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Atrial Fibrillation in the Era of Rhythm Control and Left Atrial Appendage Occlusion

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UW Medicine
HEART INSTITUTE

UNIVERSITY *of* WASHINGTON



Disclosures

- I have no financial relationships to disclose

Atrial Fibrillation

- Objectives:
- Understand the goals of therapy for atrial fibrillation and identify which patients benefit from rate control, cardioversion, antiarrhythmics, or ablation
- Identify the indications for stroke reduction therapies and be able to discuss risks and benefits for antiplatelet therapy, anticoagulation or left atrial appendage occlusion
- Recognize when patients need to be referred to cardiology or electrophysiology and help set patient expectations about what cardiology can (and can't) offer

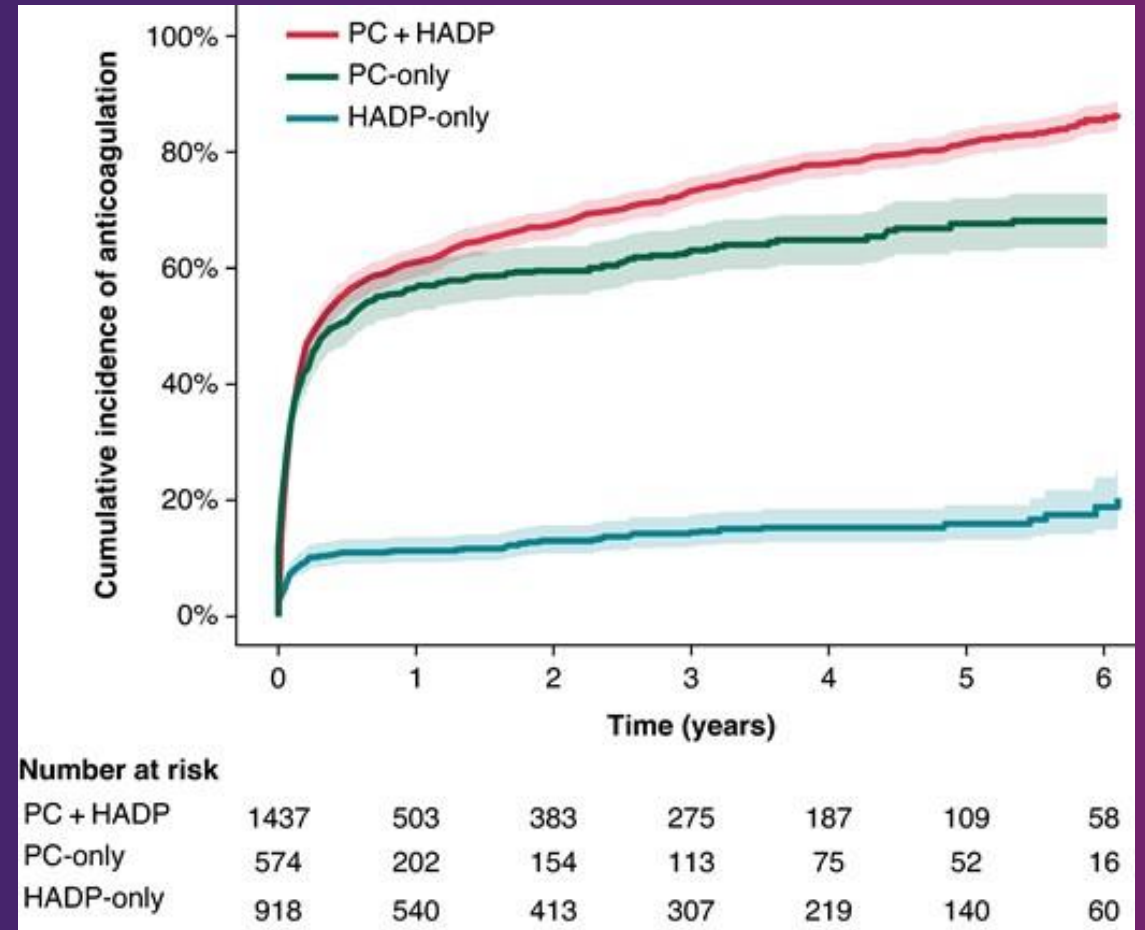
Atrial Fibrillation: Definitely not just a cardiology thing

UK Biobank

- 4374 patients with afib
- 46.2% Diagnosed in Primary care
- Primary Care—more likely to prescribe anticoagulation

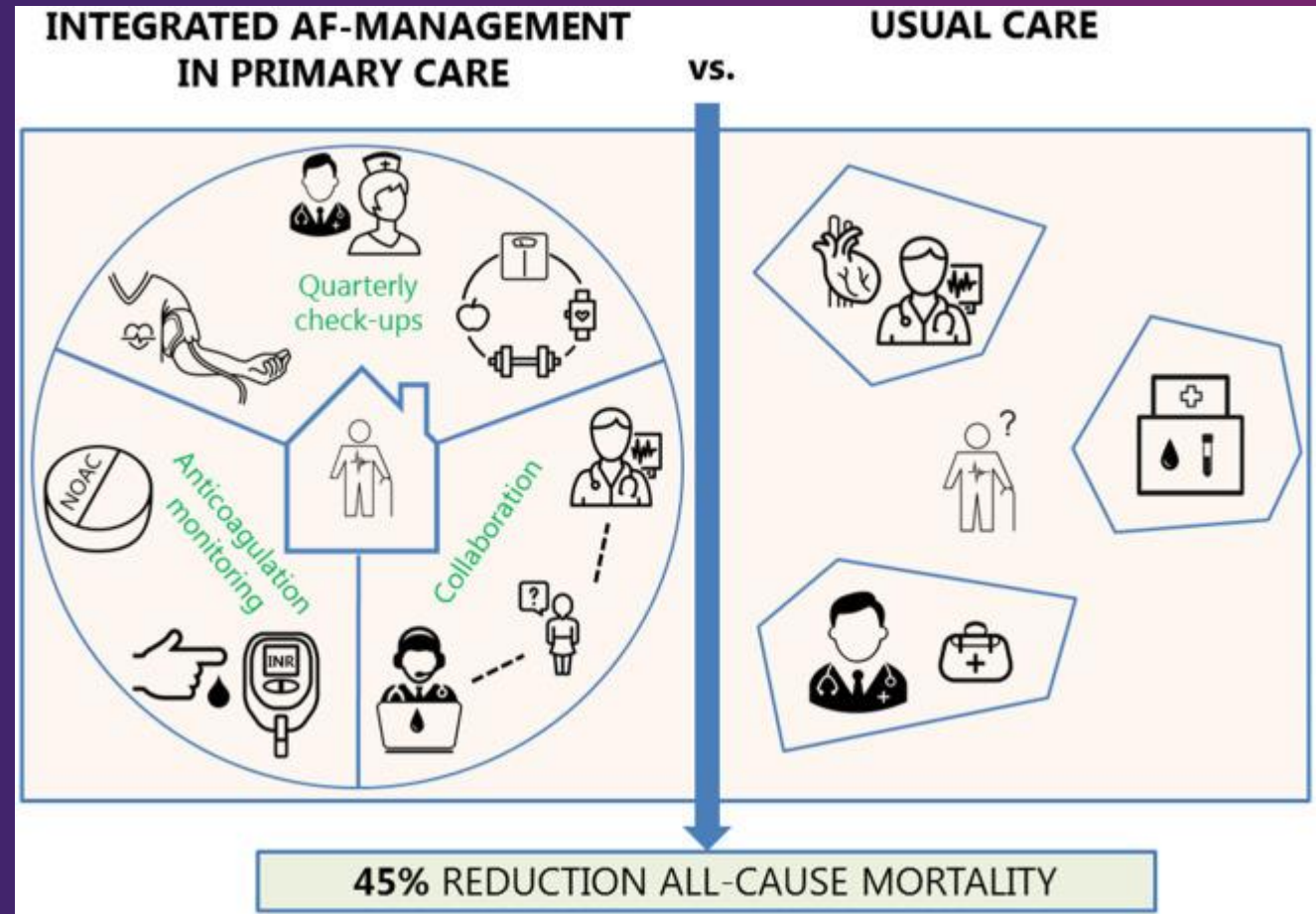
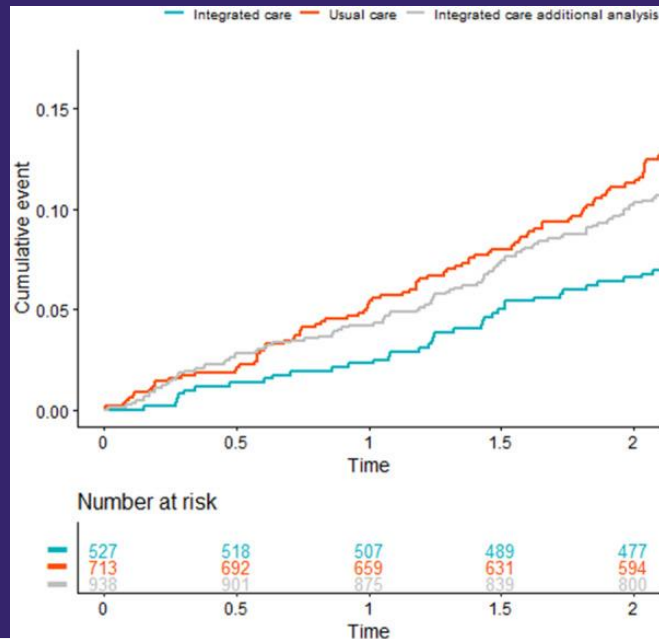
Dutch Cohort

- 55% Diagnosed in Primary Care



Integrated Primary Care Management of Afib

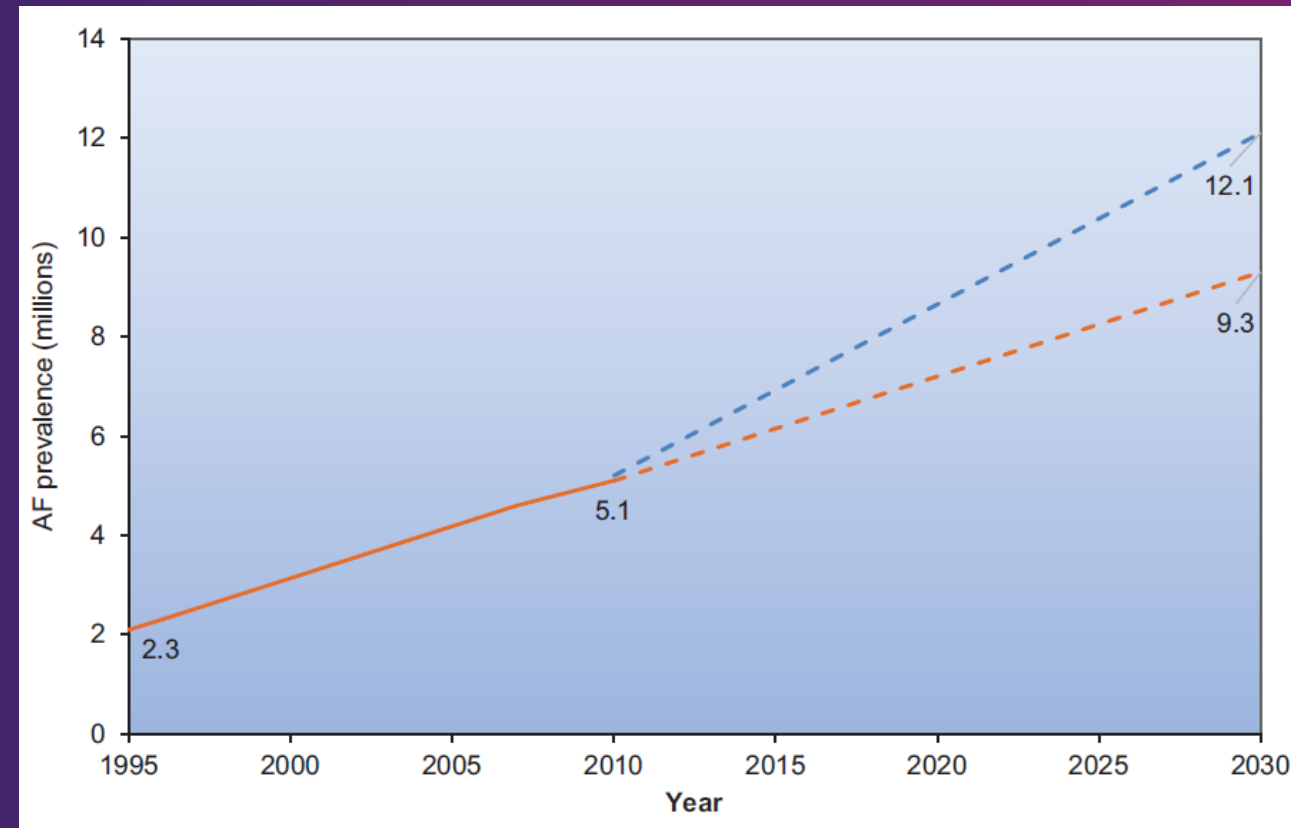
- ALL-IN Clustered Randomized Trial
- Quarterly AF checkups RN/PCP
- Anticoagulation Clinic Monitoring
- Cardiology referral if necessary



Burden of Atrial Fibrillation

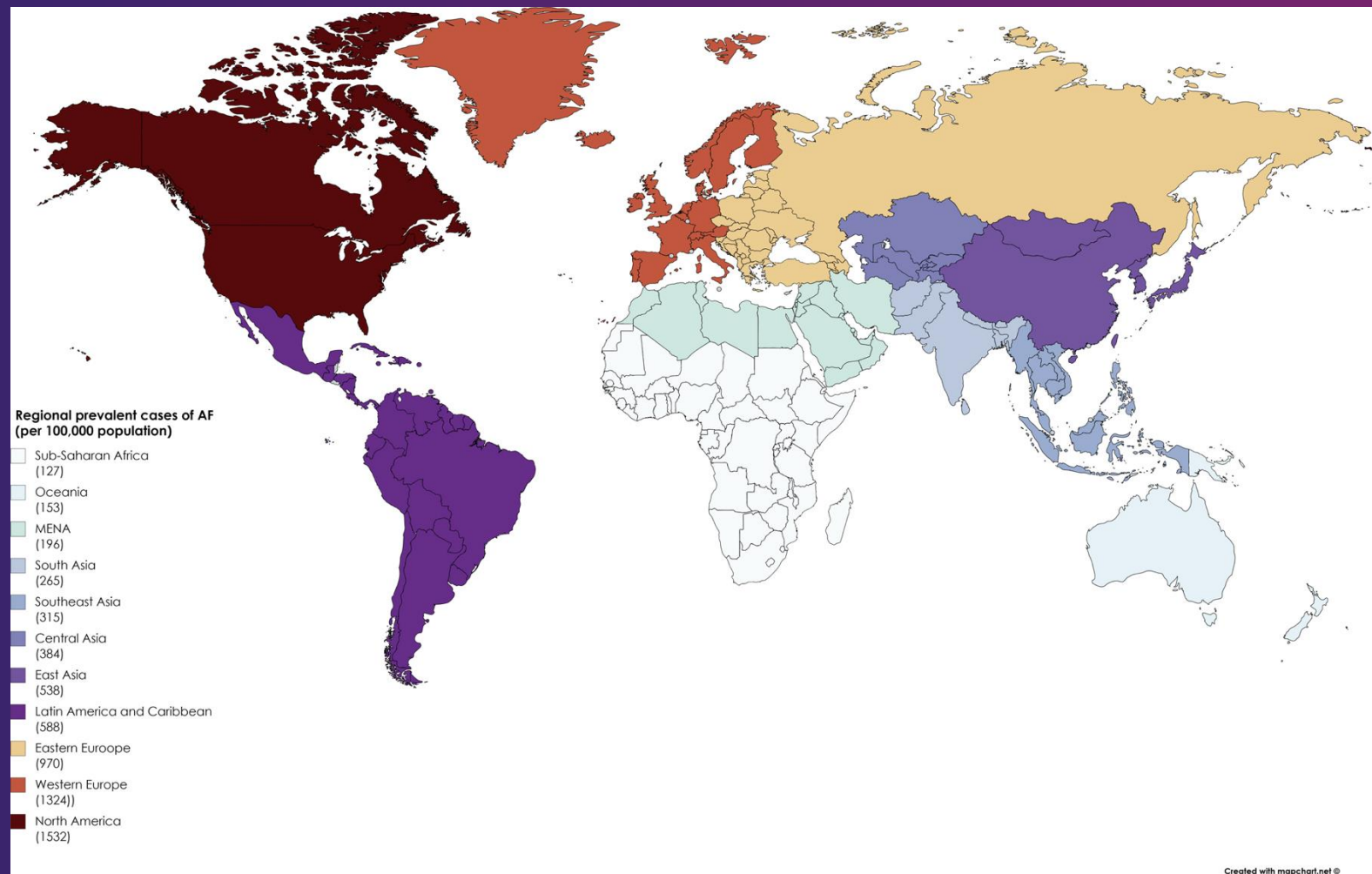
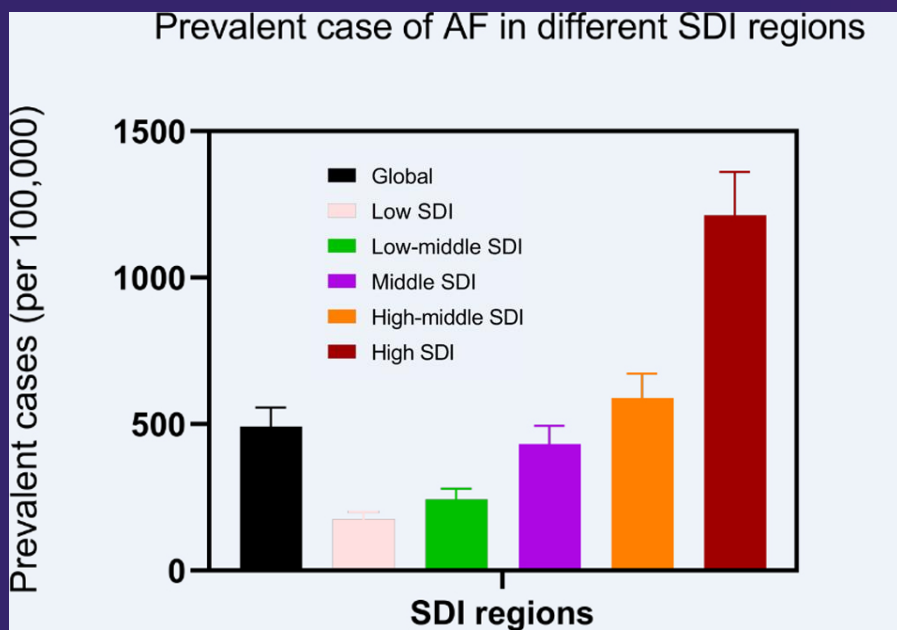
Atrial Fibrillation Prevalence in US

- 2-4% of the population
- Prevalence 2.7 to 6.1 million in US
- Underestimated
 - Subclinical afib 5-30% patients ≥ 65 yrs
 - Ischemic stroke HR 2.50
 - ~20% for patients ≥ 80 years



Global Burden of Atrial Fibrillation

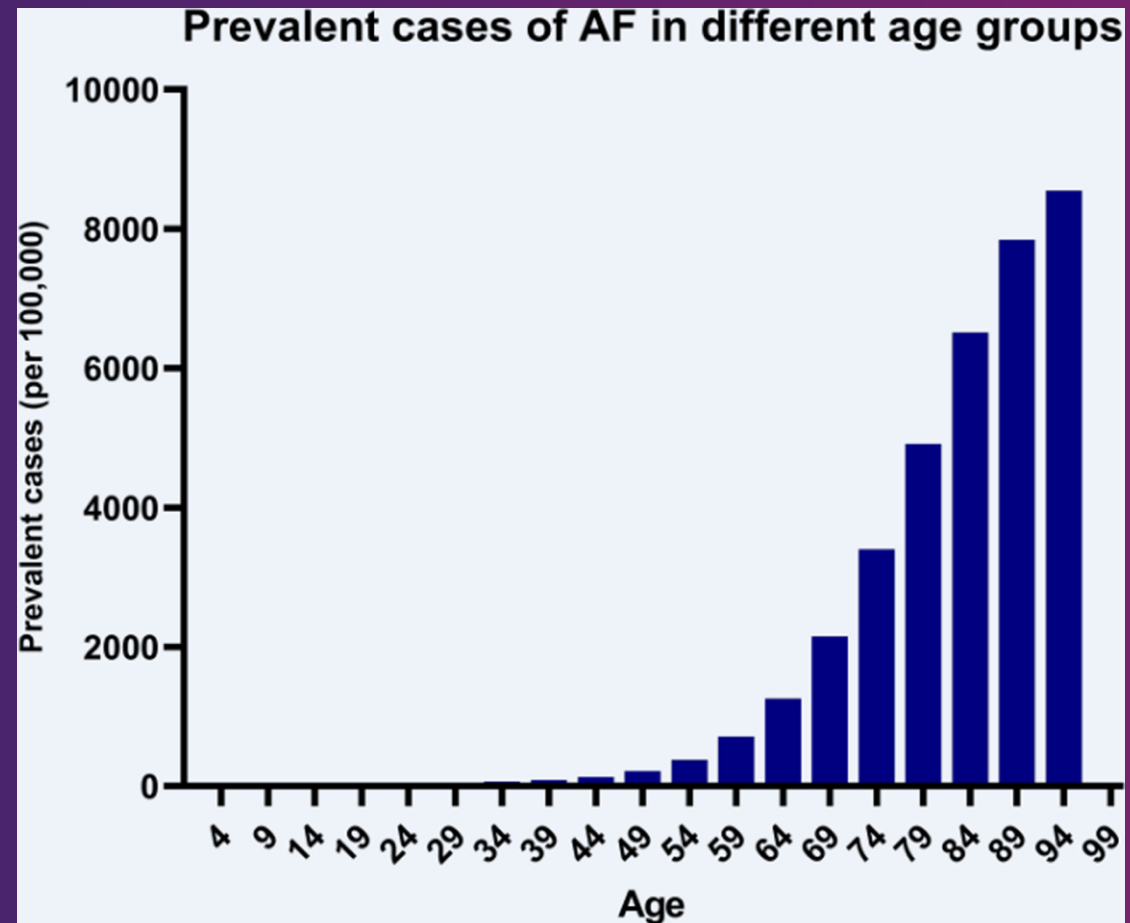
- Worldwide 37.6 million
- Increase 60% by 2050



Age and atrial fibrillation

- Overall 4 to 5-fold increase in the risk for stroke
- Similar for paroxysmal, persistent, permanent
- Risk factor for stroke severity

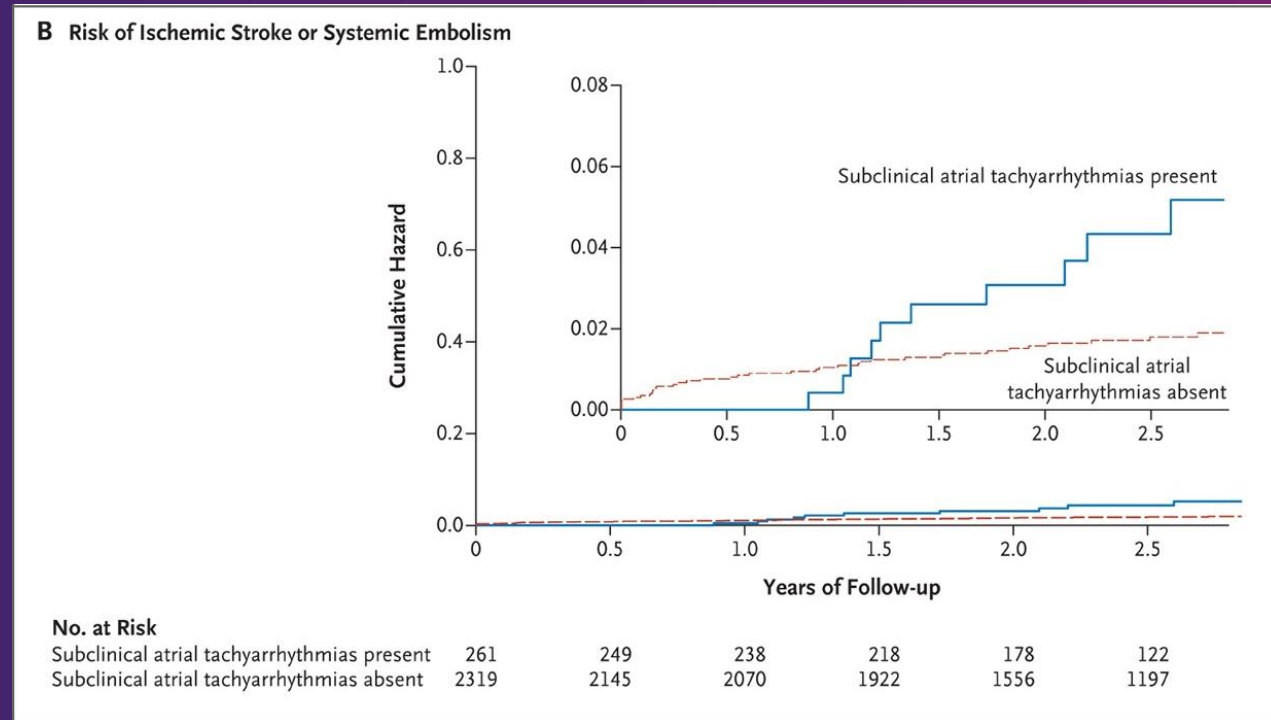
Age	Proportion of attributable risk	Relative Risk
50-59	1.5	4.0
60-69	2.8	2.6
70-79	9.9	3.3
80-89	23.5	4.5



Subclinical Atrial Fibrillation: ASSERT

- 2580 patients ≥ 65 without AFIB undergoing pacemaker implant
- 10% of patients with subclinical afib at 3 months
- 34.7% of patients with subclinical afib at 2.5 y follow-up
- Ischemic stroke HR 2.50; 95% CI, 1.28–4.89; $P < 0.008$
- Annual ischemic stroke or systemic embolism rate of 1.69% (versus 0.69%)
- Primarily if afib duration > 24 hrs

If afib detected in first 3 months



Meta-Analysis Wearable Monitors and Afib Detection

- Age 50-75
- HTN , DM, Heart disease
- Monitoring period

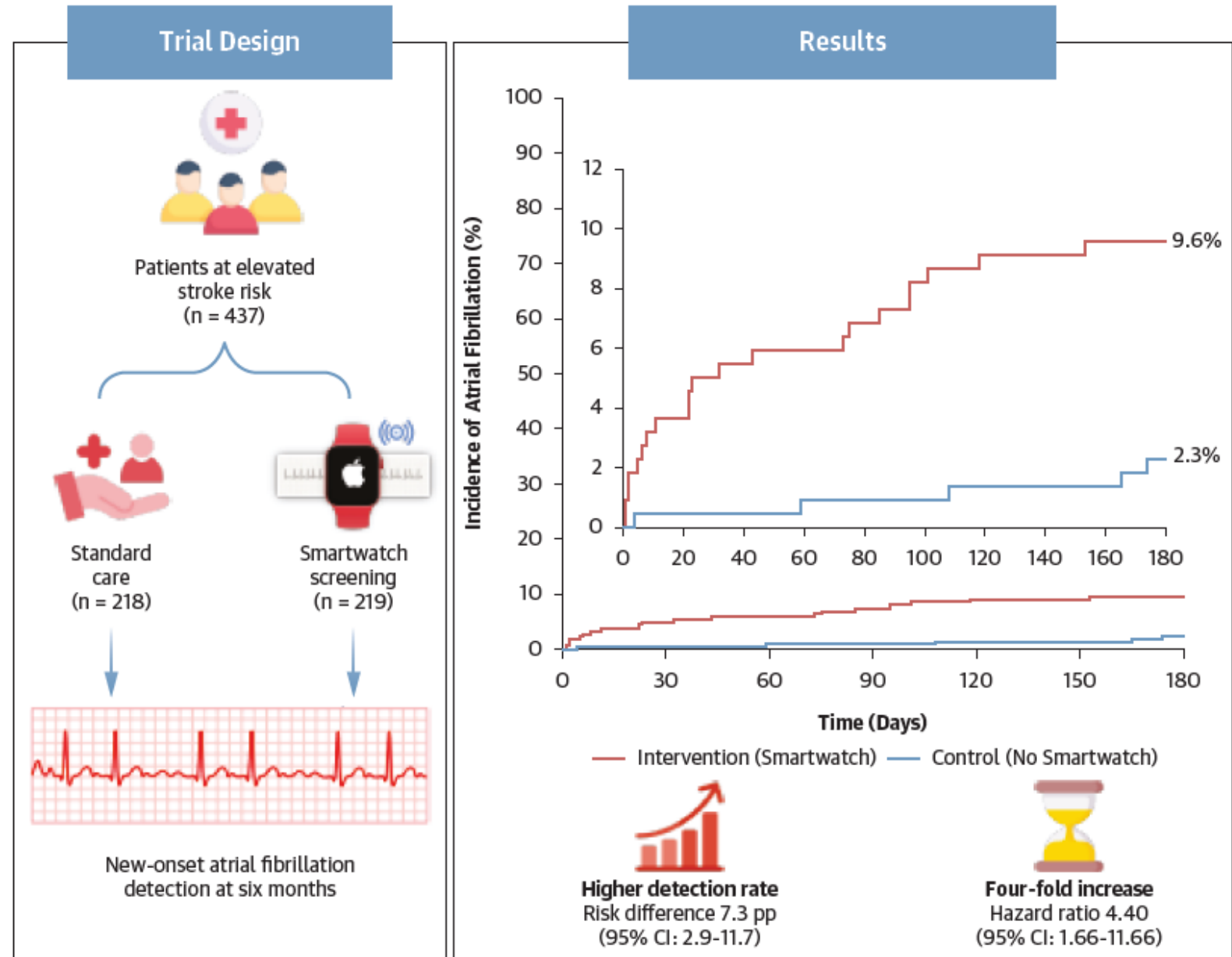
Study	Device	N	Setting	Sensitivity	Specificity
Pepplinkhuizen et al. (2022)	Apple (single lead)	74	Inpatient	93-94.6%	96.5-100%
Fu and Li (2021)	Huami (wearable)	114	Outpatient Screening	88.7-94.3%	100%
Wouters et al. (2025)	Apple, Kardia, FibriCheck, Preventicus	122	Cardiology Clinic	100%	96.4-98.9%
Spaccarotella et al. (2020)	Apple (multi)	108	Emergency Dept	84-94%	92-100%
Velraeds et al. (2023)	Apple v Enhanced	723	Inpatient	90%	92%

Apple Watch

- Age ≥ 65
- CHA₂DS₂-VASc ≥ 2 M
- CHA₂DS₂-VASc ≥ 3 F
- No prior afib/flutter
- No pacemaker/ILR

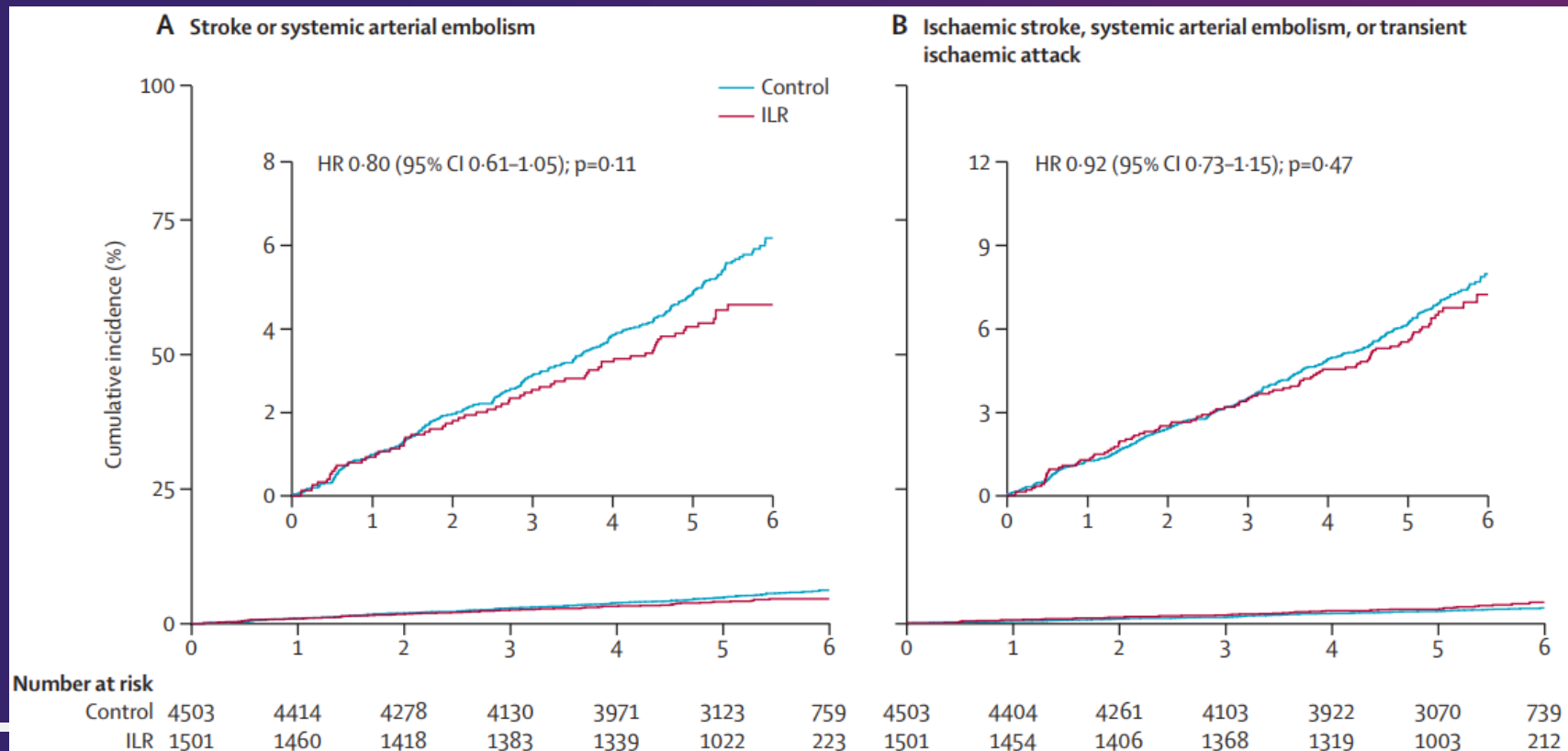
Outcome:

Detection of afib



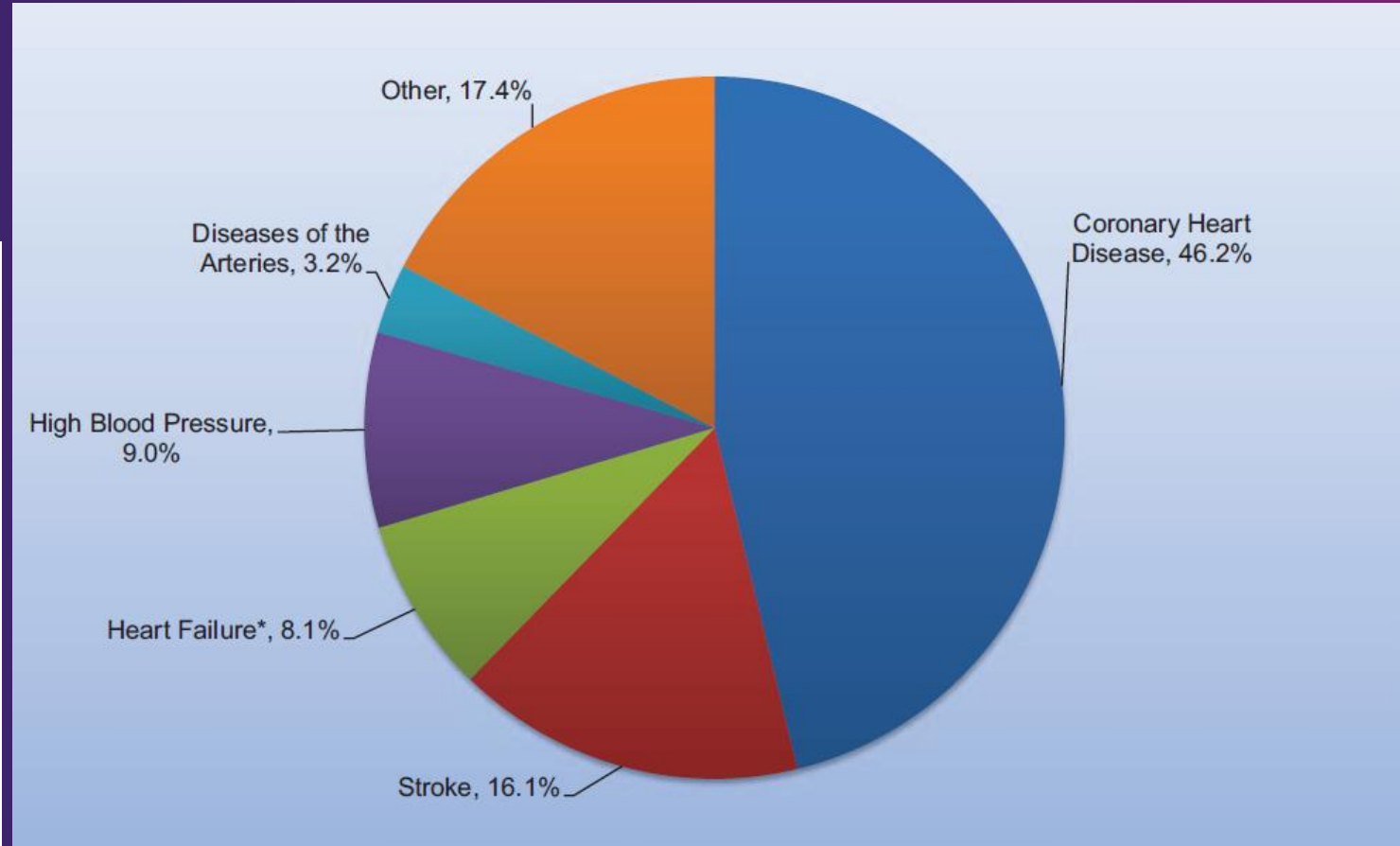
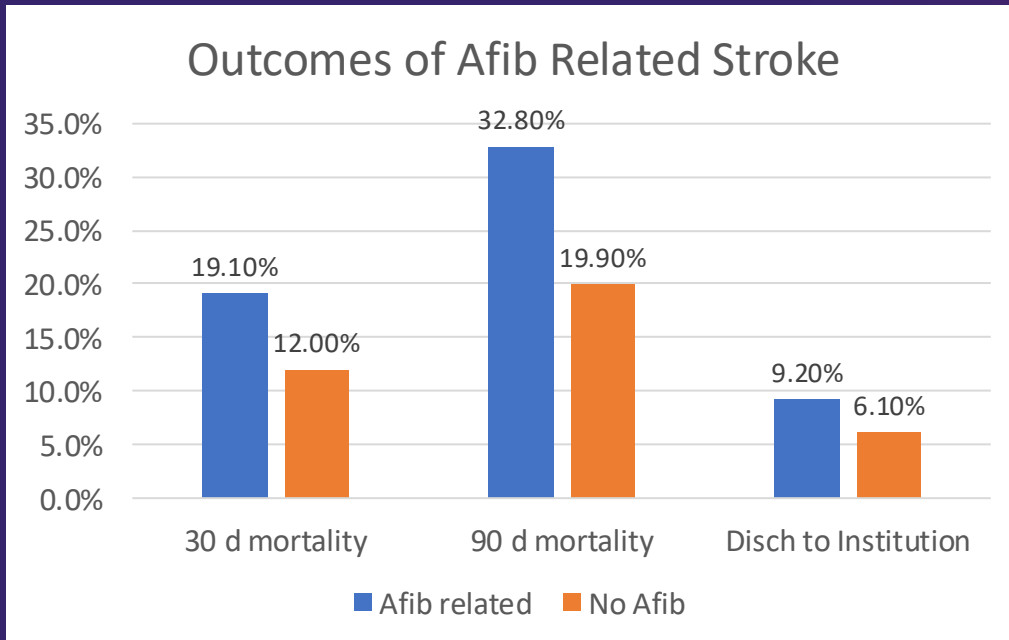
Does screening improve outcomes?

- 6205 patients randomized 1:3 to implantable loop recorder v. usual care
- 74.7 years, (1-4 Risk Factors) 3-year follow-up, Afib > 6 min → anticoagulation
- Atrial fibrillation 31.8% (ILR) v. 12.2% (control) (HR 3.17, 2.81-3.59, P<0001)

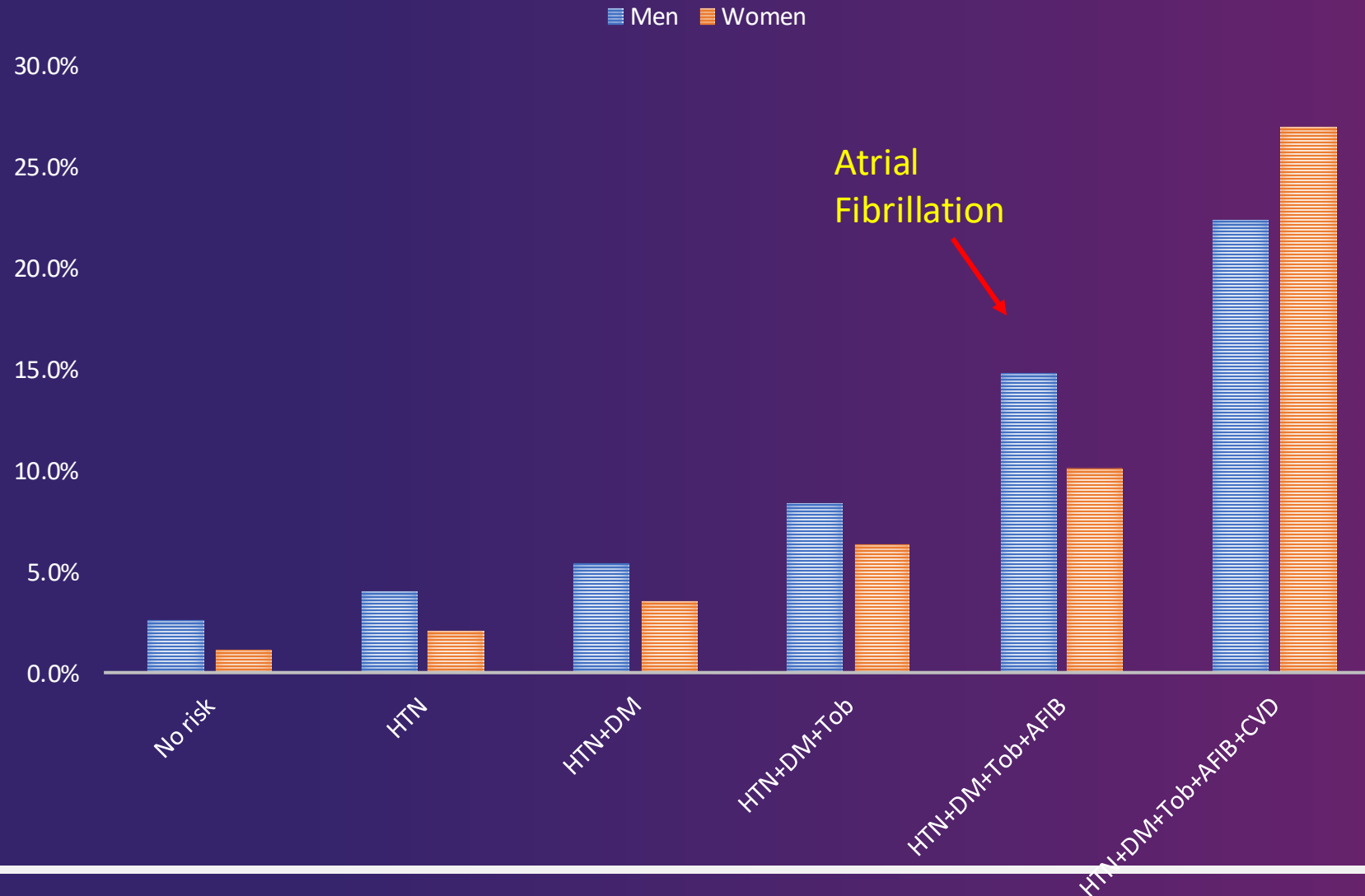


Stroke Impact

- Stroke: US 5th leading cause of death
 - World-wide 2nd leading cause of death
- Afib Strokes
 - 3-month disability OR 1.43 (95% CI 1.13-1.80)



Proportional attributable risk: AFIB



Impact of atrial fibrillation

2x Mortality

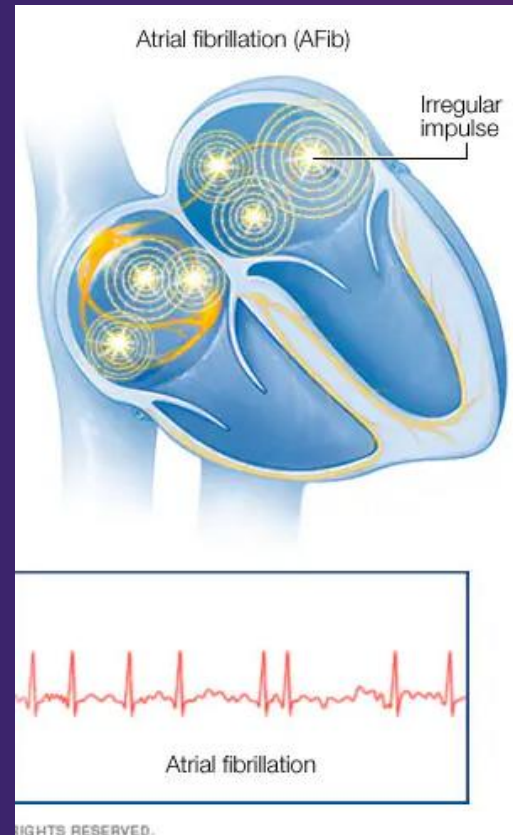
2.5x Stroke

2x Sudden Death

50% ↑ Myocardial Infarct

50% ↑ Dementia

2x Healthcare Costs



5-7x Major Bleeding

5x Heart Failure

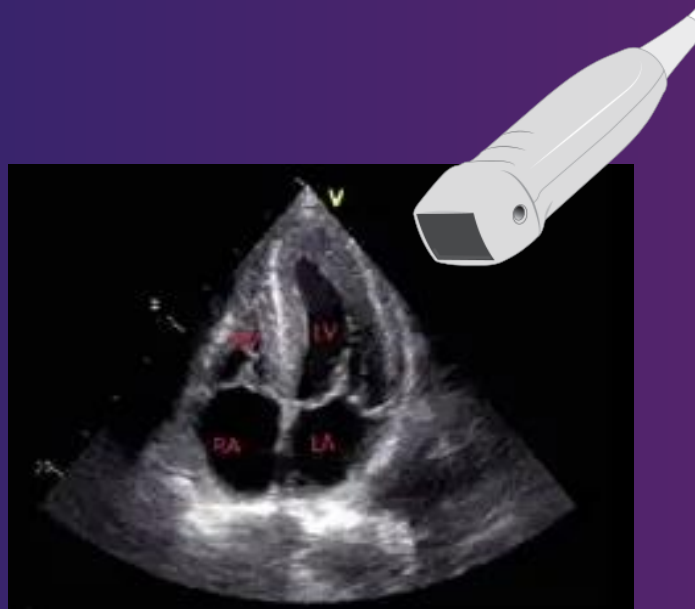
50% ↑ Renal Impairment

RISK FACTORS

ATRIAL FIBRILATION

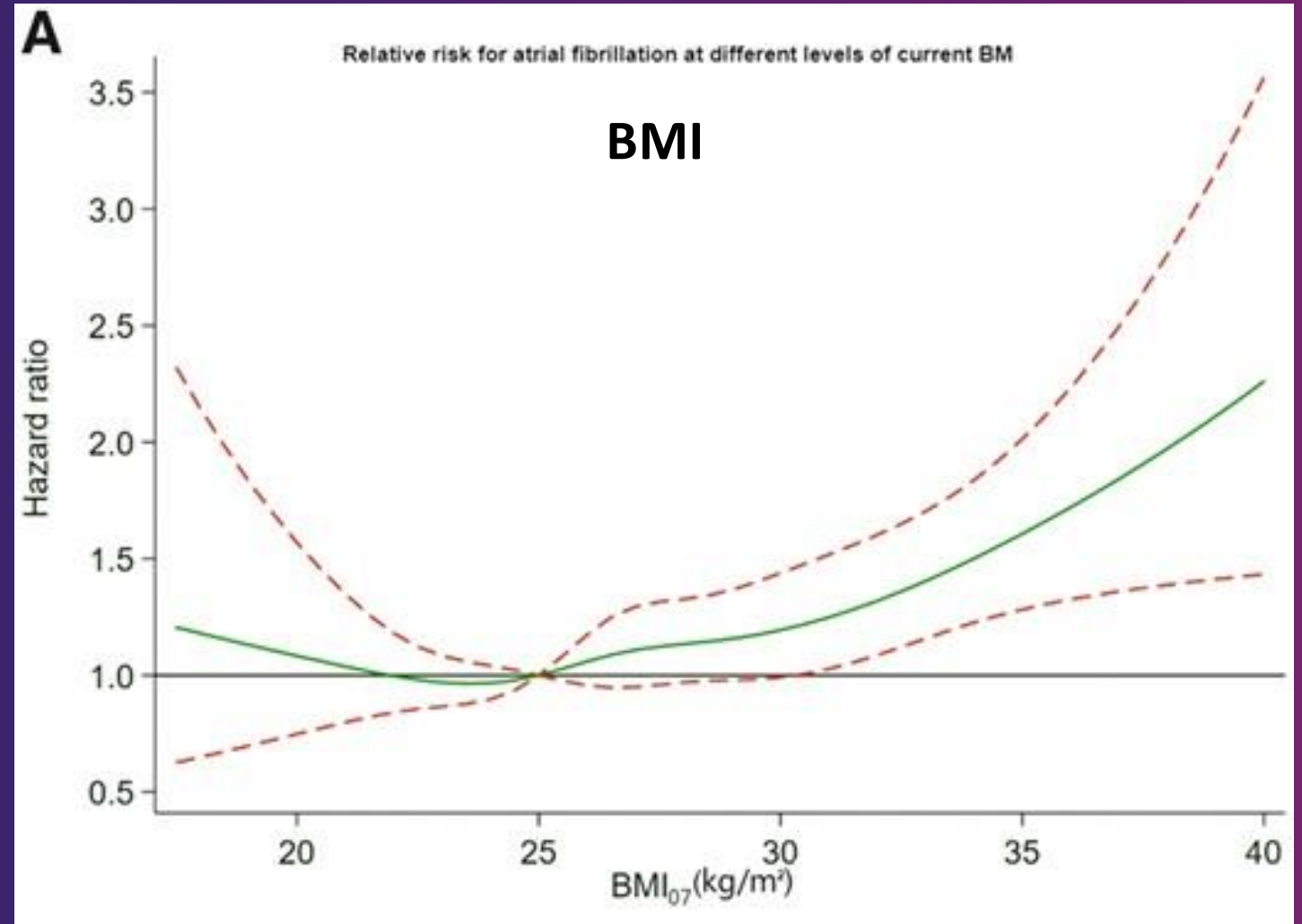
Risk Factors

- Older Age
- Hypertension
- Diabetes
- Heart Failure
- Myocardial Infarction
- Hypothyroidism
- Physical Inactivity
- Obesity
- Sleep Apnea
- Tobacco Use
- Alcohol Use



Obesity and Atrial Fibrillation

- HUNT Study
- 15,214 patients
- Adjusted for comorbidities
- Waist-Hip Ratio (N.S.)
- Waist Circumference
 - HR 1.2 (1.1.-1.4)
 - Not sig after adjustment



Risk Factor Modification

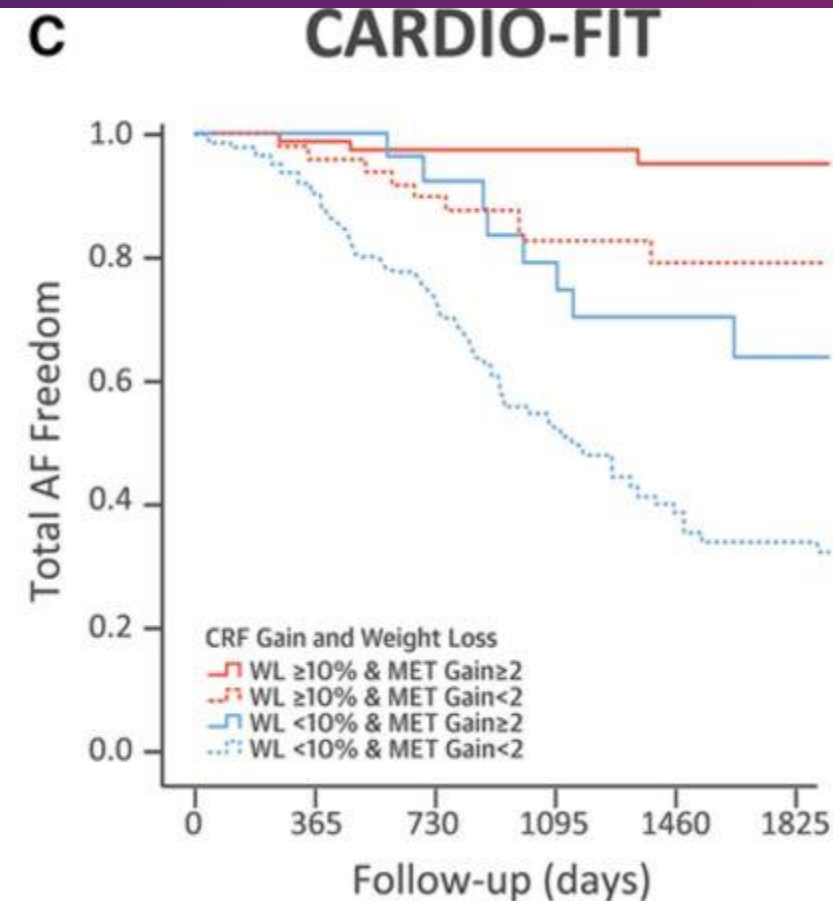
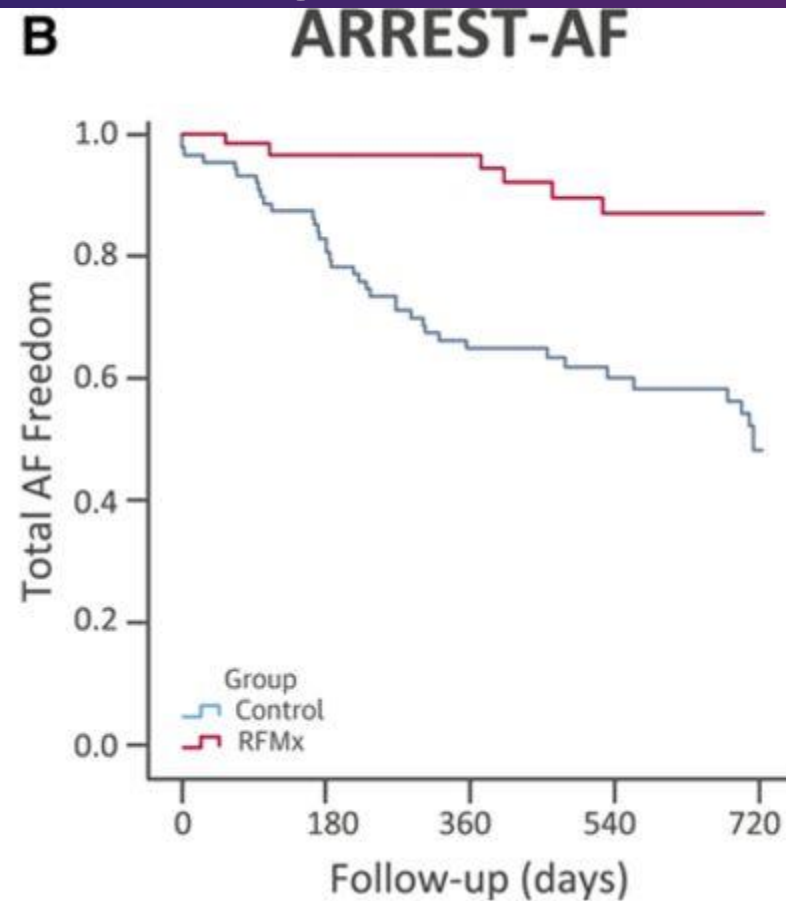
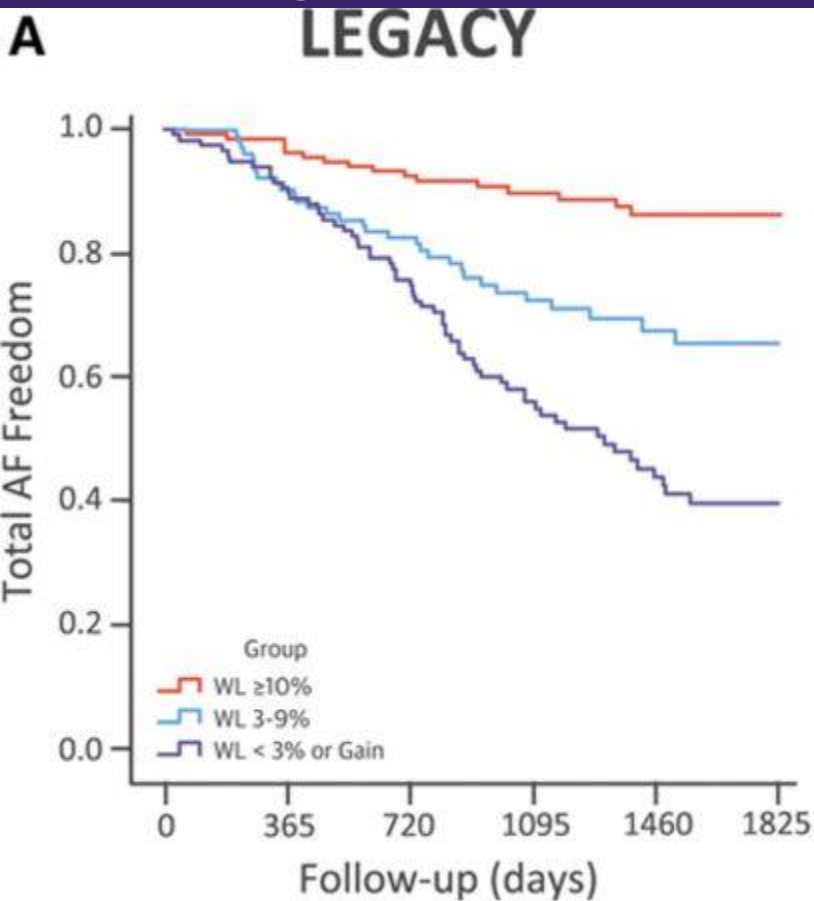
LEGACY

ARREST-AF

CARDIO-FIT

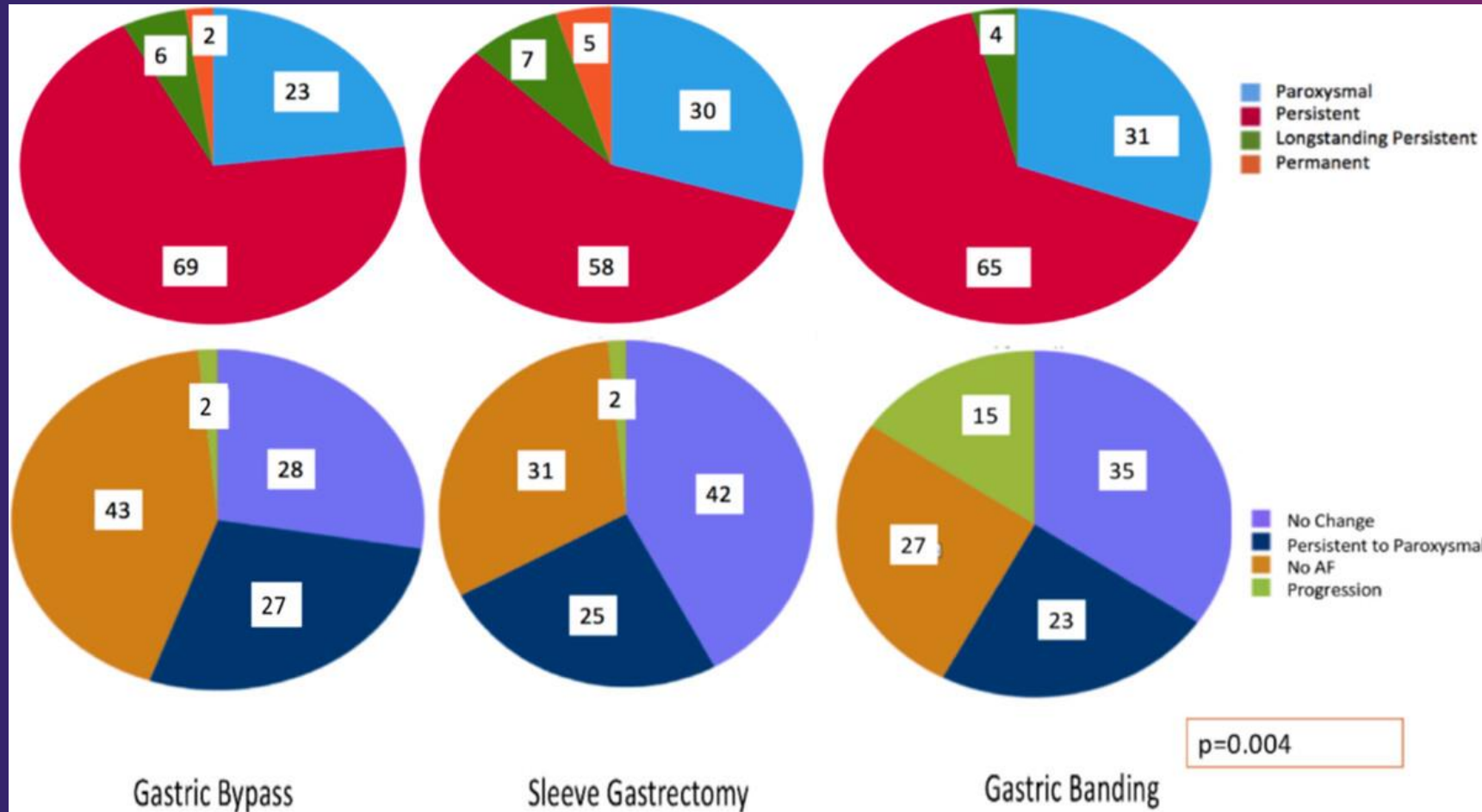
Goal Directed Diet/Exercise

Weight loss (<27 BMI), HTN <130 mmHg, Tob/EtOH reduction

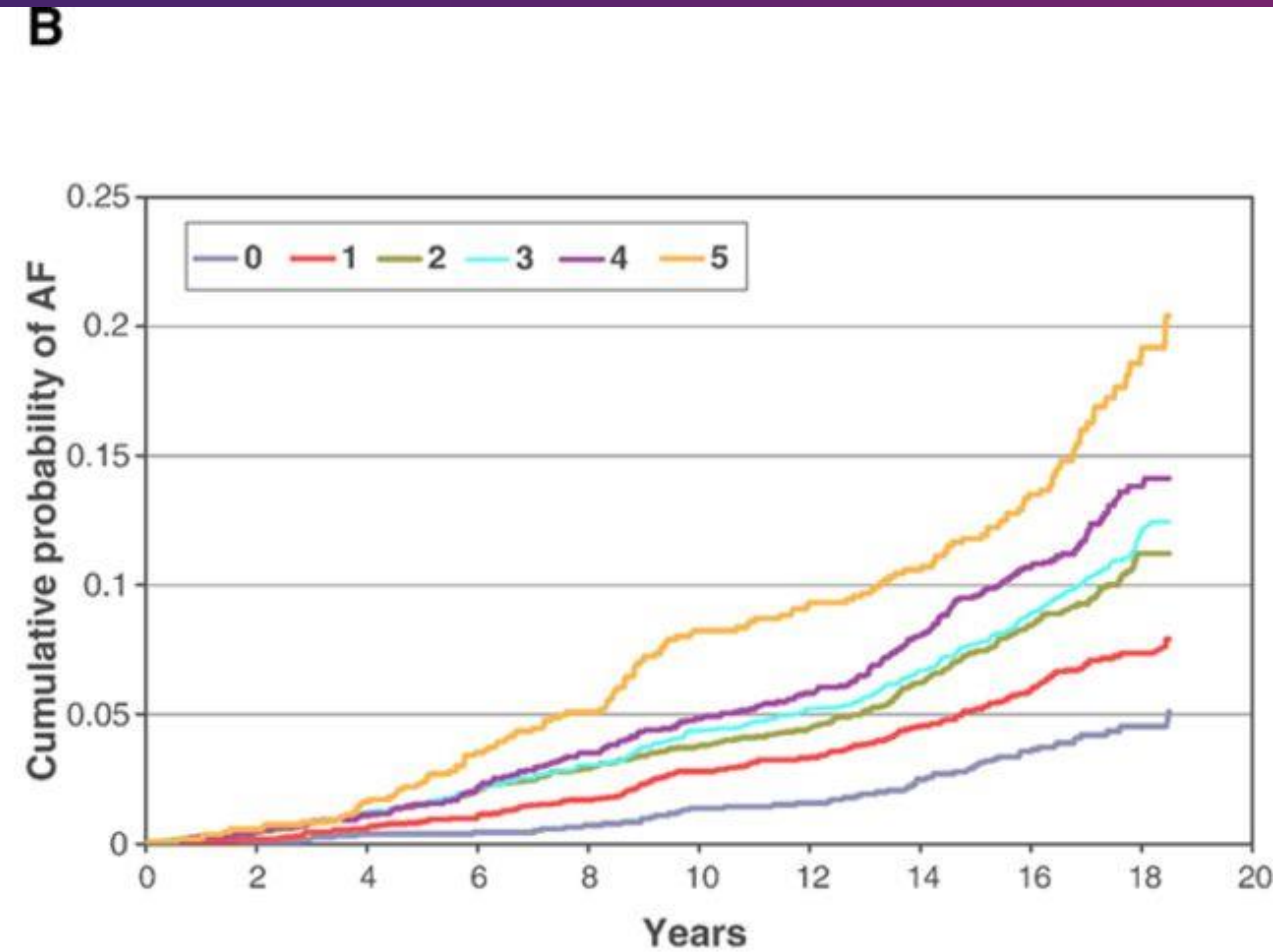
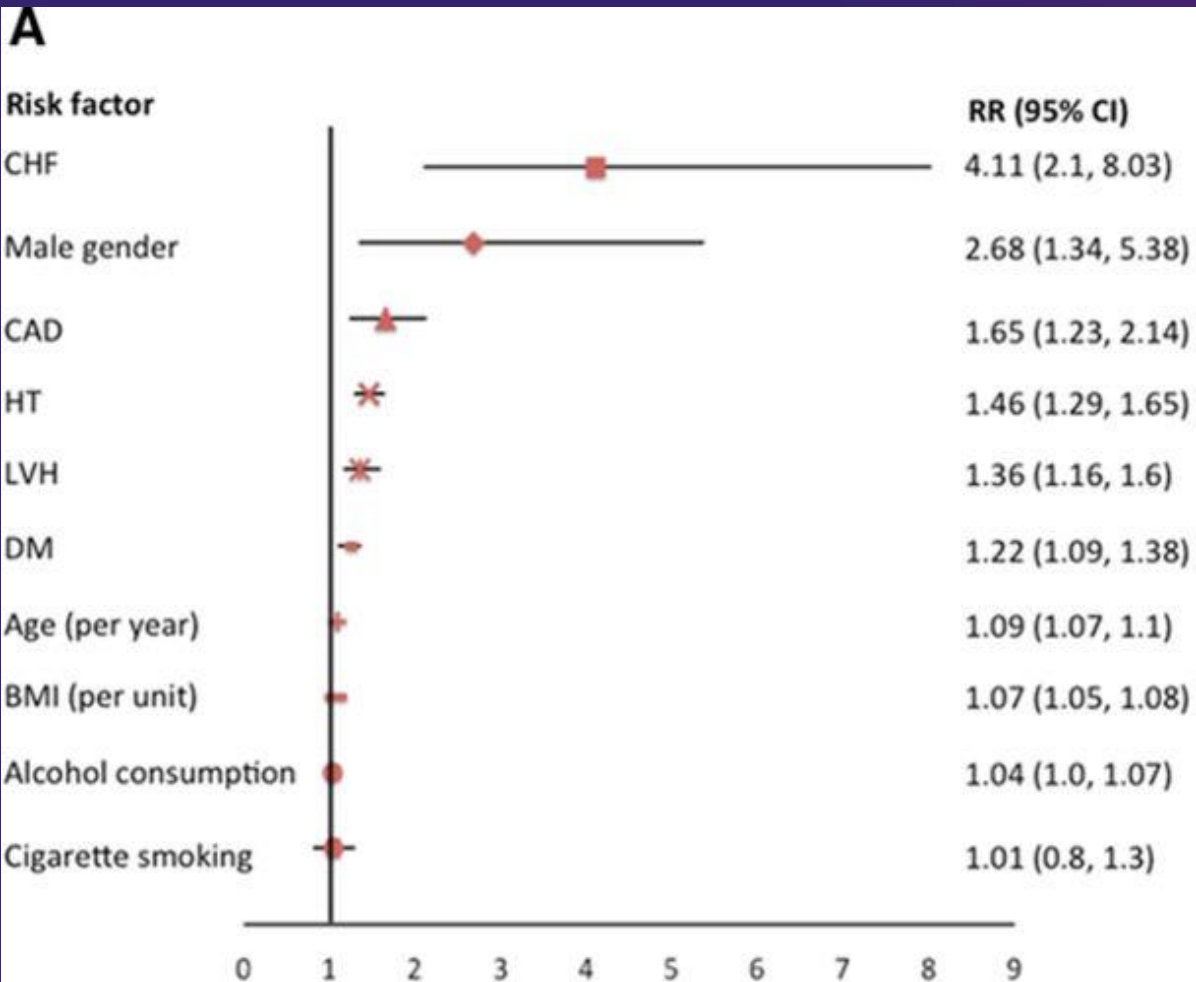


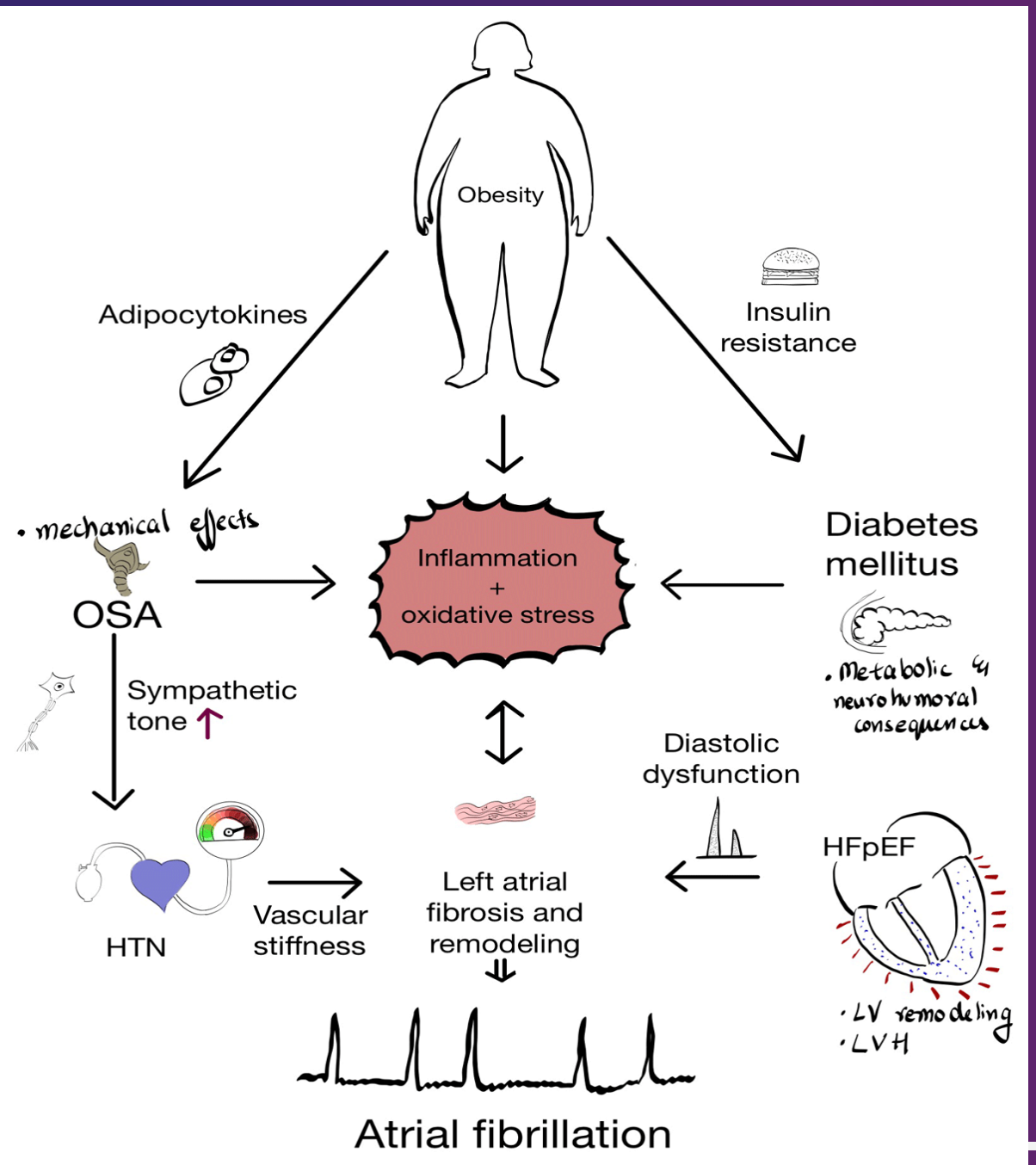
Bariatric Surgery and Atrial Fibrillation

- Retrospective study of 2522 patients undergoing bariatric surgery v. controls
 - Incident atrial fibrillation 0.8% v. 2.9% (p 0.0001)
- Retrospective study 220 of patients with afib undergoing bariatric surgery v. controls
 - Rhythm monitoring post-surgery
 - Reversal of AF type 50-71% of patients



Risk Factors for Atrial Fibrillation





Heart Failure

Volume overload, congestion

LV dilation

Mitral regurgitation

LA dilation

Atrial stretch, fibrosis

Neuro-humoral effects

Atrial fibrillation

irregular LV filling

High heart rate

Atrial stretch, fibrosis

Loss of atrial contractility

Neuro humoral effects

Aggressive Risk Factor Management

Weight Management and Exercise

- Educate for permanent lifestyle change
- Diet Plan
- Initial target: >10% weight loss. Final target: BMI <27 kg/m²
- Avoid weight fluctuation
- Exercise: 30 minutes for 3-4x per week
- Increase type and duration of activity up to 250 minutes per week

Hyperlipidaemia

- Initial lifestyle measures
- At 3 months: start statins if LDL >100 mg/dl
- Add fibrates if TG >200 mg/dl
- Start fibrates if TG >500 mg/dl

Obstructive Sleep Apnea

- Overnight sleep study
- CPAP if AHI ≥30; or ≥20/h with resistant HT or daytime somnolence
- Check adherence: regular CPAP machine data download

Hypertension

- Home BP diary: 2-3 x daily
- Reduce salt
- Start ACEI or ARB
- Target: <130/80 mmHg (at rest) & <200/100 mmHg (at peak exercise)

Diabetes

- Glucose tolerance test
- Lifestyle measures
- At 3 months: Metformin if HbA1c >6.5%
- Diabetes clinic

Smoking Cessation & Alcohol Abstinence (or reduction to 30g per week)

AFIB RHYTHM CONTROL

SINUS RHYTHM IS THE GOAL...WHEN IT CAN BE ACHIEVED

Atrial Fibrillation

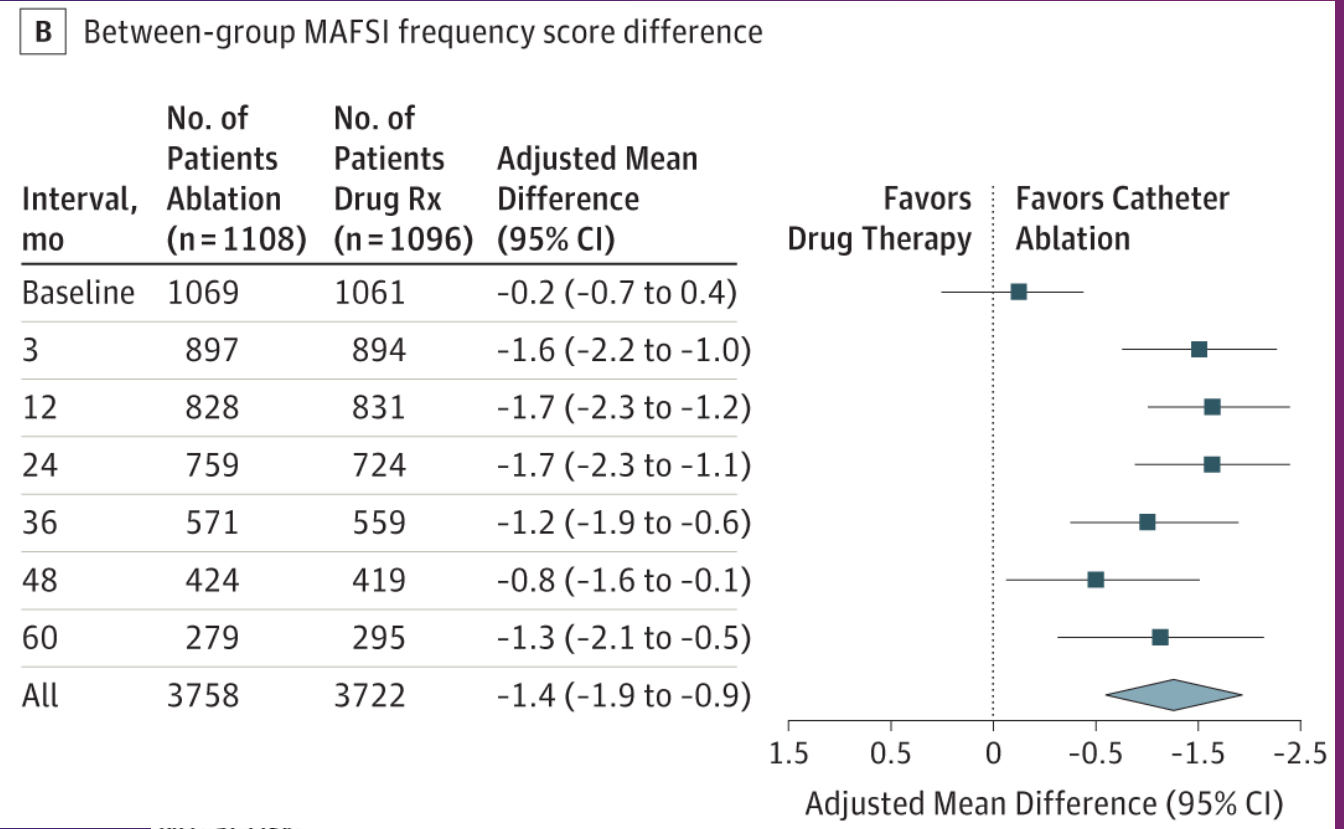
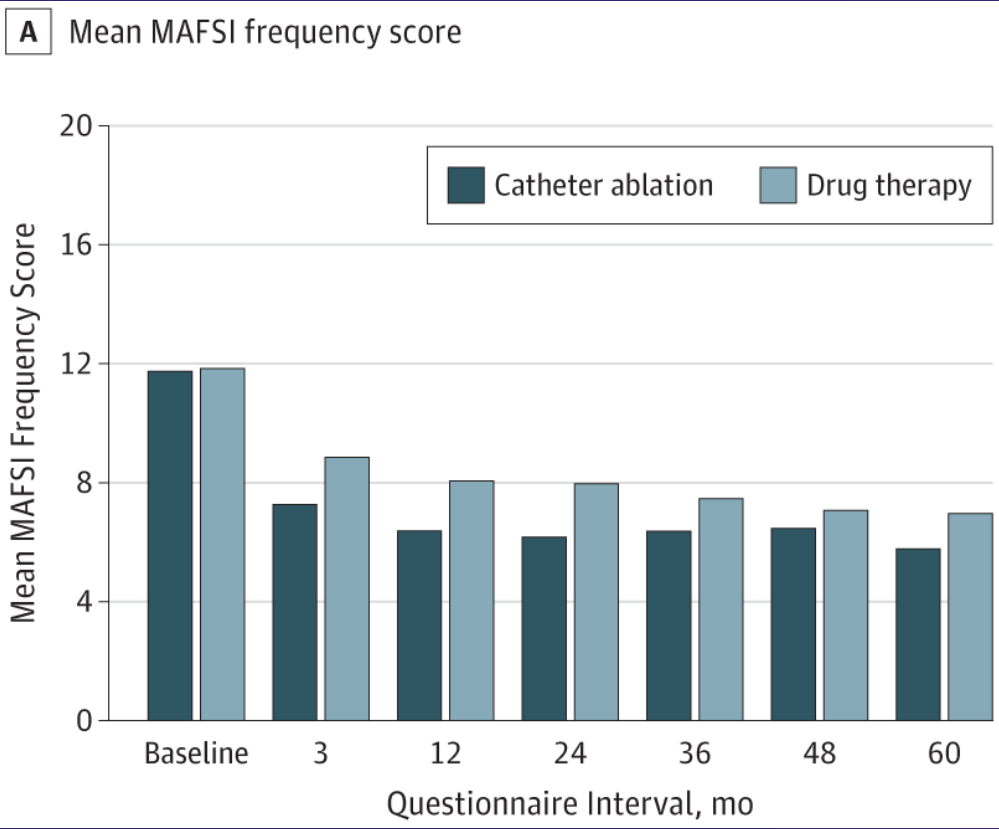
Rhythm Control = Rate Control

- AFFIRM
- RACE
- Not so fast....
 - CABANA
 - CASTLE-AF
 - EAST-AFNET 4



CABANA

- 2204 patients with symptomatic atrial fibrillation

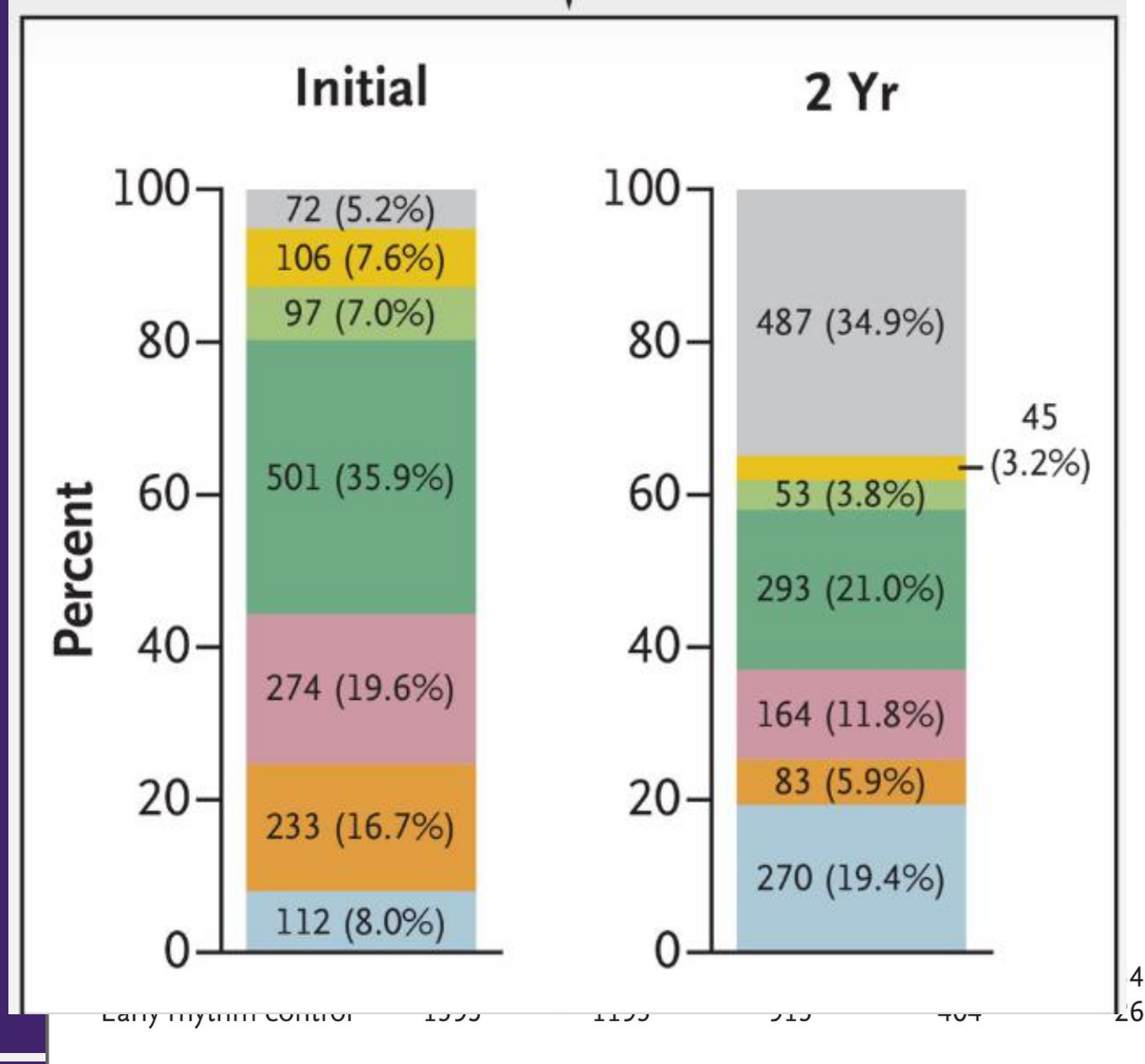
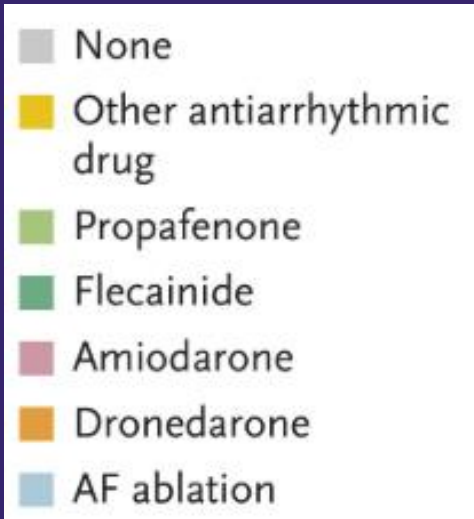


JAMA. 2019;321(13):1261-1274.
 JAMA. 2019;321(13):1275-1285.

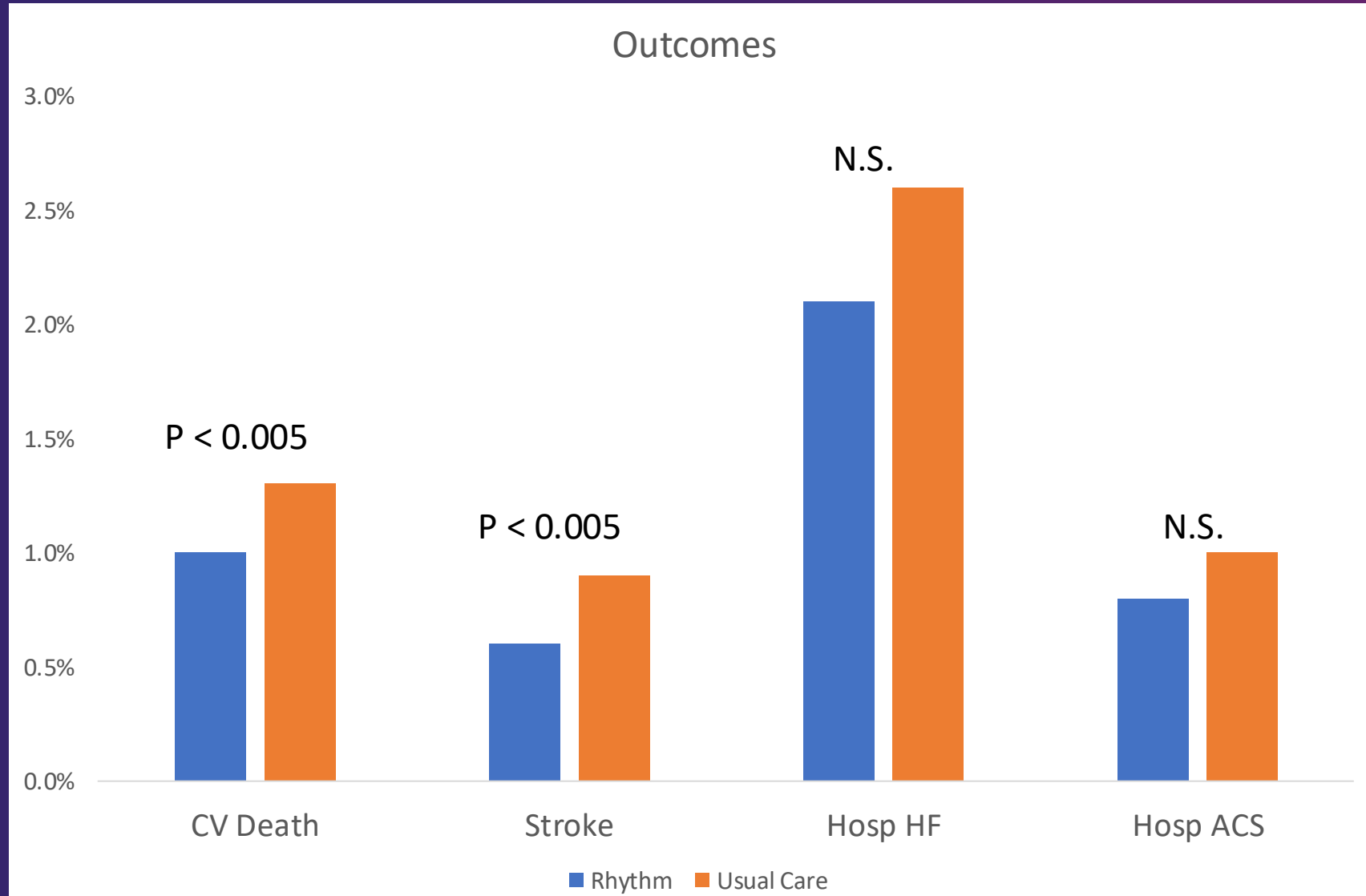
NO. at RISK	1096	1036	1006	970	880	763	652	578	499	418	312
Drug therapy											
Catheter ablation	1108	1045	1021	996	915	793	700	614	535	432	309

EAST-AFNET 4

- 2789 patients with new afib (<1 year)
- Rhythm control v. rate control
- Rhythm control
 - with meds +/- ablation
 - Death, stroke, or adverse events related to rhythm-control therapy



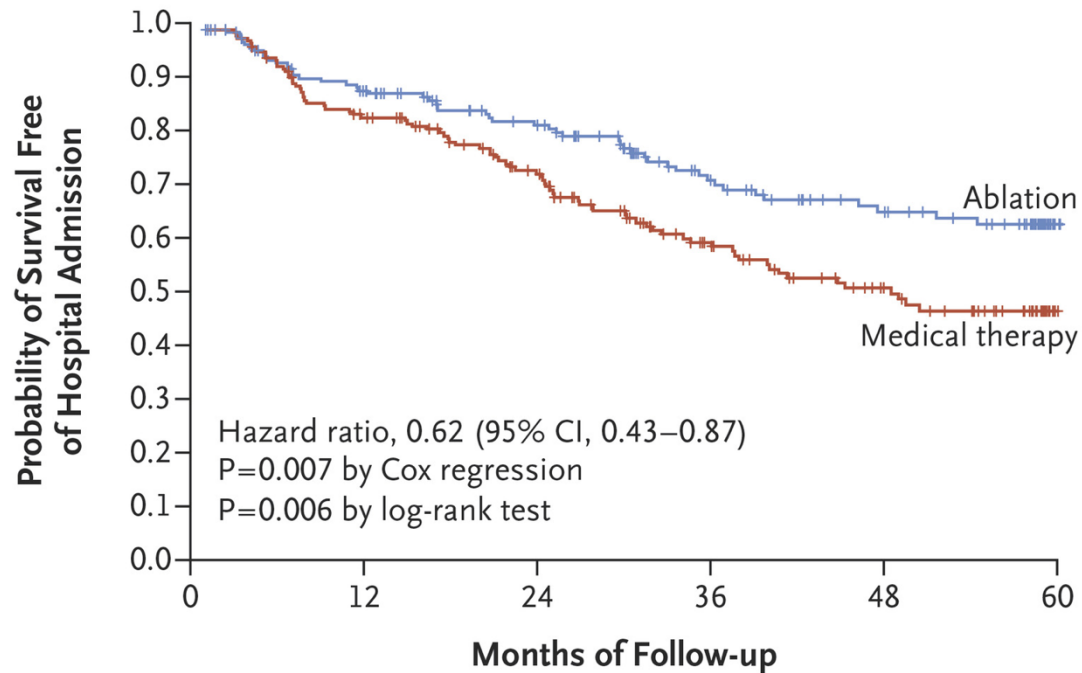
EAST-AFNET 4



CASTLE-AF

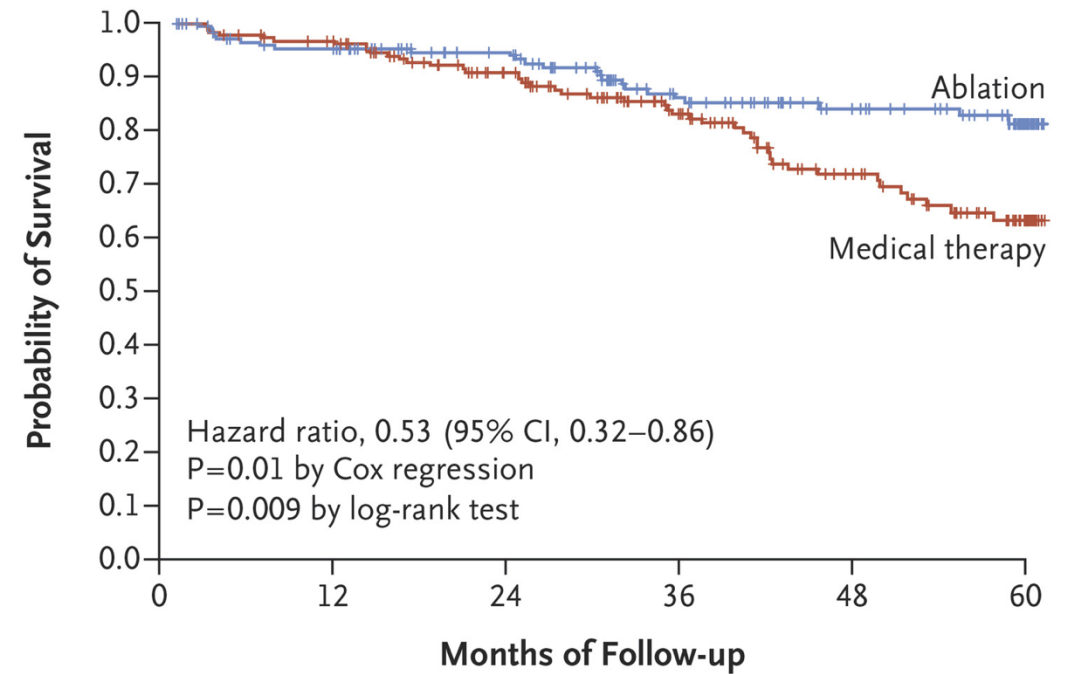
- 398 patients with EF < 35%, NYHA 2-4, and AFIB
- Catheter ablation v. medical therapy

A Death or Hospitalization for Worsening Heart Failure



No. at Risk		0	12	24	36	48	60
Ablation	179	141	114	76	58	22	
Medical therapy	184	145	111	70	48	12	

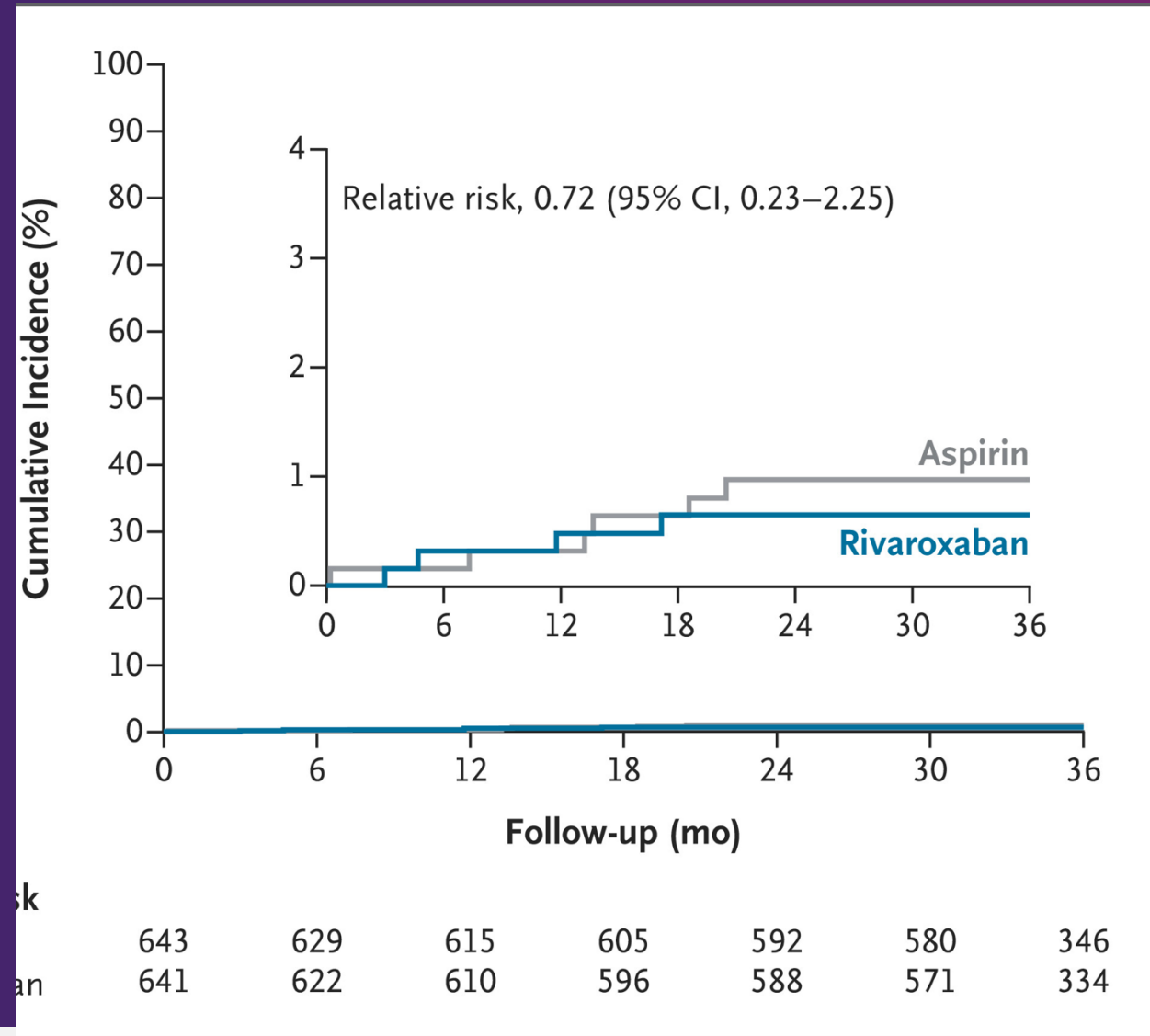
B Death from Any Cause



No. at Risk		0	12	24	36	48	60
Ablation	179	154	130	94	71	27	
Medical therapy	184	168	138	97	63	19	

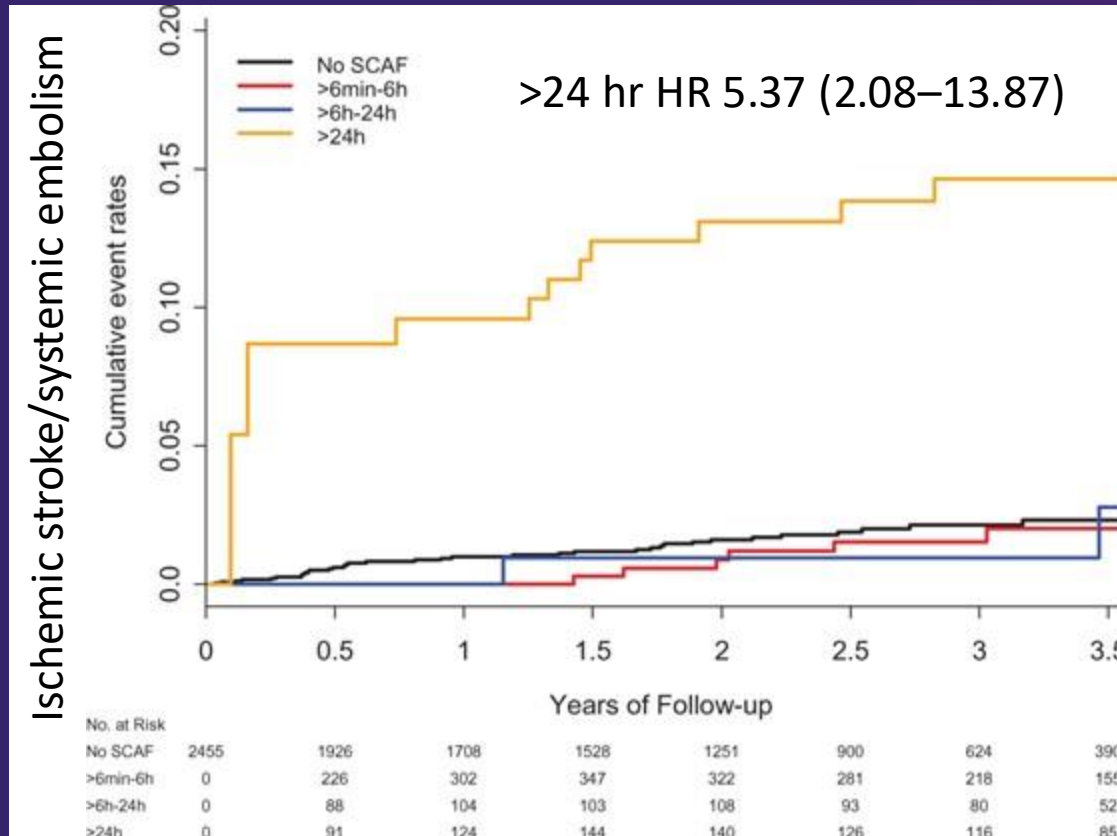
OCEANS AF: Afib Ablation and anticoagulation

- Patients with successful catheter ablation (age ~66 yrs, CHA₂DS₂-VASc 2.2)
- No afib on event monitoring ~ 6 months
- Composite outcome stroke, embolism, MRI detected stroke
- 1284 patients randomized to ASA v. anticoagulation



Not all that fibrillates needs anticoagulation

- Subclinical atrial fibrillation (ASSERT)



Van Gelder IC. Eur Heart J. 2017 May 1;38(17):1339-1344.

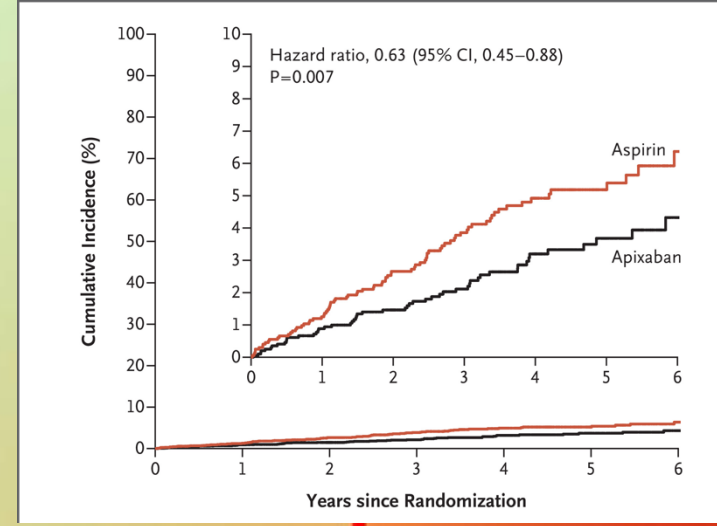
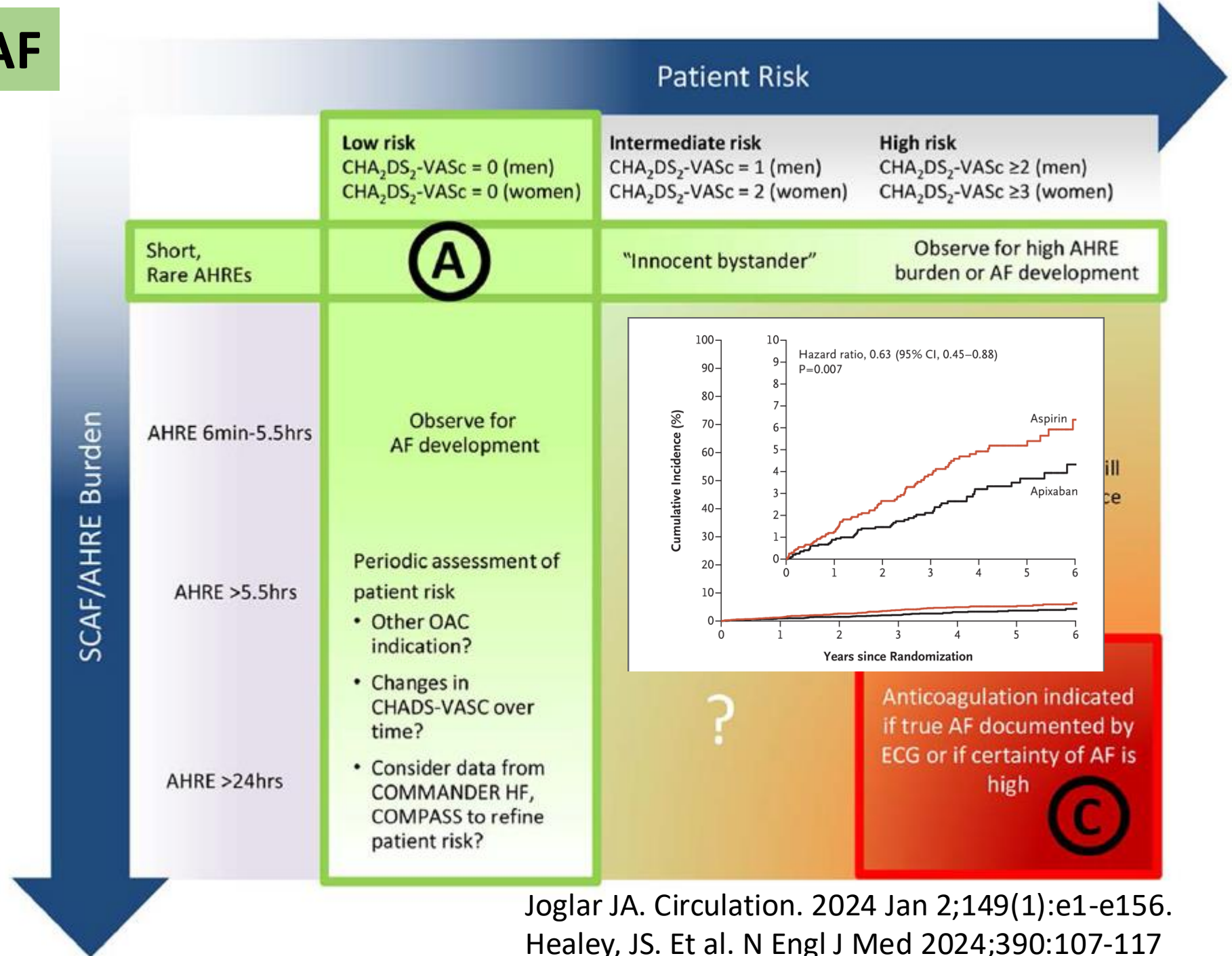
Joglar JA. Circulation. 2024 Jan 2;149(1):e1-e156.

COR	LOE	Recommendations
1	A	1. For patients with AF and an estimated annual CHA2DS2-VASC ≥ 2 M, ≥ 3 F women, anticoagulation is recommended to prevent stroke and systemic thromboembolism. ¹⁻⁷
2a	A	3. For patients with AF and an estimated annual CHA2DS2-VASC ≥ 1 M, ≥ 2 F and 2 in women), anticoagulation is reasonable to prevent stroke and systemic thromboembolism. ^{1,3}
2a	B-NR	1. For patients with a device-detected atrial high-rate episode (AHRE) lasting ≥ 24 hours ¹ and with a >24 hrs; CHA2DS2-VASC ≥ 2 within a SDM framework that considers episode duration and individual patient risk.
2b	B-NR	2. For patients with a device-detected AHRE lasting between 5 minutes and 24 hours and with a 5-24 hrs; CHA2DS2-VASC ≥ 2 within a SDM framework that considers episode duration and individual patient risk.
3: No Benefit	B-NR	2. Patients with a device-detected AHRE lasting <5 min; CHA2DS2-VASC ≥ 2 anticoagulation. ^{4,5}

Subclinical AF

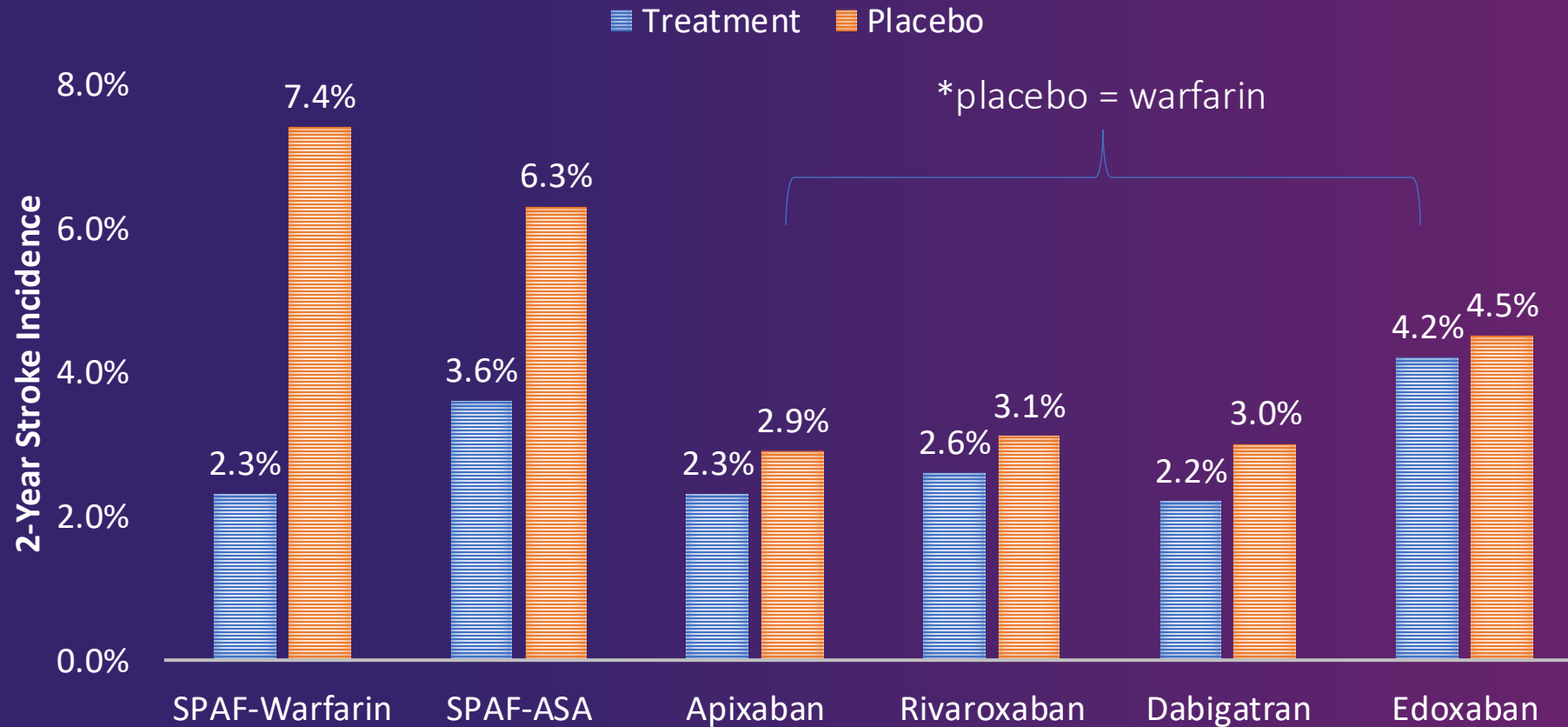
ARTESIA

- C2V \geq 3
- <24 hrs afib
- DOAC > ASA
- (More bleeds)



Anticoagulation

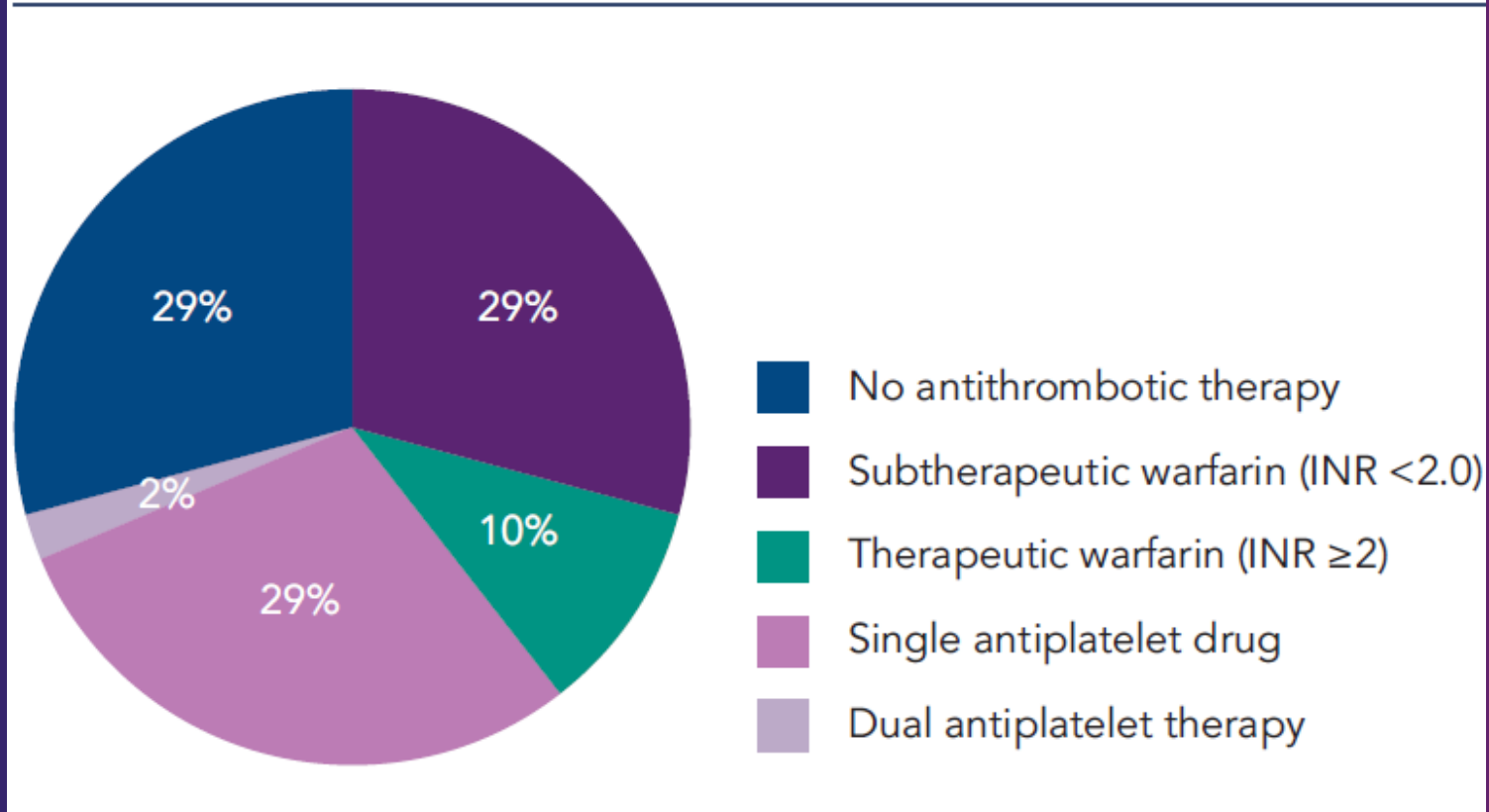
Anticoagulation and stroke reduction



SPAF Investigators. Circulation. 1996; Patel MR. NEJM. 2011; Granger CB. NEJM. 2011; Giugliano RP. NEJM. 2013.
Don C et al. Catheter Interventions for Structural Heart Disease. 2013. Adapted from Go AS et al. JAMA 2003.

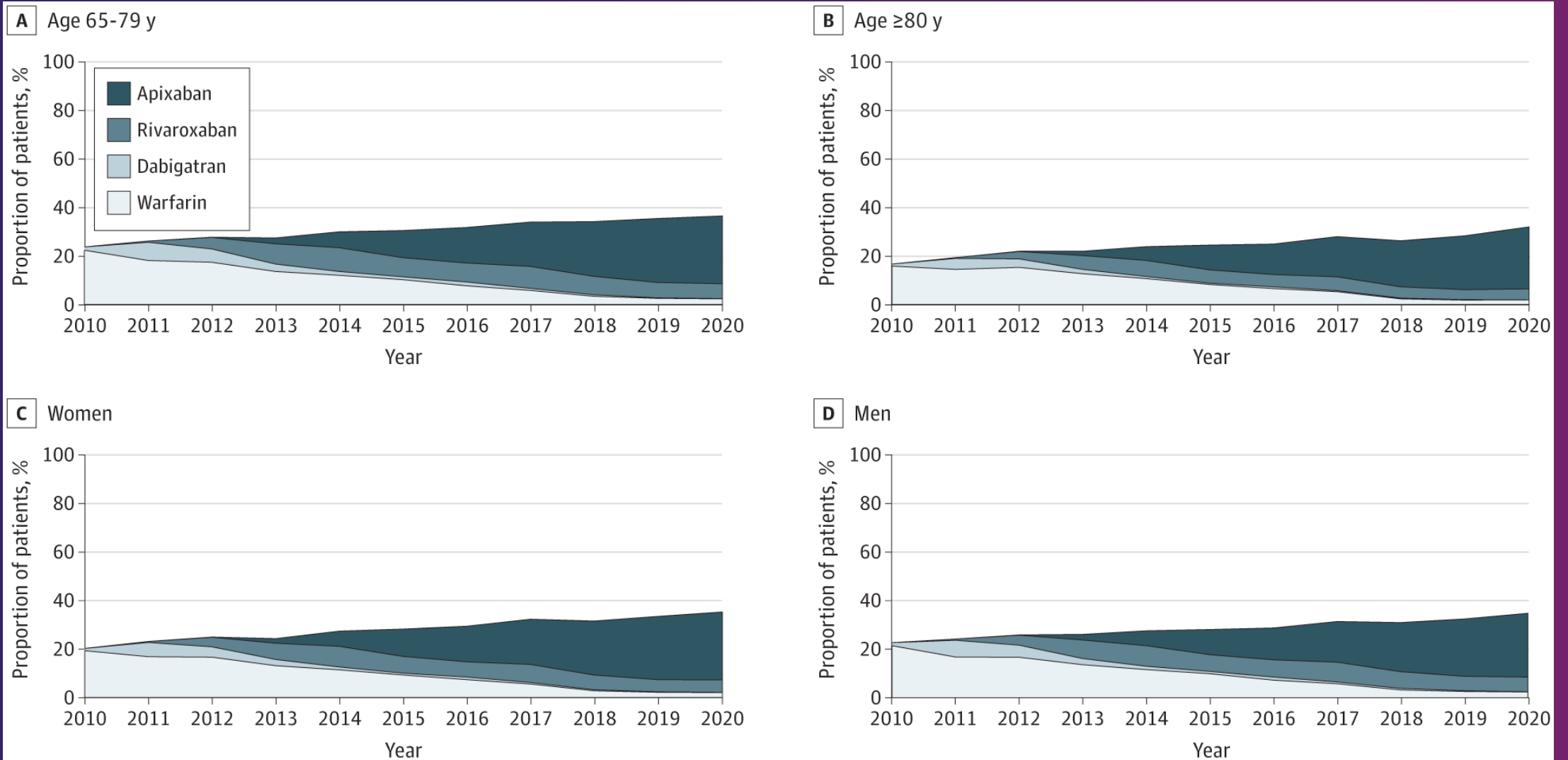
Under treatment causes strokes

Figure 5: Preadmission Medications in Patients with Known Atrial Fibrillation Who Were Admitted with Acute Ischaemic Stroke (High-Risk Cohort, n=597)



Source: Gladstone et al, 2009.³¹

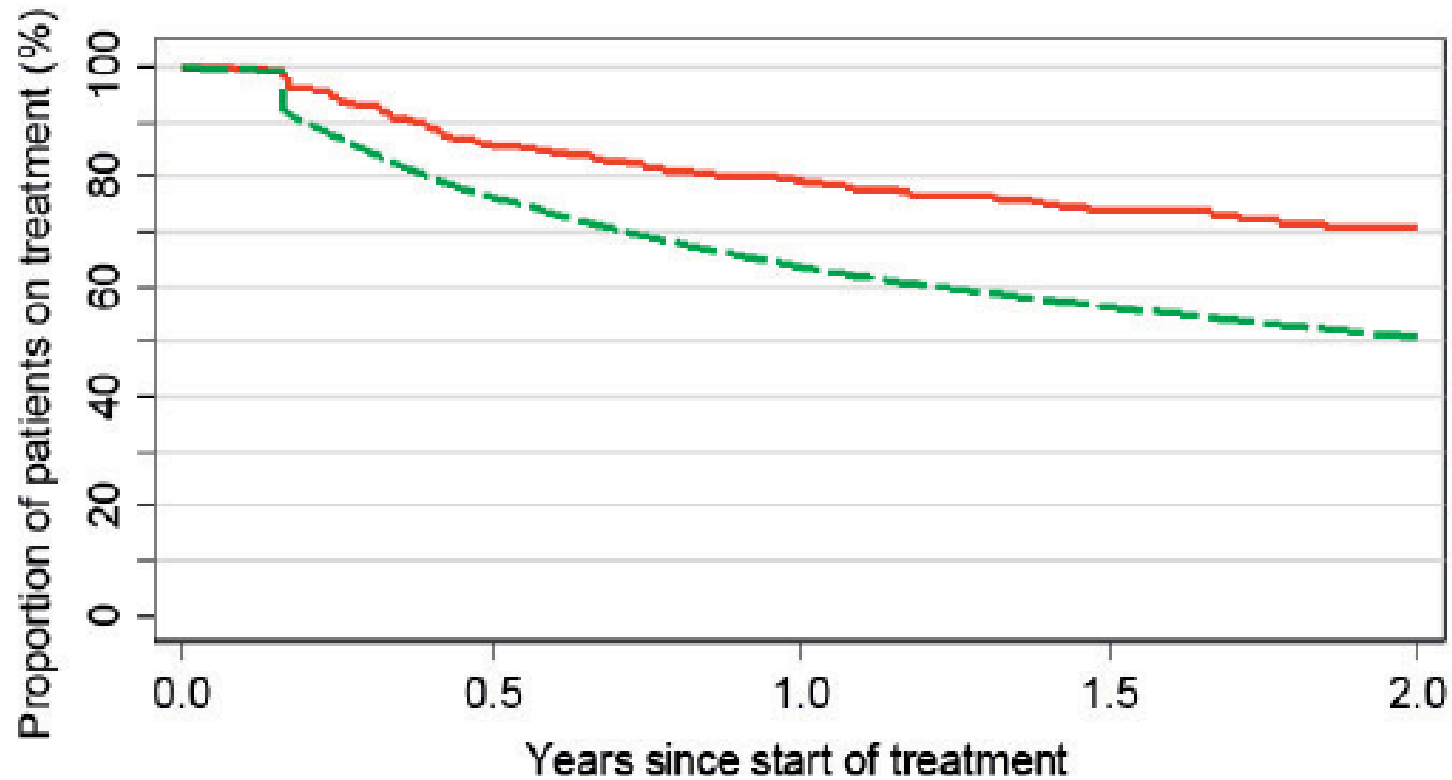
Anticoagulation—initiation w/in 12 mo of AF diagnosis



DOAC discontinuation—clinical trials

Treatment	Study Drug Discontinuation Rate	Major Bleeding (rate/year)
Rivaroxaban¹	24%	3.6%
Apixaban²	25%	2.1%
Dabigatran³ (150 mg)	21%	3.1%
Edoxaban⁴ (60 mg / 30 mg)	33 % / 34%	2.8% / 1.6%
Warfarin¹⁻⁴	17 – 28%	3.1 – 3.6%

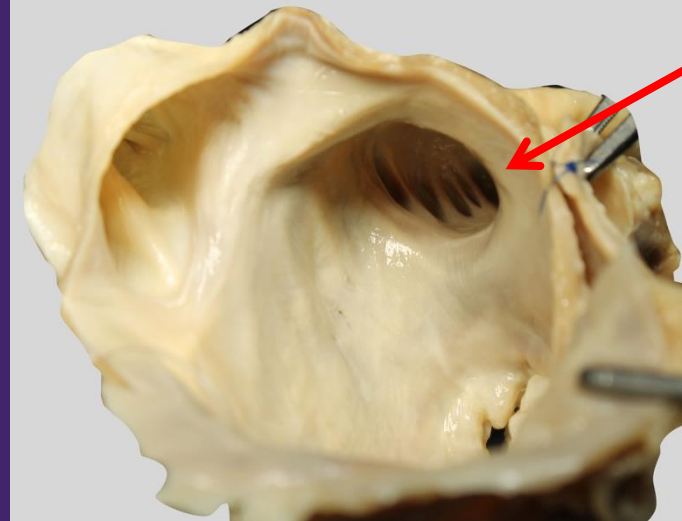
DOAC discontinuation—real world



NOAC	914	651	342	139	41
VKA	12307	8453	5762	3915	2506

Strokes and the Left Atrial Appendage

Benefits of LAA closure



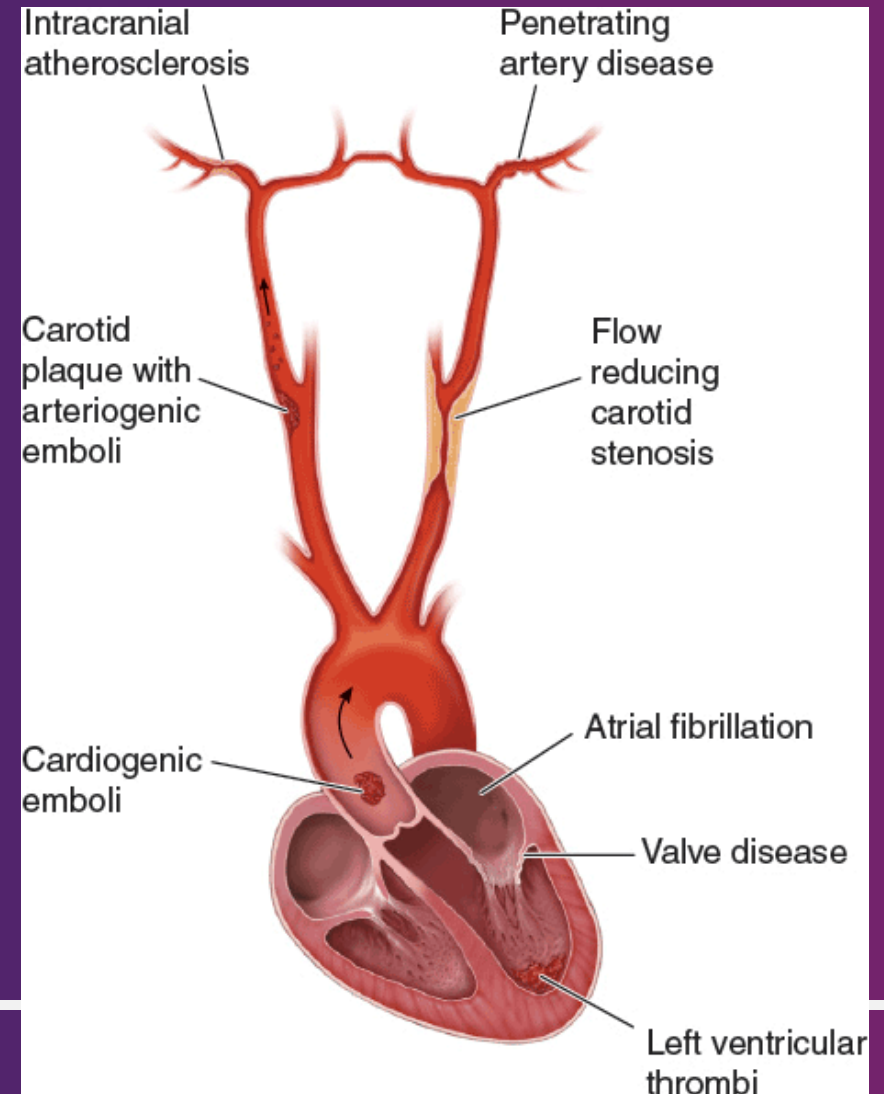
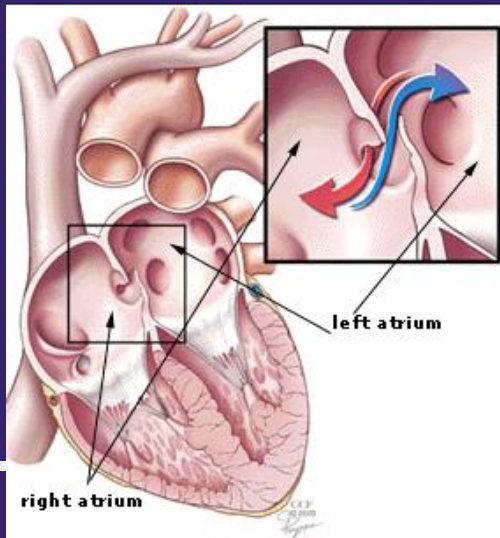
Where do strokes come from?

Cardioembolic strokes—20% of all stroke

- Atrial fibrillation—atrial clots
- LV dysfunction—LV clots
- Valvular disease
- PFO (Patent foramen ovale)



80% from vascular source:
Aorta, Carotids, Cerebral arteries



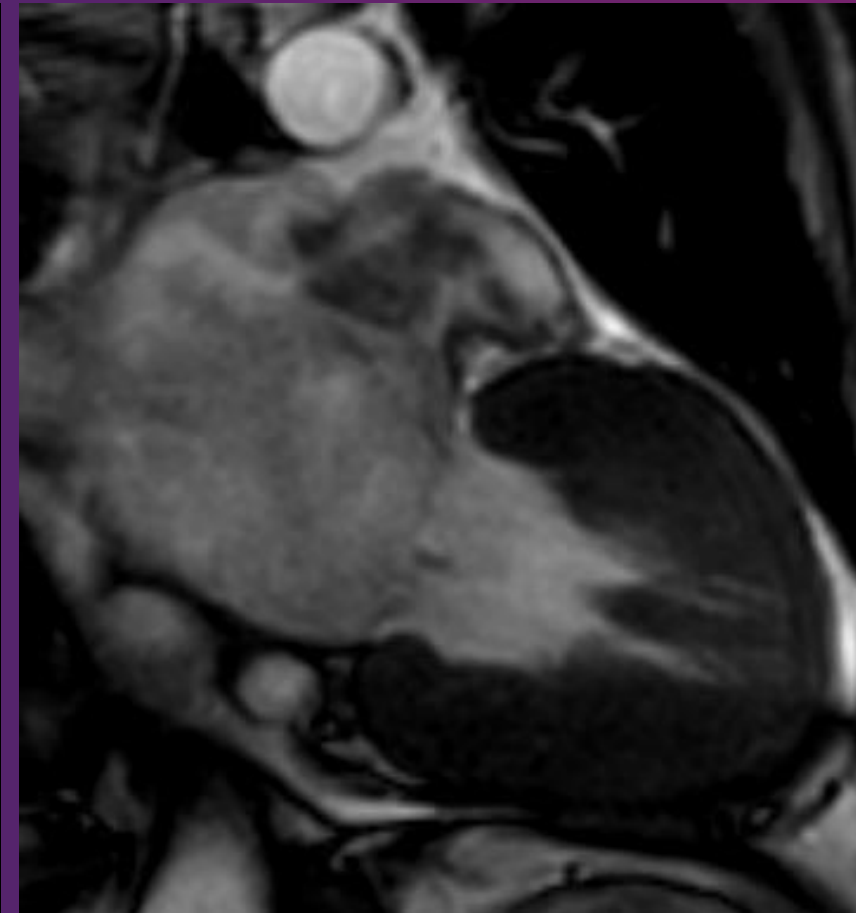
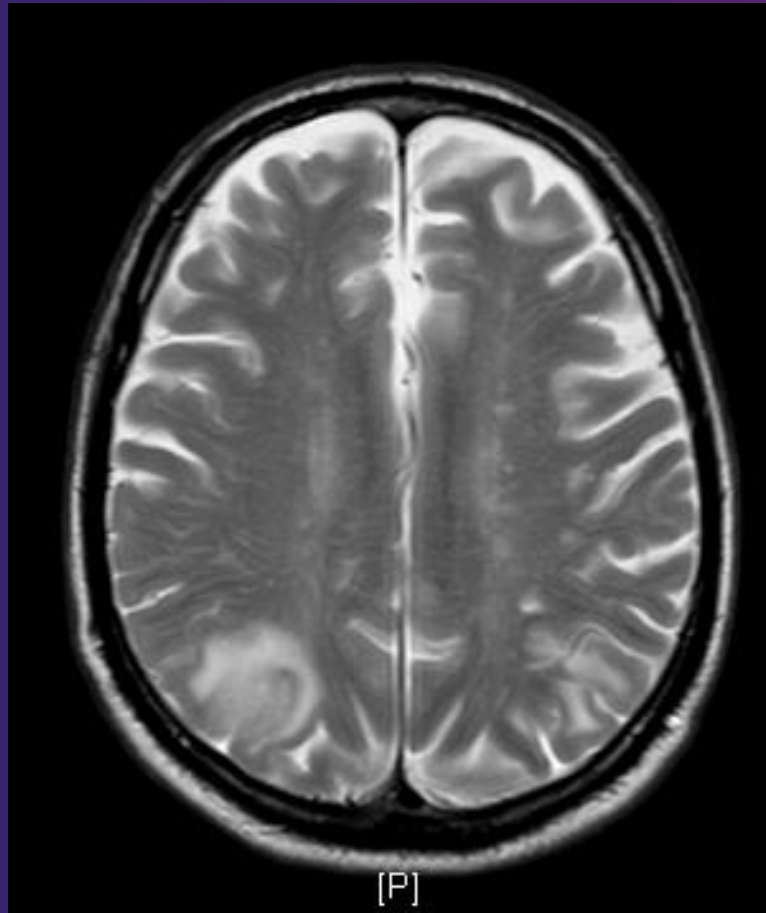
Thrombus location

- Approximately 25% of embolic events in afib are associated with atrial thrombi
- Rheumatic atrial fibrillation
 - Thrombus in LA appendage: 57%
- Non-rheumatic atrial fibrillation
 - Thrombus in LA appendage: 91%

Study	N	LA Appendage	LA chamber
TEE	317	66	1
TEE	233	34	1
Autopsy	506	35	12
TEE	52	2	2
TEE	48	12	1
TEE + surgery	171	8	3
TEE (SPAF 3)	359	19	1
TEE	272	19	0
TEE	60	6	0
Total	1288	201	21

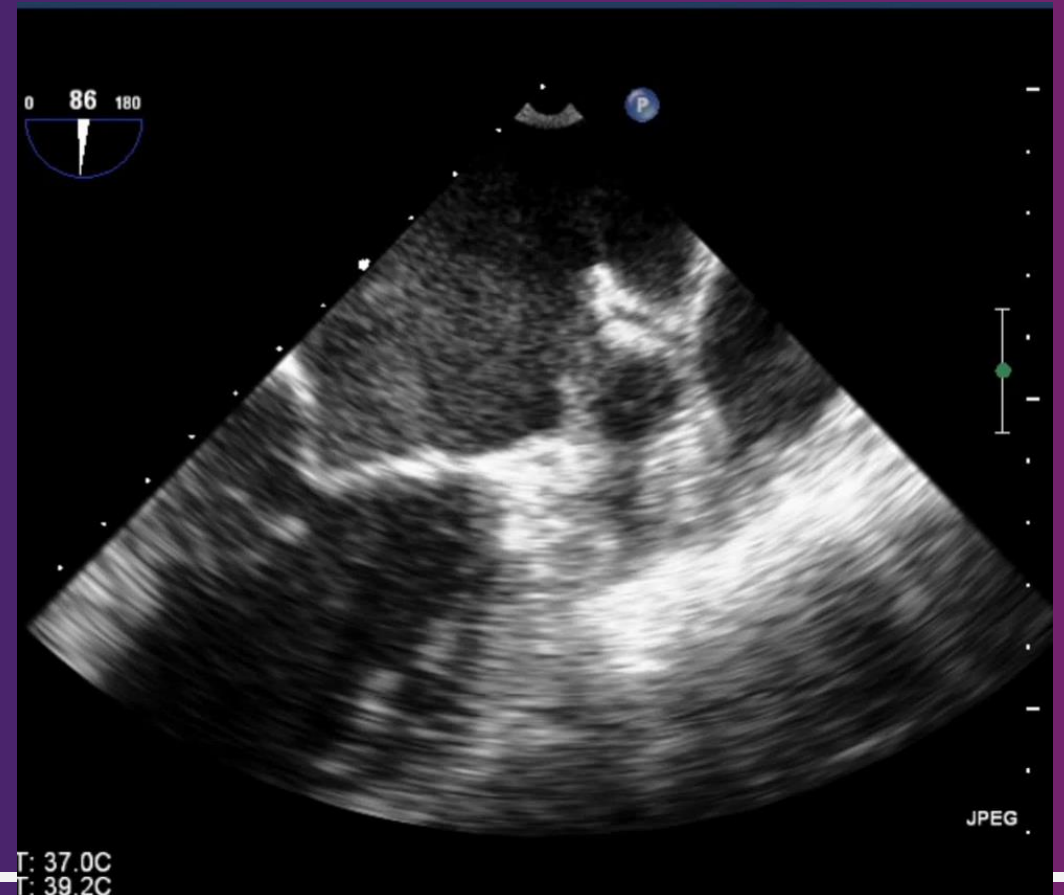
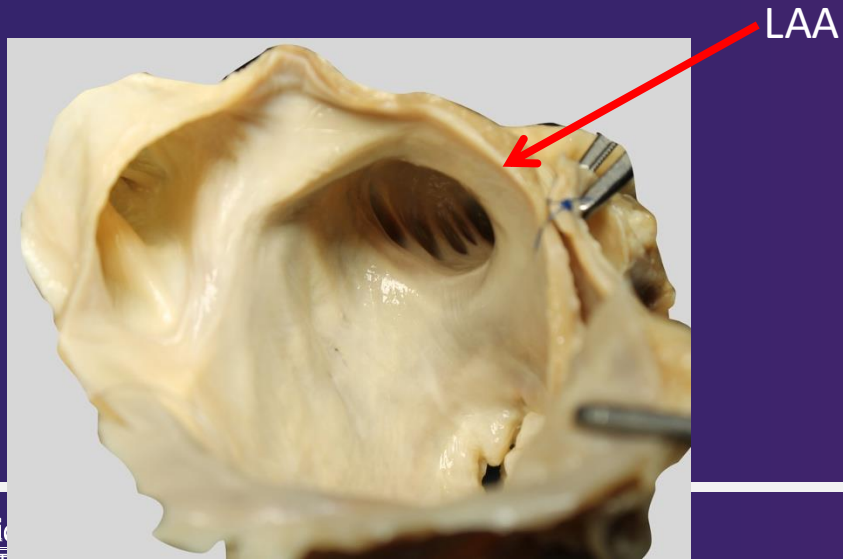
70 year old with stroke

- HTN
- CAD/PVD
- Amyloidosis
- Renal Insufficiency
- Myocardial Infarction
 - LV dysfunction EF 45%
- Atrial fibrillation



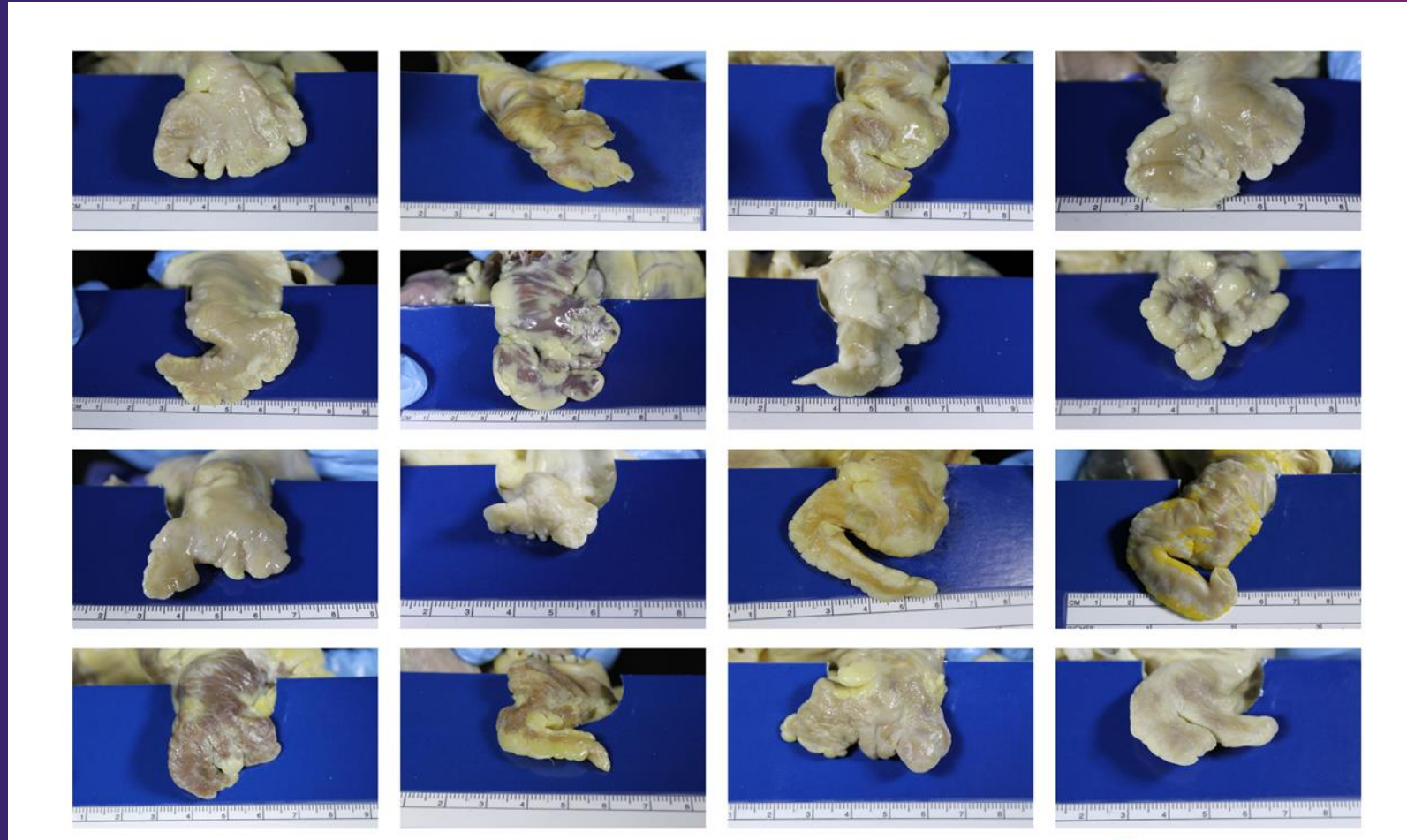
Mechanisms of Stroke with Atrial Fibrillation

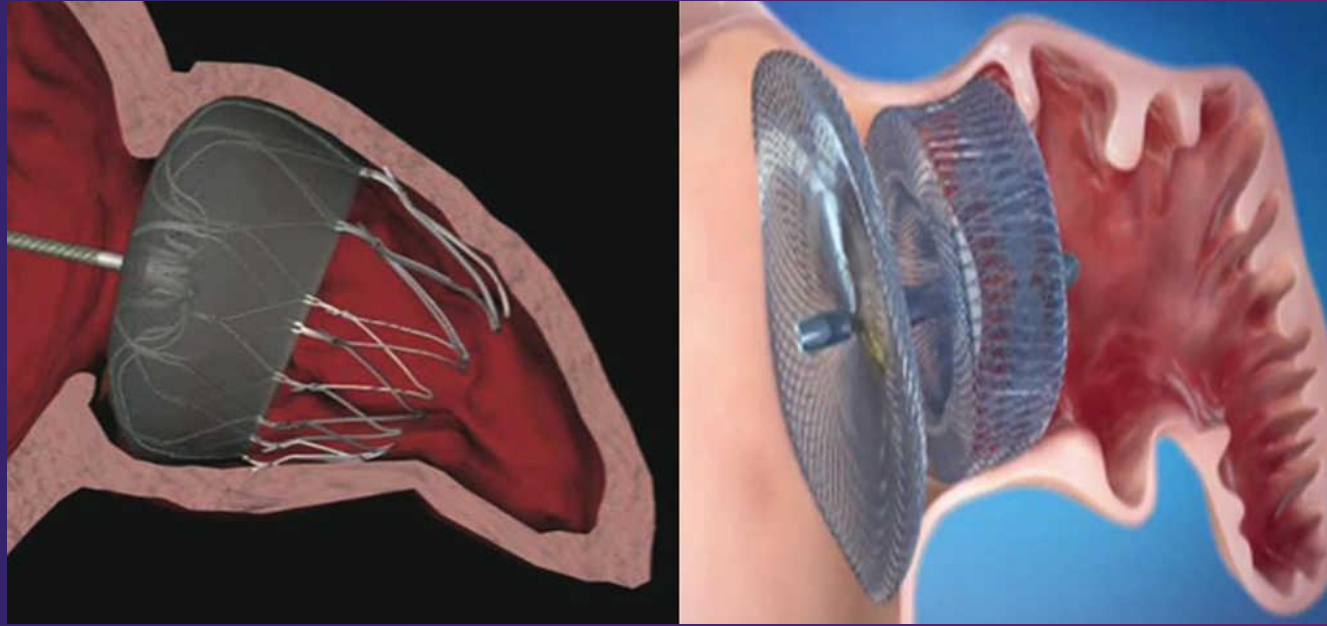
- Stasis of blood
 - Spontaneous echo contrast
 - Increased thrombus with larger left atria
- Left atrial appendage anatomy



Left atrial appendage anatomy and risk for embolism

- Morphology
 - Number of lobes
 - Shape of lobes
- Volume
- Tribeculation
- Flow velocity





Left Atrial Appendage Closure

Left atrial appendage closure

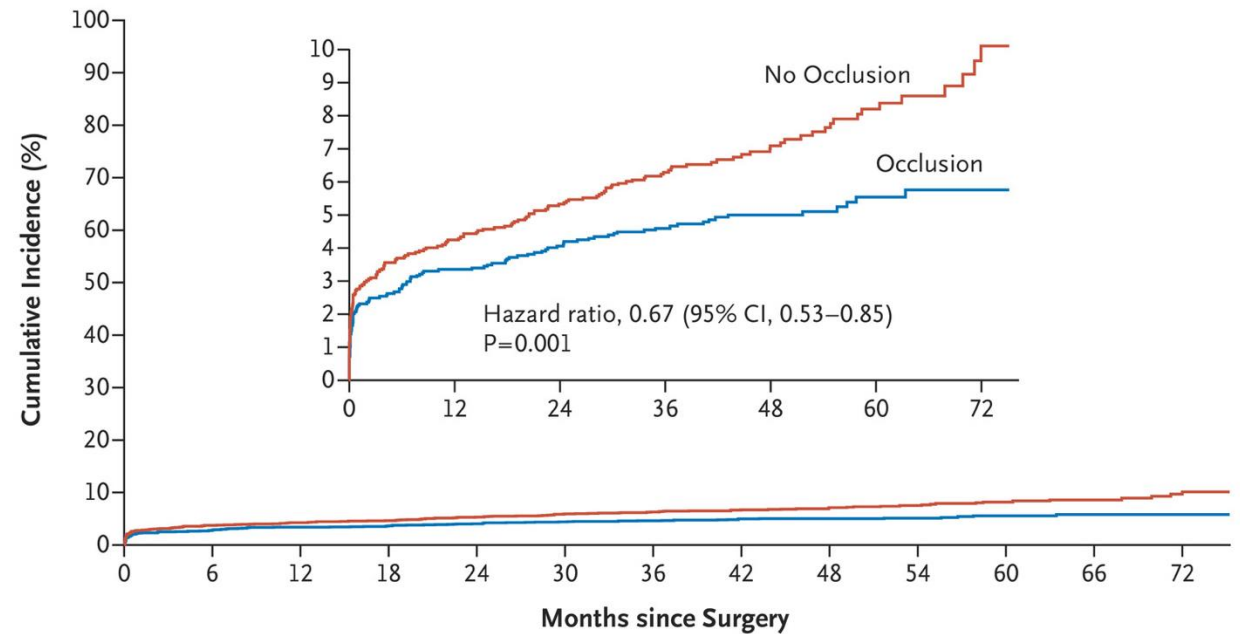
- Atricure, Tiger Paw



Cardiac Surgery and LAAO

- LAAOS III Study
- 4,811 patients with afib undergoing unrelated cardiac surgery randomized to LAAO or control
- Increase in bypass time 5 min
- Closure devices, cut and sew, or staples
- Anticoagulation at provider discretion (75-83% at 3 yrs)

Stroke or Arterial Embolism



No. at Risk

No Occlusion	2391	2134	2081	2030	1981	1897	1607	1291	1016	751	540	348	205
Occlusion	2379	2163	2105	2059	2020	1948	1642	1322	1046	781	550	349	199

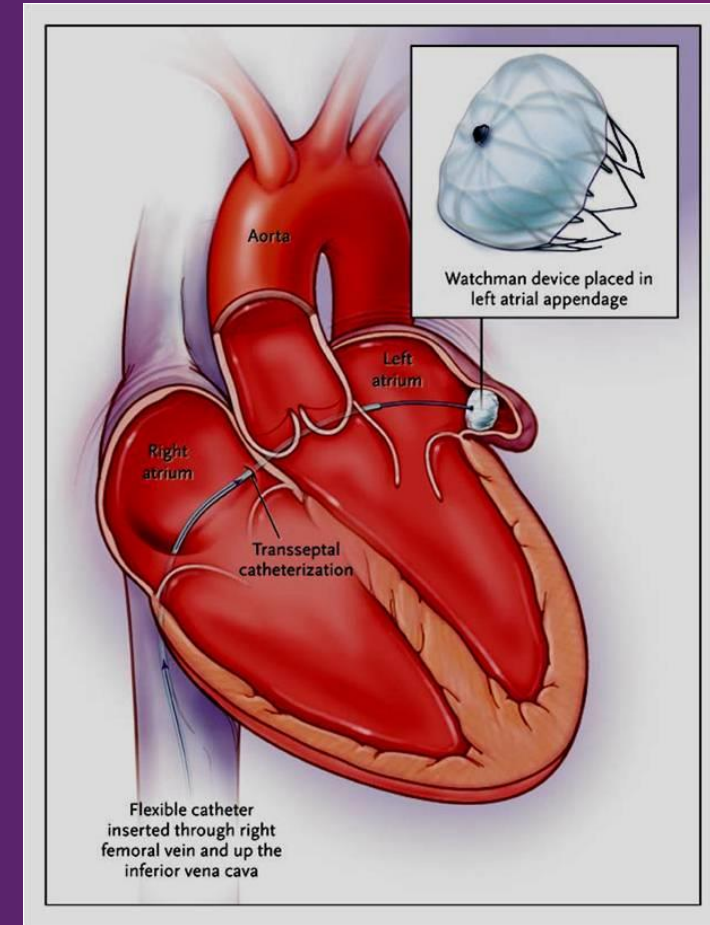
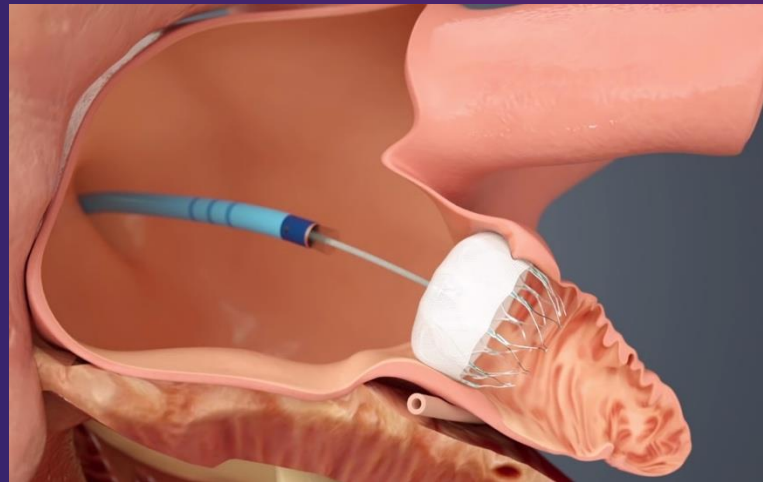
Watchman LAA closure device

160 Micron Membrane

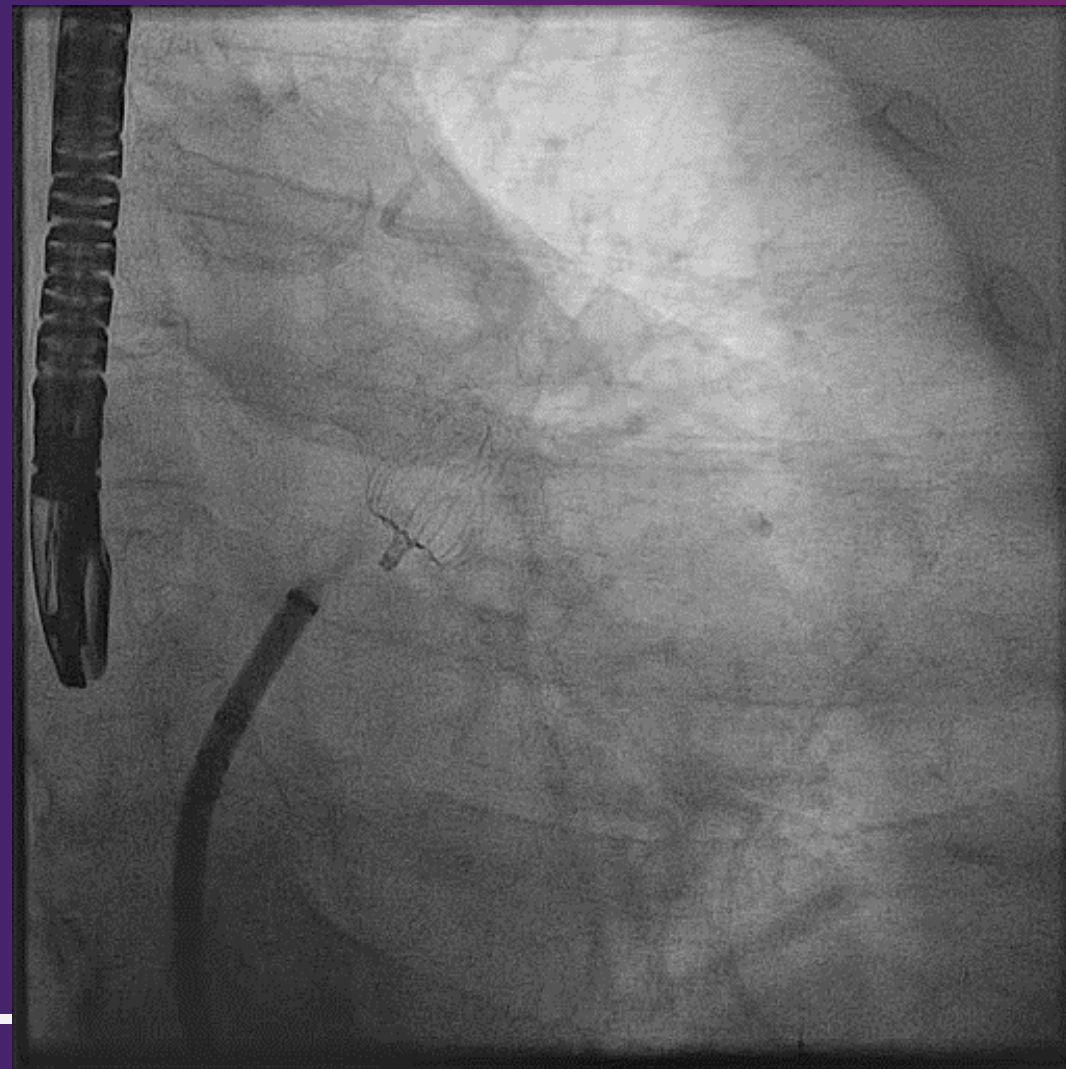
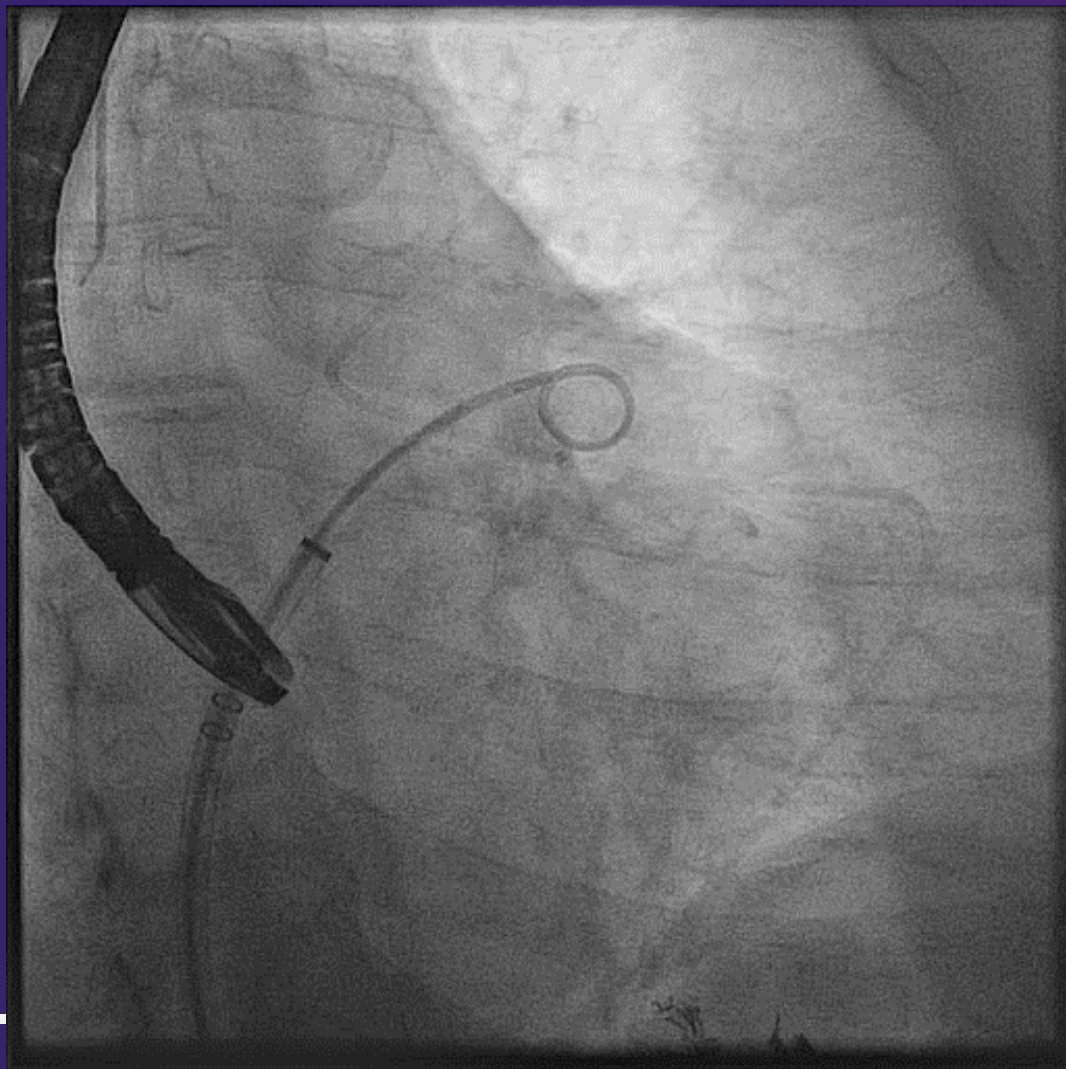


Nitinol frame with Anchors

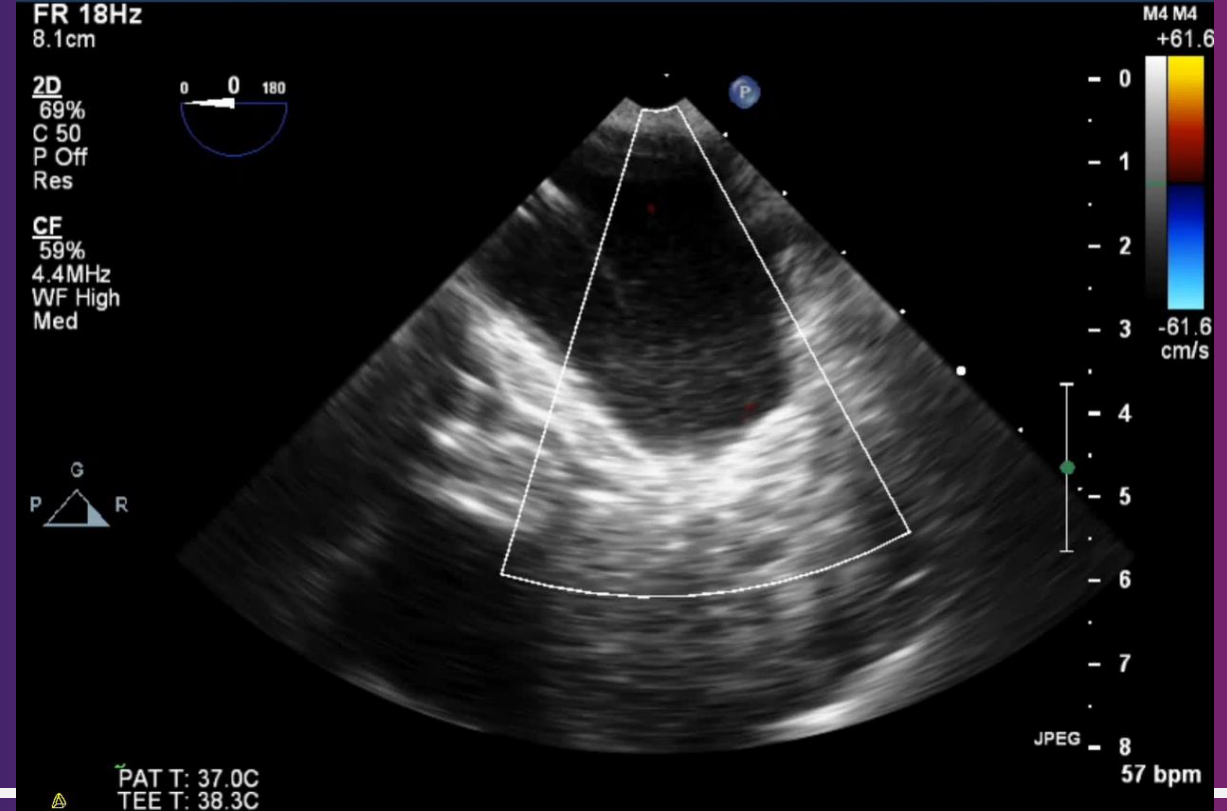
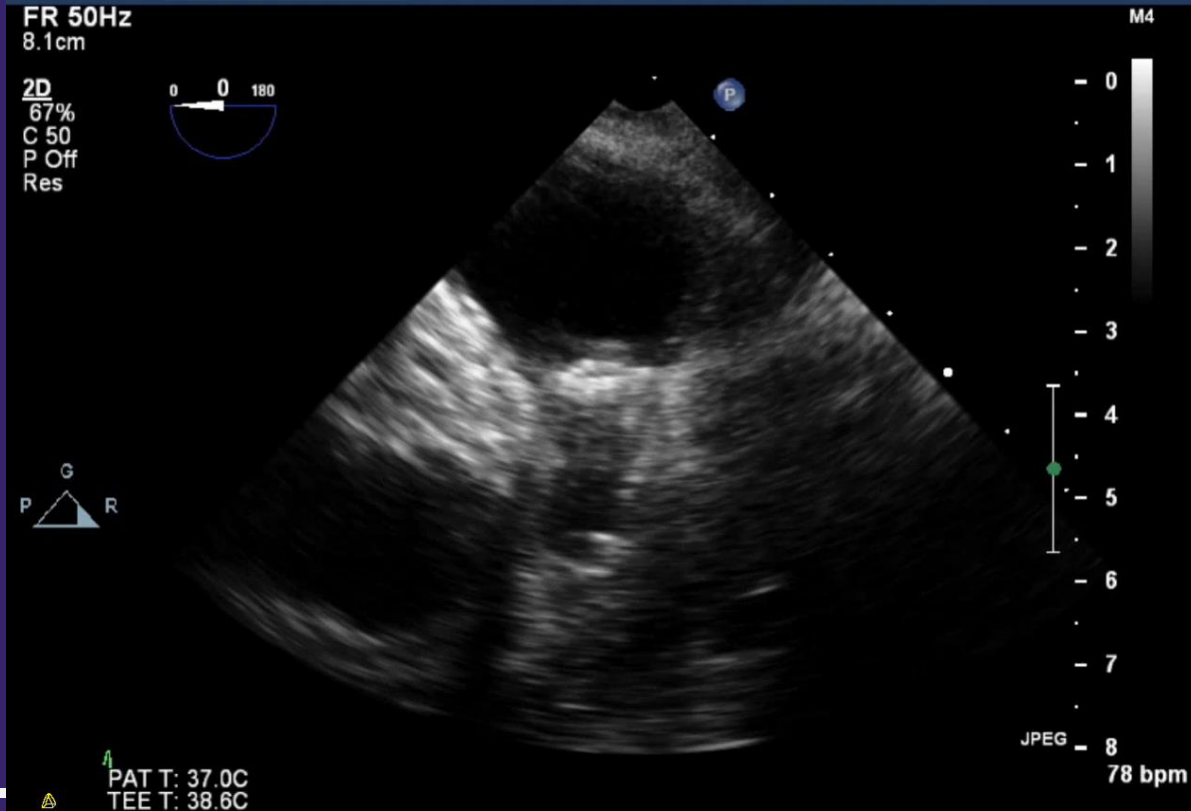
- 60 min procedure
- Moderate Sedation
- Overnight hospitalization?



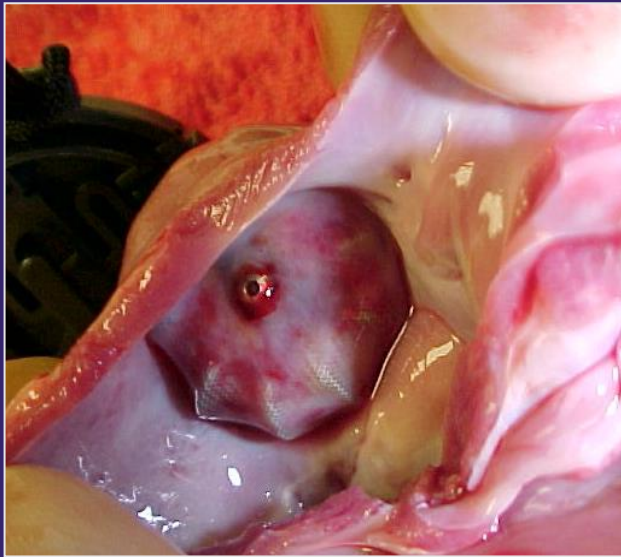
Left Atrial Appendage Closure



Left Atrial Appendage Closure



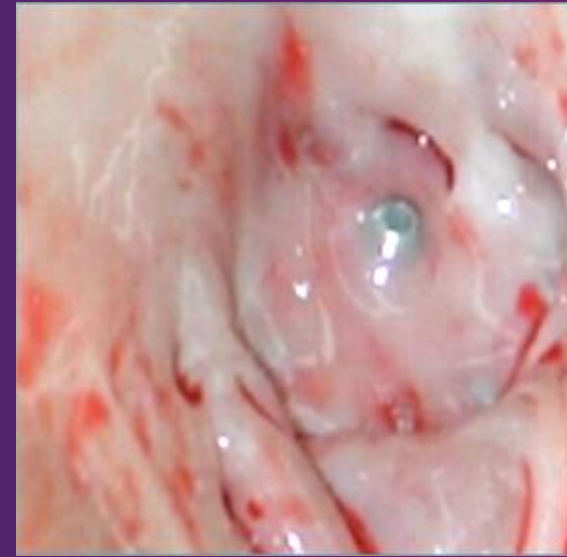
Left Atrial Appendage Closure



Canine model
30 day



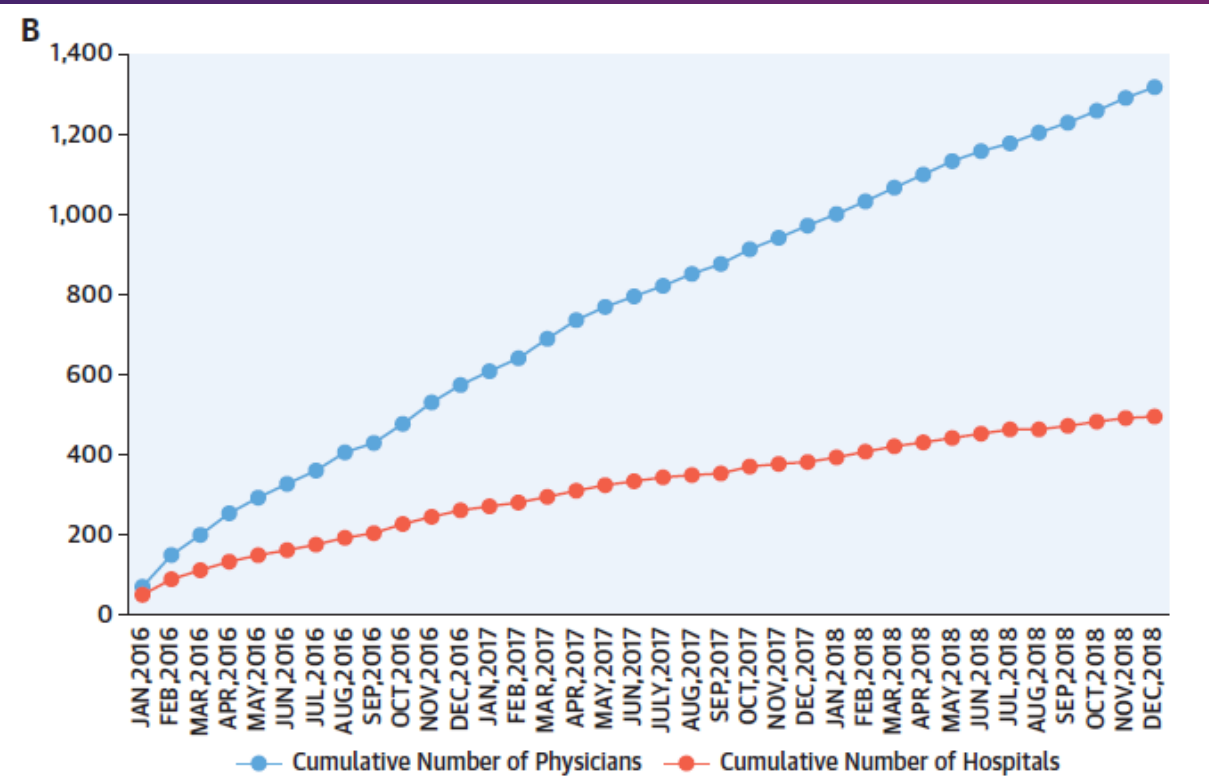
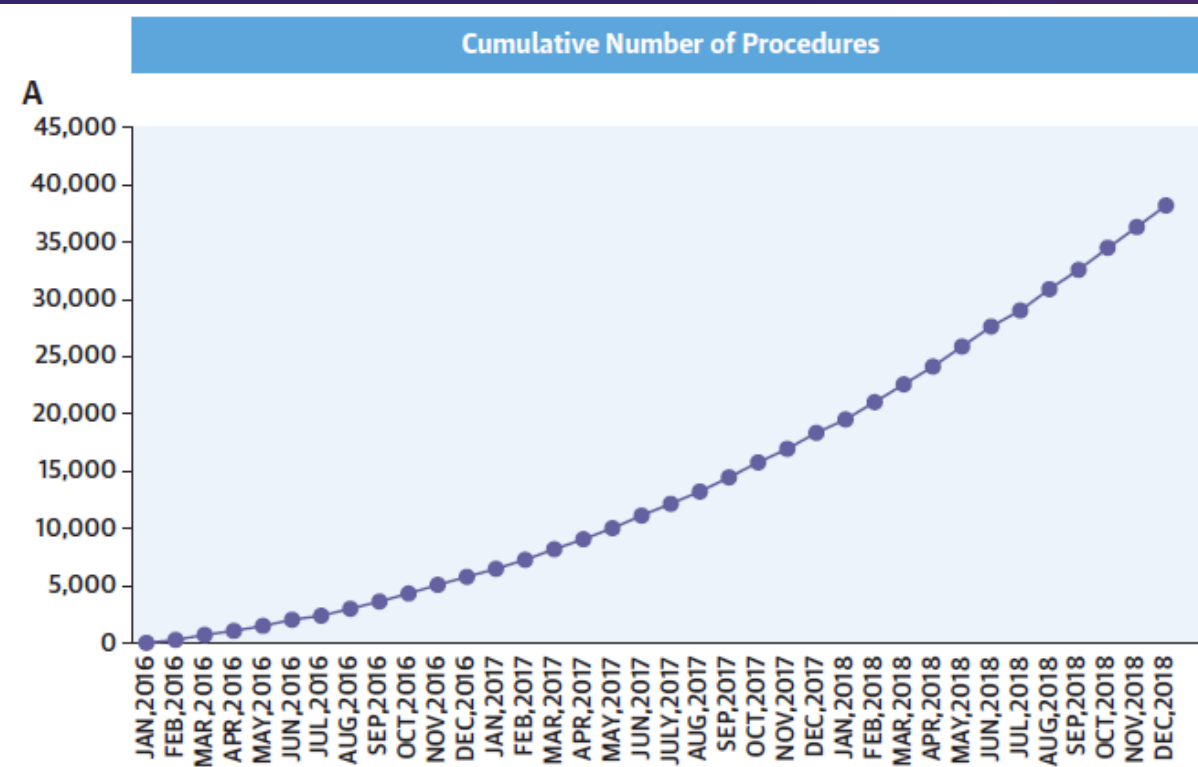
Canine model
45 day



Human pathology - 9 months
(non-device related death)

NCDR LAAO Registry

- 38,158 procedures performed (2016-2018)



Patient Characteristics (NCDR)

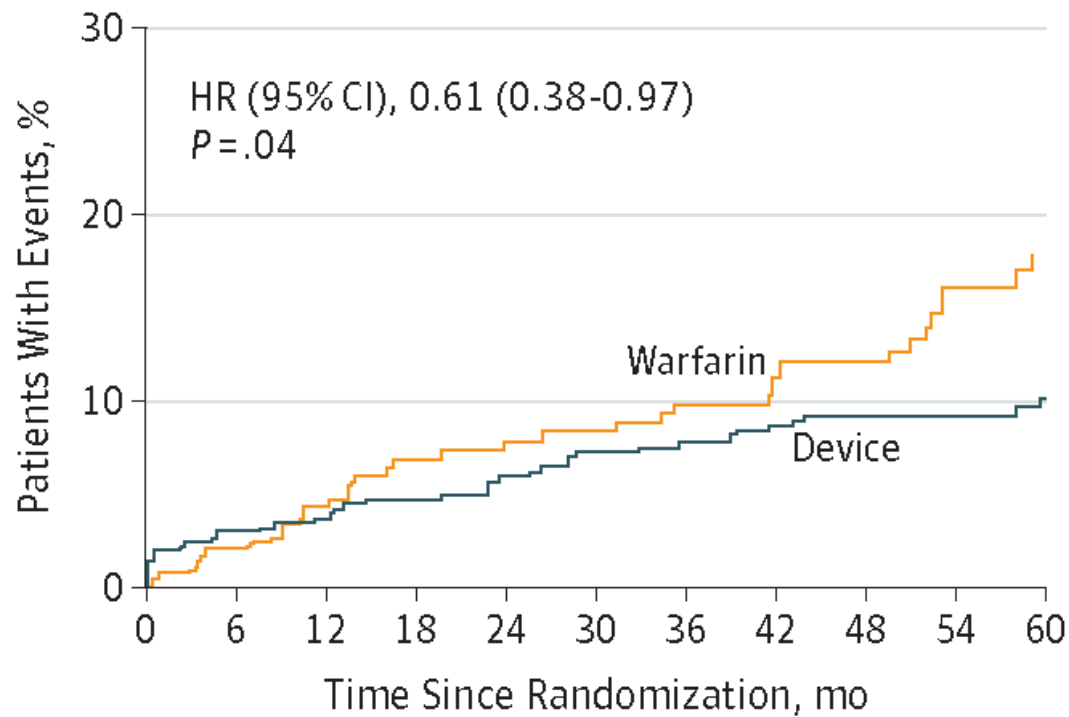
38,158 Patients Undergoing LAAO 2016-2018

Characteristic	
HAS-BLED	3.0 (SD 1.1)
Hemorrhagic Stroke	7.3%
Other Prior Bleeding	69.4%
• Intracranial	11.9%
• Epistaxis	6.4%
• Gastrointestinal	41.8%
• Other	14.9%
Fall risk	39.5%
Coagulopathy	0.9%

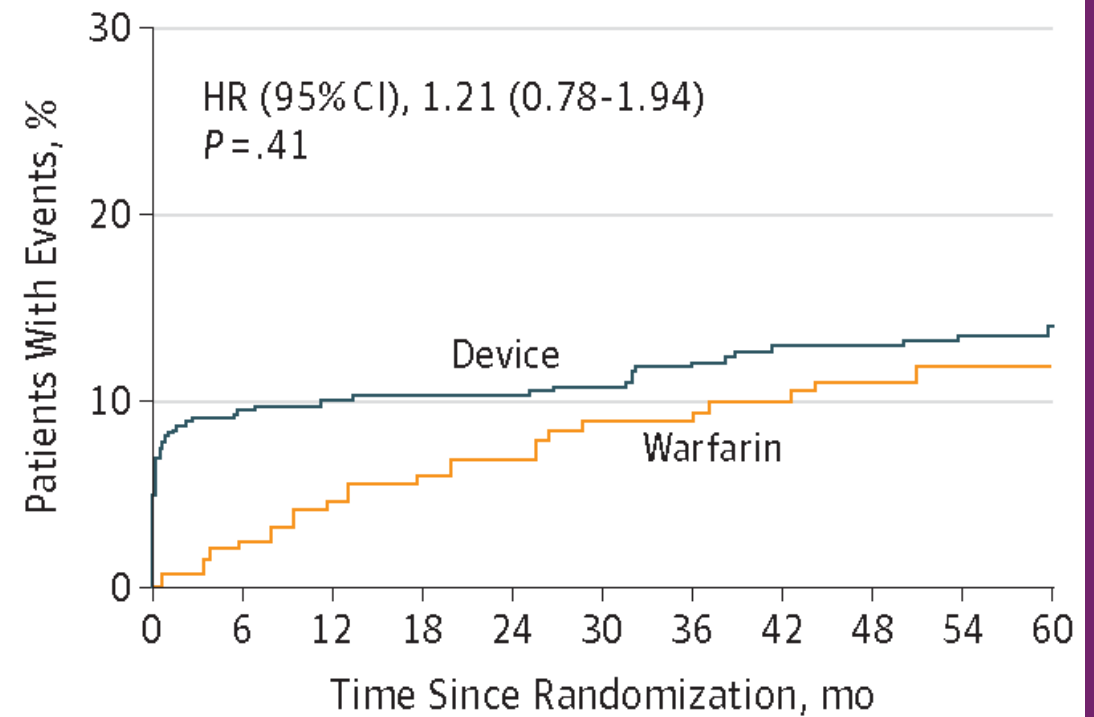
Left atrial appendage closure PROTECT AF: 4-year results

- 707 patients randomized 2:1 LAAC (Watchman) vs. Warfarin 2:1
- Endpoint: Stroke, embolism, death

A Primary efficacy end point



B Primary safety end point

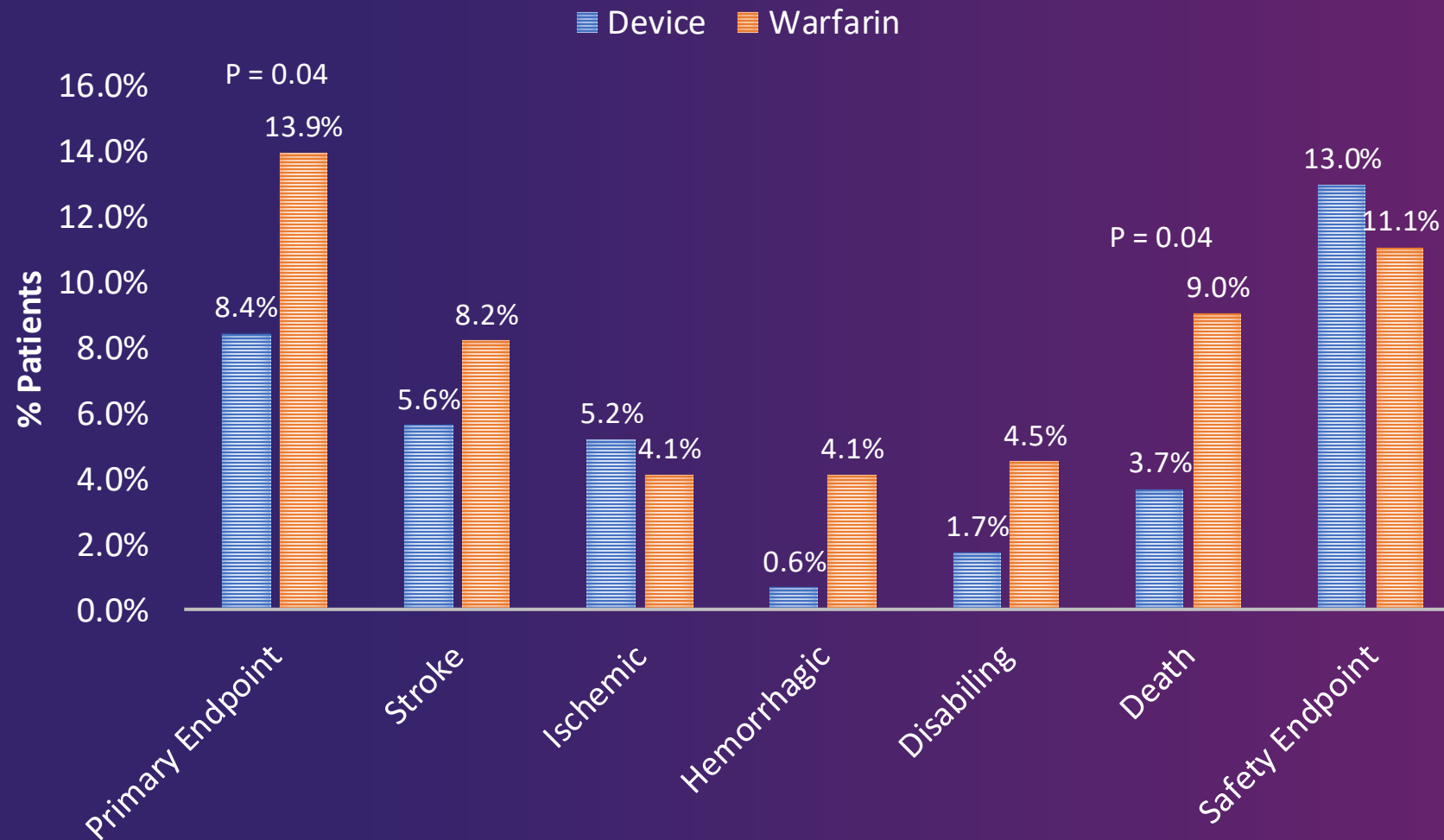


No. of patients

Device	463	398	382	370	360	345	337	327	317	285	196
Warfarin	244	230	218	210	200	188	173	159	147	121	87

Device	463	376	364	357	353	341	332	320	310	277	190
Warfarin	244	228	214	207	195	183	169	153	139	117	86

Left atrial appendage closure PROTECT AF: 4-year results

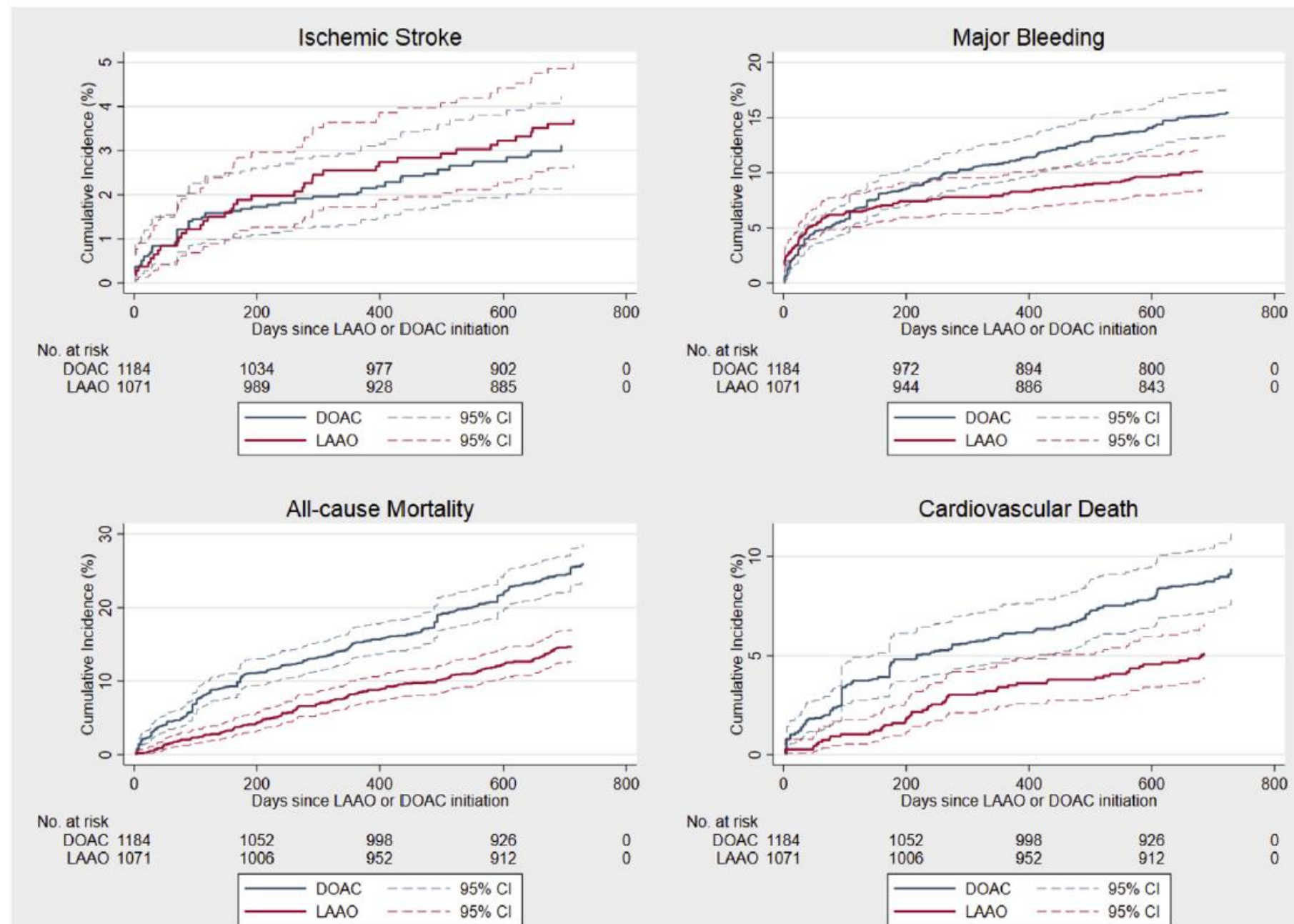


LAAO v. DOACs

- 1,078 patients with Amulet LAAO
- Propensity matched to 1,184 patients on DOACs
- 60% DOACs discontinued at 2.5 years

Nielsen-Kudsk JACC CI. 2021

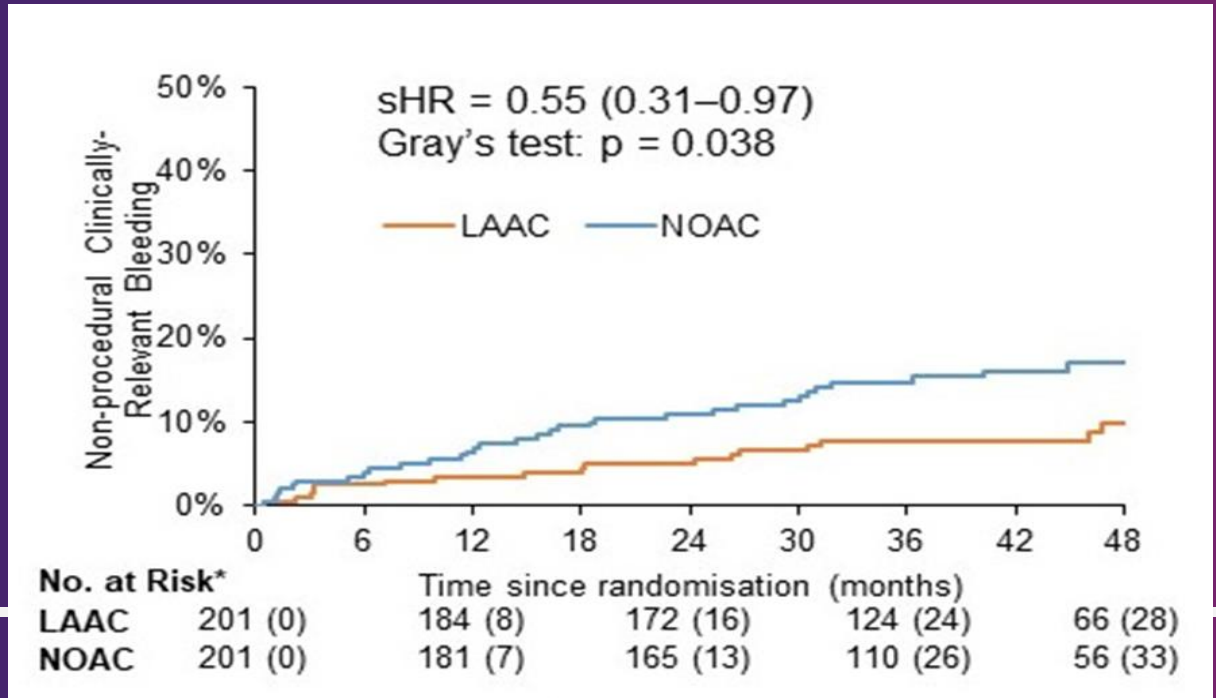
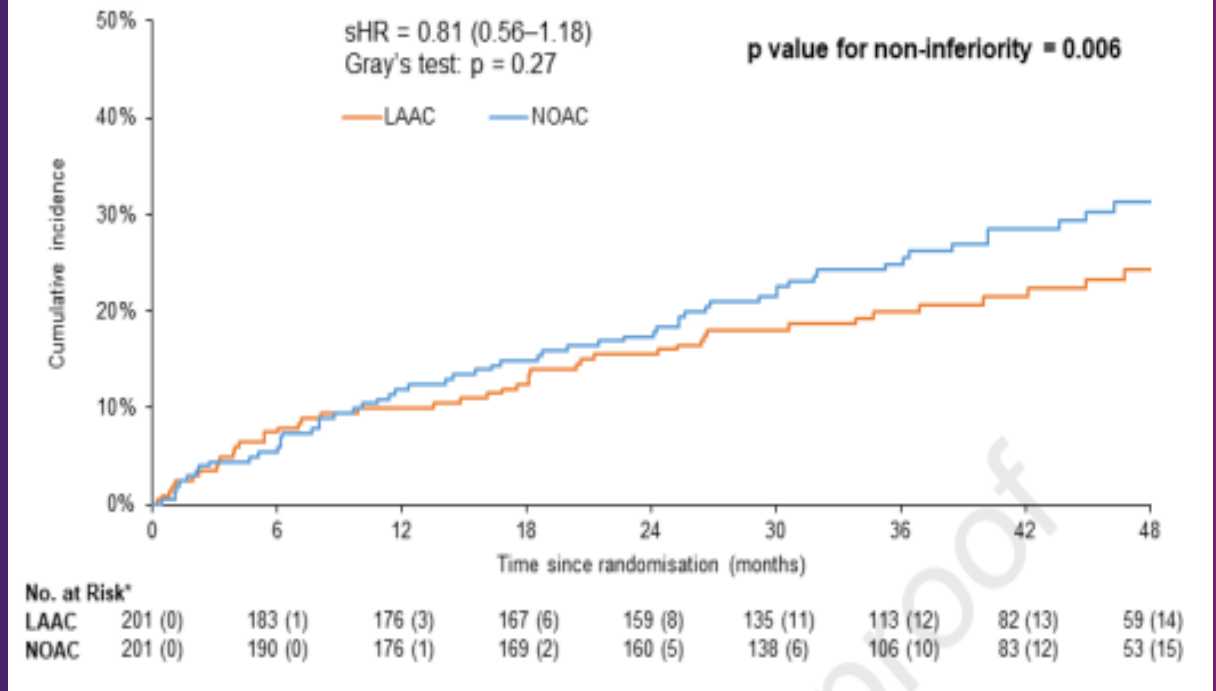
FIGURE 1 Secondary Clinical Outcomes



LAAC v. DOAC: PRAGUE 17

- Randomized open label trial (Watchman or Amulet) v. DOACs
- Post-LAAC (DAPT ~3 months)
- 402 patients
- Composite Endpoint:
 - Stroke/TIA
 - Systemic Embolism
 - Bleeding
 - CV Death
 - Procedural/Device Complications

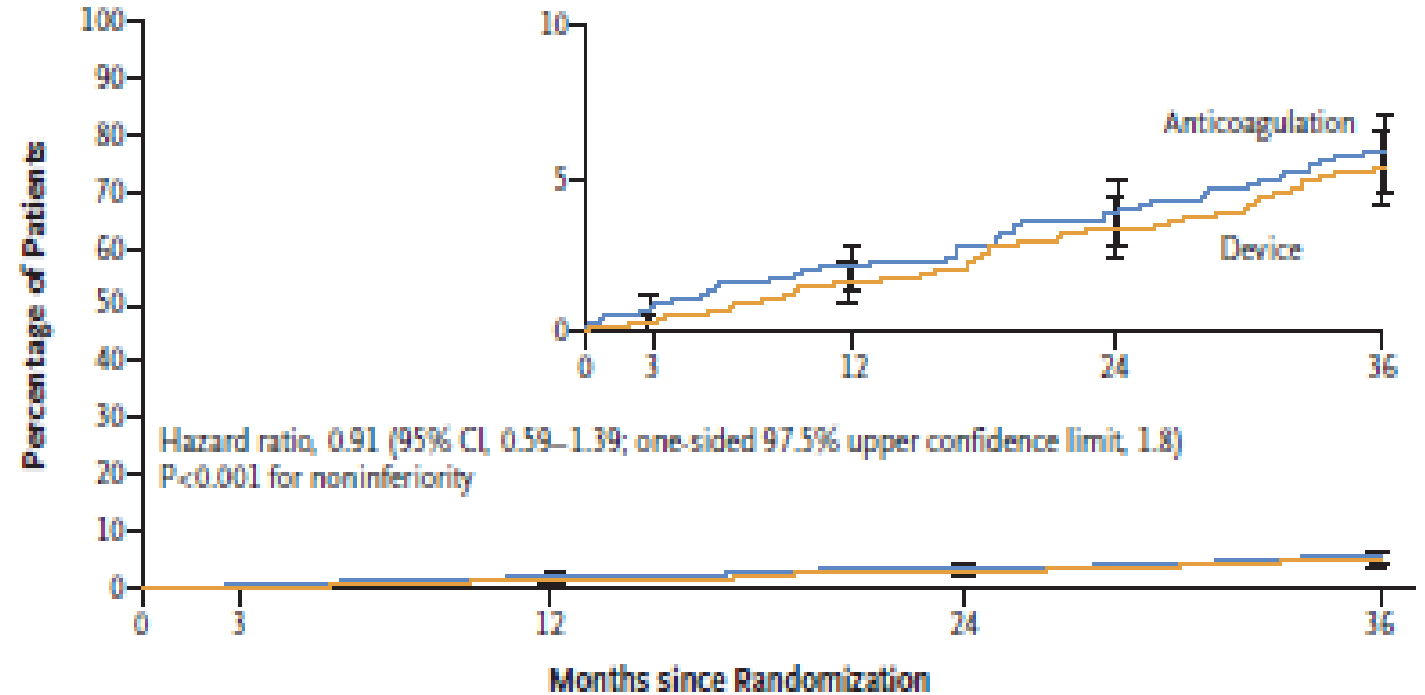
Osmancik P et al. JACC. 2021



OPTION Trial

- 1600 patients undergoing EP catheter ablation for afib
- CHA2DS2VASC ≥ 2 (men) ≥ 3 (women)
- Randomized to LAAC or anticoagulation
 - LAAC—12 mo antiocoag
- Average Age 69
- HAS-BLED 1.2 ± 0.8
- Concomitant 40.8%

B Composite of Death from Any Cause, Stroke, or Systemic Embolism (primary efficacy end point)

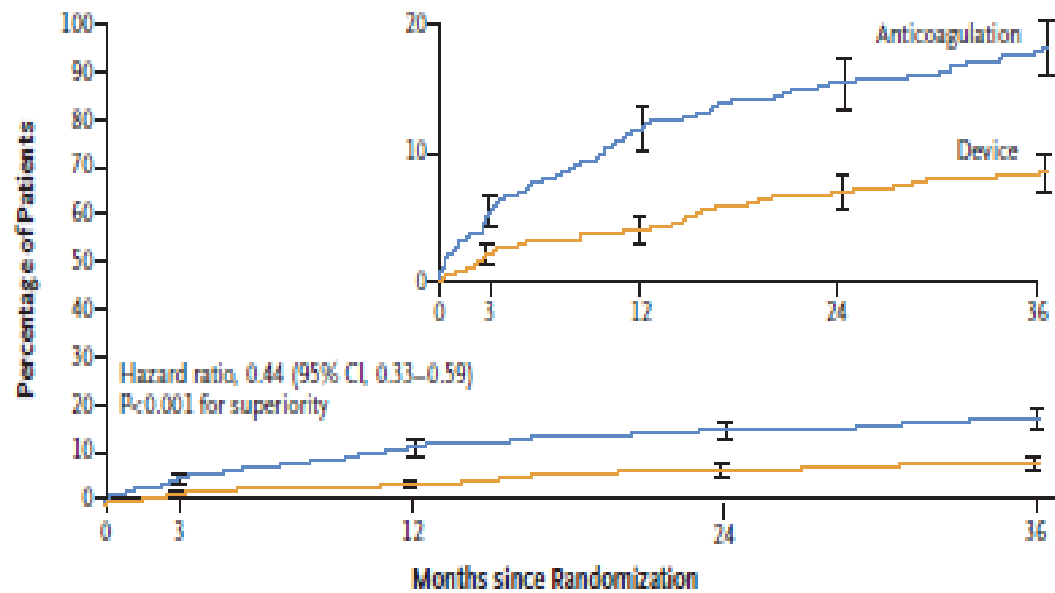


No. at Risk

Anticoagulation	797	775	754	740	701
Device	803	782	772	757	722

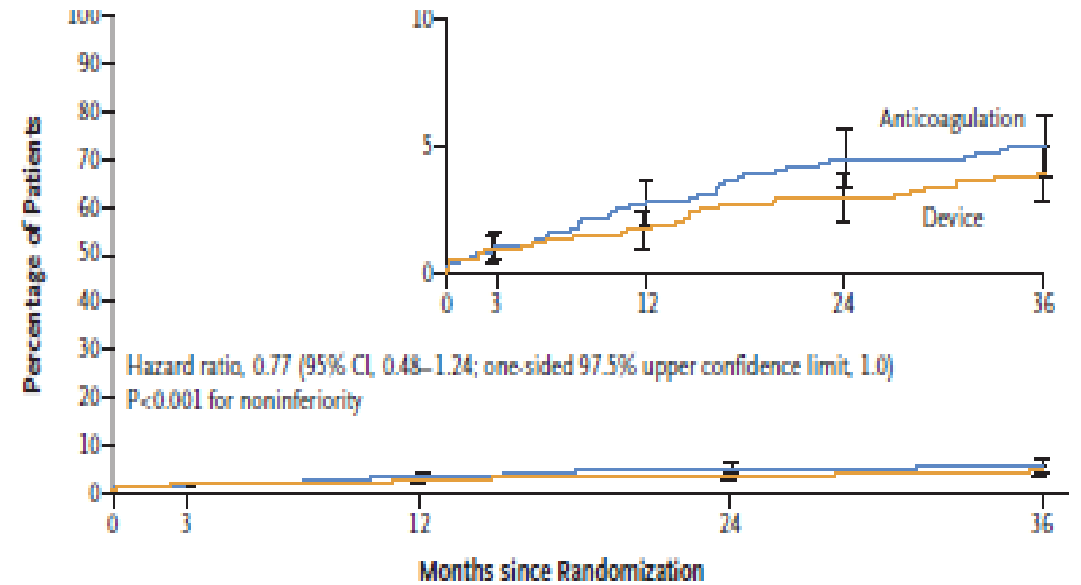
OPTION Trial

Non-Procedure-Related Major Bleeding or Clinically Relevant Nonmajor Bleeding (primary safety endpoint)



No. at Risk	0	3	12	24	36
Anticoagulation	797	753	701	657	598
Device	803	776	749	728	681

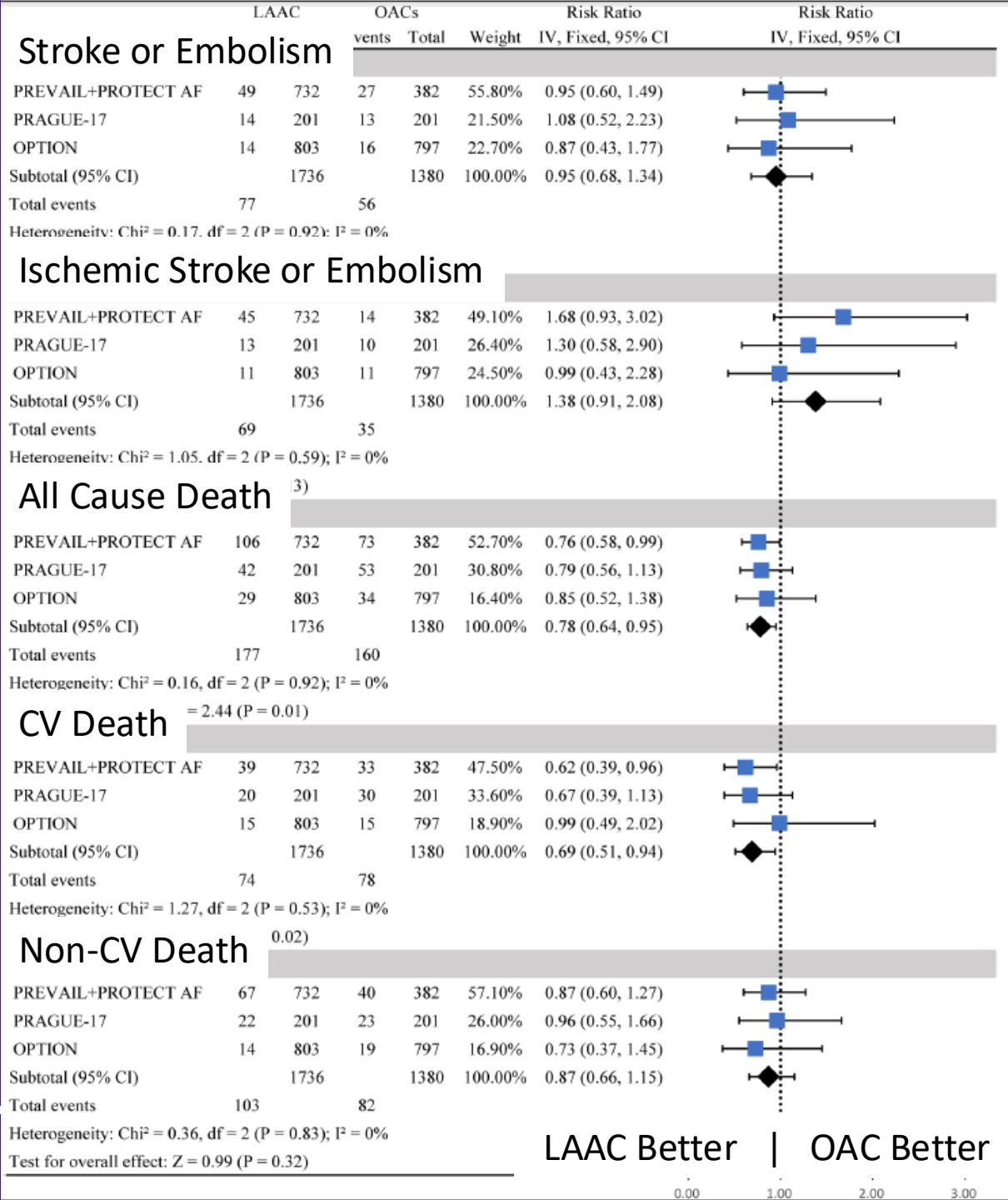
Major bleeding (including perioperative)



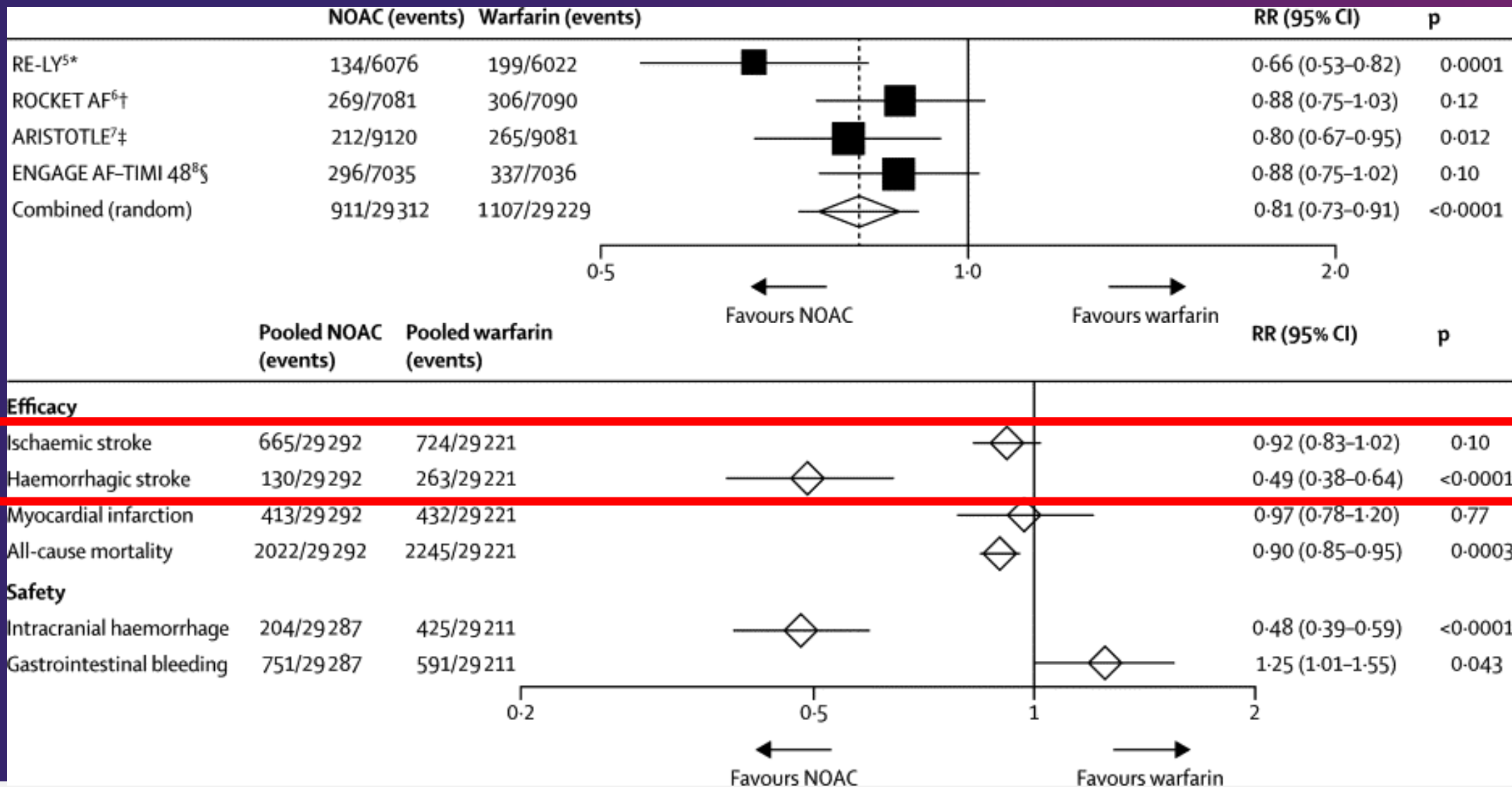
No. at Risk	0	3	12	24	36
Anticoagulation	797	772	749	726	678
Device	803	778	763	746	708

Meta-analysis

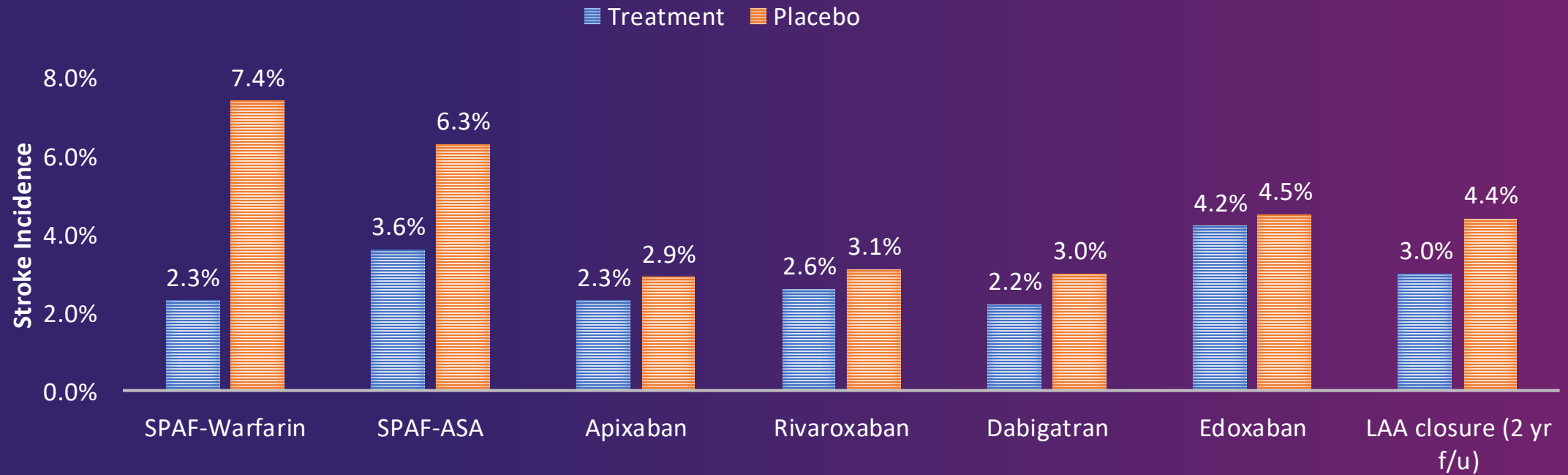
- PROTECT AF-PREVAIL
- PRAGUE 17
- OPTION



DOACs and Warfarin



Anticoagulation and stroke reduction



SPAF Investigators. Circulation. 1996; Patel MR. NEJM. 2011; Granger CB. NEJM. 2011; Giugliano RP. NEJM. 2013.

ACC/AHA/ACCP/HRS 2023 guidelines

- Gastrointestinal, pulmonary, or genitourinary bleeding
- Intracranial hemorrhage
- Recurrent falls with serious bleeding

6.5.1. Percutaneous Approaches to Occlude the LAA

Recommendations for Percutaneous Approaches to Occlude the LAA
Referenced studies that support the recommendations are summarized in the [Online Data Supplement](#).

COR	LOE	Recommendations
2a	B-NR	1. In patients with AF, a moderate to high risk of stroke (CHA ₂ DS ₂ -VASc score ≥ 2), and a contraindication (Table 14) to long-term oral anticoagulation due to a nonreversible cause, percutaneous LAAO (pLAAO) is reasonable. ¹⁻⁴
2b	B-R	2. In patients with AF and a moderate to high risk of stroke and a high risk of major bleeding on oral anti-coagulation, pLAAO may be a reasonable alternative to oral anticoagulation based on patient preference, with careful consideration of procedural risk and with the understanding that the evidence for oral anticoagulation is more extensive. ^{1-3,5,6}

Other IIB Recommendations

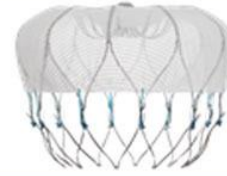
- Beta-blockers or calcium channel blockers for HTN in patients with angina
- Anticoagulation for afib in patients with ESRD
- PCI or CABG for stable coronary artery disease
- Valve Replacement for Asymptomatic Severe Aortic Valve Stenosis

PINNACLE FLX Trial

- Single arm study 400 patients
- Implant Success 98.8%
- Procedural safety endpoint: 0.5% stroke
 - No Tamponade, death, embolization
- Peri-device flow 0-5 mm
 - Implant 7.4%
 - 45 days 17.2%
 - 12 mo 10.5%
 - None were > 5 mm
- DRT at 12-months
 - 7 patients (1.8%)
 - 2 died (carotid dissection, limb ischemia)

Kar S. Circulation. 2021

First generation
percutaneous left
atrial appendage
closure device



Large size range
and shorter device



Next generation
percutaneous left
atrial appendage
closure device



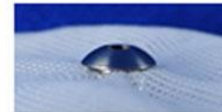
Distal tines folded back



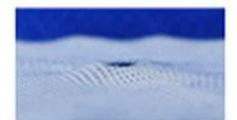
Greater number of struts



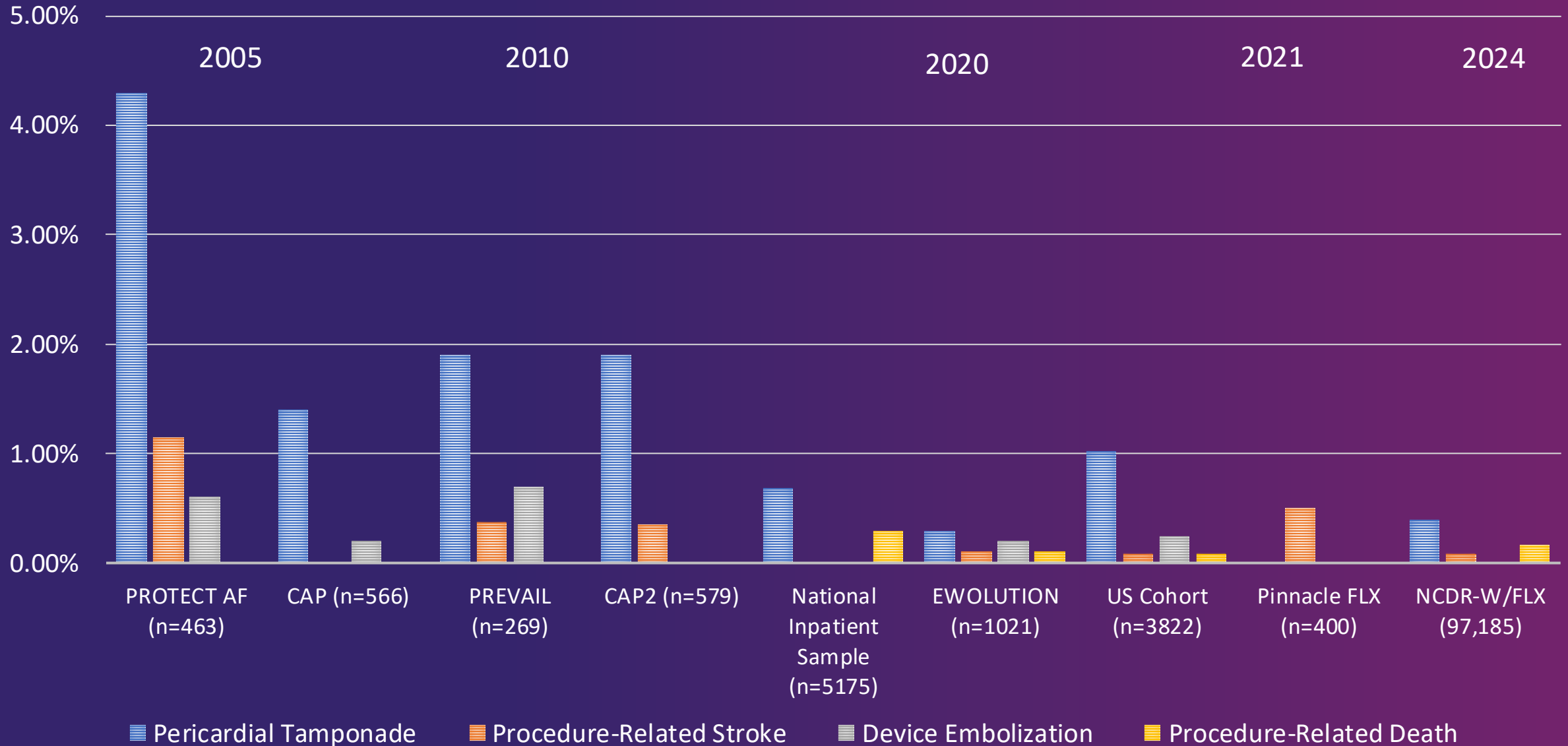
Dual-row
anchors



Reduced metal
exposure



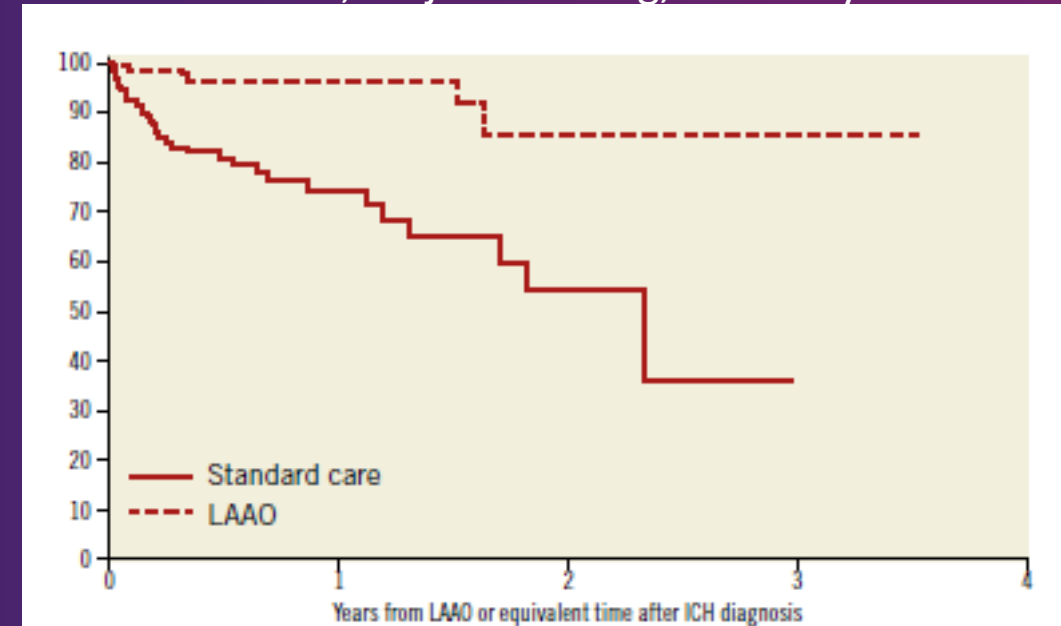
Procedural Complications



Intracranial Hemorrhage

- Patients with afib and ICH
- 151 with LAAO
- 151 on medical tx
 - Anticoag 20%
 - Antiplatelet 51%
 - No tx 31%
- Matched for stroke and bleeding risk

Stroke, major bleeding, mortality



Outcome	Hazard ratio (95% CI)
Ischaemic stroke/major bleeding/ all-cause mortality	0.16 (0.07-0.37)
Ischaemic stroke	0.21 (0.05-1.00)
Major bleeding	0.28 (0.09-0.85)
recurrent ICH	0.10 (0.01-0.81)
All-cause mortality	0.11 (0.03-0.51)

ICH: intracerebral haemorrhage; LAAO: left atrial appendage occlusion

Nielsen-Kudsk. Eurointervention. 2017

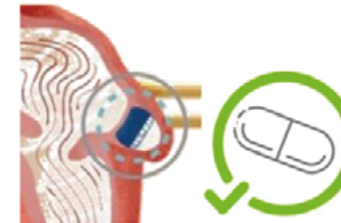
Ischemic stroke despite anticoagulation

- Retrospective study of patients with stroke while on anticoagulation
- 141 continued on anticoagulation, 95 treated with additional LAAC

The cumulative 3-year incidence of outcomes compared among the four subgroups



Strategy after AFIDA



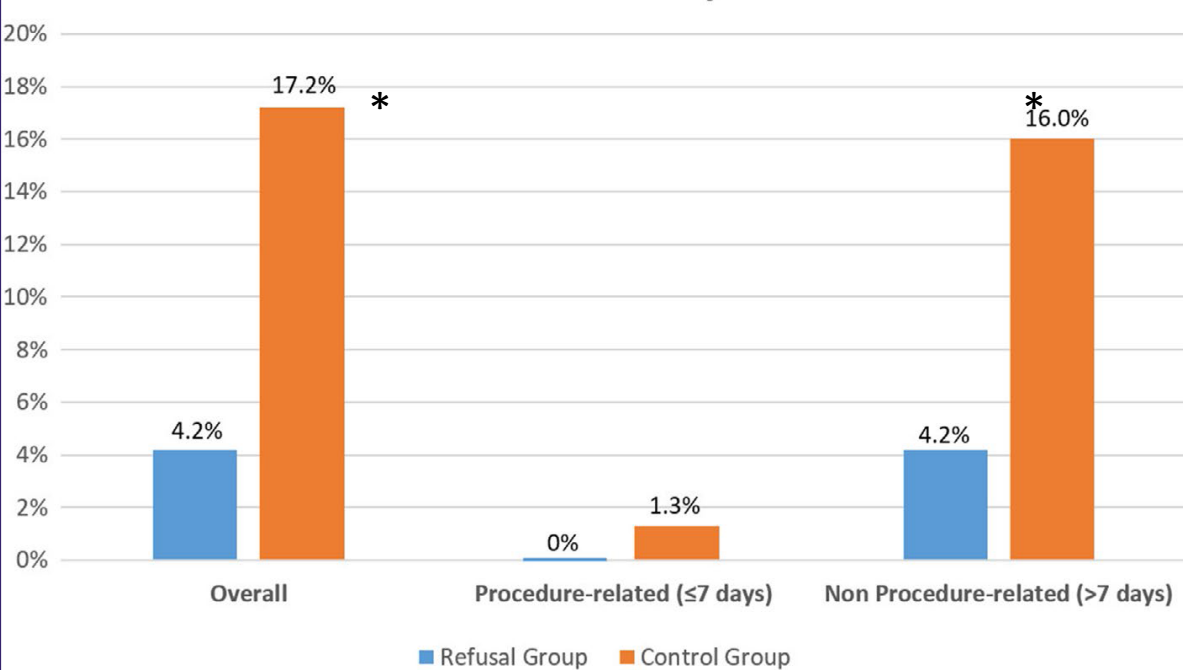
Cumulative 3-year incidence	Aggressive OAC	Conventional OAC	LAAC with OAC	LAAC without OAC
Ischemic stroke	15.6%	15.2%	7.2%	16.4%
Fatal/disabling stroke	14.1%	16.0%	0%	5.3%
Major bleeding	33.1%	12.6%	4.5%	5.9%
Fatal bleeding	10.6%	0%	0%	0%

LAAC may potentially prevent fatal or disabling stroke and fatal bleeding in AFIDA.

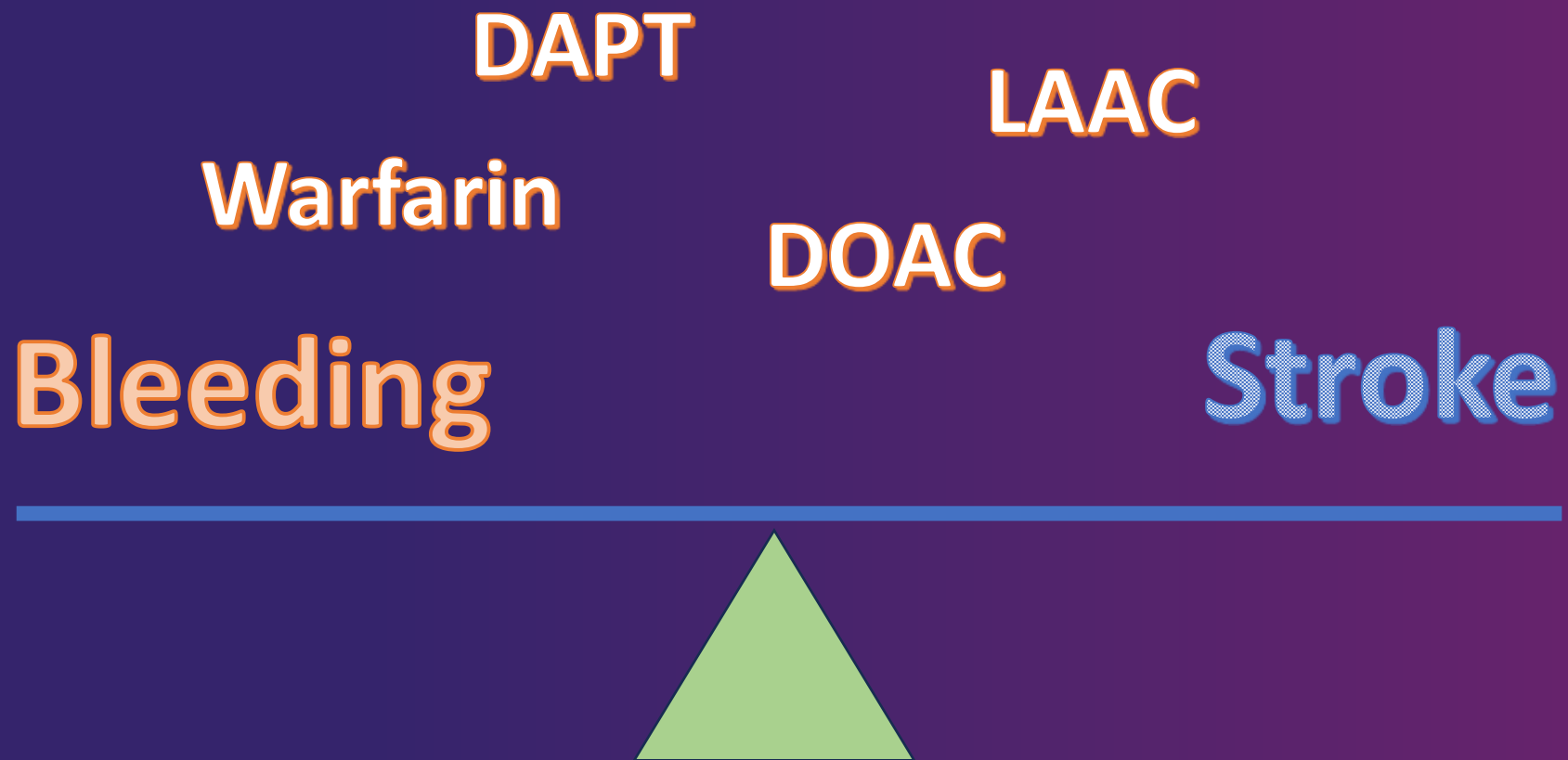
Patients who refuse to take anticoagulation

- Retrospective evaluation of 2649 patients undergoing LAAC
- 119 Patients who refused to take anticoagulation compared to controls

CV Death or Stroke or SE at 3 years after LAAC



	Observed events*	Expected events*	Standardized event ratio (95% CI)
Thromboembolic events	2.3	5.9 [†]	0.38 (0.10–1.40)
Major bleedings	1.9	3.6 [‡]	0.53 (0.13–2.18)
Nonprocedural major bleedings	1.2	3.6 [‡]	0.35 (0.06–1.99)



Atrial Fibrillation

PUTTING IT ALL TOGETHER

Atrial Fibrillation: Putting It Together

1



ASSESS INDIVIDUAL RISK FACTORS

- | | |
|----------------|-------------------|
| Hypertension | Physical activity |
| Hyperlipidemia | Sleep apnea |
| Diabetes | Obesity |
| Alcohol intake | Smoking |

Initiate anticoagulation & antiarrhythmic medication as per guidelines

2

INITIATE LIFESTYLE CHANGES

Prescribe Mutually Agreed Achievable Targets for Each Risk Factor

REGULAR EVALUATION OF PROGRESS

Determine Barriers & Set New Goals

3

IF SYMPTOMATIC AF PERSISTS

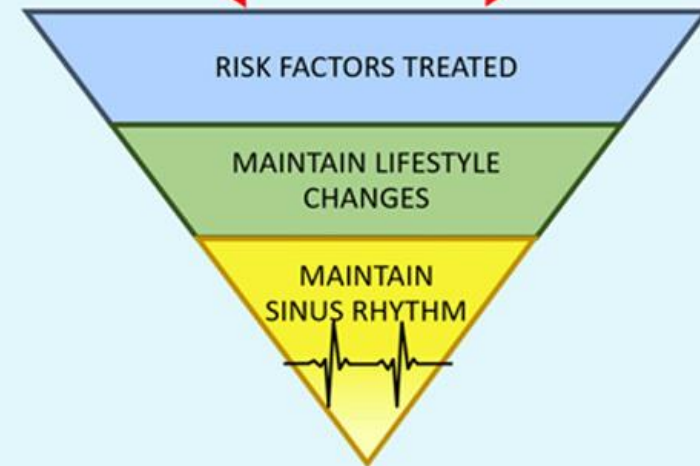
Consider AF Ablation and/or AAD as per AF guidelines

IF NO SYMPTOMATIC AF

Consider AAD if required as per AF guidelines

CONTINUE RISK FACTOR MANAGEMENT

4



Atrial Fibrillation: Putting It Together

- Control rate (if needed)
- Modify risk factors (HTN, DM, CV risk, CHF, Obesity/Exercise, alcohol, tobacco)
- Rule out other structural heart problems (ECHO)
- Persistent Atrial Fibrillation or Symptoms
 - Consider rhythm control
- Manage Stroke Risk
 - CHA2DS2-VASC ≥ 2
 - Unable to tolerate? Consider LAAC

Refer to cardiology

Thank You

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- UW Structural heart

206-598-VALV (8258)