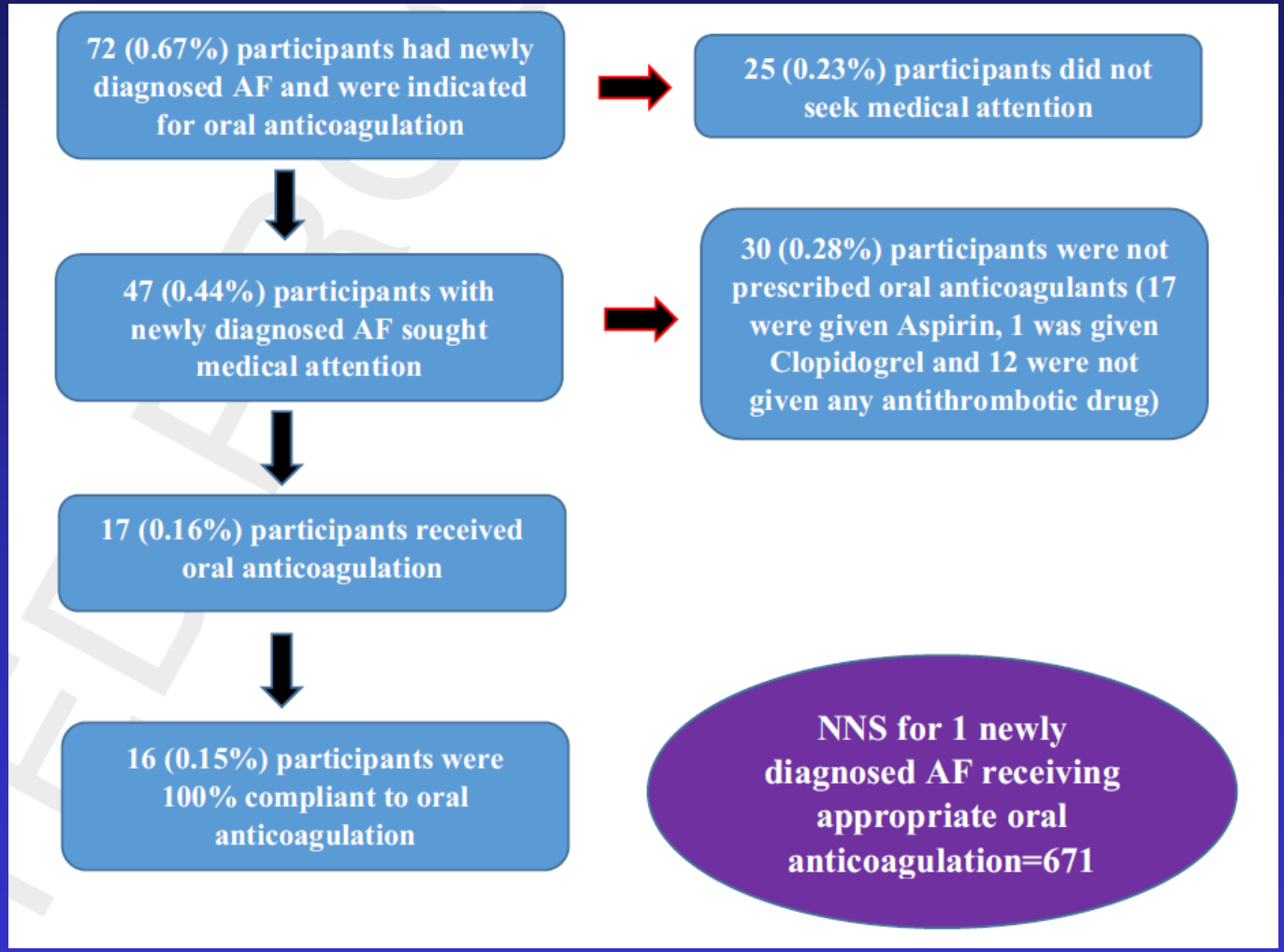
AFinder Program

- N=10,735 (8564 [79.8%] female, mean age 78.6±8.1) participants
- 244 participants (172 [70.5%] female, mean age 79.5±7.9) had atrial fibrillation



Chan NY et al. Effectiveness of a nongovernmental organization-led large-scale community atrial fibrillation screening program using the smartphone ECG: an observational cohort study. Heart Rhythm 2018;13:1306-11

AFinder Program



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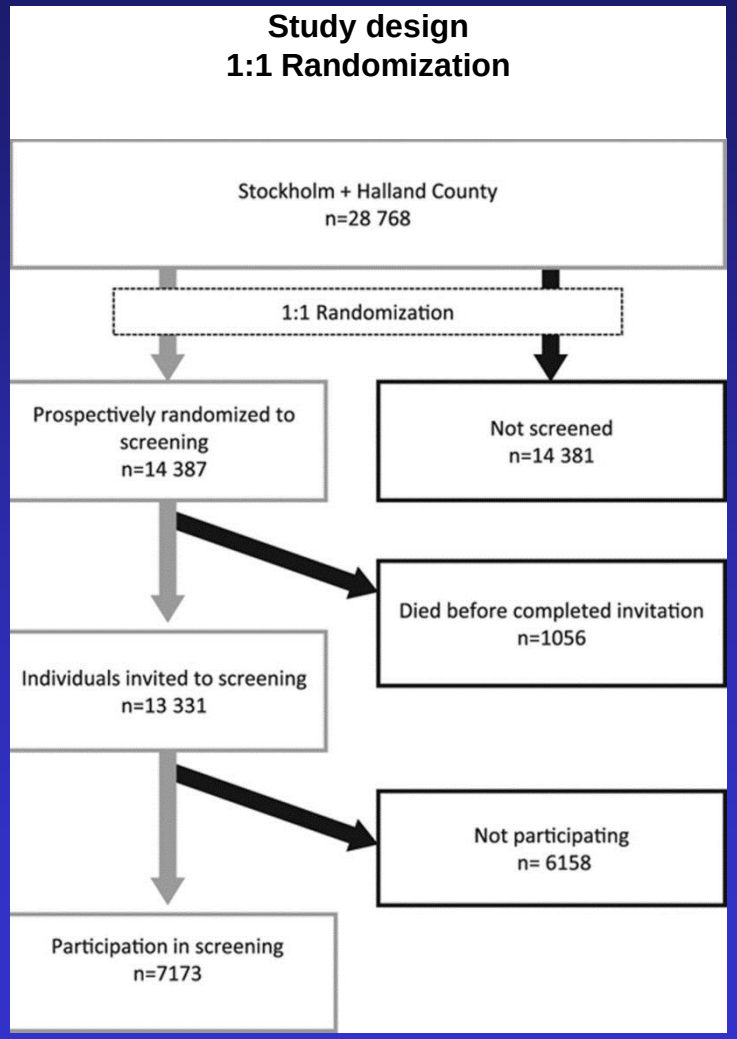
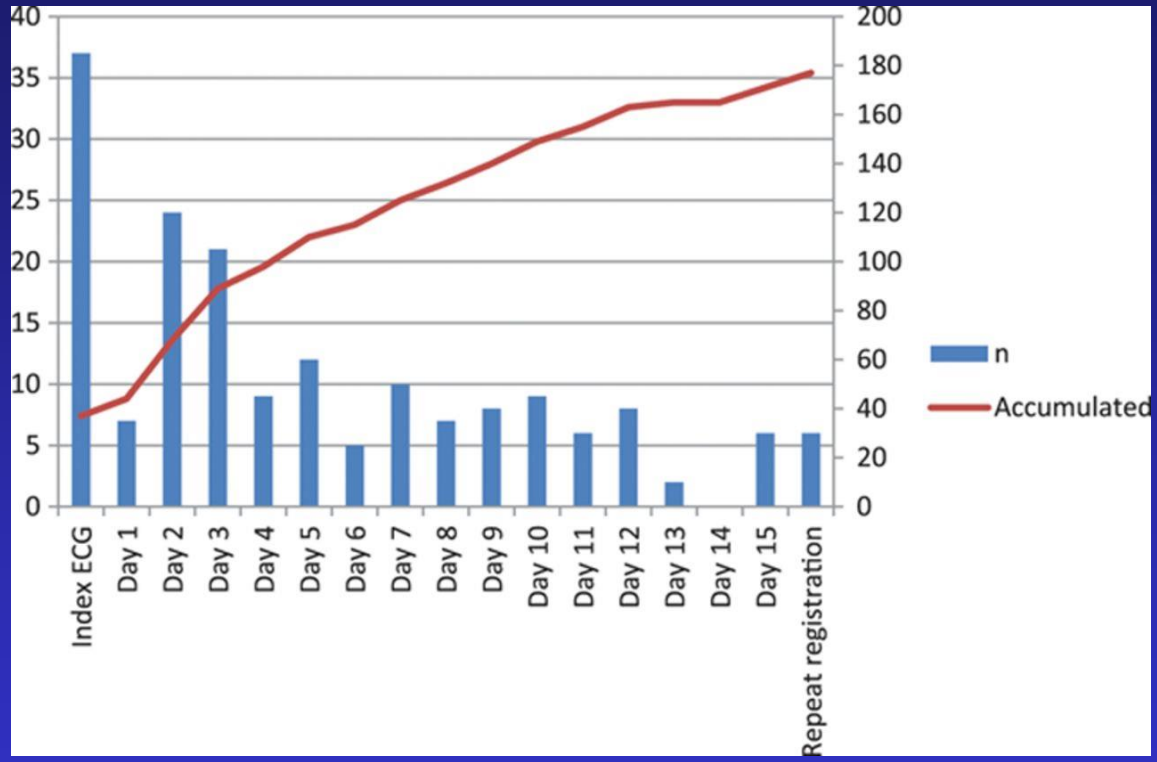
Population Atrial Fibrillation Screening in 75-76 years old in Sweden: STROKESTOP study

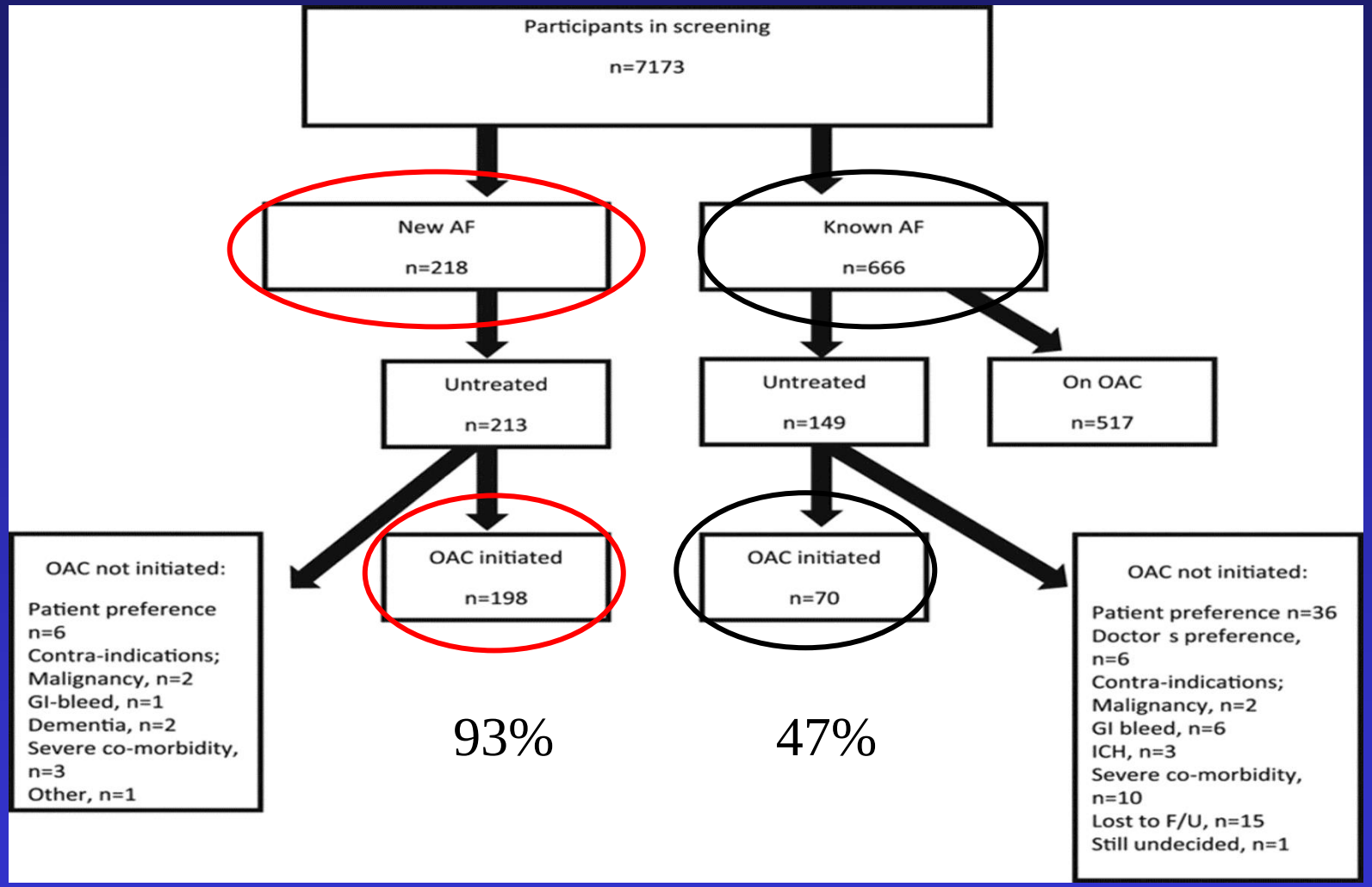




Time to first AF detection by intermittent ECG registrations using AliveCor

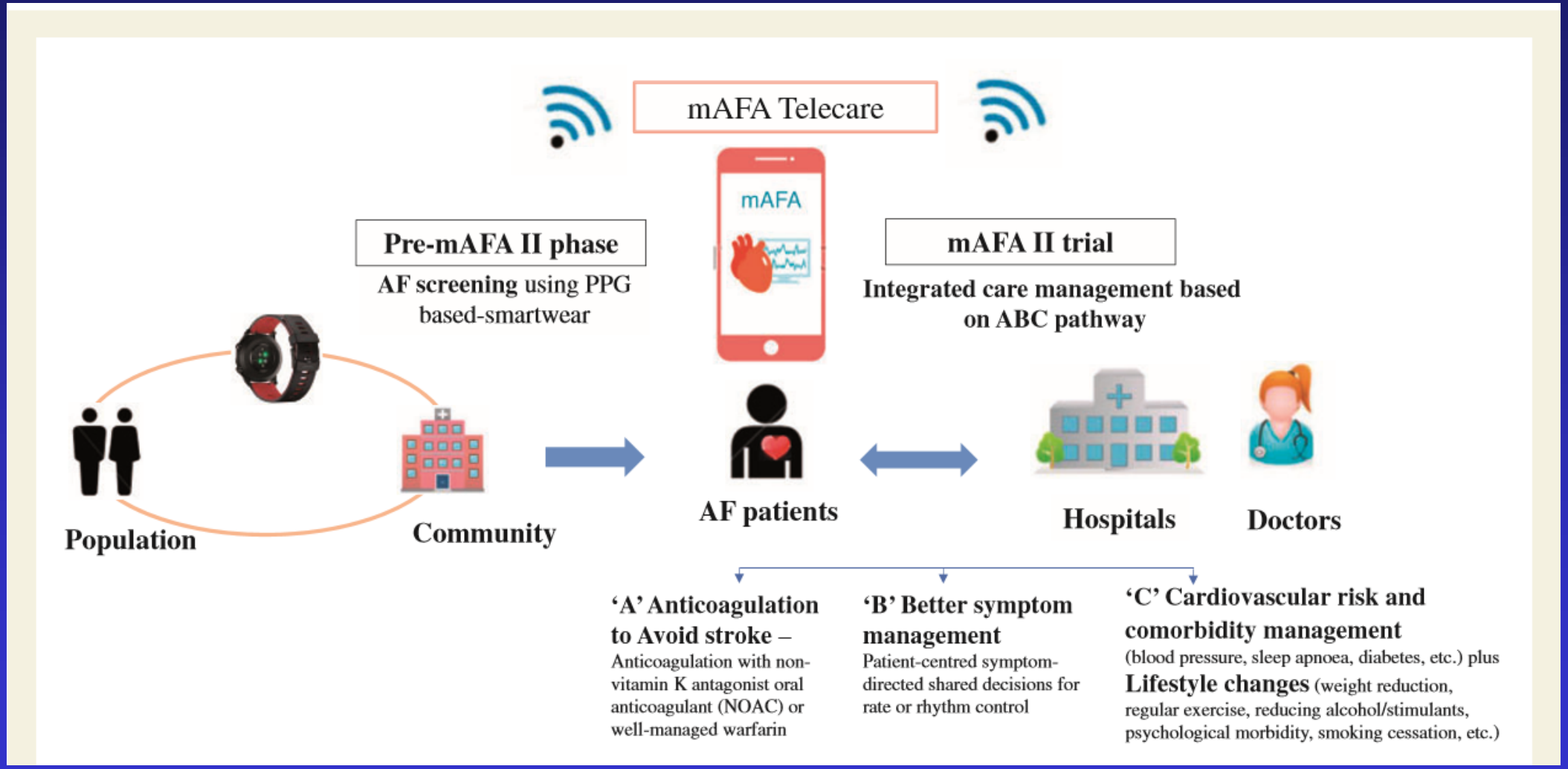
Svennberg E et al. Mass screening for untreated atrial fibrillation. The STROKESTOP study. Circulation 2015;131:2176-84.

Community Atrial Fibrillation Screening in 75-76 years old in Sweden: STROKESTOP study



Svennberg E et al. Mass screening for untreated atrial fibrillation. The STROKESTOP study. Circulation 2015;131:2176-84.

Mobile Health Technology for Integrated Care in Patients with AF



Guo Y et al. Mobile health technology facilitates population screening and integrated care management in patients with atrial fibrillation. Eur Heart J 2020;41(17):1617-9.

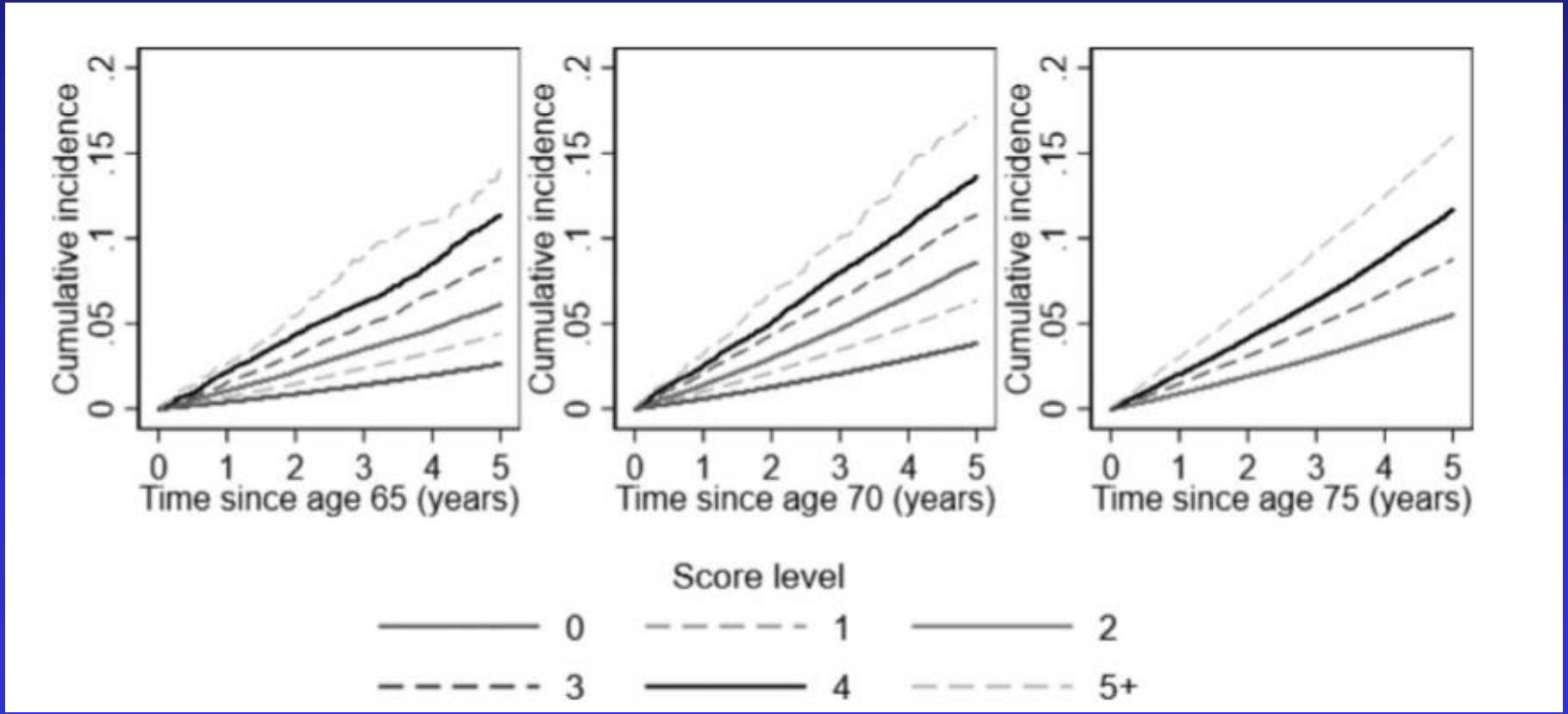
Mobile Health Technology for Integrated Care in Patients with AF

	mAFA group	Usual care group	P-value
No. of patients	1646	1678	
Mean age (years)	67	70	
Female sex n (%)	625 (38)	637 (38)	
Mean FU (months)	262	291	
Ischaemic stroke/systemic thromboembolism/death/ Rehospitalization (%)	1.9	6	<0.05
Rehospitalization (%)	1.2	4.5	<0.05

Guo Y et al. Mobile health technology facilitates population screening and integrated care management in patients with atrial fibrillation. Eur Heart J 2020;41(17):1617-9.

C_2HEST Risk Score

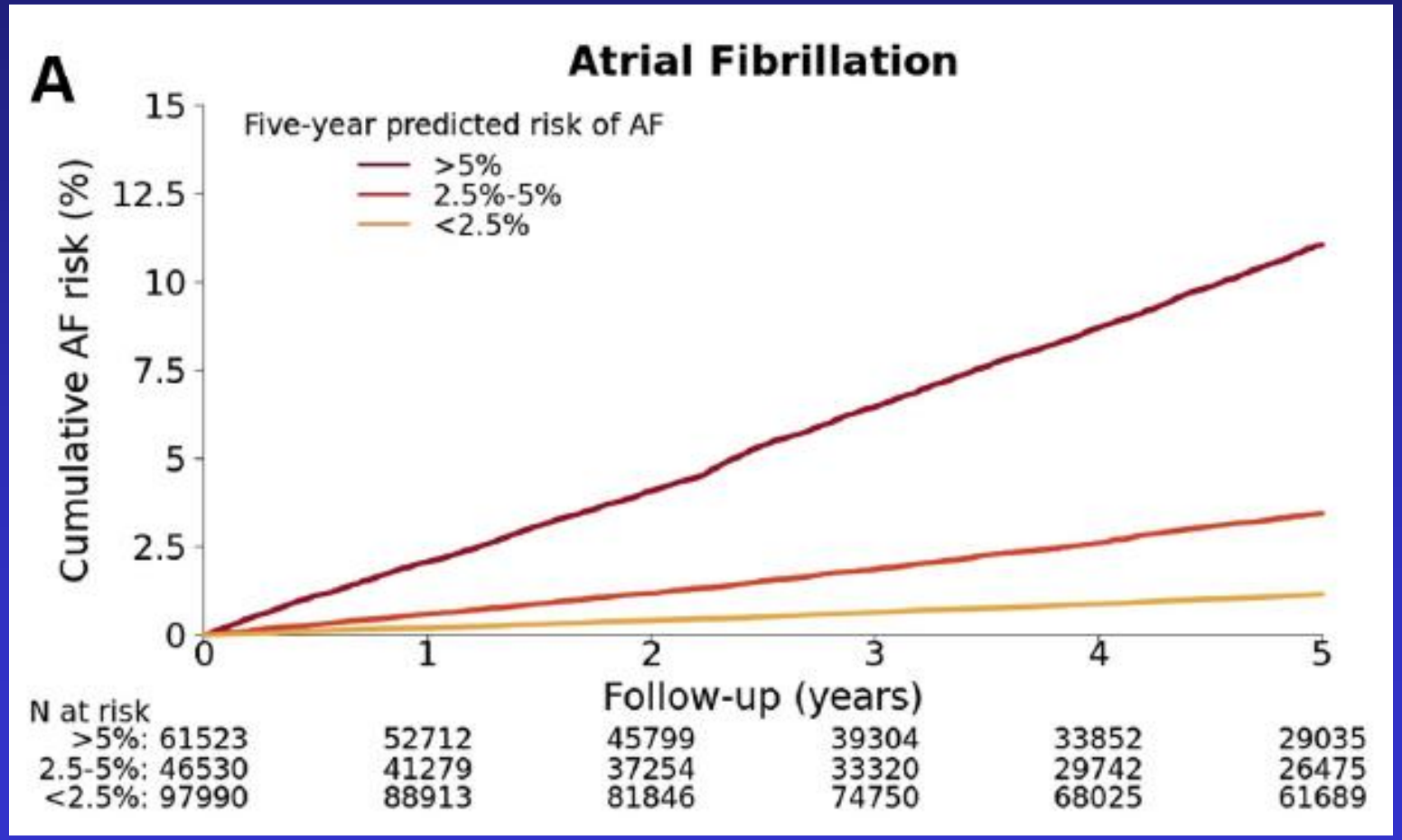
C_2: CAD/COPD; H: Hypertension; E: Elderly (Age≥75, doubled); S: Systolic HF (doubled); T: Thyroid disease (hyperthyroidism)



Gregory YH Lip, et al. Evaluation of the C_2HEST risk score as a possible opportunistic screening tool for incident atrial fibrillation in a healthy population (from a nationwide Danish cohort study). Am J Cardiol 2020;125:48-54.

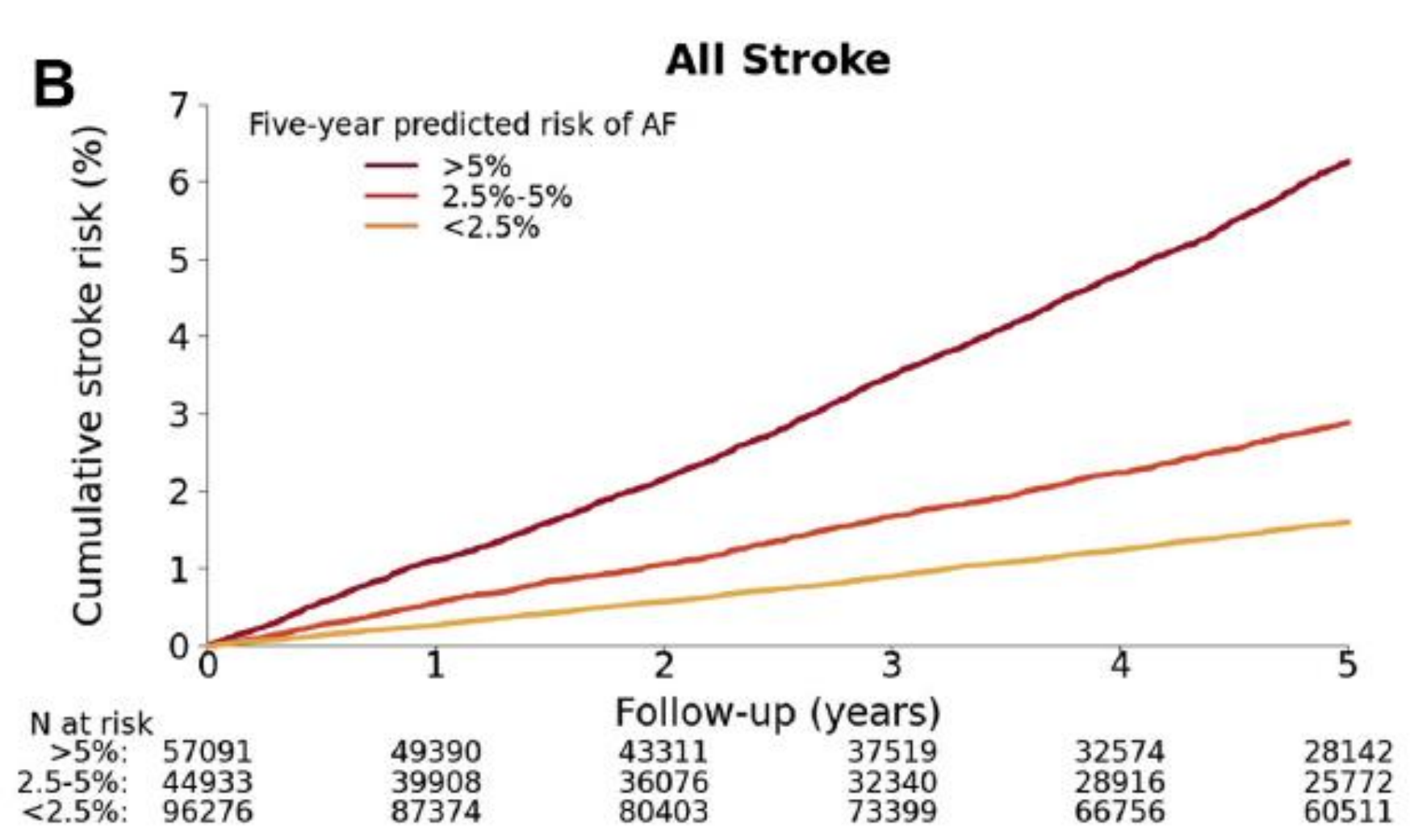
Electronic Health Record Score

The optimal risk model included sex, age, race, smoking, height weight, DBP, HT, hyperlipidaemia, heart failure, CHD, VHD, prior stroke, PAD, chronic kidney disease, hypothyroidism and quadratic terms for height, weight and age



Hulme OL, et al. Development and validation of a prediction model for atrial fibrillation using electronic health records. J Am Coll Cardiol EP 2019;5:1331-41

Electronic Health Record Score



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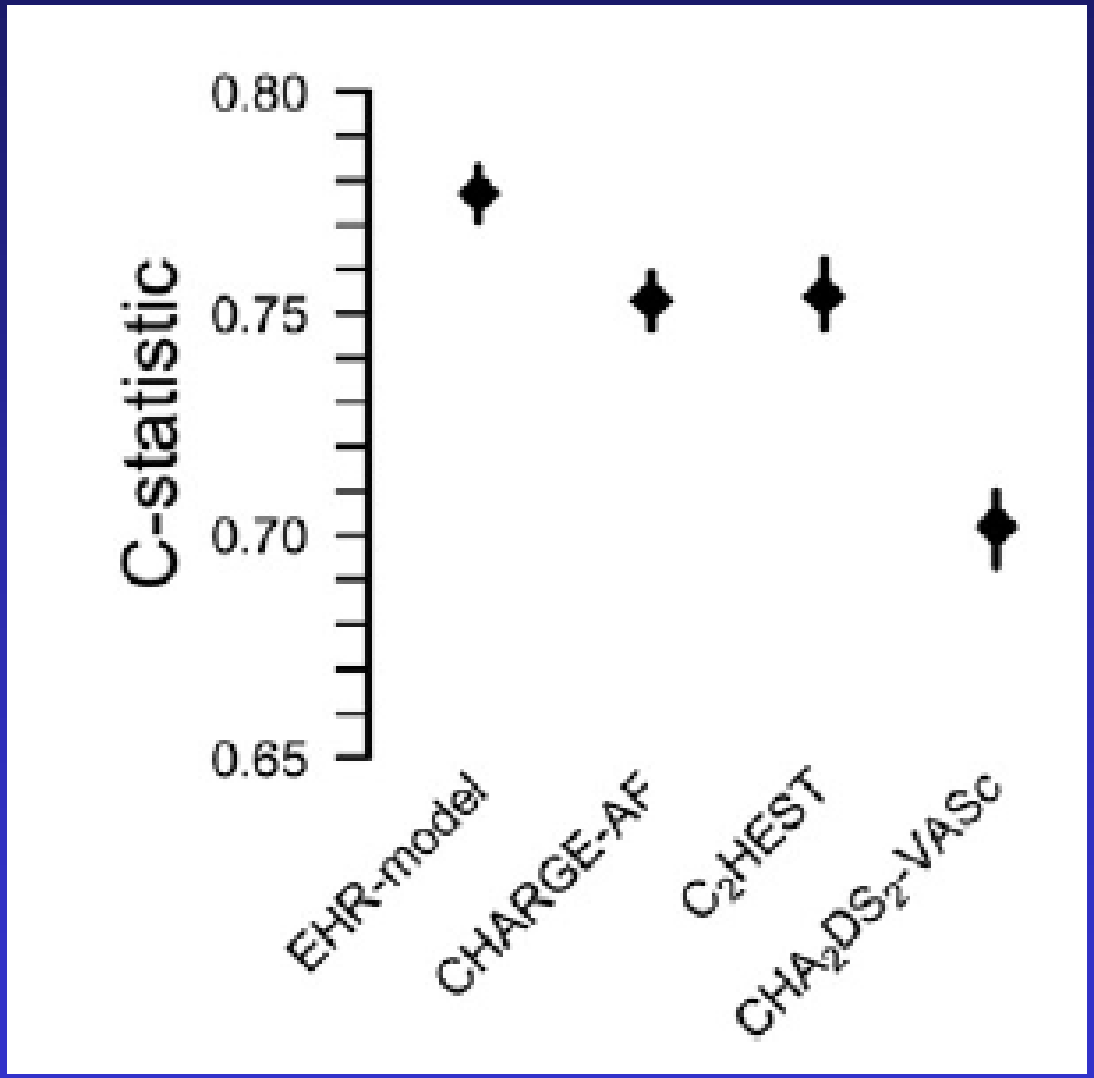

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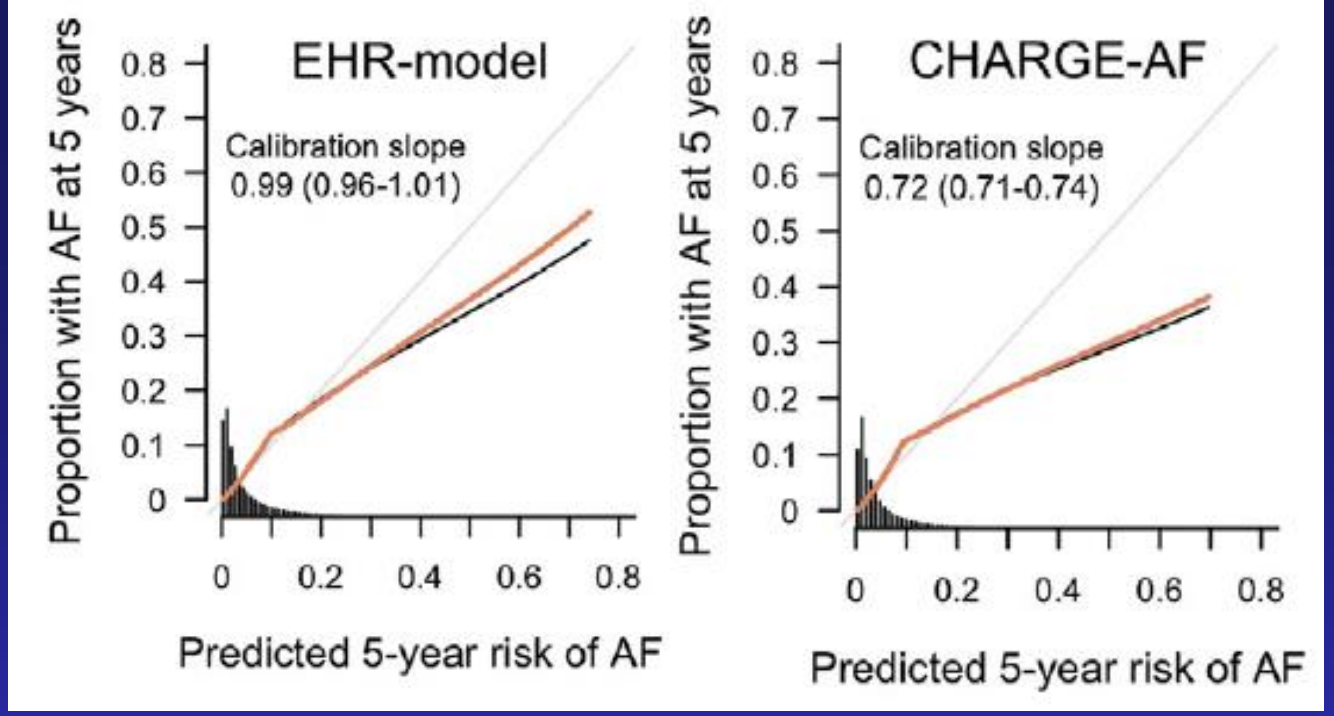
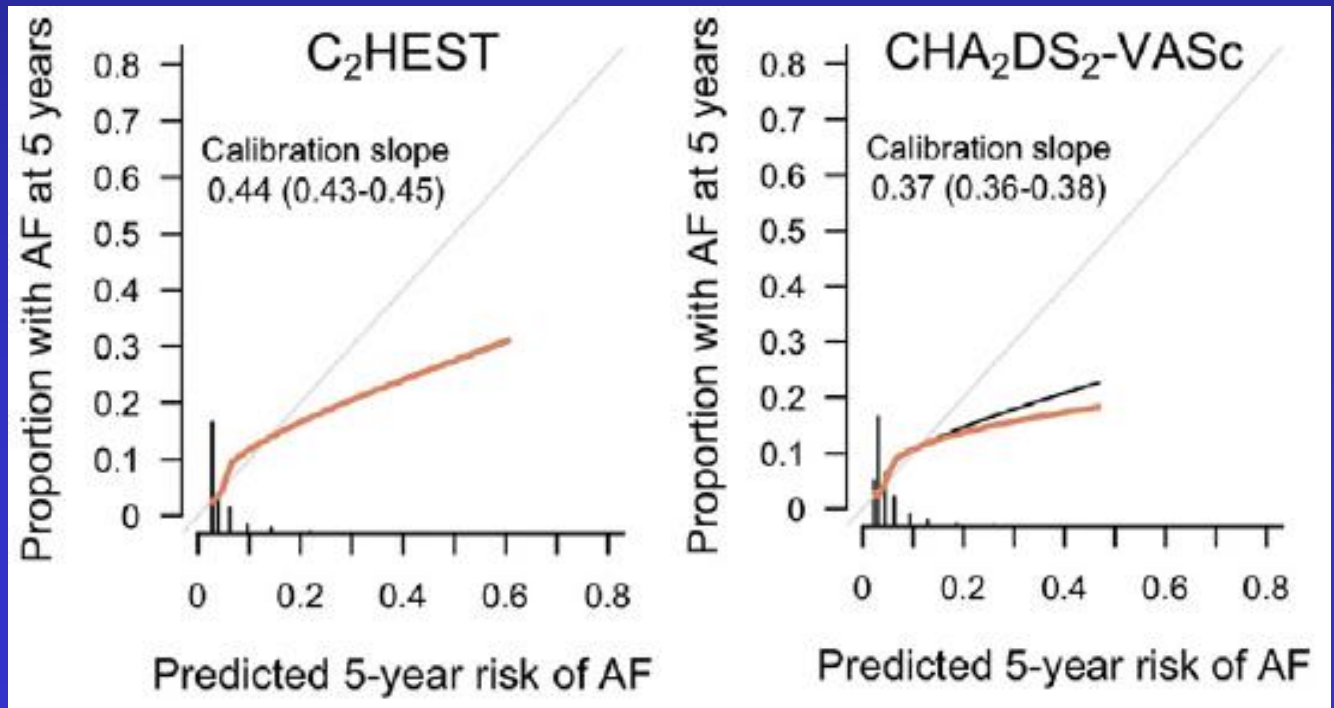
Electronic Health Record Score





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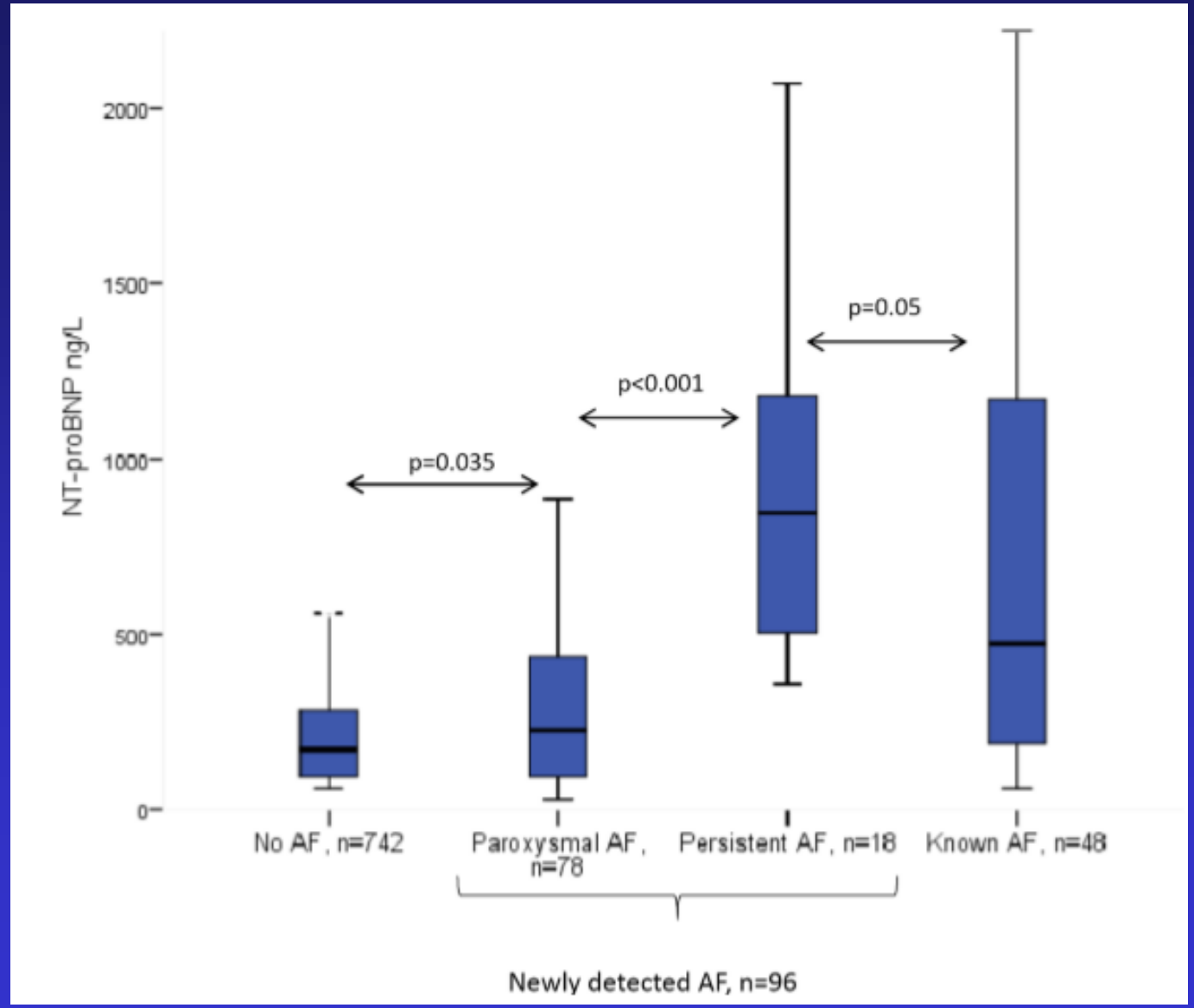
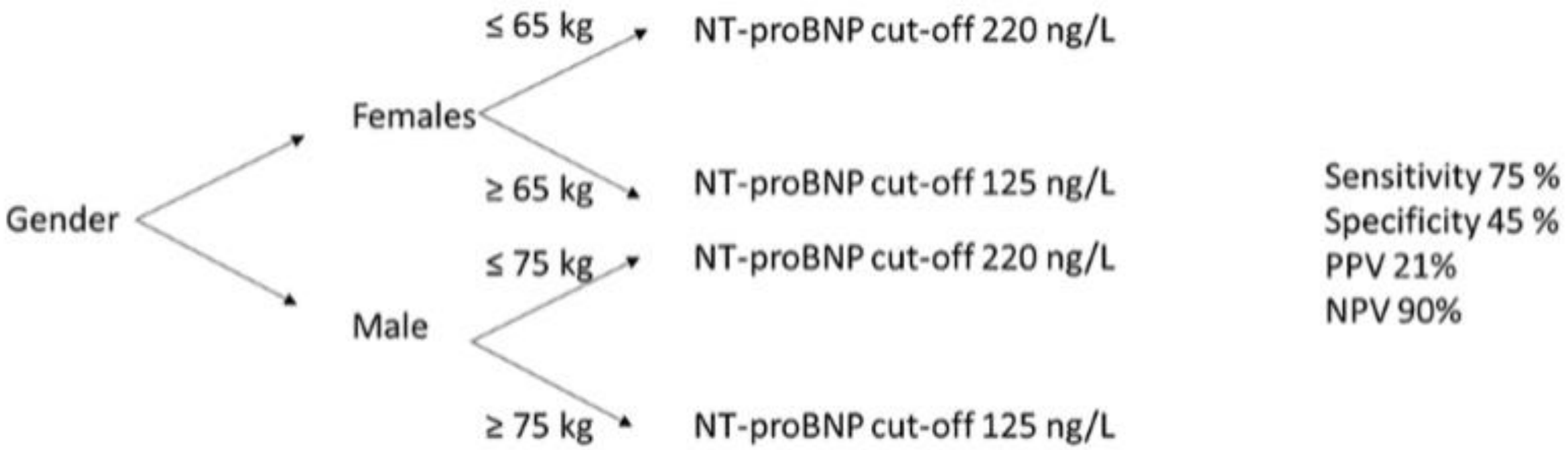
NT-proBNP



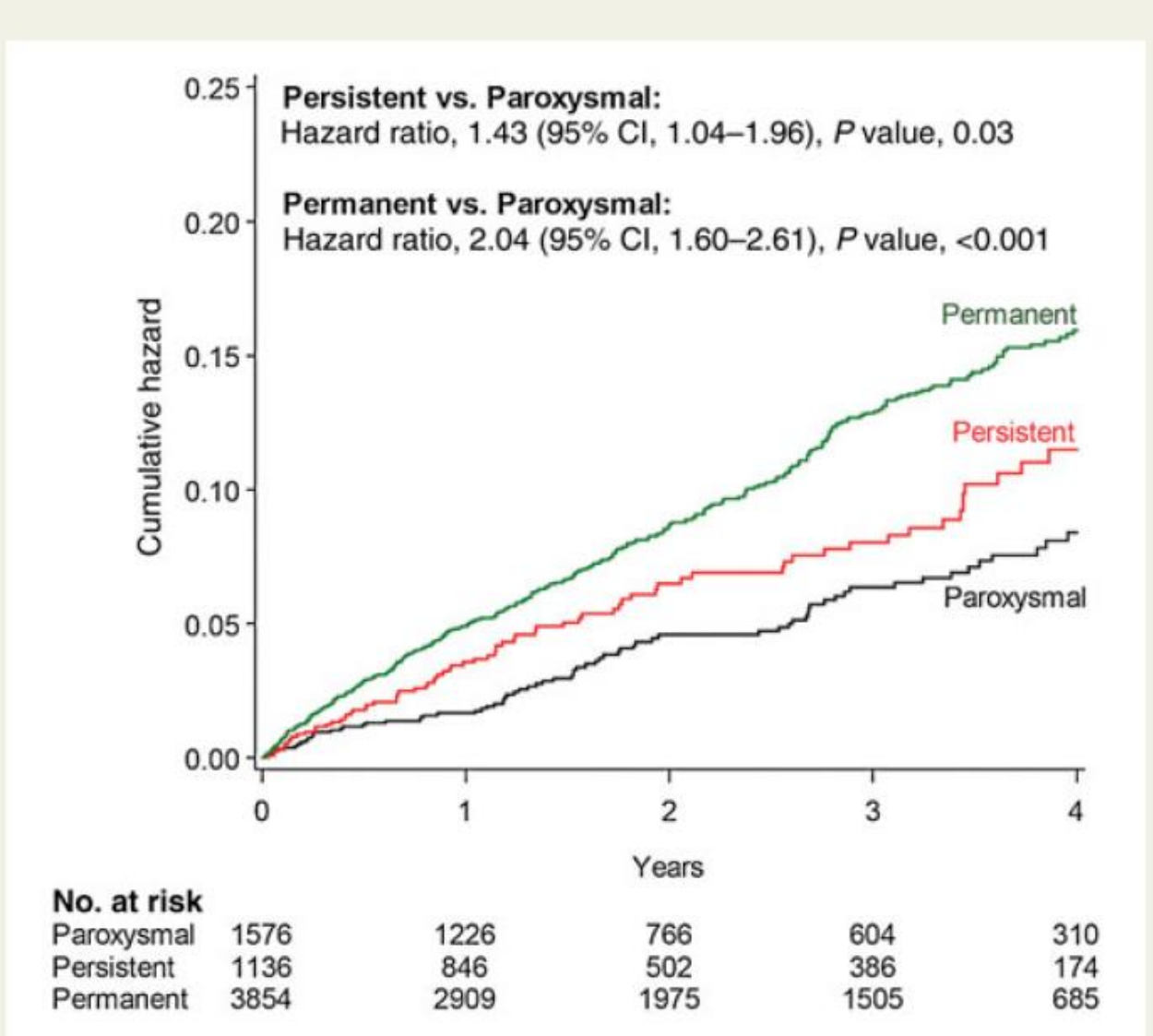
Svennberg E et al. N-terminal pro B-type natriuretic peptide in systematic screening for atrial fibrillation. Heart 2017;103:1271-7.

NT-proBNP and Weight



Svennberg E et al. N-terminal pro B-type natriuretic peptide in systematic screening for atrial fibrillation. Heart 2017;103:1271-7.

Embolic Events According to the Pattern of AF



N=6563 aspirin-treated patients with AF from ACTIVE-A and AVERROES databases

Rates of stroke and systemic embolism analysed

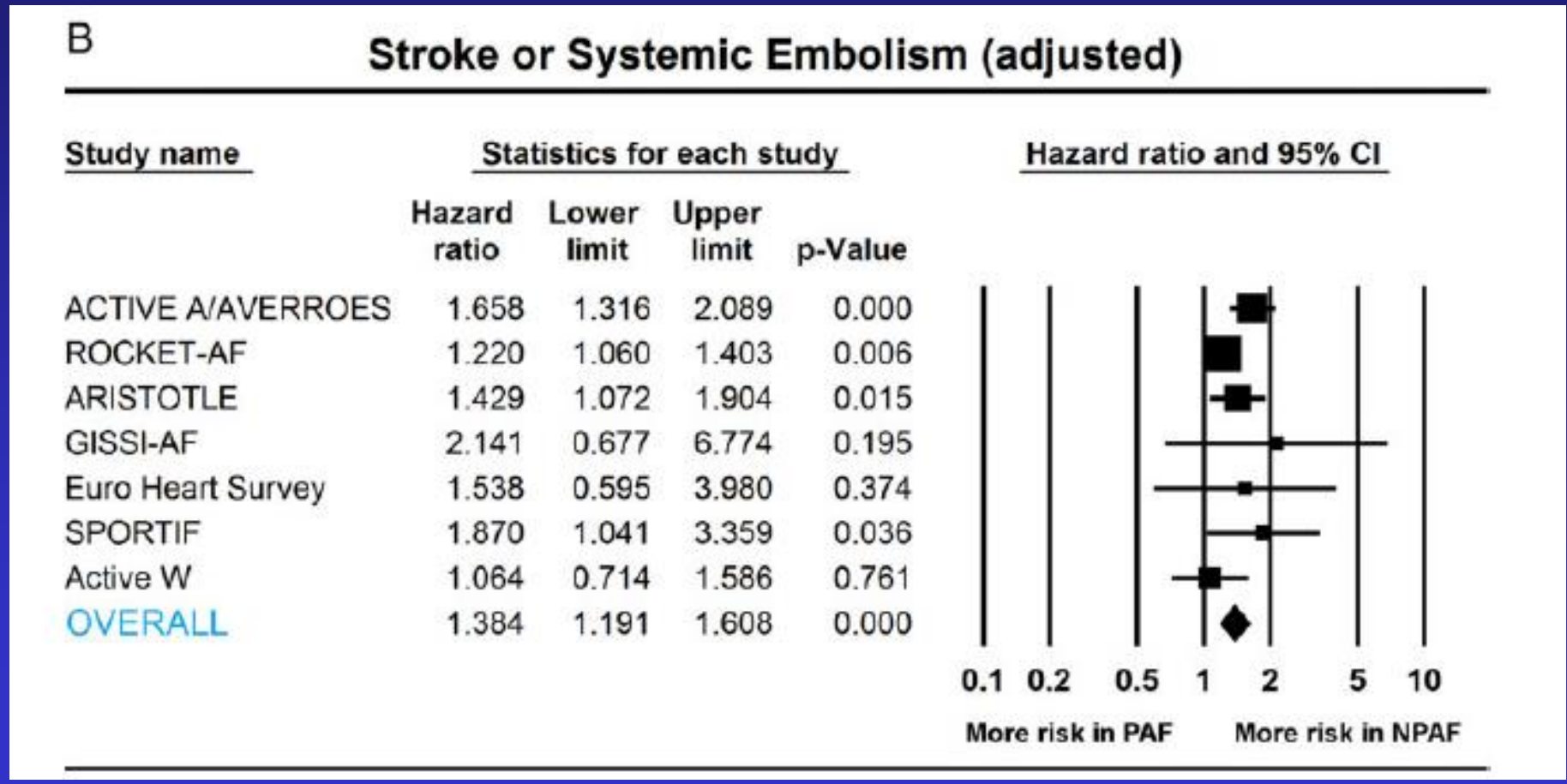
Annualized ischaemic stroke rates were 2.1, 3.0 and 4.2% for paroxysmal, persistent and permanent AF respectively

Age ≥75 years, sex, history of stroke/TIA and AF pattern are independent predictors, with AF pattern ranked the 2nd

Vanassche T et al. Risk of ischaemic stroke according to pattern of atrial fibrillation: analysis of 6563 aspirin-treated patients in ACTIVE-A and AVERROES. Eur Heart J 2015;36:281-7

Risk of Thromboembolism and Mortality According to the Pattern of AF

AF clinical outcome data were extracted from 12 studies containing 99,996 patients



Ganesan AN et al. The impact of atrial fibrillation type on the risk of thromboembolism, mortality, and bleeding: a systematic review and meta-analysis. Eur Heart J 2016;37:1591-1602

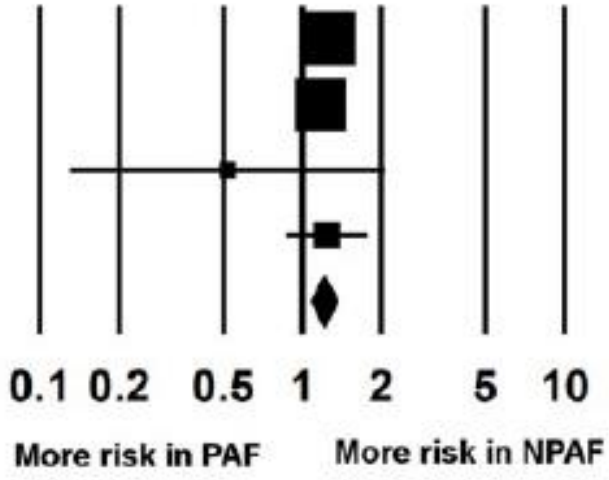
Risk of Thromboembolism and Mortality According to the Pattern of AF

AF clinical outcome data were extracted from 12 studies containing 99,996 patients

B

All-cause mortality (adjusted)

Study name	Hazard ratio	Lower limit	Upper limit	p-Value
ROCKET-AF	1.266	1.069	1.499	0.006
ARISTOTLE	1.176	0.986	1.403	0.071
GISSI-AF	0.520	0.132	2.055	0.351
SPORTIF	1.240	0.871	1.765	0.232
OVERALL	1.217	1.085	1.365	0.001



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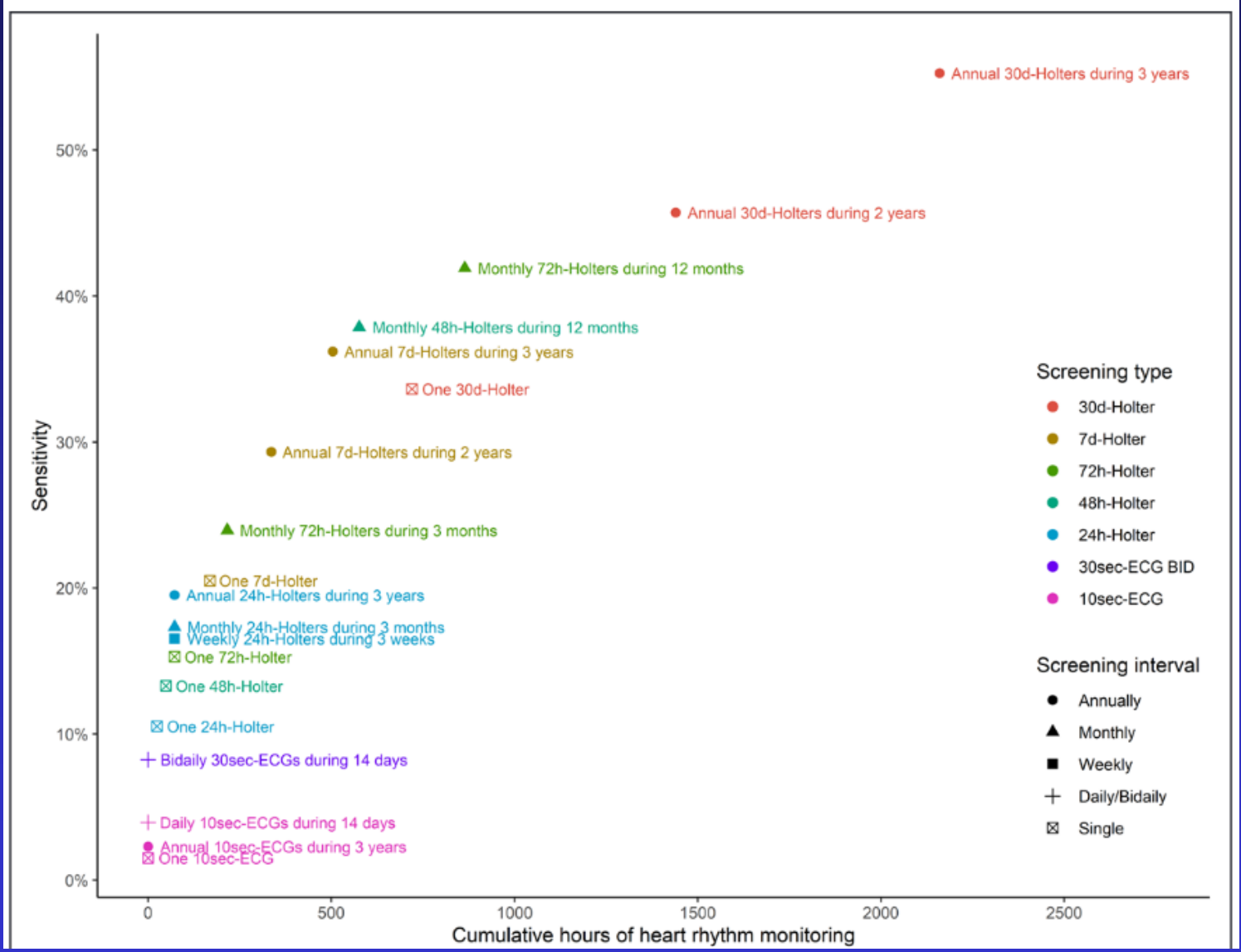
How Frequent and How Long Shall we Screen?



590 individuals with stroke risk factors but without AF recruited from general population

Screening with an ILR
New onset AF lasting≥6 minutes adjudicated

Continuous monitoring for >3 years

Random sampling applied to assess sensitivity and NPV of screening with various simulated screening strategies

Zoga S et al. Comprehensive evaluation of rhythm monitoring strategies in screening for atrial fibrillation: insights from patients at risk monitored long term with an implantable loop recorder. Circulation 2020;141:1510-22.

Zoga S et al. Comprehensive evaluation of rhythm monitoring strategies in screening for atrial fibrillation: insights from patients at risk monitored long term with an implantable loop recorder. Circulation 2020;141:1510-22.

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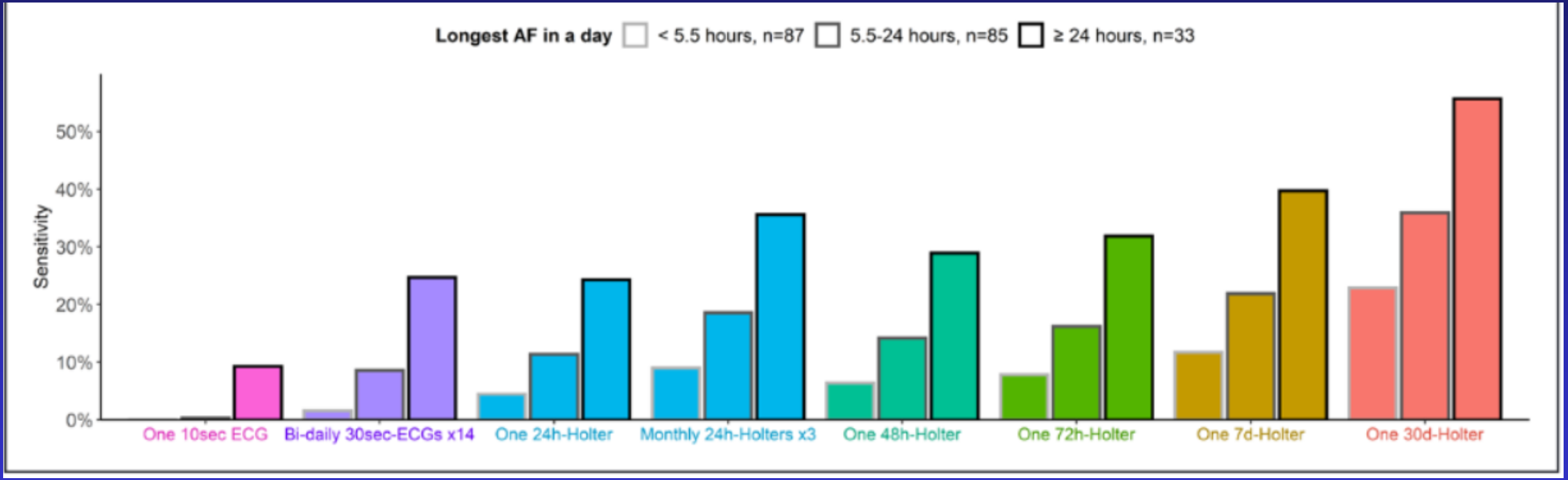

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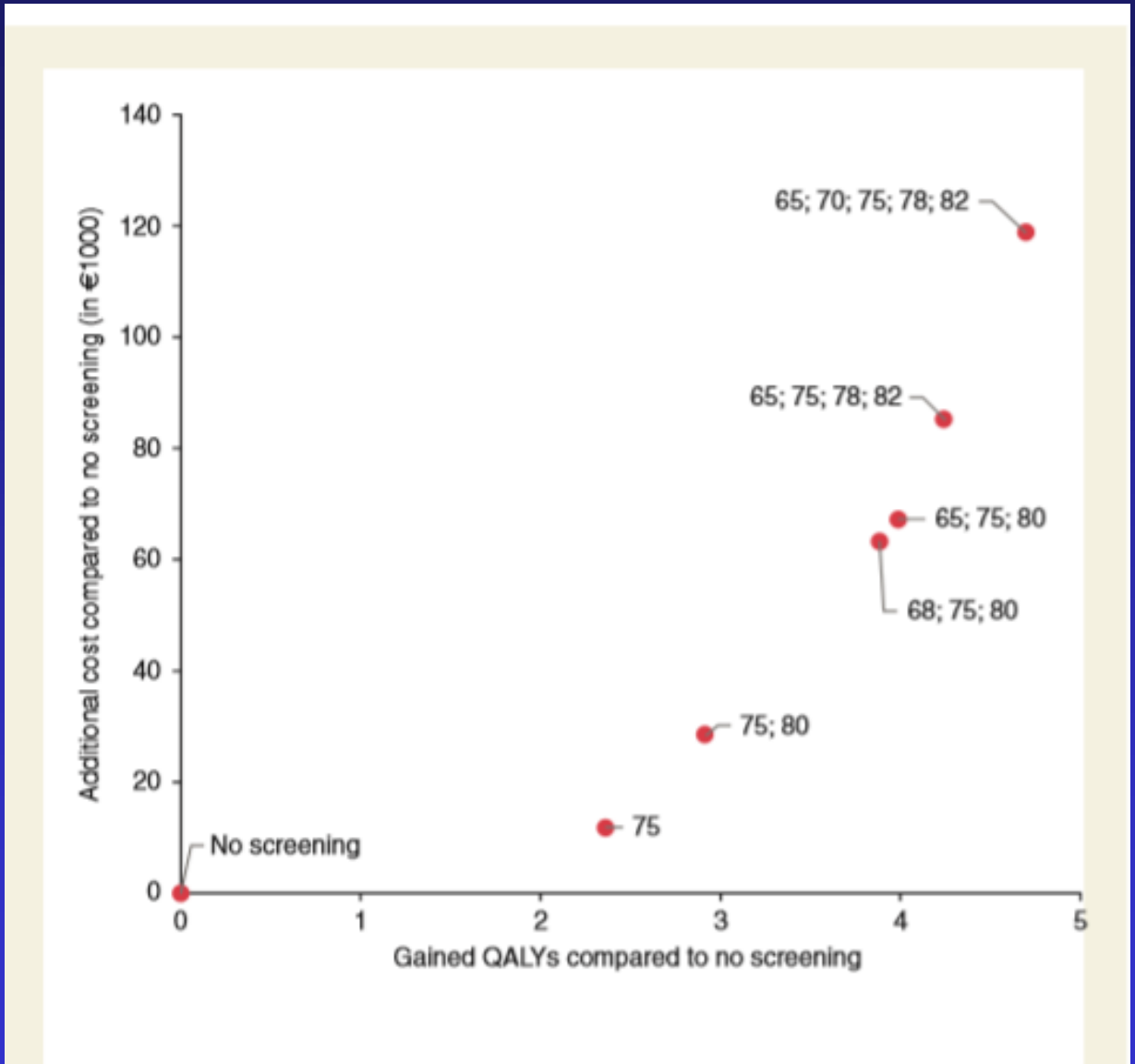
Cost Effectiveness of AF Screening



Based on a decision-analytic simulation model

Mathematical Markov model was built to simulate how different designs of screening affected a population of 55-year-olds

Data used in the model was mainly from STROKESTOP study and supplemented with inputs from other studies

Aronsson M et al. Designing an optimal screening program for unknown atrial fibrillation: a cost-effectiveness analysis. Europace 2017;19:1650-6.

Cost Effectiveness of AF Screening

Age when screening is conducted (years)	Cost per gained QALY compared to no screening (€)	The design is the best option when a QALY is worth between (€)	Prevented stroke per 1000 simulated 55-year-olds (Cost per stroke €)
All			
No screening	–	<4 800	
75	4 800	4 800*–31 000	3.1 (7 300)
75, 80	9 500	31 000–37 000	4.1 (13 200)
68, 75, 80	15 800	37 000–40 000	4.7 (21 000)
65, 75, 80	16 400	40 000–74 000	4.7 (20 600)
65, 75, 78, 82	19 500	74 000–77 000	5.1 (23 900)
65, 70, 75, 78, 82	24 500	77 000–10 0000	5.3 (31 600)

Aronsson M et al. Designing an optimal screening program for unknown atrial fibrillation: a cost-effectiveness analysis. Europace 2017;19:1650-6.

Conclusions

- Patients with asymptomatic AF or screen-detected AF likely have a poorer prognosis than patients without
- Guidelines and expert opinion on AF screening vary and this remains a controversial topic
- The longer the period to screen AF, the higher the yield in patients with cryptogenic stroke; yet empirical oral anticoagulation treatment for embolic stroke of undetermined source has not been shown to be beneficial

Conclusions

- Subclinical atrial tachyarrhythmias detected by CIED predicts both occurrence of clinical AF and thromboembolic events; significant subclinical atrial tachyarrhythmias appear to be of a duration>24 hours or daily burden≥ 5.5 hours; whether oral anticoagulation treatment can improve the prognosis remains to be shown

Conclusions

- Opportunistic AF screening, although shown to be more cost effective than systematic screening; it is seldomly practised in the real world
- With technological advancement, the cost-effectiveness equation becomes more favourable for systematic screening for AF
- A structured and comprehensive downstream management is crucial for any AF screening program to be effective
- AF burden is probably related to the level of stroke risk

Conclusions

- Increasing frequency, duration and dispersion of AF screening identifies patients with low AF burden and thus probably with low level of stroke risk
- Different risk prediction models have been developed to increase the detection rate for AF screening and at the same time, its cost effectiveness
- Depending on the cost effectiveness threshold acceptable by the country, a suitable design of an AF screening program can be implemented to make it cost effective