Screening for Atrial Fibrillation: is it cost-effective?

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Primary Care Clinical Sciences

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Stroke Prevention and Atrial fibrillation

- **Atrial fibrillation – major indication for use of warfarin**
- **Why?**
  - **Impact of atrial fibrillation**
  - **Effect of warfarin**
- **Is it likely to be in the future?**
  - **Will atrial fibrillation become more or less common?**

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Impact of AF

- **Increased risk of death**
- **Increased risk of stroke**
- **Associated with higher mortality from CHD and heart failure**

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AF and mortality – the Framingham study

Circulation 1998

- **5209 residents aged 28-62 enrolled in 1948**
- **621 new cases of AF identified over 40 years of follow up**

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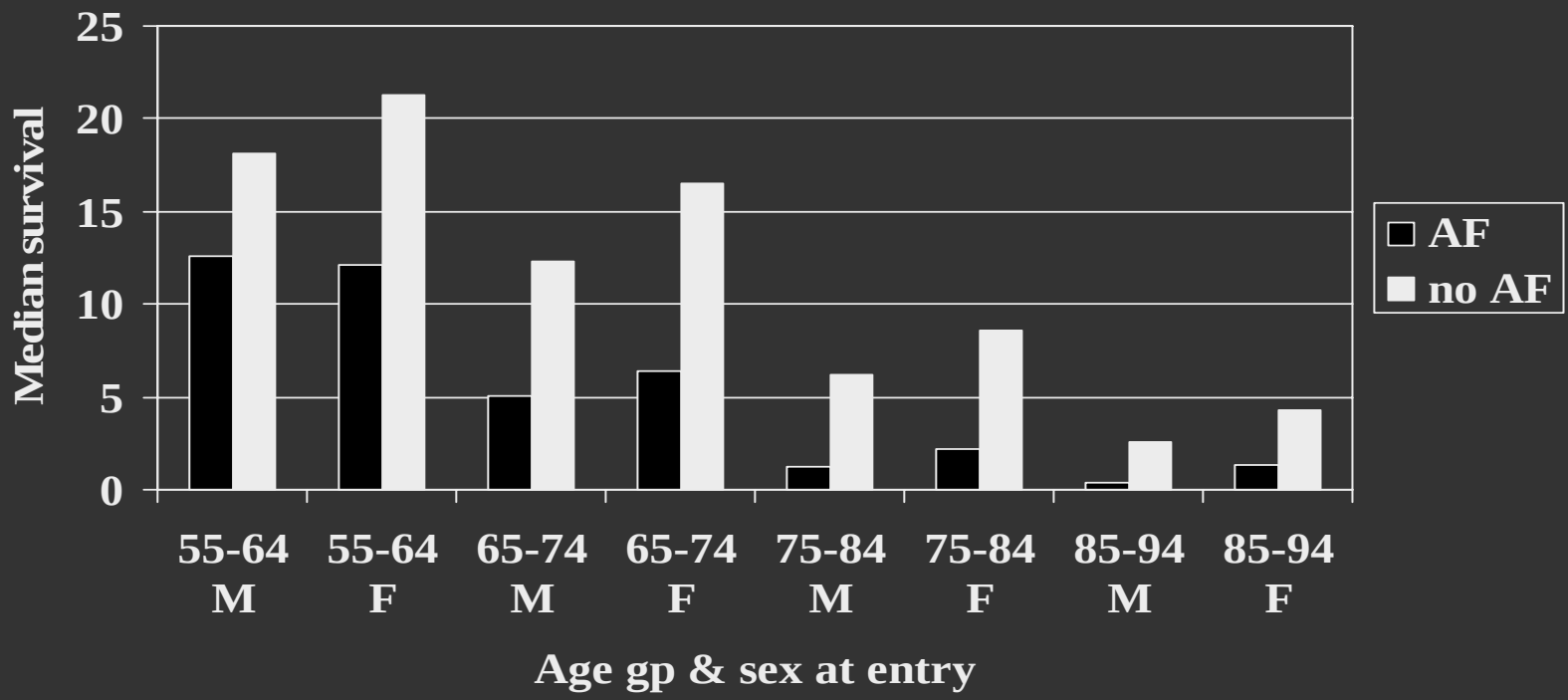
AF and mortality – the Framingham study

Circulation 1998



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Odds ratios for death

- **Multi-variate analysis:**
  - **Men: 1.5 (95% CI: 1.2 – 1.8)**
  - **Women: 1.9 (95% CI 1.5 – 2.2)**
- **CHD commonest cause of death**

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AF and stroke

- Five fold increase in risk of stroke
- What does this mean for an individual patient?
  - Need to know risk of stroke
  - Factors that increase risk of stroke

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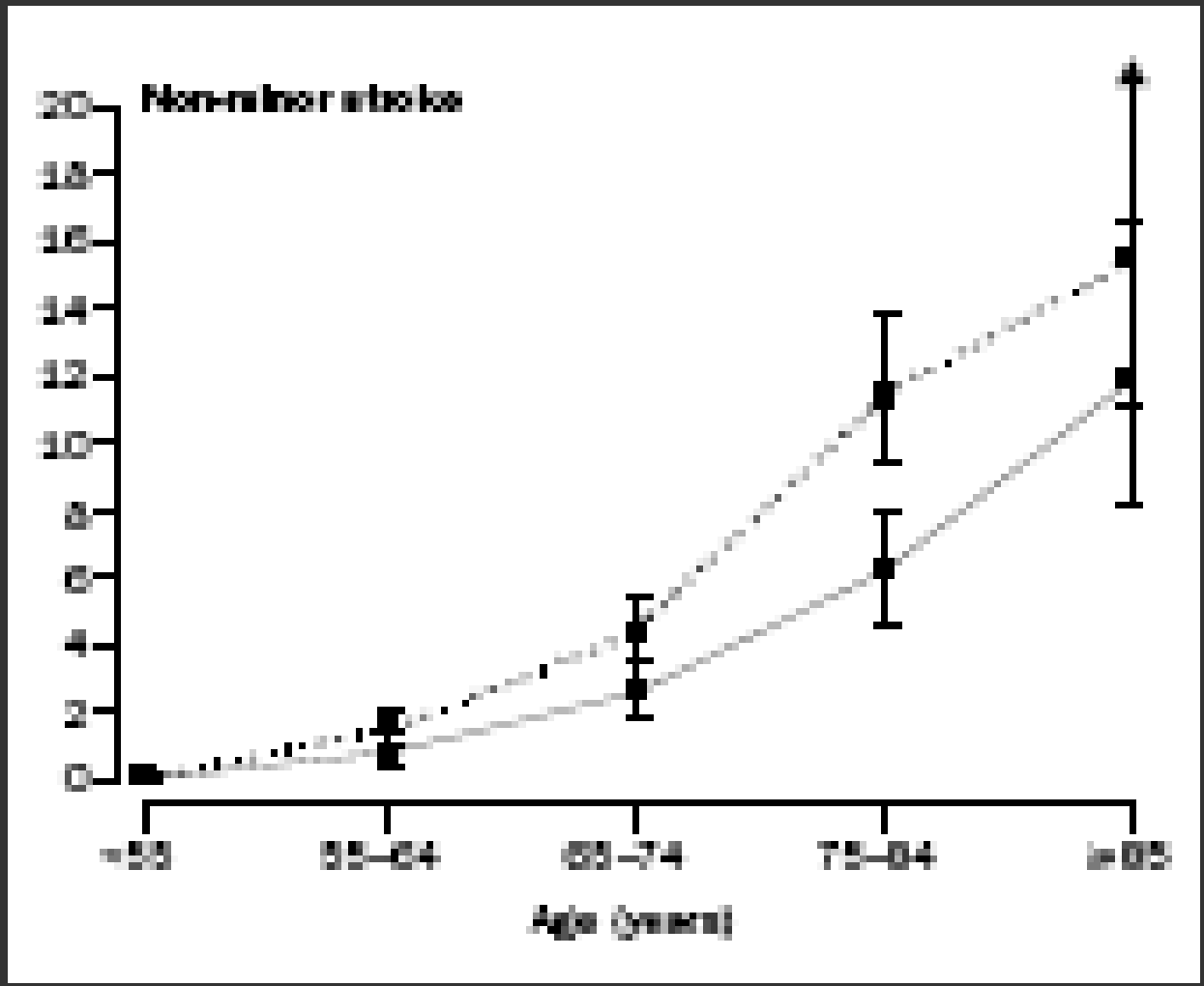
Change in stroke incidence 1981-2004



Rothwell et al, Lancet 2004; 363:1925-33

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Factors that increase risk of stroke in AF – CHADS2 classification

Gage et al JAMA 2001; 285:2864

- **Congestive heart failure (within 100 days)**
- **Hypertension**
- **Age > 75**
- **Diabetes Mellitus**
- **prior Stroke or TIA (2 points)**

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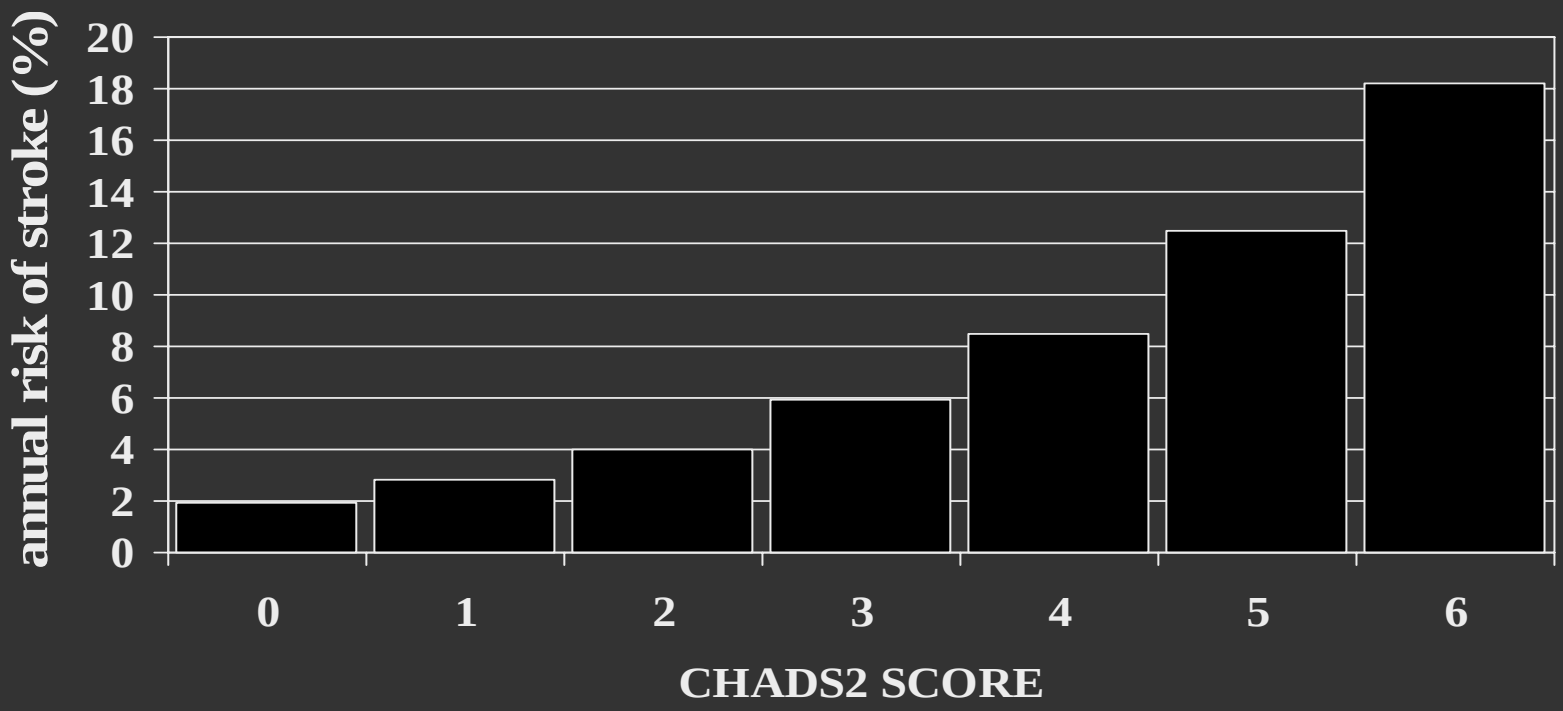
Stroke risk in AF by CHADS2 score



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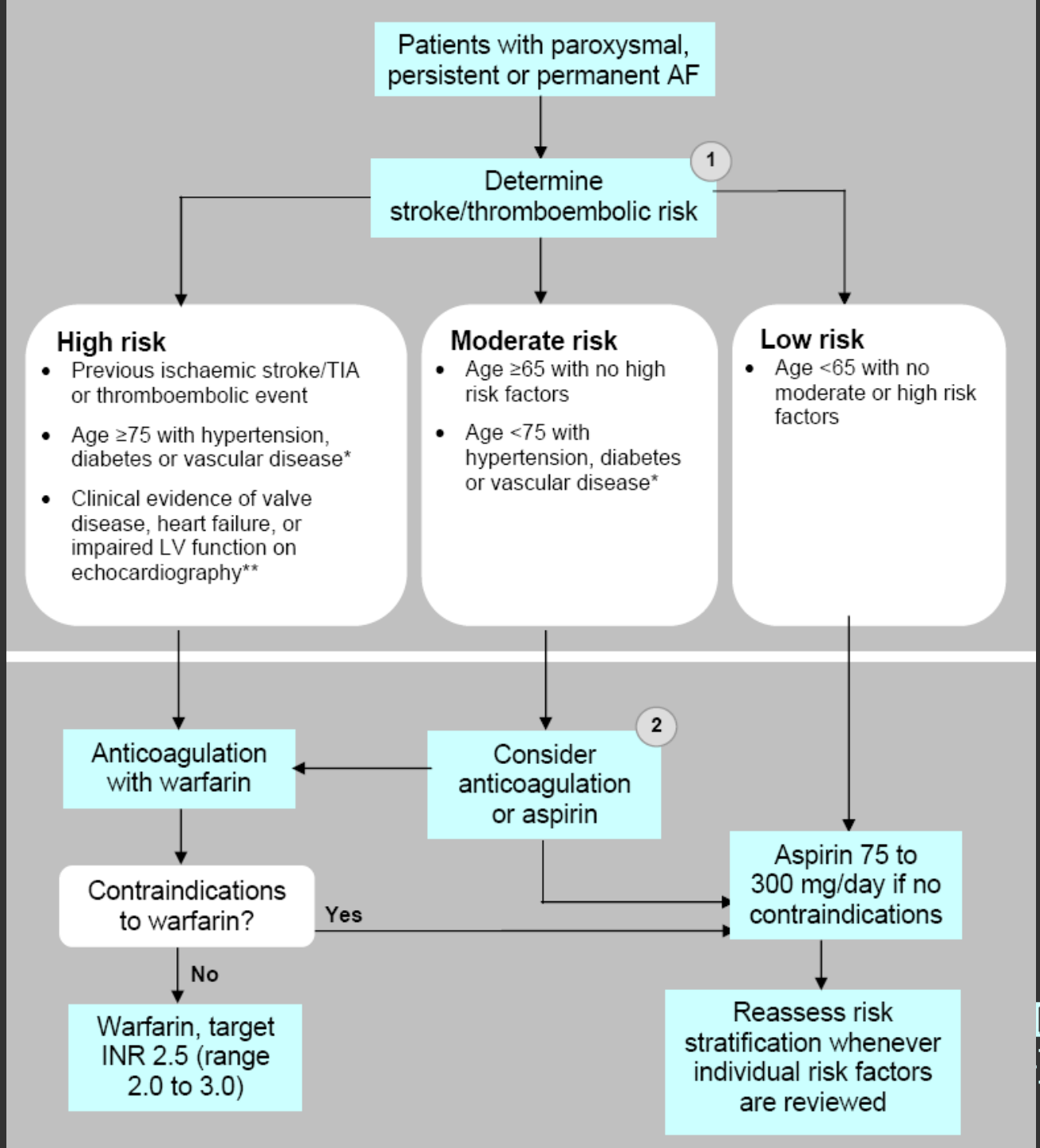
Effect of warfarin in AF

Cochrane Review 2005, issue 3 (update)

- **2313 patients in 5 trials: warfarin versus control**
- **mean age 69; mean achieved INR: 2-2.6.**
- **During mean 1.5 yrs follow up warfarin associated with:**
  - **61% (41%-74%) reduction in risk of stroke**
  - **31% (6%-50%) reduction in risk of death**
  - **44% (24%-58%) reduction in risk of stroke, MI or vascular death.**

NICE Guideline



BMJ

RESEARCH

Screening versus routine practice in detection of atrial fibrillation in patients aged 65 or over: cluster randomised controlled trial

David A Fitzmaurice, professor of primary care,[1] F D Richard Hobbs, professor, head of department,[1] Sue Jowett, research fellow,[1] Jonathon Mant, reader,[1] Ellen T Murray, research fellow,[1] Roger Holder, head of statistics,[1] J P Raftery, professor of health technology assessment,[2] S Bryan, professor of health economics,[3] Michael Davies, consultant cardiologist,[4] Gregory Y H Lip, professor of cardiovascular medicine,[5] T F Allan, senior lecturer[6]

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Aims of SAFE trial

- **Does screening improve detection of atrial fibrillation?**
- **Is systematic screening better than opportunistic screening?**

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Design of SAFE trial

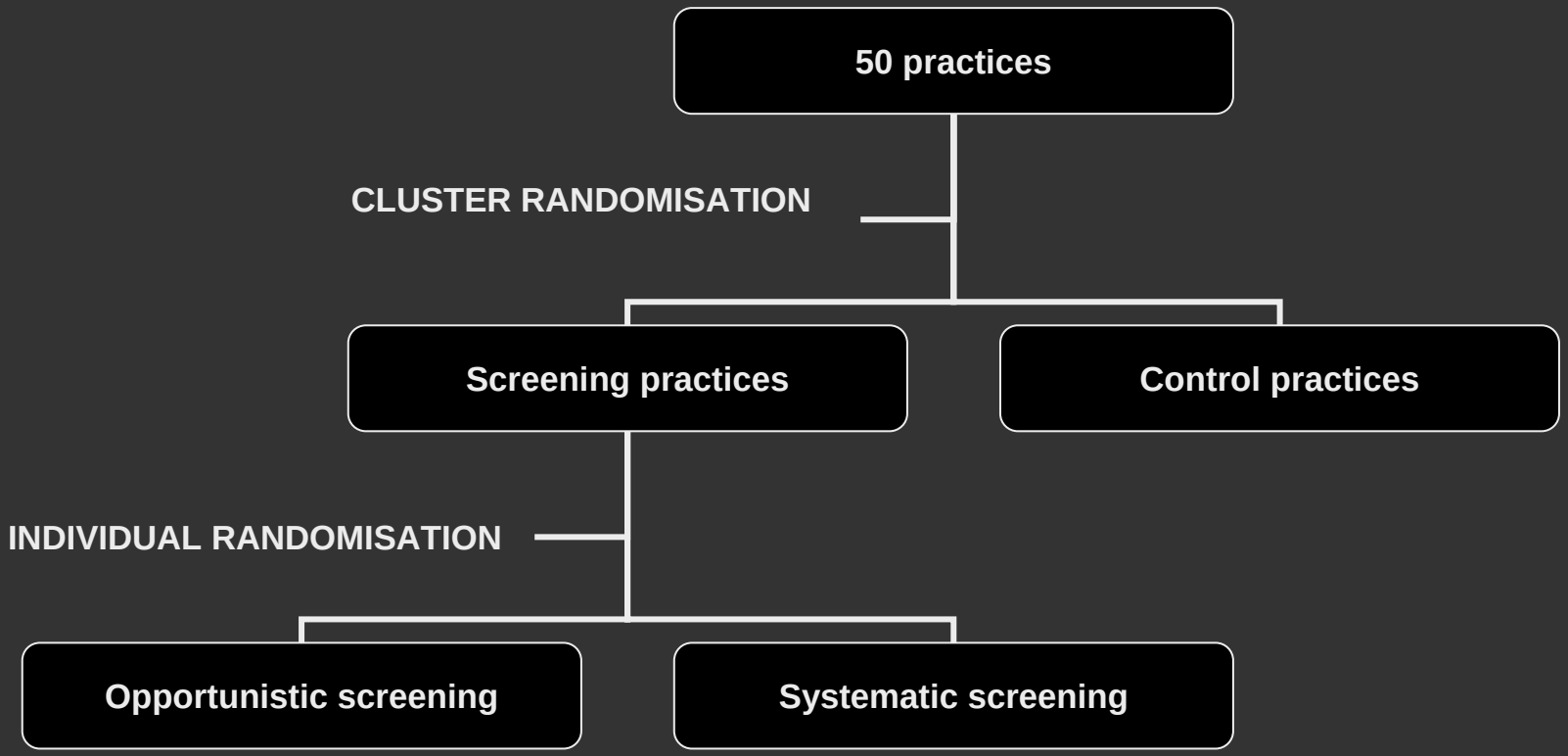

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Table 2 | New cases of atrial fibrillation (AF) by trial arm identified in case notes 12 months after baseline

Group	Patients	Baseline AF	Missing notes	Denominator	Newly identified cases	New case detection %
Control	4936	389	34	4513	47	1.04
Intervention:						
Total	9866	679	50	9137	149	1.63
Opportunistic*	4933	340	18	4575	75	1.64
Systematic*	4933	339	32	4562	74	1.62

*Subsets of total intervention population.

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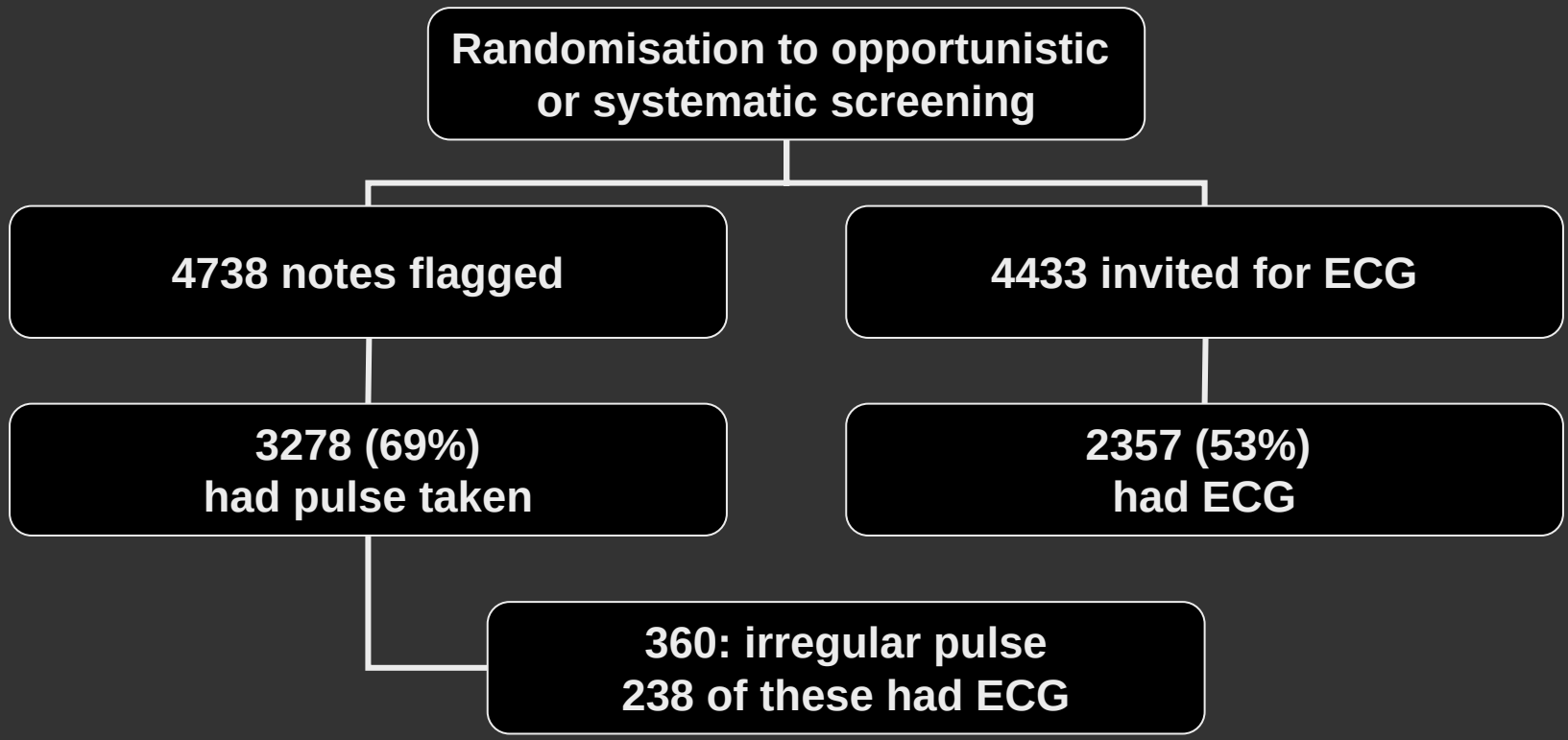
Results: systematic versus opportunistic screening



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	Men			Women			
Group	65-74	75-84	≥85	65-74	75-84	≥85	Total
12 month prevalence							
Control	81/1213 (6.7)	91/699 (13.0)	27/151 (17.9)	55/1377 (4.0)	122/1044 (11.7)	60/418 (14.4)	436/4902 (8.9)
Opportunistic	90/1303 (6.9)	77/647 (11.9)	28/148 (18.9)	59/1443 (4.1)	109/1001 (10.9)	52/373 (13.9)	415/4915 (8.4)
Systematic	90/1312 (6.9)	82/643 (12.8)	23/154 (14.9)	77/1387 (5.6)	88/1012 (8.7)	53/398 (13.5)	413/4906 (8.4)
12 month new case detection							
Control	7/1139 (0.6)	7/615 (1.1)	2/126 (1.6)	11/1333 (0.8)	16/938 (1.7)	4/362 (1.1)	47/4513 (1.0)
Opportunistic	20/1233 (1.6)	14/584 (2.4)	4/124 (3.2)	11/1395 (0.8)	18/910 (2.0)	8/329 (2.4)	75/4575 (1.6)
Systematic	21/1243 (1.7)	15/576 (2.6)	8/139 (5.8)	9/1319 (0.7)	18/942 (1.9)	3/343 (0.9)	74/4562 (1.6)

Effectiveness

- **Screening is effective**

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Cost of screening

- **Opportunistic**
  - **Flag, admin time, pulse taking**
- **Systematic**
  - **Invite and reminders, admin**
- **All screening**
  - **Machine, consumables, staff costs, admin, overheads**
- **Interpretation**
  - **Staff costs**

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Within-trial economic evaluation

Strategy	Cases detected (95% CI)	Incremental cases detected	Incremental cost (95% CI)	Incremental cost per additional case detected (£)
No screening	**47 (35-62)**	**-**	**-**	**-**
Opportunistic	**75 (59-94)**	**28**	**9429 (8938-9920)**	**337**
Systematic high risk	**53 (40-69)**	**6**	**21119 (20408-21831)**	**3520**
Systematic population	**74 (58-93)**	**27**	**40882 (39790-41974)**	**1514**

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Conclusions - 1

- **Screening will detect new cases of AF**
- **Opportunistic screening detects as many cases as systematic screening**
- **Opportunistic screening dominant in health economic terms**
- **Prevalence of AF is high in people over aged 65**

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RESEARCH

Accuracy of diagnosing atrial fibrillation on electrocardiogram by primary care practitioners and interpretative diagnostic software: analysis of data from screening for atrial fibrillation in the elderly (SAFE) trial

Jonathan Mant, reader,[1] David A Fitzmaurice, professor of primary care,[1] F D Richard Hobbs, professor and head of department,[1] Sue Jowett, research fellow,[2] Ellen T Murray, research fellow,[1] Roger Holder, head of statistics,[1] Michael Davies, consultant cardiologist,[3] Gregory Y H Lip professor of cardiovascular medicine[4]

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Aim

- To determine the accuracy of ECG identification of AF when the reader is
  - A GP
  - Practice nurse
  - Computer interpretative software

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Methods

- **Participants: GPs and Practice nurses from 50 practices participating in SAFE study**
- **SAFE study generated 2,595 ECGs in patients aged 65+ in 25 practices**
- **All ECGs performed using Biolog machines**
- **Sample of ECGs sent to GP and PN in each pracice**
- **Reference standard: all ECGs read independently by 2 cardiologists. Where disagreement, a third cardiologist made the decision**

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Mant J et al

BMJ published online 29 Jun 2007;
doi:10.1136/bmj.39227.551713.AE

Table 1 | Detection of atrial fibrillation on 12 lead electrocardiogram

	Reference standard		
	Atrial fibrillation	Not atrial fibrillation	Total
General practitioner			
Atrial fibrillation	79	114	193
Not atrial fibrillation	20	1239	1259
General practitioner and interpretative software			
Both positive	71	3	74
Only software positive	12	7	19
Only general practitioner positive	8	111	119
Both negative	8	1234	1242
Total	99	1355	1454

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Discussion

- Many primary care practitioners cannot detect AF accurately on ECG
- Strategies for identification of AF need to take this into account
  - training?
  - Specialist reading of ECGs?
  - Computer software not quite accurate enough

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Conclusion

- **Opportunistic screening for atrial fibrillation in a population aged 65 and over is both clinically and cost-effective**
- **Implementation will be dependent on accurate reading of ECGs**

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