

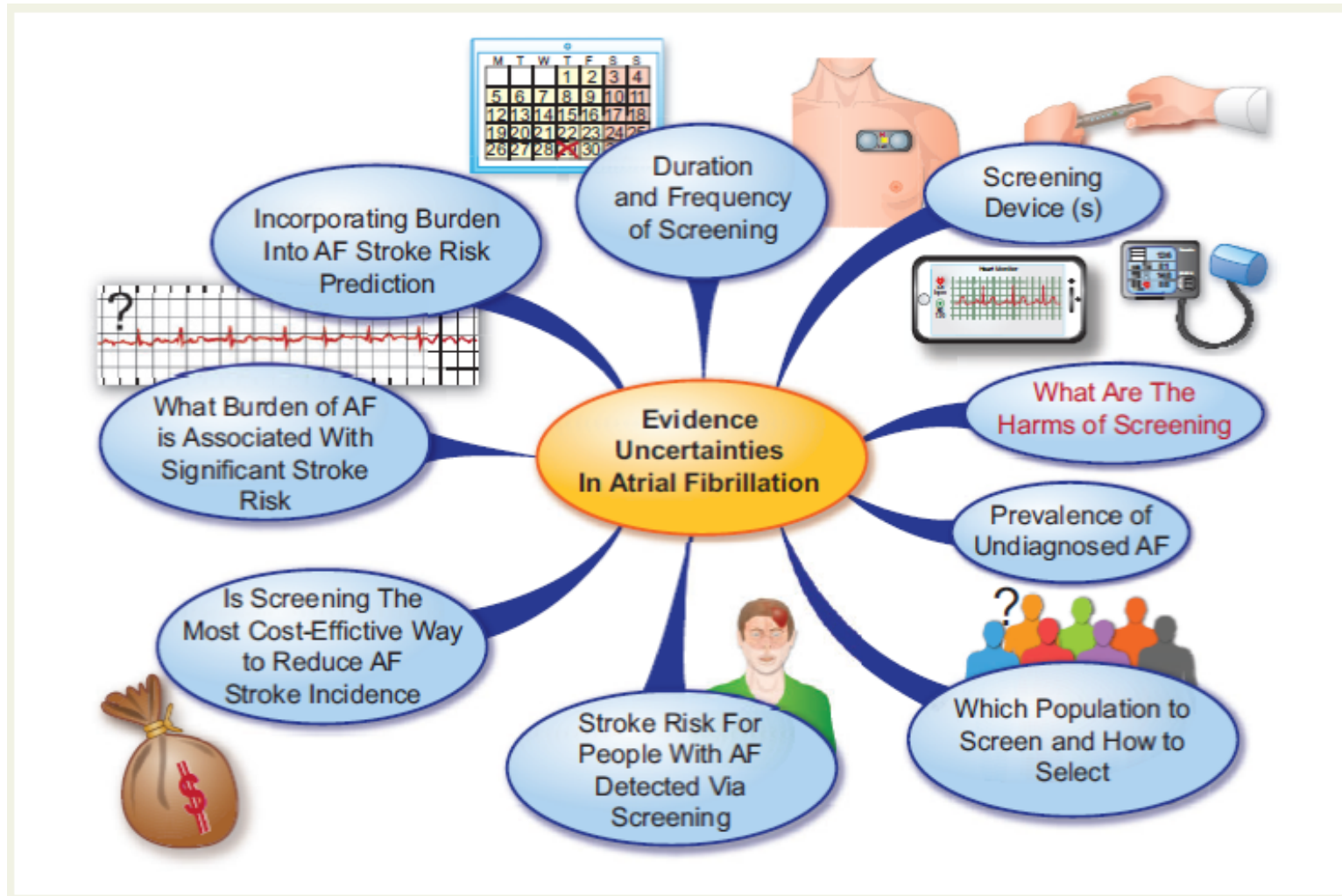
Ictus, PFO, Fibrillazione atriale e dintorni

Screening della fibrillazione atriale per la prevenzione dello stroke

Giuseppe Di Pasquale
Editor Giornale Italiano di Cardiologia



Screening for atrial fibrillation: a call for evidence



Agenda

- **Device per lo screening della FA**
- **Resa diagnostica di nuova FA attraverso lo screening sistematico**
- **Effetti dello screening sistematico della FA sugli outcome clinici**
- **Take home message**



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Tools for atrial fibrillation screening (1)

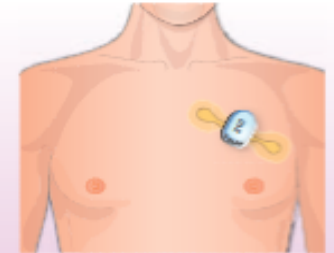
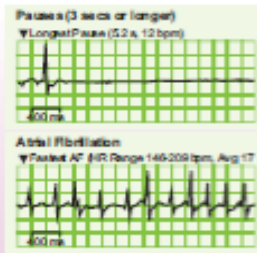
Tools for atrial fibrillation screening

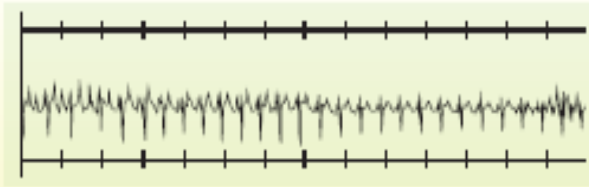
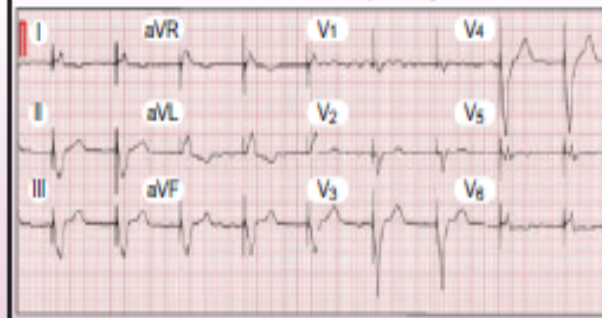
- (i) Pulse palpation
- (ii) Use of artificial intelligence algorithms to identify patients at risk
- (iii) ECG-based devices**
 - (a) Conventional ECG devices
 - (1) Classic 12-lead ECG
 - (2) Holter monitoring (from 24 hours to a week or more)
 - (3) Mobile cardiac telemetry (during hospitalization)
 - (4) Handheld devices
 - (5) Wearable patches (up to 14 days)
 - (6) Biotextiles (up to 30 days)
 - (7) Smart devices (30 s)
 - (b) Implantable loop recorders (3–5 years)

Tools for atrial fibrillation screening cont.

(iv) Non-ECG-based devices

- (a) Photoplethysmography and automatic algorithms: contact (fingertip, smart device, band) and contactless (video)
- (b) Oscillometry (blood pressure monitors that derive heart rhythm regularity algorithmically)
- (c) Mechanocardiography (accelerometers and gyroscopes to sense the mechanical activity of the heart)
- (d) Contactless video plethysmography (through video monitoring)
- (e) Smart speakers (through the identification of abnormal heart rate patterns)

Device name	Device	Atrial fibrillation recording
Photoplethysmography via smartwatch or watch e.g. AppleWatch		 On screen message can alert wearer to suspected arrhythmia
Patch ECG monitors, e.g. Zio patch Zio (iRhythm), Cardiotat (Icortia) and Nuvant (Corventis)		 Pauses (3 seconds or longer) Longest Pause (52 s, 12 bpm) Atrial Fibrillation Fastest AF HR Range 146-209 bpm, Aug 17
Smartphone compatible ECG recorder e.g. Alivecor Kardia		 Unclassified Possible Atrial Fibrillation Normal
WatchBP		Watch BP uses an inbuilt algorithm to detect an irregular heart beat and highlights this to the patient and healthcare professional via an 'AFIB' symbol displayed on screen.

Handheld device e.g. MyDiagnostick (Applied Biomedical Systems BV)		
Implantable cardiac loop recorder		
Implanted devices e.g. Pacemaker		 Atrial fibrillation with ventricular pacing

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TABLE 2 Summary of the 3 Largest Mass Population-Based AF Screening Studies

	Huawei Heart Study (N = 187,912)	Apple Heart Study (N = 419,297)	Fitbit Heart Study (N = 455,699)
Period measurement frequency	Every 10 min	Every 2 h for baseline mode; irregular tachogram initiates a cascade of more frequent mode (every 16 mins)	Every 5 min

Varma N et al. J Am Coll Cardiol 2024;83:611-631



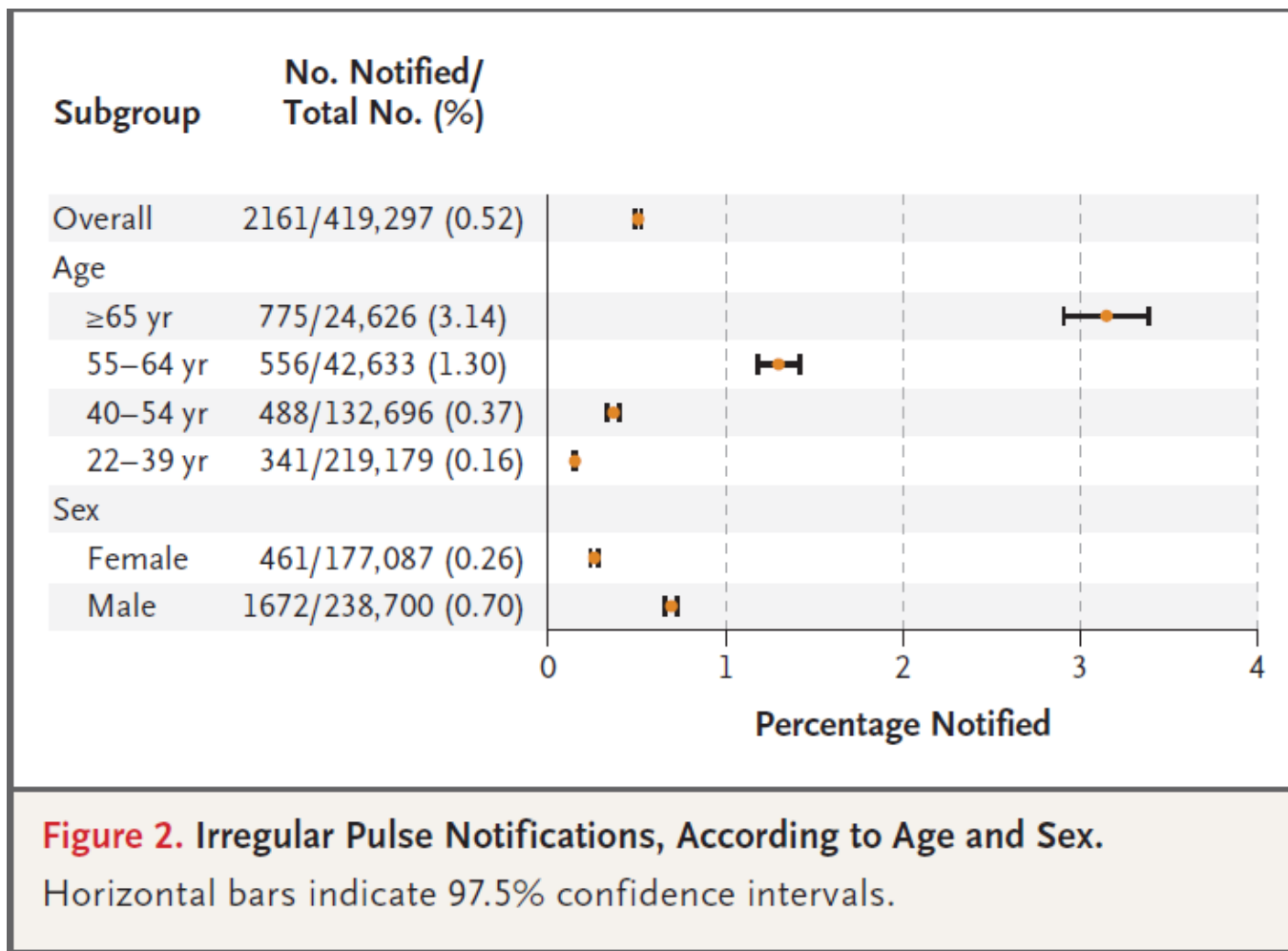
Large-Scale Assessment of a Smartwatch to Identify Atrial Fibrillation

Marco V. Perez, M.D., Kenneth W. Mahaffey, M.D., Haley Hedlin, Ph.D., John S. Rumsfeld, M.D., Ph.D., Ariadna Garcia, M.S., Todd Ferris, M.D., Vidhya Balasubramanian, M.S., Andrea M. Russo, M.D., Amol Rajmane, M.D., Lauren Cheung, M.D., Grace Hung, M.S., Justin Lee, M.P.H., Peter Kowey, M.D., Nisha Talati, M.B.A., Divya Nag, Santosh E. Gummidipundi, M.S., Alexis Beatty, M.D., M.A.S., Mellanie True Hills, B.S., Sumbul Desai, M.D., Christopher B. Granger, M.D., Manisha Desai, Ph.D., and Mintu P. Turakhia, M.D., M.A.S., for the Apple Heart Study Investigators*

N Engl J Med 2019;381:1909-1917

- 419,297 used a smartphone (Apple iPhone).
- Smartwatch notified possible atrial fibrillation in 0.52%.
- In these subjects a telemedicine visit and ECG patch for up to 7 days was performed which confirmed AF in 34%.

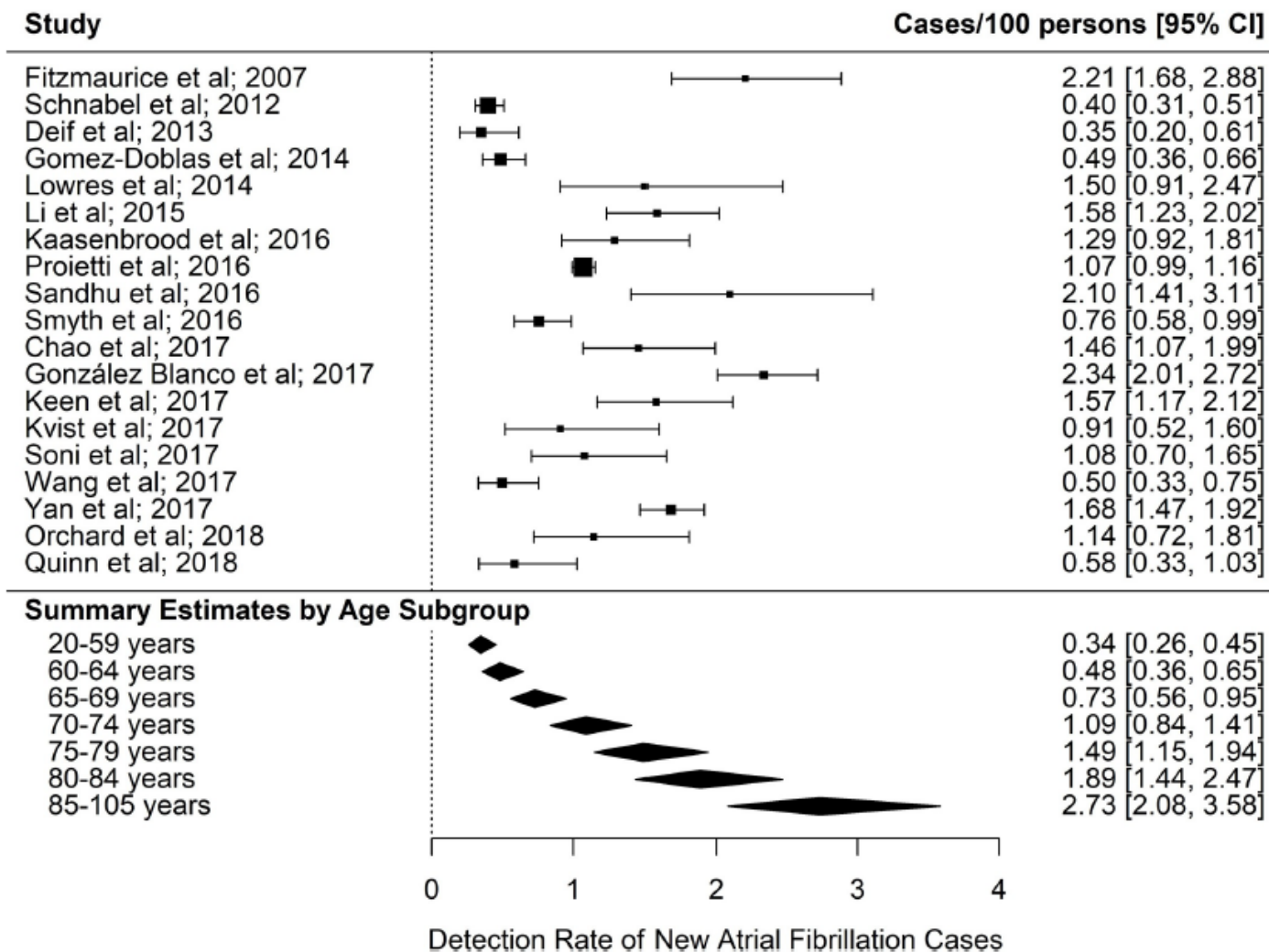
Apple Heart Study



N Engl J Med 2019;381:1909-1917



Screening della FA per la prevenzione dello stroke



Lowres N et al. PLOS Medicine 2019



Screening della FA per la prevenzione dello stroke

Age group, years	NNS to identify 1 new AF (<i>n</i>)	NNS to identify 1 treatable new AF (<i>n</i>) [‡]
<60	294	1,089
60–64	208	926
65–69	137	211
70–74	92	136
75–79	67	67
80–84	53	53
85+	37	37

Lowres N et al. PLOS Medicine 2019



Screening della fibrillazione atriale nella popolazione generale: esperienza della campagna educazionale sul rischio cardiovascolare della Regione Emilia-Romagna

Giuseppe Di Pasquale¹, Laura Sofia Cardelli², Luca Canovi², Beatrice Dal Passo², Federica Frascaro²,
Luca Zanarelli², Gabriele Guardigli², Gianluca Campo², Daniela Aschieri³, Luigi Vignali⁴,
Alessandro Navazio⁵, Andrea Rubboli⁶, Paolo Ortolani⁷, Marcello Galvani⁸, Marco Marconi⁹,
Giancarlo Piovaccari¹⁰, Gianfranco Tortorici¹¹, Stefano Urbinati¹², Stefano Tondi¹³, Biagio Sassone¹⁴,
Giovanni Tortorella¹⁵, Rossana De Palma¹, Gianni Casella¹⁶, Giuseppe Boriani¹⁷

Methods. A total of 2547 subjects underwent AF screening.

Results. The device detected an arrhythmia in 42 subjects (1.65%), and AF was confirmed on 12-lead ECG in 14 (0.55%) of them. The prevalence of confirmed AF increased in subjects over 65 years of age (1.21%) or with a CHA₂DS₂-VASc score ≥ 2 in males or ≥ 3 in females (1.33%). Furthermore, heart failure (odds ratio [OR] 8.62, 95% confidence interval [CI] 1.87-39.6, $p=0.006$) and diabetes (OR 4.55, 95% CI 1.25-16.5, $p=0.021$) significantly increased the risk of AF.

Systematic screening for atrial fibrillation with non-invasive devices: a systematic review and meta-analysis

Ali Wahab,^{a,b,c,q} Ramesh Nadarajah,^{a,b,c,q,*} Harriet Larvin,^d Maryum Farooq,^e Keerthenan Raveendra,^f Mohammad Haris,^{a,b,g} Umbreen Nadeem,^h Tobin Joseph,^{a,b} Asad Bhatti,^{a,b} Chris Wilkinson,^{b,i} Kamlesh Khunti,^j Rajesh Vedanthan,^k A John Camm,^l Emma Svennberg,^m Gregory YH. Lip,^{n,o} Ben Freedman,^p Jianhua Wu,^d and Chris P. Gale^{a,b,c,q}

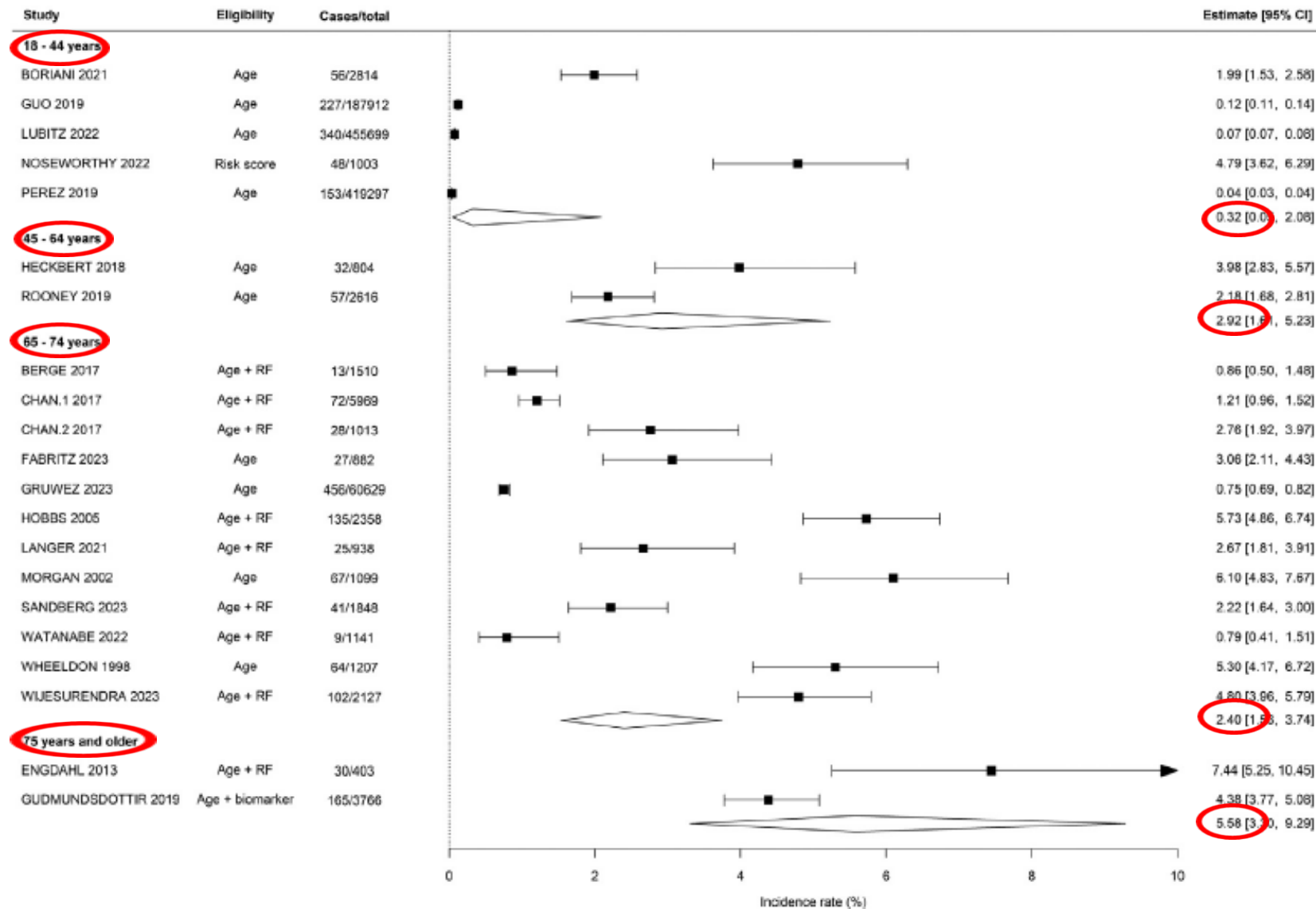
The Lancet Regional Health-Europe 2025;53:101298

32 studies including 735,542 participants from 8 RCTs and 24 prospective cohorts

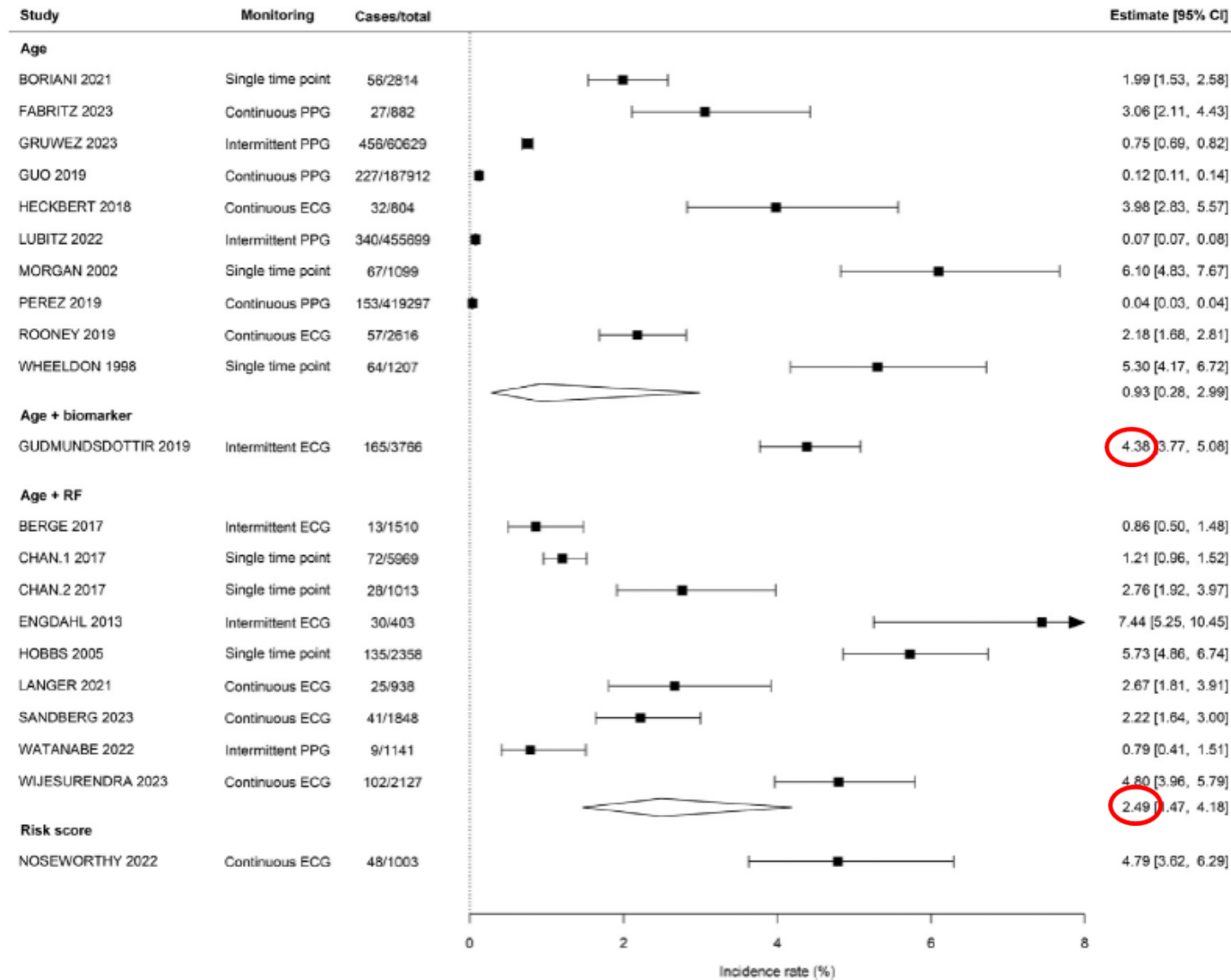
-----► **Incidence rate of new AF diagnosis: 2.75%**



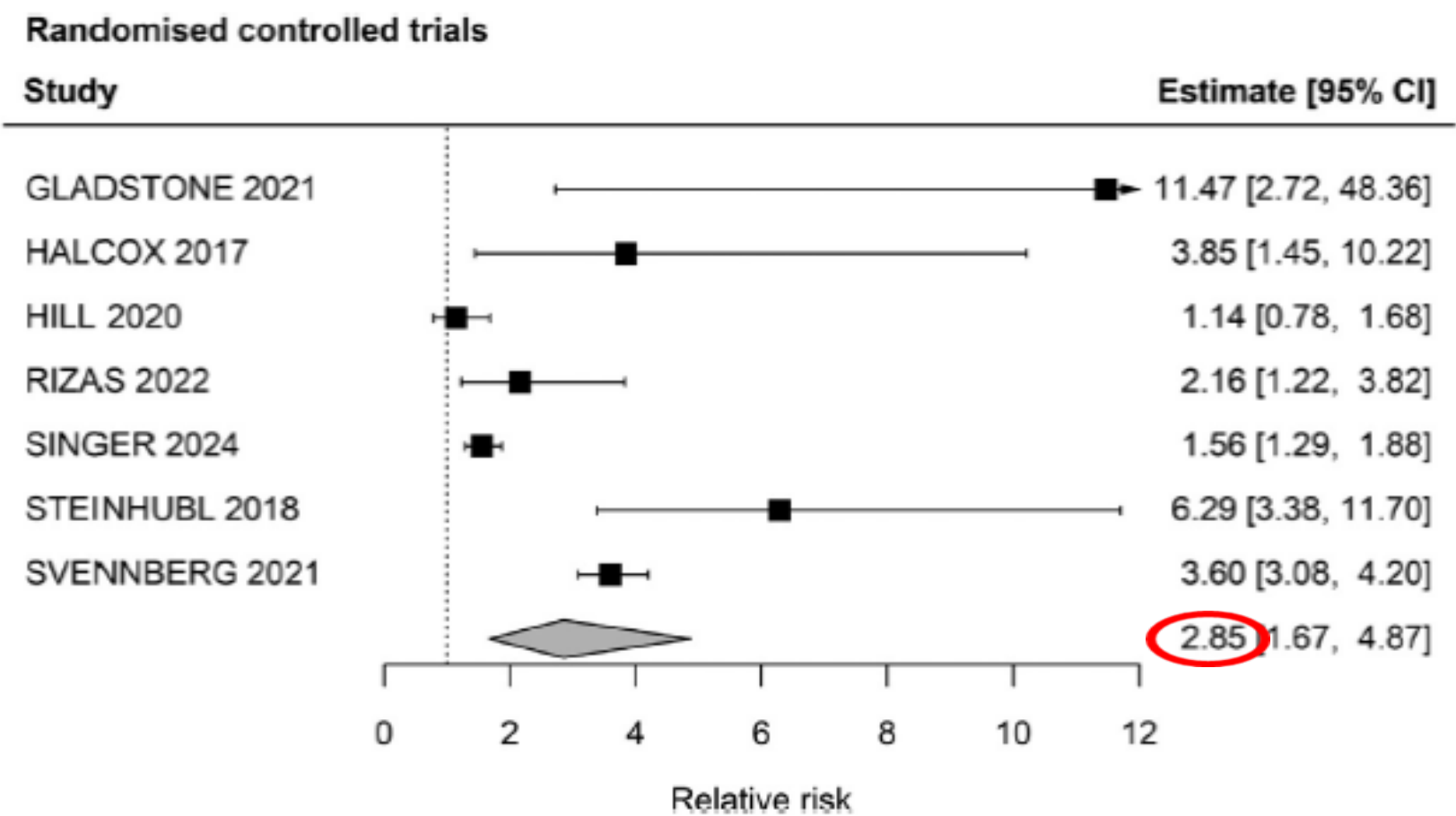
Incidence rate of new AF diagnosis by median age of participants



Incidence rate of new AF diagnosis by methods of selection of participants



Relative risk for new AF in RCTs of AF screening comparing the intervention and control arm



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Hypothesis : Screening for Atrial Fibrillation in high-risk individuals can reduce the risk of ischaemic stroke

Steering committee

Chair person: Prof Mårten Rosenqvist
Johan Engdahl, MD, PhD
Viveka Frykman, MD, PhD
Leif Friberg, MD, PhD
Emma Svennberg, MD, PhD student
Prof Lars-Åke Levin
Mats Pallerius



**Karolinska
Institutet**



Region of Stockholm
Population 2 060 000

Region of Halland
Population 299 000



Clinical outcomes in systematic screening for atrial fibrillation (STROKESTOP): a multicentre, parallel group, unmasked, randomised controlled trial

Emma Svennberg, Leif Friberg, Viveka Frykman, Faris Al-Khalili, Johan Engdahl, Mårten Rosenqvist**

Methods STROKESTOP was a multicentre, parallel group, unmasked, randomised controlled trial done in Halland and Stockholm in Sweden. All 75–76-year-olds residing in these two regions were randomly assigned (1:1) to be invited to screening for atrial fibrillation or to a control group. Participants attended local screening centres and those without a history of atrial fibrillation were asked to register intermittent electrocardiograms (ECGs) for 14 days.

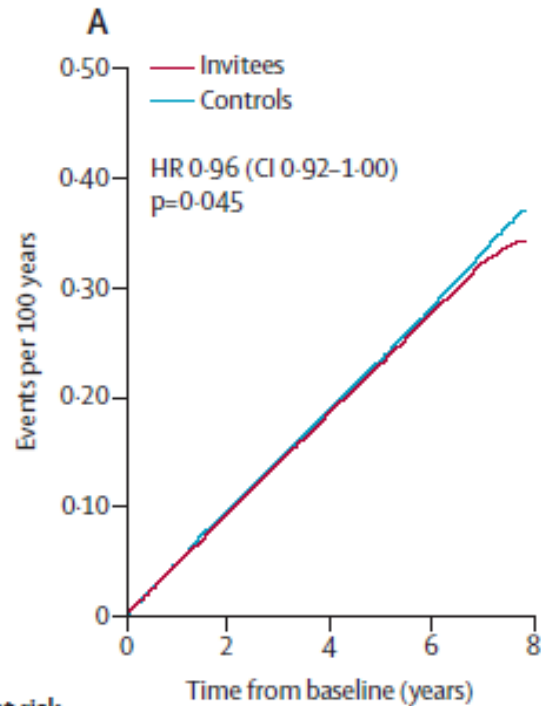
Interpretation Screening for atrial fibrillation showed a small net benefit compared with standard of care, indicating that screening is safe and beneficial in older populations.

Lancet 2021;398:1498-1506



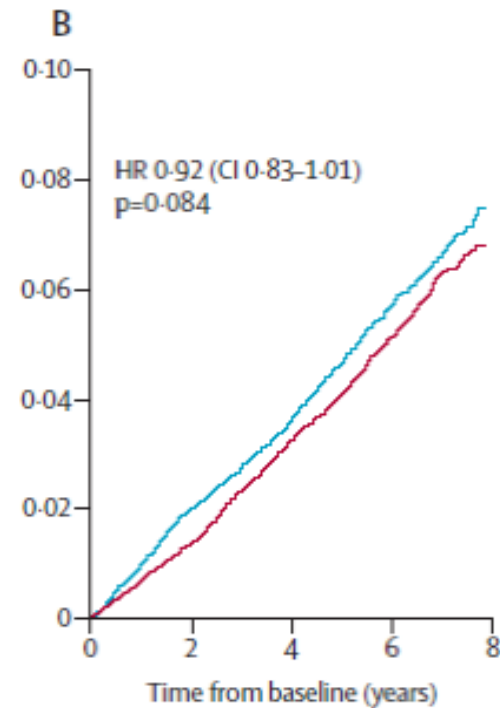
The STROKESTOP Trial

Ischemic, hemorrhagic stroke,
SE, major bleeding or death



Number at risk					
Invitees	13 979	12 639	11 342	9 747	..
Controls	13 996	12 614	11 300	9 727	..

Ischemic stroke

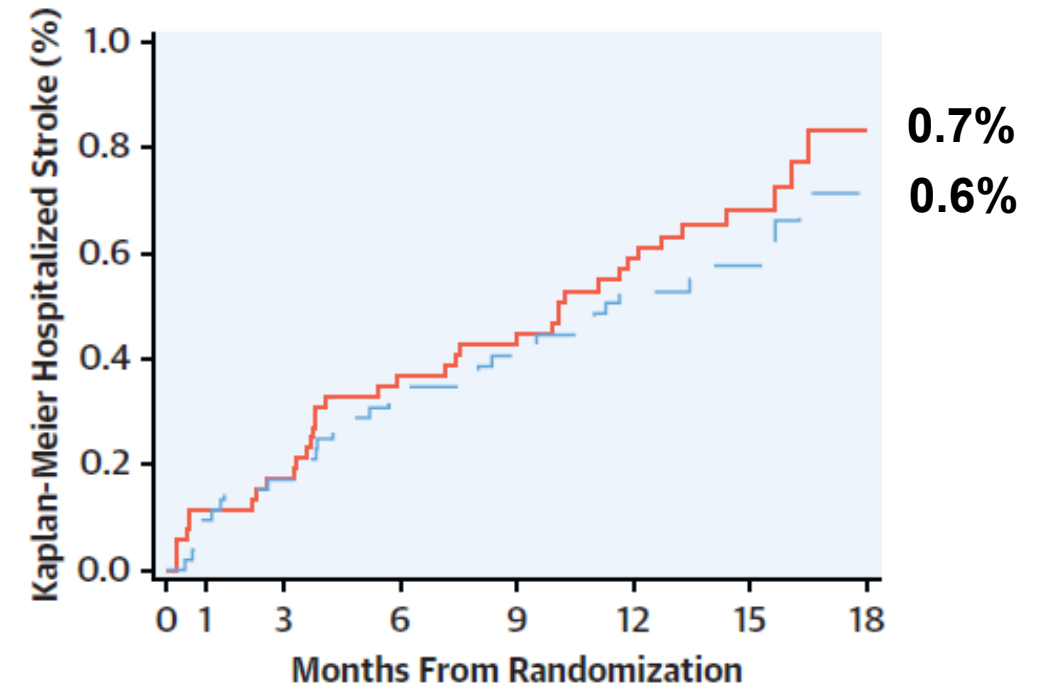
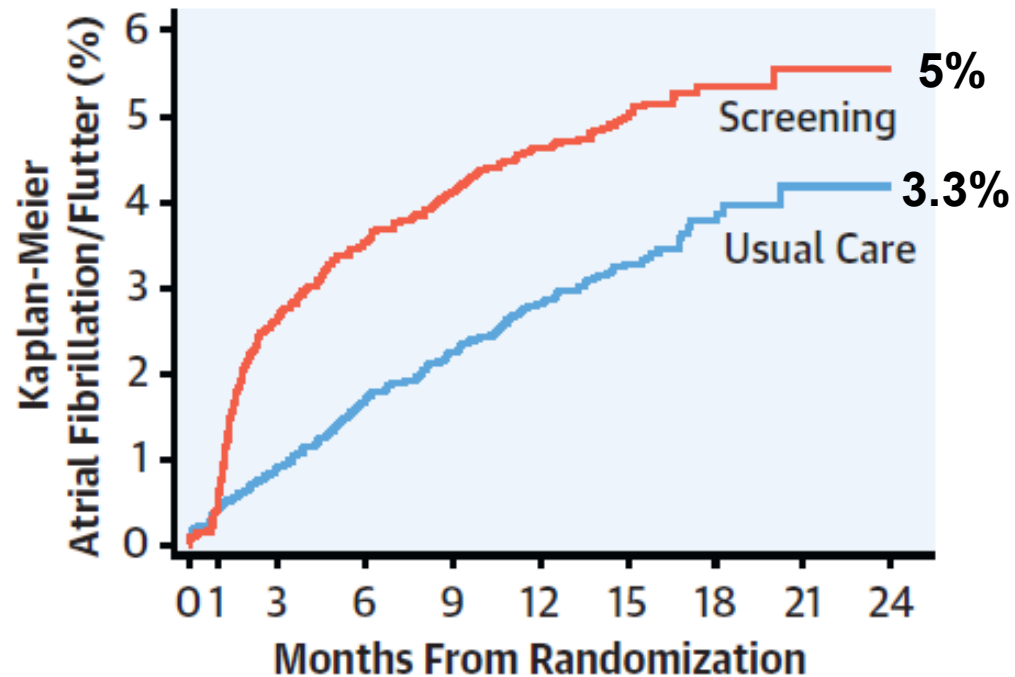


13 979	12 960	11 929	10 470	..
13 996	12 929	11 880	10 437	..

Effect of Screening for Undiagnosed Atrial Fibrillation on Stroke Prevention

GUARD-AF

11,957 participants aged ≥ 70 years randomized to 14-day single lead continuous ECG patch monitor or usual care.



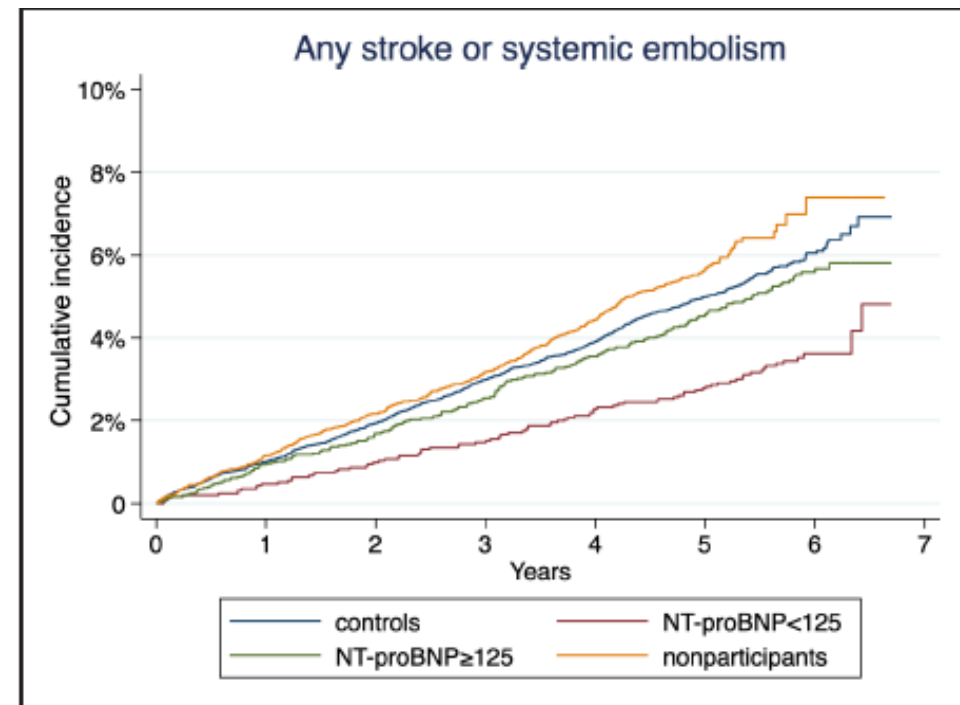
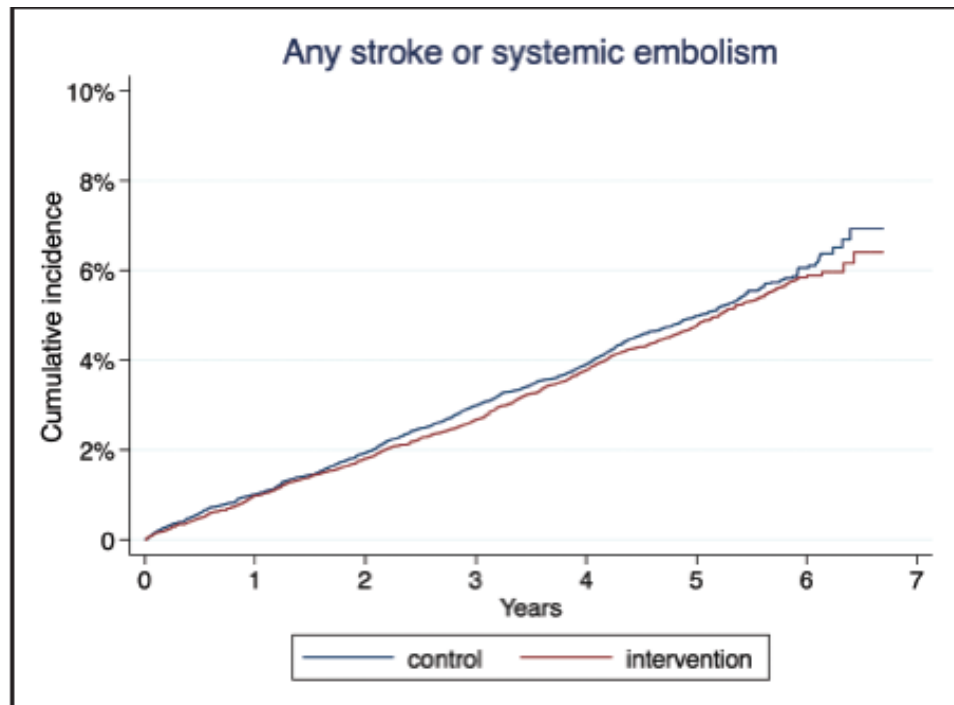
Low use (55%) of OAC in subjects with newly diagnosed AF.

Lopes RD et al. J Am Coll Cardiol 2024;84:2073-2084

Randomized Invitation to Systematic NT-proBNP and ECG Screening in 75-Year-Olds to Detect Atrial Fibrillation: STROKESTOP II

Katrin Kemp Gudmundsdottir¹, MD, PhD; Emma Svennberg², MD, PhD; Leif Friberg³, MD, PhD; Tove Hygrelle⁴, MD, PhD; Viveka Frykman⁵, MD, PhD; Faris Al-Khalili⁶, MD, PhD; Ziad Hijazi⁷, MD, PhD; Mårten Rosenqvist⁸, MD, PhD; Johan Engdahl, MD, PhD

28,712 individuals randomized to single-lead ECG registered only once if NT-proBNP <125ng/L or single-lead ECG 4 times daily for 2 weeks if NT-proBNP ≥ 125ng/L versus control group.

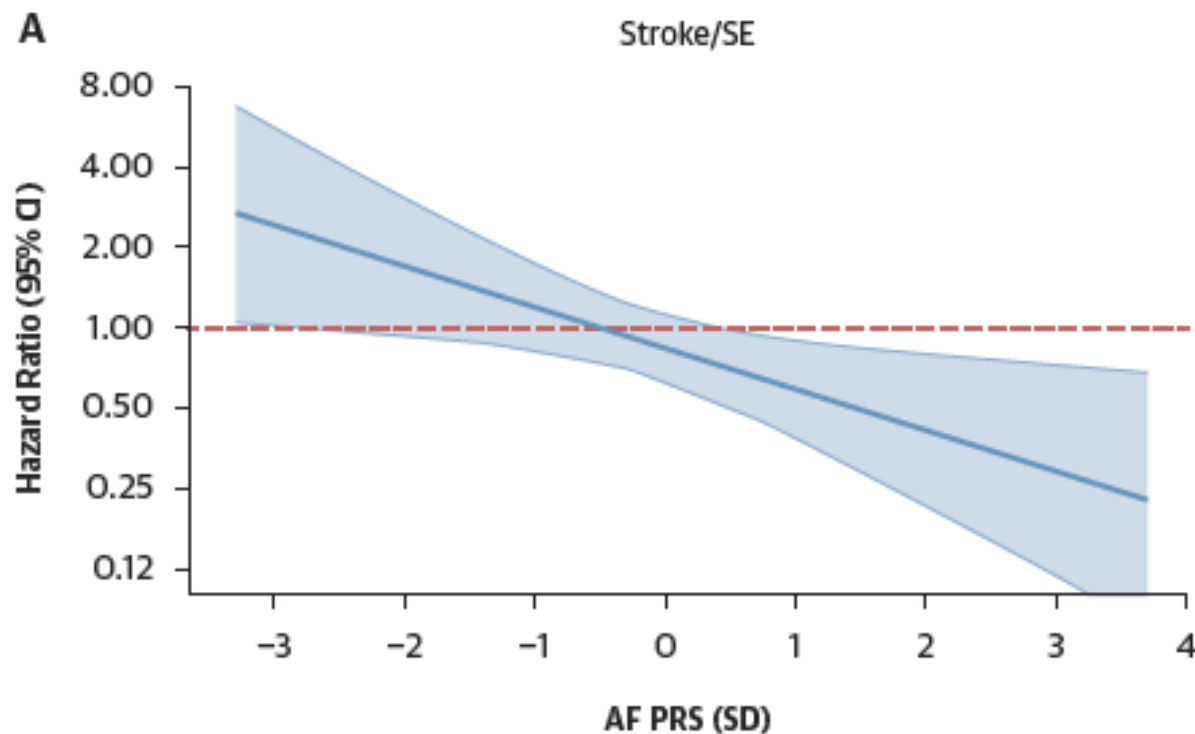


No difference in AF prevalence between the intervention and control group during 6.5 years of follow-up.

Circulation 2024;150:1837-1846

Atrial Fibrillation Screening According to Genetic Risk

A Secondary Analysis of the Randomized LOOP Study



Genetic risk of AF was assessed using a Polygenic Risk Score for AF (PRS_{AF})

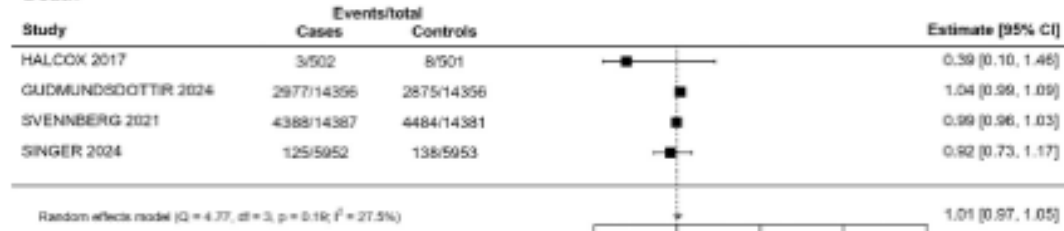
Vad OB et al. J Am Coll Cardiol 2026;87:143-153



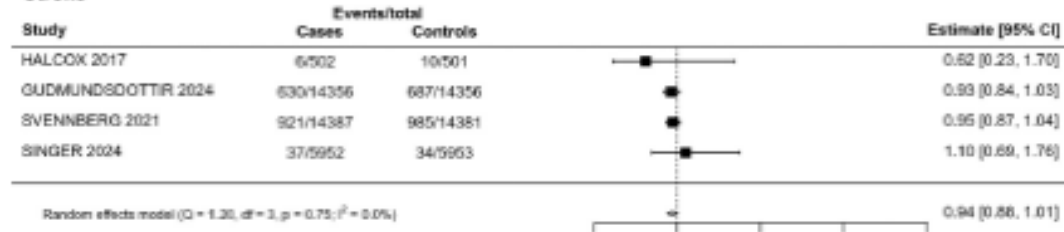
Systematic screening for atrial fibrillation with non-invasive devices: a systematic review and meta-analysis

Forest plot of outcomes of AF systematic screening using non-invasive devices

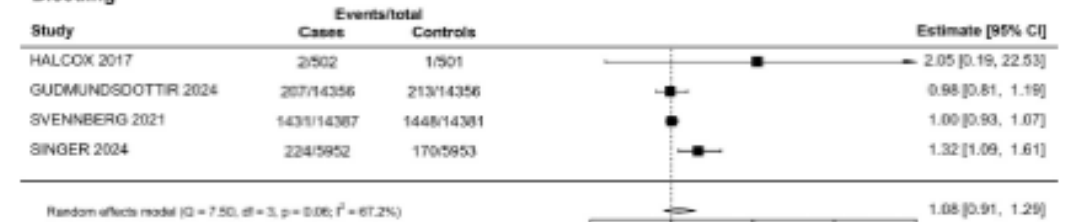
Death



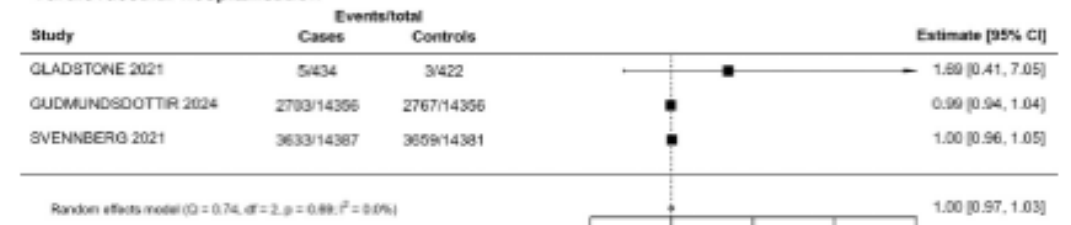
Stroke



Bleeding



Cardiovascular hospitalisation



Wahab A et al. Lancet Regional Health-Europe 2025



Possibili spiegazioni

- Il rischio di stroke associato alla FA è oggi molto più basso rispetto al passato.
- Sample size inadeguato degli RCT sullo screening della FA (è stato stimato che il sample size necessario per dimostrare un beneficio dello screening nella prevenzione dello stroke è di 103.454 pax).
- Mancanza di una tempestiva presa in carico sistematica dei pazienti screenati con FA per l'inizio della TAO.



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Recommendations for screening for atrial fibrillation

Recommendations	Class	Level
Review of an ECG (12-lead, single, or multiple leads) by a physician is recommended to provide a definite diagnosis of AF and commence appropriate management.	I	B
Routine heart rhythm assessment during healthcare contact is recommended in all individuals aged ≥ 65 years for earlier detection of AF.	I	C
Population-based screening for AF using a prolonged non-invasive ECG-based approach should be considered in individuals aged ≥ 75 years, or ≥ 65 years with additional CHA ₂ DS ₂ -VA risk factors to ensure earlier detection of AF.	IIa	B

Screening for atrial fibrillation: a call for evidence

Nicholas R. Jones ¹, Clare J. Taylor ¹, F.D. Richard Hobbs ¹,
Louise Bowman ², and Barbara Casadei ^{3*}

Screening for atrial fibrillation: a call for evidence

