Atrial fibrillation during ACS

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Disclosures

- Medtronic
- Boston Scientific
- Pfizer
- Rafa
- Taro
- Bayer
- Sanofi Aventis

AF and ACS

- Epidemiology of AF in ACS
- Outcome: Acute and Long-Term
- Association with Stroke
- Management: Acute and Long-Term
- Anti-Coagulation in the ACS patient

Epidemiology

European Heart Journal (1992) 13, 45–50

Long-term prognosis of patients with paroxysmal atrial fibrillation complicating acute myocardial infarction

S. Behar, Z. Zahavi, U. Goldbourt, H. Reicher-Reiss and the SPRINT Sudy Group (see Appendix)

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Table 2 Characteristics of patients with paroxysmal atrial fibrillation complicating acute myocardial infarction

	PAF (n = 577)		Others (n = 5075)		*P* value
	no.	%	no.	%	
Males	411	71·2	3777	74·4	NS
Age (mean)	68·3 years		62·2 years		<0·0001
Past history					
MI	148	25·6	1223	24·1	NS
Hypertension	250	43·3	1998	39·4	NS
MI location					
Anterior	275	47·7	2190	43·2	<0·01
Inferior	217	37·6	1999	39·4	NS
non Q MI	35	6·1	400	7·9	NS
Lateral	21	3·6	236	4·6	NS
Hospital complications					
CHF	405	70·2	1896	37 4	<0·0001
VF	70	12·1	328	6 5	<0·0001
VT	120	20·8	852	16·8	<0·01
AV Block 2° or 3°	86	14 9	540	10·6	<0·001
Pericarditis	89	15·4	400	7·9	<0·0001
Systemic emboli	10	1·7	30	0·6	<0·001
Enzymes (≥ 4 times upper normal limit)					
CPK	319	55·3	2682	52·8	NS
SGOT	307	53·2	1985	39·1	<0·0001
LDH	113	19·6	567	11·2	<0 0001

Significance of Paroxysmal Atrial Fibrillation Complicating Acute Myocardial Infarction in the Thrombolytic Era

Michael Eldar, MD; Menachem Canetti, MD; Zeev Rotstein, MD; Valentina Boyko, MSc; Shmuel Gottlieb, MD; Elieser Kaplinsky, MD; Solomon Behar, MD; for the SPRINT and Thrombolytic Survey Groups

TABLE 1. Characteristics of 2866 TE Patients in a Comparison of Patients With (+) and Without (−) PAF

	PAF+ (n=255), No. (%)	PAF− (n=2611), No. (%)	*P*
Age, mean±SD y	70±11	62±12	<.001
Age≥70 y, n (%)	143 (56)	821 (31)	.001
Female, n (%)	95 (37)	647 (25)	.001
Diabetes mellitus, n (%)	82 (32)	654 (25)	.01
Past AMI, n (%)	84 (33)	704 (27)	.04
Hypertension, n (%)	117 (46)	1014 (39)	.03
Anterior AMI, n (%)	120 (47)	1189 (46)	NS
CHF on admission, n (%)	138 (55)	645 (26)	.001
Angina pectoris, n (%)	97 (38)	869 (33)	NS
Stroke in CCU, n (%)	10 (3.9)	16 (0.6)	.001

Circulation. 1998;97:965-970

Incidence and prognostic significance of atrial fibrillation in acute myocardial infarction: the GISSI-3 data

Table 1 Clinical characteristics of patients with or without atrial fibrillation (AF)

Characteristic	*Without AF (n=16 363)*	*With AF (n=1386)*	*p Value*
Women	21.1	27.7	< 0.0001*
Age >70 years	24.8	46.7	< 0.0001*
Time from symptom onset (hours)			
< 3	58.4	56.6	
> 3–6	20.9	21.9	NS†
> 6–12	12.3	13.0	
> 12–24	8.4	8.5	
Killip class at randomisation			
1	86.0	74.3	
2	12.7	23.7	< 0.0001†
3	0.7	1.9	
Site of infarction			
Anterior	29.0	27.8	
Infero-posterior	34.2	33.0	
Multiple location	3.5	3.2	< 0.00001*
Non-Q wave	19.6	16.8	
Undefined	9.7	15.1	
Not reported	3.9	4.1	
Heart rate at randomisation (beats/min)			
< 60	11.5	9.3	
60–79	50.9	38.7	< 0.00001†
80–100	33.3	39.2	
> 100	4.2	12.8	
Systolic blood pressure at randomisation (mm Hg)			
100–120	39.5	36.7	
121–150	46.2	46.8	< 0.03†
> 150	14.4	16.6	
History			
Previous MI	13.2	15.4	< 0.05*
Previous angina	34.2	34.8	NS*
Treated hypertension	28.9	36.6	< 0.001*
Diabetes	15.2	18.5	< 0.01*

Heart 2001;86:527–532

Prognostic Significance of Atrial Fibrillation/Atrial Flutter in Patients With Acute Myocardial Infarction Treated With Percutaneous Coronary Intervention

Kunihiro Kinjo, MD, Hiroshi Sato, MD, PhD, Hideyuki Sato, MD, Yozo Ohnishi, MD, Eiji Hishida, MD, Daisaku Nakatani, MD, Hiroya Mizuno, MD, Masatake Fukunami, MD, Yukihiro Koretsune, MD, Hiroshi Takeda, MD, and Masatsugu Hori, MD, on behalf of the Osaka Acute Coronary Insufficiency Study (OACIS) Group

TABLE 3 Independent Predictors of Atrial Fibrillation and/or Atrial Flutter After Acute Myocardial Infarction

Characteristic	Chi-square*	OR (95% CI)	p Value
Age	39.6	1.06 (1.04–1.07)	<0.001
Men	8.36	1.89 (1.23–2.90)	0.004
Diabetes mellitus	0.22	1.09 (0.77–1.53)	0.642
Systemic hypertension	0.04	1.04 (0.74–1.44)	0.841
Current smoker	0.92	0.84 (0.60–1.19)	0.339
Prior myocardial infarction	3.36	1.49 (0.97–2.29)	0.067
Prior cerebrovascular disease	2.81	1.55 (0.93–2.58)	0.094
Systolic blood pressure <100 mm Hg	2.51	1.43 (0.92–2.24)	0.113
Heart rate ≥100 beats/min	24.5	3.00 (1.94–4.64)	<0.001
Killip class IV	4.68	2.06 (1.07–3.94)	0.030
Time to presentation >12 h	1.94	0.68 (0.40–1.17)	0.163
Left anterior descending coronary artery disease	0.64	0.87 (0.62–1.22)	0.423
TIMI flow grade 3	0.09	0.94 (0.62–1.42)	0.766
Multivessel disease	0.01	0.99 (0.76–1.28)	0.929
Stent use	0.01	0.98 (0.71–1.36)	0.921

*Wald's chi-square value.
CI = confidence interval; OR = odds ratio; other abbreviation as in Table 2.

Am J Cardiol 2003;92:1150–1154

Atrial fibrillation in acute myocardial infarction: a systematic review of the incidence, clinical features and prognostic implications

Joern Schmitt[1†], Gabor Duray[1†], Bernard J. Gersh[2], and Stefan H. Hohnloser[1*]

Table 2 Incidence and predictors of AF after AMI

Author/Study	Publication year	AF—incidence after AMI (%)	Predictors of AF in AMI	Treatment modality of AMI
Behar/Sprint Prognosis[20]	1992	9.9	Age >70 years ($P < 0.01$), female gender ($P < 0.01$), diabetes mellitus ($P = 0.01$), CHF on admission ($P < 0.01$)	n.a.
Madias[37]	1996	11.2	Higher age (OR 1.08, 95% CI 1.02–1.06), left ventricular hypertrophy (OR 2.30, 95% CI 1.65–2.96)	n.a.
Crenshaw/GUSTO I[19]	1997	7.9	Older age, increased heart ate, higher Killip class, lower systolic blood pressure	Thrombolysis
Eldar/Sprint[18]	1998	8.9	Age >70 years ($P < 0.01$), female gender ($P < 0.01$), diabetes mellitus ($P = 0.01$), CHF on admission ($P < 0.01$)	Thrombolysis vs. no reperfusion Rx
Pedersen/TRACE[33]	1999	15	Age, female gender, hypertension, diabetes, prior CHF, smoking, no thrombolysis	80% thrombolysis
Rathore[10]	2000	11.3	Age, female gender, hypertension, diabetes, prior AMI or CHF, higher Killip at enrolment	n.a.
Wong/GUSTO III[17]	2000	6	Higher age, female gender, hypertension, diabetes mellitus, higher Killip class, CHF	Thrombolysis
Pizzetti/GISSI III[28]	2001	6.1	Female gender ($P < 0.001$), age >70 years ($P < 0.001$), Killip class >2 ($P < 0.001$), higher heart rate ($P < 0.001$), hypertension ($P < 0.001$), diabetes ($P < 0.01$)	Thrombolysis
Goldberg[21]	2002	13.2	Higher age ($P < 0.001$), hypertension ($P < 0.05$), heart failure ($P < 0.001$)	n.a.
Kinjo/OACIS[22]	2003	7.7	Age (OR 1.06, 95% CI 1.04–1.07), male gender (OR 1.89, 95% CI 1.23–2.90), heart rate ≥100/min (OR 3.0, 95% CI 1.94–4.64), Killip class IV (OR 2.06, 95% CI 1.07–3.94)	PCI
Lehto/OPTIMAAL[34]	2005	7.2	Higher age (per 10 years) (HR 1.66, 95% CI 1.48–1.86), male sex (OR 1.65, 95% CI 1.28–2.12), Killip class III (OR 1.92, 95% CI 1.36–2.72)	n.a.
Stenestrand/RIKS-HIA[46]	2005	1.7	n.a.	n.a.
McMurray/CAPRICORN[35]	2005	2.7–5.5	n.a.	45% thrombolysis or PCI
Laurent/RICO[41]	2005	7.6	Higher age ($P < 0.001$), Killip class >2 ($P = 0.01$), higher heart rate ($P < 0.001$)	n.a.
Kober/VALIANT[36]	2006	12.3	Higher age, prior HF, prior angina, prior MI	n.a.
Siu[40]	2007	13.7	Higher age ($P < 0.01$), female gender $P = 0.02$)	70% thrombolysis and 30% PCI

AF, atrial fibrillation; AMI, acute myocardial infarction.

European Heart Journal (2009) 30, 1038–1045

Trends in Atrial Fibrillation Complicating Acute Myocardial Infarction

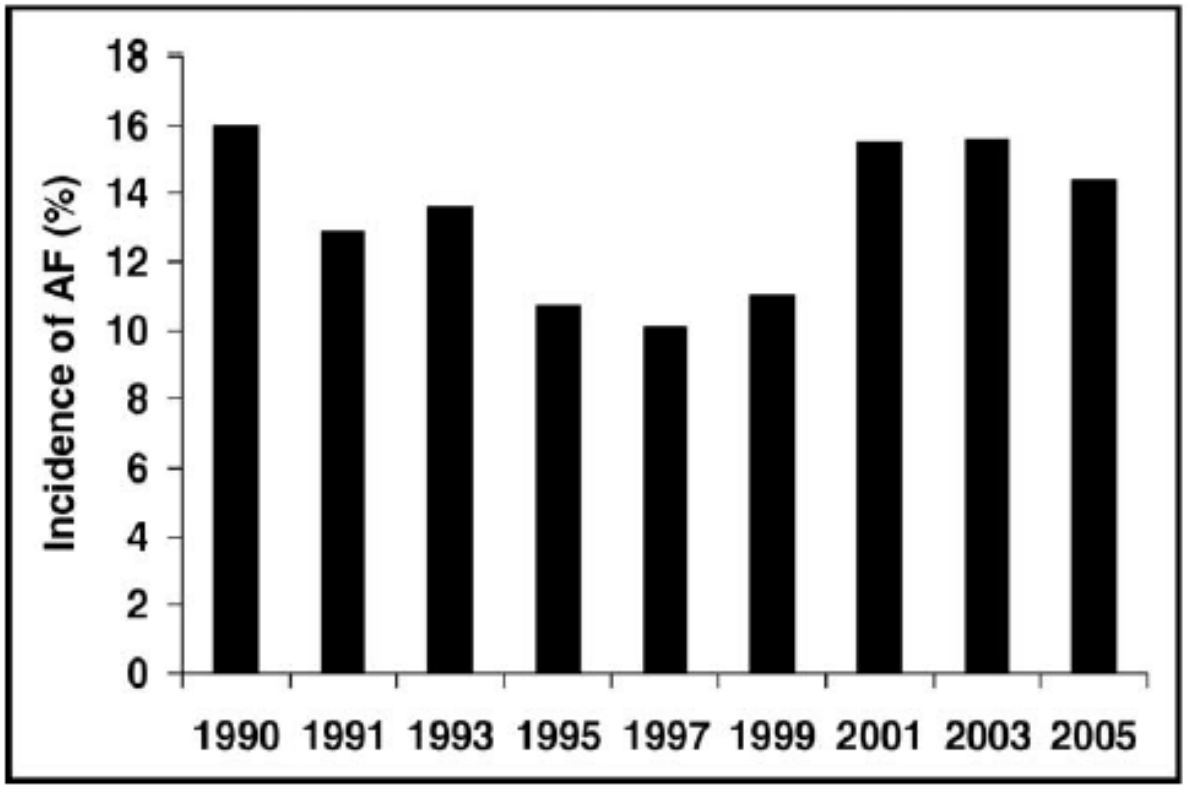

Figure 1. Trends in incidence rates of AF in patients hospitalized with AMI in the Worcester Heart Attack Study.

Am J Cardiol 2009;104:169 –174

Trends in Atrial Fibrillation Complicating Acute Myocardial Infarction

Table 2

Crude and multivariable adjusted odds of developing atrial fibrillation during hospitalization for acute myocardial infarction: Worcester Heart Attack Study

Period	Patients	Crude OR	95% CI	Adjusted OR*	95% CI
1990†	701	1.0	—	1.0	—
1991	776	0.78	0.58–1.04	0.76	0.56–1.04
1993	873	0.83	0.62–1.10	0.91	0.67–1.23
1995	876	0.63	0.47–0.85	0.69	0.50–0.95
1997	952	0.59	0.44–0.79	0.67	0.48–0.92
1999	908	0.65	0.48–0.87	0.75	0.55–1.03
2001	1,065	0.96	0.74–1.26	1.08	0.80–1.45
2003	987	0.97	0.74–1.27	1.17	0.87–1.58
2005	781	0.88	0.66–1.18	1.07	0.78–1.48

Am J Cardiol 2009;104:169 –174

Atrial fibrillation in acute myocardial infarction: a systematic review of the incidence, clinical features and prognostic implications

Joern Schmitt[1†], Gabor Duray[1†], Bernard J. Gersh[2], and Stefan H. Hohnloser[1*]

- Most Important Predictors of AF in pts. With AMI were:
  - CHF
  - Advanced Age
  - In the RICO study the rate of AF was similar in pts with STEMI And NSTEMI

European Heart Journal (2009) 30, 1038–1045

Outcome

European Heart Journal (1992) **13**, 45–50

Long-term prognosis of patients with paroxysmal atrial fibrillation complicating acute myocardial infarction

S. BEHAR, Z. ZAHAVI, U. GOLDBOURT, H. REICHER-REISS AND THE SPRINT SUDY GROUP (see Appendix)

SPRINT Coordinating Center, Neufeld Cardiac Research Institute, Sheba Medical Center, Tel Hashomer 52621, Israel

Table 3 Hospital myocardial infarctio

Table 4 Long-term mortality of patients with paroxysmal atrial fibrillation complicating acute myocardial infarction

Mortality	PAF (n = 430)		Others (n = 4247)		*P* value
	no.	%	no	%	
1 year	80	18 6	349	8·2	<0·0005
5 years	186	43·3	1081	25·4	<0·0005

Gender					
Males	132	32·6	665	33·1	NS
Female	15	8·7	163	5·1	<0·05
Age (years)					
⩽59	76	27 6	445	20·3	<0·001
60-69	49	22·6	251	12·6	<0·001
>70	7	20·0	35	8·7	<0·05
CHF in CCU	5	23·8	26	11·0	<0·05
yes	147	25·5	828	16·3	<0·001
no					
MI location					
Anterior					
Inferior					
non Q MI					
Lateral					
Total					

Significance of Paroxysmal Atrial Fibrillation Complicating Acute Myocardial Infarction in the Thrombolytic Era

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TABLE 1. Characteristics of 2866 TE Patients in a Comparison of Patients With (+) and Without (−) PAF

	PAF+ (n=255), No. (%)	PAF− (n=2611), No. (%)	*P*
Mortality			
30 d	64 (25.1)	270 (10.4)	.001
1 y	98 (38.4)	397 (15.4)	.001

Circulation. 1998;97:965-970

Prognostic Significance of Atrial Fibrillation/Atrial Flutter in Patients With Acute Myocardial Infarction Treated With Percutaneous Coronary Intervention

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TABLE 4 In-hospital Events

	AF		
Event	+ (n = 297)	− (n = 2,178)	p value
Death	16.0%	6.7%	<0.001
Cardiogenic shock	15.7%	6.1%	<0.001
Congestive heart failure	34.8%	16.6%	<0.001
Recurrent infarction	5.0%	3.3%	0.129
Recurrent ischemia	2.3%	2.7%	0.756
Cardiac rupture	3.0%	1.4%	0.042
Acute mitral regurgitation	1.3%	0.6%	0.146
Ventricular tachycardia/fibrillation	27.3%	14.7%	<0.001
Stroke	2.3%	0.6%	0.002

Am J Cardiol 2003;92:1150–1154

Incidence and prognostic significance of atrial fibrillation in acute myocardial infarction: the GISSI-3 data

Table 3 In-hospital events in patients with or without atrial fibrillation (AF)

Event	*Without AF (n=16 363)*	*With AF (n=1386)*	*p Value*
Clinical evidence of heart failure	23.6	51.5	< 0.0001
Congestive heart failure > 4 days	3.8	12.1	< 0.0001
Reinfarction + postinfarction angina	13.8	15.3	NS
Sustained ventricular tachycardia	1.9	4.3	< 0.0001
Ventricular fibrillation	2.3	4.4	< 0.0001
Death in hospital	5.0	12.6	< 0.0001
Stroke	0.7	0.8	NS

Table 4 Short term and medium term prognos developing in hospital

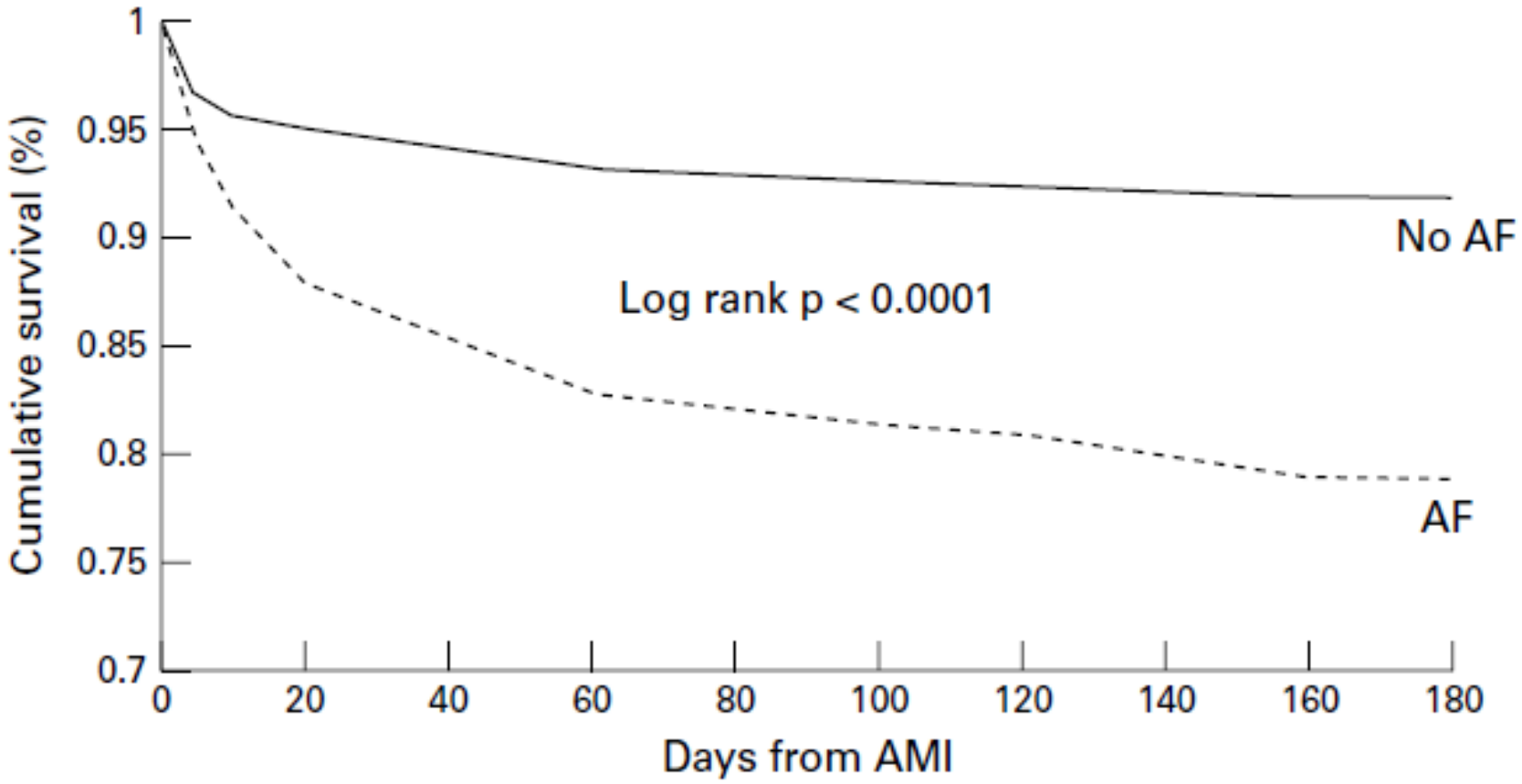
	RR unadjusted	*95%*
In-hospital mortality	3.01	2.55
Six month mortality	2.93	2.40

Table 5 Long term (four years) independent predictors of mortality in patients discharged alive (Cox model)

	Relative risk	*95% CI*
Age >70 years	2.93	2.70 to 3.18
Killip class 3	2.12	1.56 to 2.89
Atrial fibrillation	1.78	1.60 to 1.98
Killip class 2	1.73	1.58 to 1.90
Left ventricular dilatation	1.67	1.50 to 1.86
Congestive heart failure > 4 days	1.65	1.43 to 1.90

Heart 2001;86:527–532

Incidence and prognostic significance of atrial fibrillation in acute myocardial infarction: the GISSI-3 data



Heart 2001;86:527–532

Comparison of Outcomes of Patients With Acute Coronary Syndromes With and Without Atrial Fibrillation

Rajendra H. Mehta, MD, MS, Omar H. Dabbous, MD, MPh, Christopher B. Granger, MD, Polina Kuznetsova, MS, Eva M. Kline-Rogers, MS, Frederick A. Anderson, Jr., PhD, Keith A.A. Fox, MB, CHB, Joel M. Gore, MD, Robert J. Goldberg, PhD, and Kim A. Eagle, MD, for the GRACE Investigators*

TABLE 5 In-hospital Outcomes of Patients With ACS Who Have New-onset and Previous AF Compared With Those Without Any AF

Outcome	New AF Odds Ratio*	New AF 95% Confidence Interval*	Prior AF Odds Ratio*	Prior AF 95% Confidence Interval*
Death (unadjusted)	3.67	3.09–4.37	1.96	1.41–2.73
Death (adjusted)	1.65	1.30–2.09	1.01	0.78–1.30
Reinfarction (unadjusted)	2.48	1.79–3.42	1.37	0.77–2.45
Reinfarction (adjusted)	2.00	1.37–2.93	0.92	0.55–1.54
Cardiogenic shock (unadjusted)	4.38	3.67–5.21	2.69	1.91–3.78
Cardiogenic shock (adjusted)	2.40	1.88–3.06	0.64	0.46–0.89
Pulmonary edema (unadjusted)	4.98	4.28–5.80	3.25	2.41–4.38
Pulmonary edema (adjusted)	2.83	2.27–3.52	0.83	0.64–1.08
Cardiac arrest (unadjusted)	3.53	2.96–4.21	2.53	1.86–3.45
Cardiac arrest (adjusted)	1.97	1.56–2.50	1.07	0.81–1.41
Stroke (unadjusted)	2.86	1.97–4.17	1.49	0.74–3.03
Stroke (adjusted)	1.33	0.80–2.20	1.19	0.70–2.02
Major bleed (unadjusted)	2.69	2.16–3.34	1.42	0.98–2.06
Major bleed (adjusted)	1.64	1.25–2.14	0.79	0.57–1.08

*Referrent = no AF.

Atrial Fibrillation and Death After Myocardial Infarction

A Community Study

Patricia Jabre, MD, PhD; Xavier Jouven, MD, PhD; Frédéric Adnet, MD, PhD; Gabriel Thabut, MD, PhD; Suzette J. Bielinski, PhD; Susan A. Weston, MS; Véronique L. Roger, MD, MPH

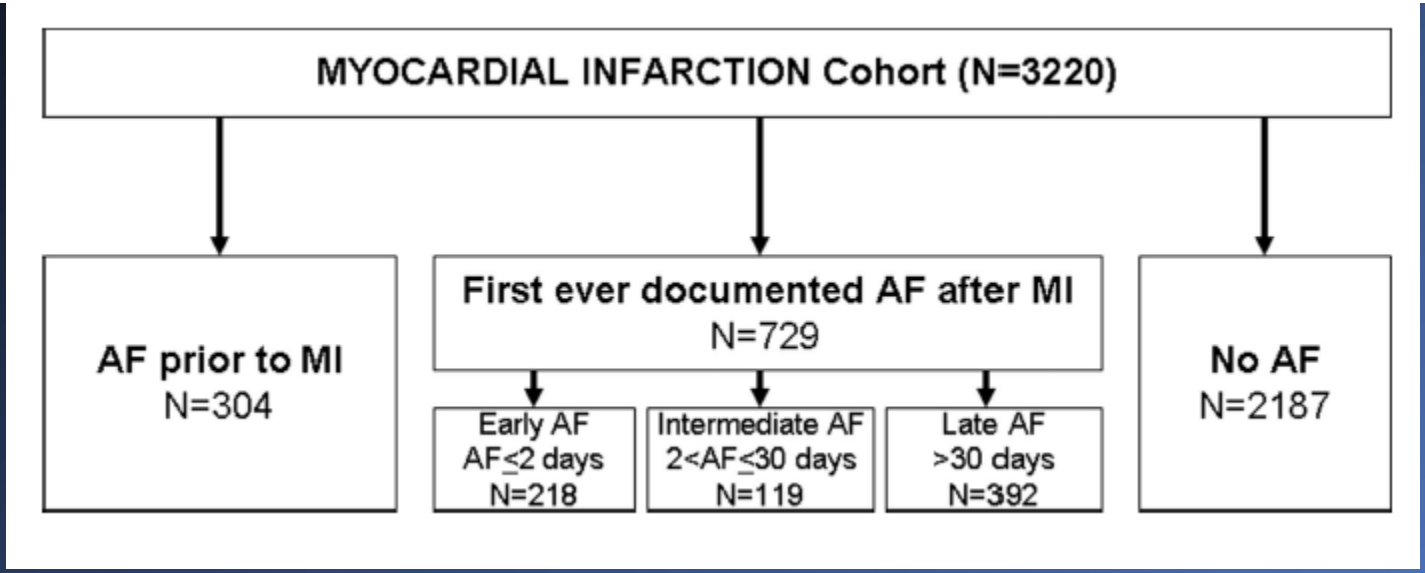


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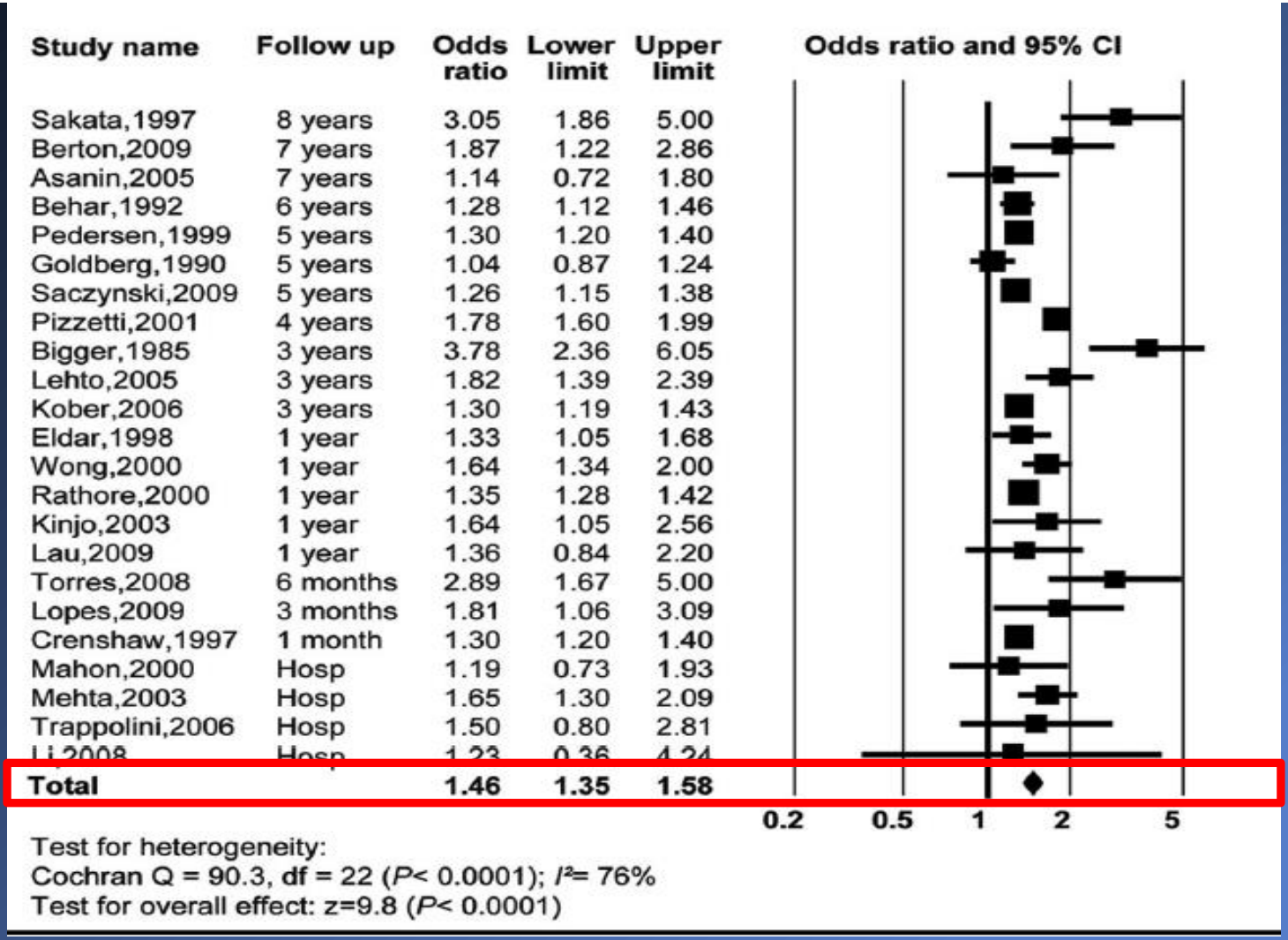
Table 2. Atrial Fibrillation and Risk of All-Cause Death and Cardiovascular Death After MI

	Prior AF	Early AF	Intermediate AF	Late AF	*P**
Death					
Unadjusted	3.50 (3.03, 4.05)	3.02 (2.55, 3.58)	2.95 (2.36, 3.68)	5.25 (4.51, 6.10)	<0.001
Model 1†	1.68 (1.44, 1.95)	1.82 (1.54, 2.17)	2.20 (1.76, 2.75)	3.25 (2.79, 3.78)	<0.001
Model 2‡	1.46 (1.26, 1.70)	1.63 (1.37, 1.93)	1.81 (1.45, 2.27)	2.58 (2.21, 3.00)	<0.001
Death within 30 d post-MI					
Unadjusted	2.42 (1.78, 3.30)	3.72 (2.70, 5.12)	7.68 (4.91,12.01)	Not applicable	<0.001
Model 1†	1.21 (0.88, 1.66)	2.19 (1.58, 3.04)	5.86 (3.74, 9.17)	Not applicable	<0.001
Model 2‡	1.13 (0.82, 1.55)	2.02 (1.46, 2.80)	4.99 (3.18, 7.82)	Not applicable	<0.001
Death among 30 d survivors					
Unadjusted	3.99 (3.38, 4.73)	2.84 (2.32, 3.48)	2.52 (1.94, 3.28)	5.22 (4.46, 6.11)	<0.001
Model 1†	1.88 (1.58, 2.24)	1.73 (1.41, 2.13)	1.81 (1.39, 2.35)	3.21 (2.74,3.76)	<0.001
Model 2‡	1.59 (1.33, 1.89)	1.51 (1.23, 1.85)	1.47 (1.13, 1.92)	2.54 (2.17, 2.98)	<0.001
Cardiovascular death among 30 d survivors					
Unadjusted	3.88 (3.07, 4.91)	3.33 (2.55, 4.33)	3.41 (2.48, 4.70)	5.77 (4.66, 7.16)	<0.001
Model 1†	1.91 (1.49, 2.43)	2.04 (1.56, 2.67)	2.49 (1.81, 3.44)	3.62 (2.92, 4.49)	<0.001
Model 2‡	1.55 (1.22, 1.98)	1.72 (1.32, 2.25)	1.94 (1.40, 2.68)	2.70 (2.17, 3.36)	<0.001

Circulation. 2011;123:2094-2100

Mortality Associated With Atrial Fibrillation in Patients With Myocardial Infarction : A Systematic Review and Meta-Analysis

Patricia Jabre, Véronique L. Roger, Mohammad H. Murad, Alanna M. Chamberlain, Larry Prokop, Frédéric Adnet and Xavier Jouven



Circulation. 2011;123:1587-1593

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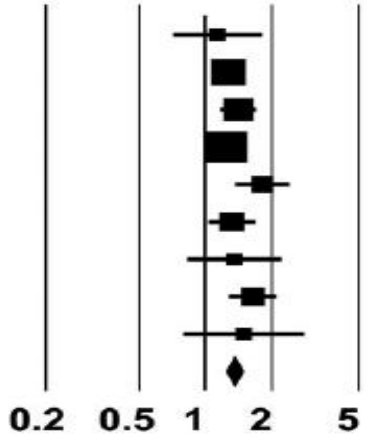
Study name	Follow up	Odds ratio	Lower limit	Upper limit
Asanin,2005	7 years	1.14	0.72	1.80
Behar,1992	6 years	1.28	1.12	1.46
Pedersen,1999	5 years	1.42	1.19	1.69
Saczynski,2009	5 years	1.26	1.15	1.38
Lehto,2005	3 years	1.82	1.39	2.39
Eldar,1998	1 year	1.33	1.05	1.68
Lau,2009	1 year	1.36	0.84	2.20
Mehta,2003	Hosp	1.65	1.30	2.09
Trappolini,2006	Hosp	1.50	0.80	2.81
Total		**1.37**	**1.26**	**1.49**

Odds ratio and 95% CI

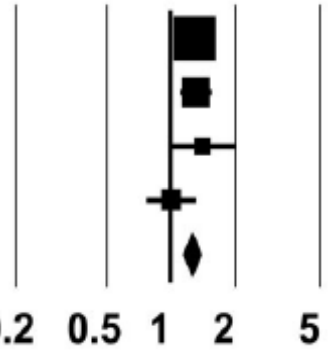


Test for heterogeneity:
Cochran Q = 11.1, df = 8 (*P*= *0.20*); I^2= 28%
Test for overall effect: z=7.4 (*P*< 0.0001)

New AF

Study name	Follow up	Odds ratio	Lower limit	Upper limit
Pedersen,1999	5 years	1.30	1.20	1.40
Lehto,2005	3 years	1.32	1.12	1.55
Lau,2009	1 year	1.42	1.01	1.99
Mehta,2003	Hosp	1.01	0.78	1.30
Total		**1.27**	**1.16**	**1.40**

Odds ratio and 95% CI



Test for heterogeneity:
Cochran Q = 3.9, df = 3 (*P*= *0.27*); I^2= 24%
Test for overall effect: z=5.1 (*P*< 0.0001)

Known AF

Circulation. 2011;123:1587-1593

Trends in Atrial Fibrillation Complicating Acute Myocardial Infarction

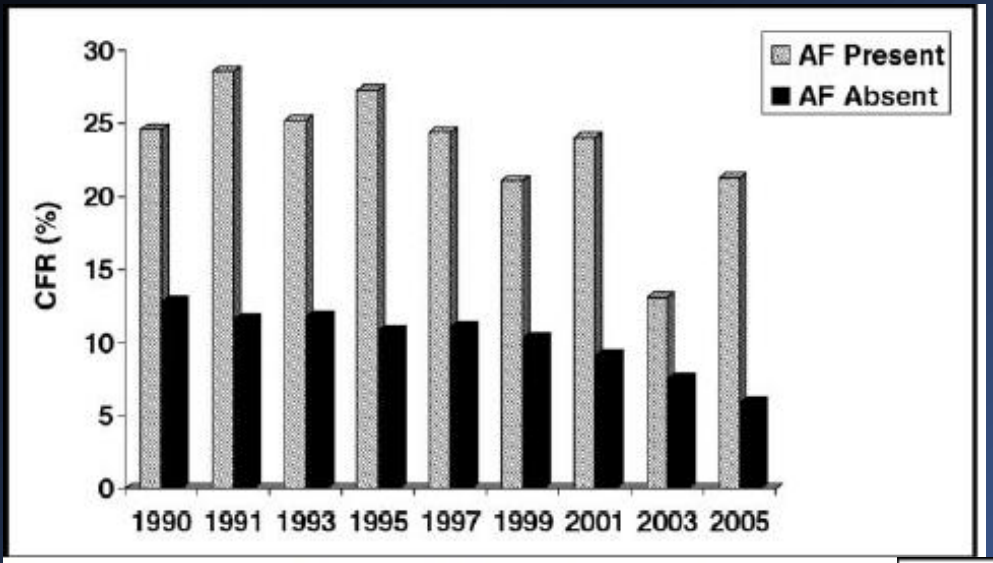
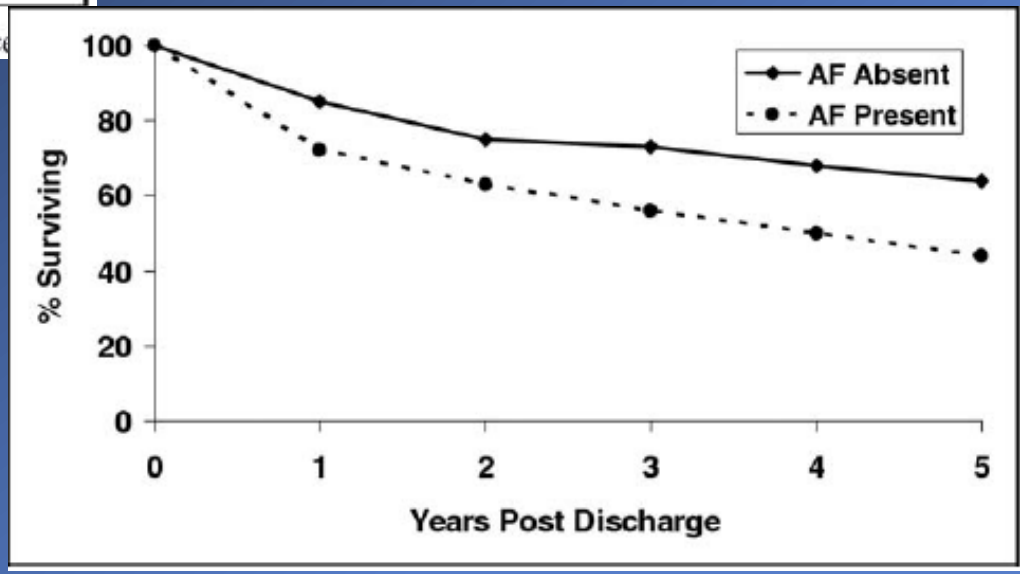


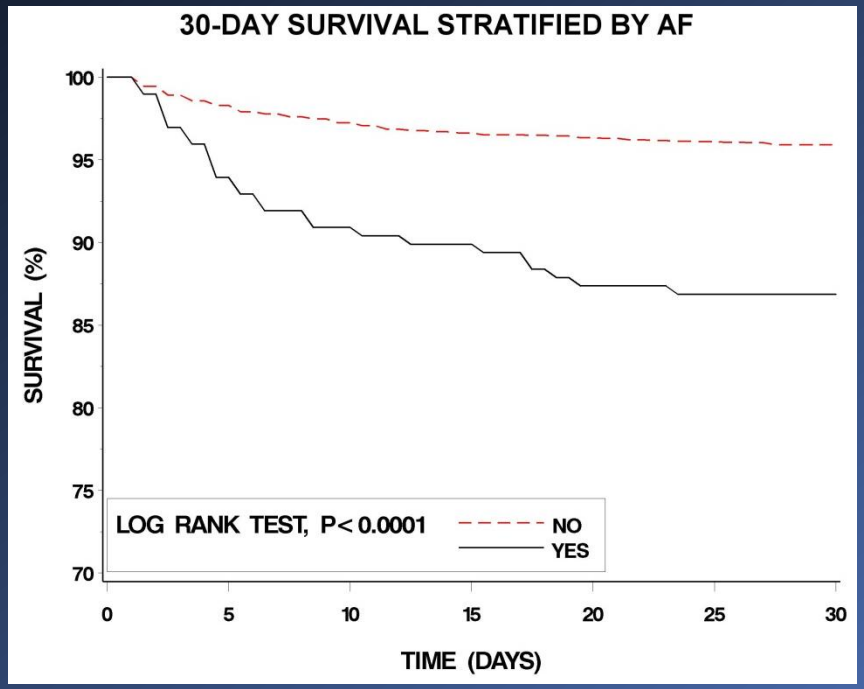
Figure 2. Hospital case-fatality rates (CFRs) according to presence



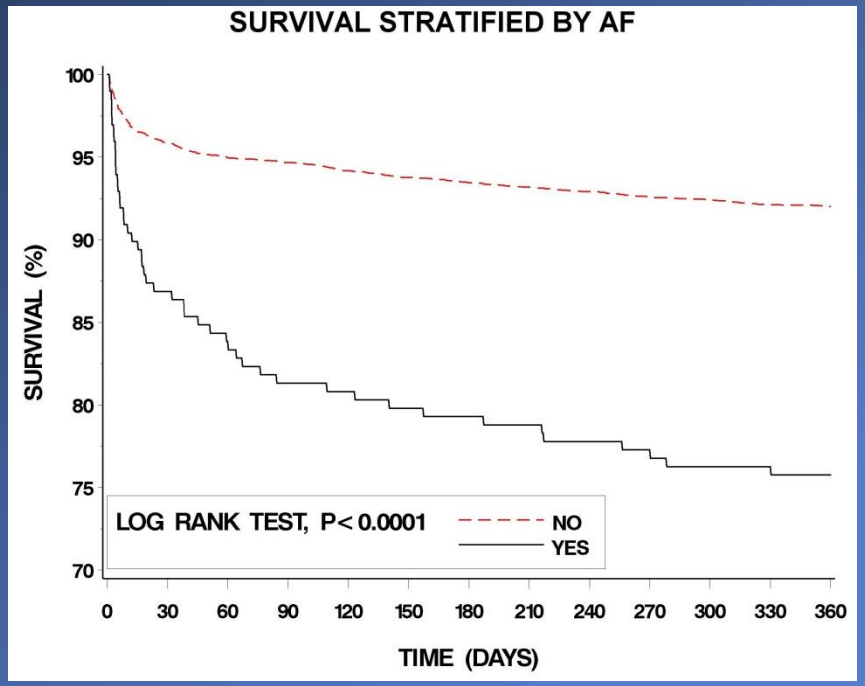
Am J Cardiol 2009;104:169 –174

ACSIS data 2000-2010

30-day



1- year



Trends in Atrial Fibrillation Complicating Acute Myocardial Infarction

Table 3

Crude and multivariable adjusted odds of one-year mortality in those who developed atrial fibrillation during hospitalization for acute myocardial infarction: Worcester Heart Attack Study

Period	Patients	Crude OR	95% CI	Adjusted OR*	95% CI
1990†	120	1.0	—	1.0	—
1991	104	1.17	0.57–2.43	1.23	0.56–2.70
1993	126	1.32	0.77–3.00	1.47	0.70–3.07
1995	112	1.23	0.59–2.59	1.42	0.63–3.22
1997	108	1.22	0.59–2.54	1.33	0.59–3.00
1999	106	1.48	0.74–2.98	1.73	0.80–3.76
2001	184	1.84	0.98–3.45	1.89	0.92–3.87
2003	161	0.94	0.49–1.81	0.84	0.40–1.77
2005	121	0.85	0.41–1.75	0.77	0.34–1.76

Am J Cardiol 2009;104:169 –174

Mortality

- AF is Independently Associated with increased risk of in-hospital as well as long-term death among patients with ACS.
- New as well as Prevalent AF are associated with death
- The risk has not changed much over the years
- Mortality is of cardiac causes in the majority: sudden and non-sudden death

Atrial Fibrillation and Stroke in ACS

Atrial Fibrillation in the Setting of Acute Myocardial Infarction: The GUSTO-I Experience

BRIAN S. CRENSHAW, MD, SAMUEL R. WARD, MD,* CHRISTOPHER B. GRANGER, MD, FACC, AMANDA L. STEBBINS, MS, ERIC J. TOPOL, MD, FACC,* ROBERT M. CALIFF, MD, FACC, FOR THE GUSTO-I TRIAL INVESTIGATORS†

Durham, North Carolina and Cleveland, Ohio

Table 4. Clinical Outcomes

	Atrial Fibrillation		
	None (n = 36,611)	Any (n = 4,280)	p Value
Mortality (unadjusted)			
In-hospital	2,104 (5.8)	591 (13.8)	0.0001
30 d	2,219 (6.1)	611 (14.3)	0.0001
1 yr	(8.4)*	(21.5)*	< 0.0001
Stroke	467 (1.3)	133 (3.1)	0.0001
Hemorrhagic	230 (0.6)	38 (0.9)	0.037
Hemorrhagic conversion	26 (0.07)	8 (0.19)	
Ischemic	172 (0.5)	75 (1.8)	0.0001
Unknown	31 (0.08)	12 (0.28)	
Time to ischemic stroke from symptom onset (d)	3.0	5.3	
Death or disabling stroke	2,374 (6.5)	663 (15.5)	0.0001

J Am Coll Cardiol 1997;30:406 –13

Significance of Paroxysmal Atrial Fibrillation Complicating Acute Myocardial Infarction in the Thrombolytic Era

Michael Eldar, MD; Menachem Canetti, MD; Zeev Rotstein, MD; Valentina Boyko, MSc; Shmuel Gottlieb, MD; Elieser Kaplinsky, MD; Solomon Behar, MD; for the SPRINT and Thrombolytic Survey Groups

TABLE 1. Characteristics of 2866 TE Patients in a Comparison of Patients With (+) and Without (−) PAF

	PAF+ (n=255), No. (%)	PAF− (n=2611), No. (%)	*P*
Age, mean±SD y	70±11	62±12	<.001
Age≥70 y, n (%)	143 (56)	821 (31)	.001
Female, n (%)	95 (37)	647 (25)	.001
Diabetes mellitus, n (%)	82 (32)	654 (25)	.01
Past AMI, n (%)	84 (33)	704 (27)	.04
Hypertension, n (%)	117 (46)	1014 (39)	.03
Anterior AMI, n (%)	120 (47)	1189 (46)	NS
CHF on admission, n (%)	138 (55)	645 (26)	.001
Angina pectoris, n (%)	97 (38)	869 (33)	NS
Stroke in CCU, n (%)	10 (3.9)	16 (0.6)	.001

Circulation. 1998;97:965-970

Prognostic risk of atrial fibrillation in acute myocardial infarction complicated by left ventricular dysfunction: the OPTIMAAL experience

Mika Lehto[1]*, Steven Snapinn[2†], Kenneth Dickstein[3], Karl Swedberg[4], and Markku S. Nieminen[1] on behalf of the OPTIMAAL investigators

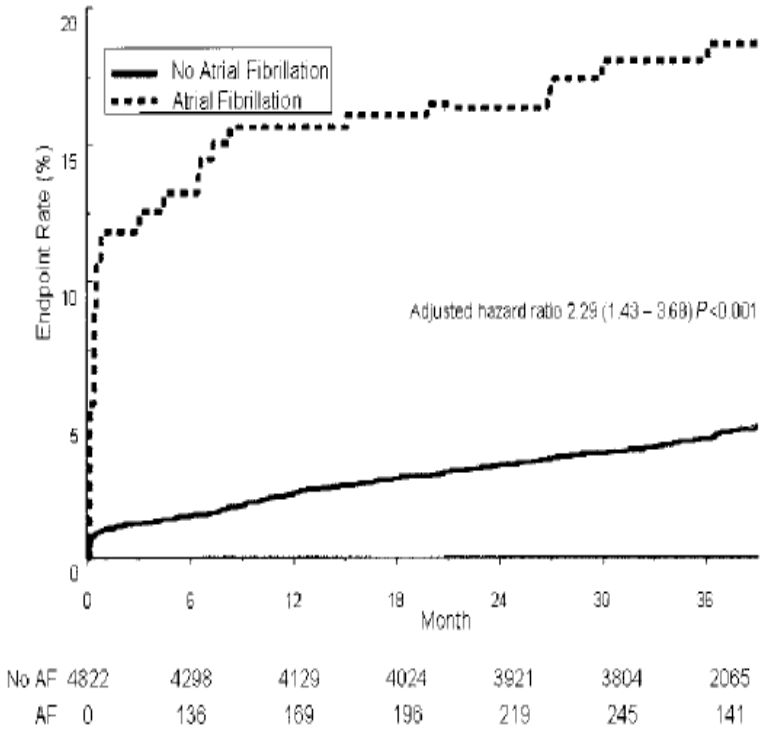


Figure 5 Kaplan–Meier curves for stroke stratified by the time-dependent presence of AF. Patients with AF at baseline excluded.

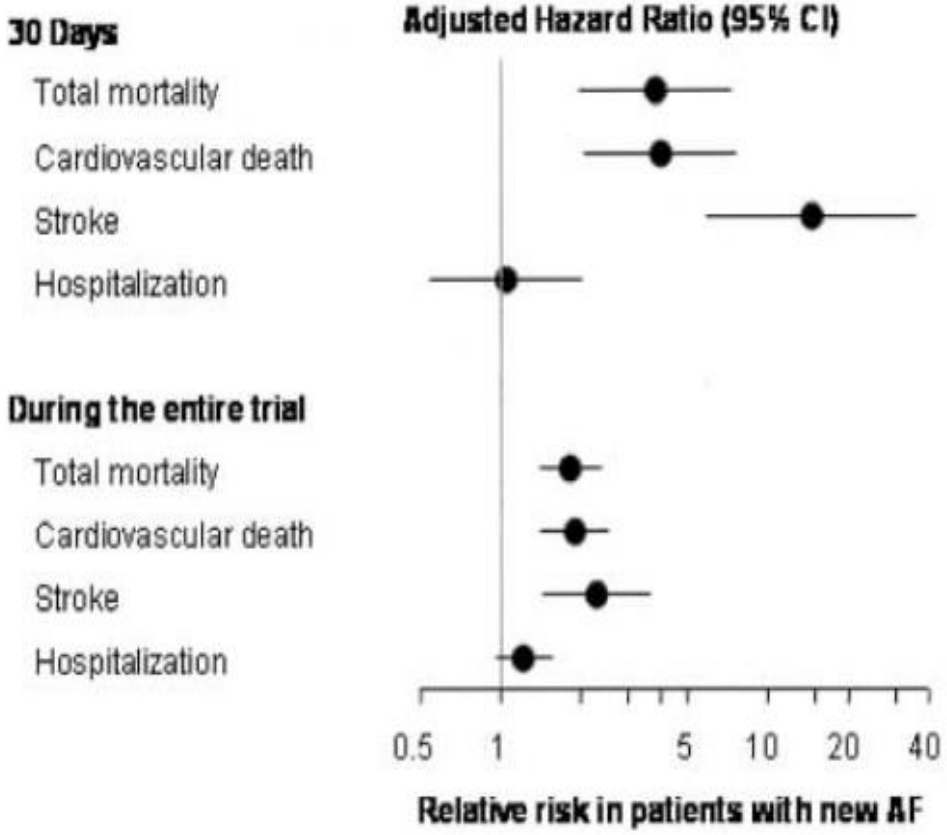


Figure 6 Adjusted risk associated with new-onset AF.

Management

- Management of AF
  - Rhythm and Rate and symptoms
  - Anti-Thrombotic Management

ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

Table 24 Management of atrial fibrillation

Recommendations	Class [a]	Level [b]	Ref [c]
Rhythm control should be considered in patients with atrial fibrillation secondary to a trigger or substrate that has been corrected (e.g. ischaemia).	IIa	C	-
Acute rate control of atrial fibrillation			
Intravenous beta-blockers or non-dihydropyridine CCB (e.g. diltiazem, verapamil)[d] are indicated if there are no clinical signs of acute heart failure.	I	A	323
Amiodarone or i.v. digitalis is indicated in case of rapid ventricular response in the presence of concomitant acute heart failure or hypotension.	I	B	324
Cardioversion			
Immediate electrical cardioversion is indicated when adequate rate control cannot be achieved promptly with pharmacological agents in patients with atrial fibrillation and on-going ischaemia, severe haemodynamic compromise or heart failure.	I	C	-
Intravenous amiodarone is indicated for conversion to sinus rhythm in stable patients with recent onset atrial fibrillation and structural heart disease.	I	A	250
Digoxin (LoE A), verapamil, sotalol, metoprolol (LoE B) and other beta-blocking agents (LoE C) are ineffective in converting recent onset atrial fibrillation to sinus rhythm and should not be used for rhythm control (although beta blockers or digoxin may be used for rate control).	III	A B C	250

ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

- Patients with atrial fibrillation and risk factors for thromboembolism should therefore be adequately treated with oral anticoagulation.
- Because AF will generally require anticoagulation, when choosing a stent in these patients, the benefits of DES on restenosis should be weighed carefully against the substantial bleeding risks that are associated with the prolonged combination of triple antithrombotic therapy.

European Heart Journal (2012) 33, 2569–2619

2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

- "Management of AF during hospitalization for STEMI is based on the usual considerations of rhythm versus rate control and the indications for anticoagulation according to current guidelines"

European Heart Journal (2011) **32**, 2999–3054
doi:10.1093/eurheartj/ehr236

ESC GUIDELINES

ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation

- AF not mentioned

ACCF/AHA Focused Update

2012 ACCF/AHA Focused Update of the Guideline for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction (Updating the 2007 Guideline and Replacing the 2011 Focused Update)

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

- AF not mentioned

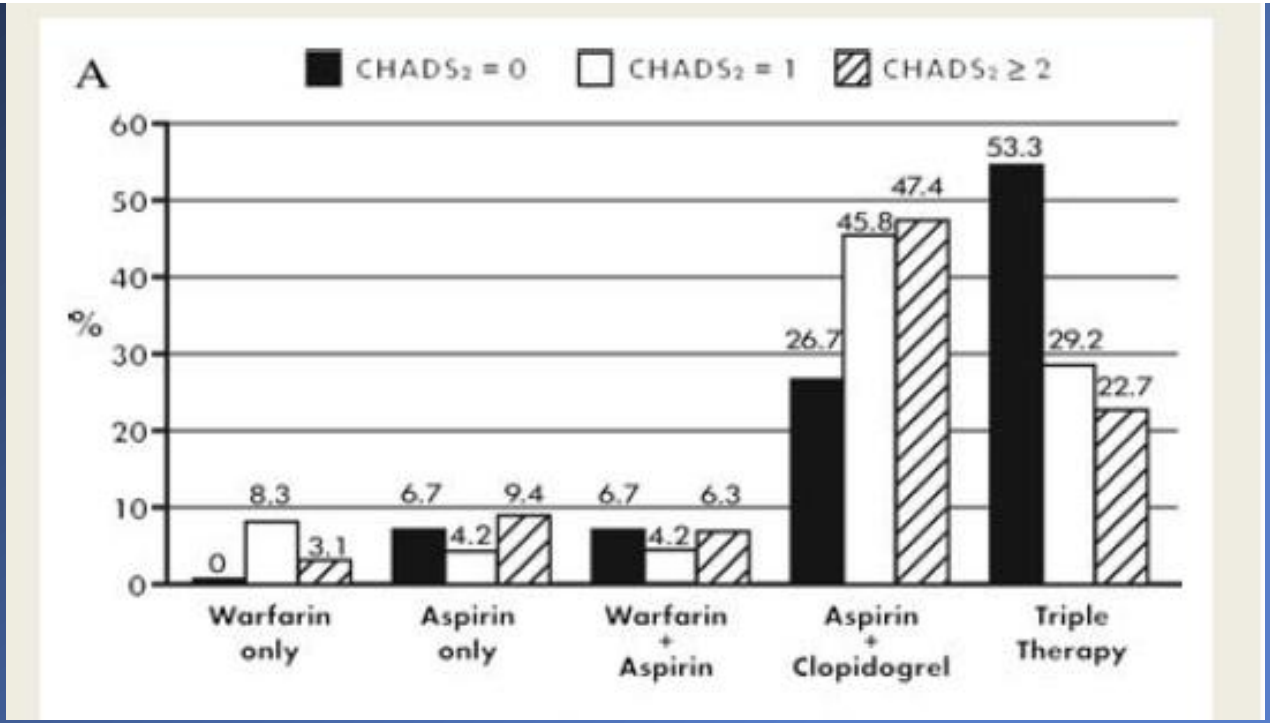
Recommendations for AF in acute coronary syndrome

Recommendations	Class[a]	Level[b]	Ref.[c]
DCC is recommended for patients with severe haemodynamic compromise or intractable ischaemia, or when adequate rate control cannot be achieved with pharmacological agents in patients with ACS and AF.	I	C	
Intravenous administration of amiodarone is recommended to slow a rapid ventricular response to AF in patients with ACS.	I	C	
Intravenous β-blockers are recommended to slow a rapid ventricular response to AF in patients with ACS.	I	C	
Intravenous administration of non-dihydropyridine calcium antagonists (verapamil, diltiazem) should be considered to slow a rapid ventricular response to AF in patients with ACS and no clinical signs of heart failure.	IIa	C	
Intravenous administration of digoxin may be considered to slow a rapid ventricular response in patients with ACS and AF associated with heart failure.	IIb	C	
Administration of flecainide or propafenone is not recommended in patients with AF in the setting of ACS.	III	B	124

European Heart Journal (2010) 31, 2369–2429

European Heart Journal (2009) **30**, 2019–2028
doi:10.1093/eurheartj/ehp213

Antithrombotic therapy and outcomes of patients with atrial fibrillation following primary percutaneous coronary intervention: results from the APEX-AMI trial

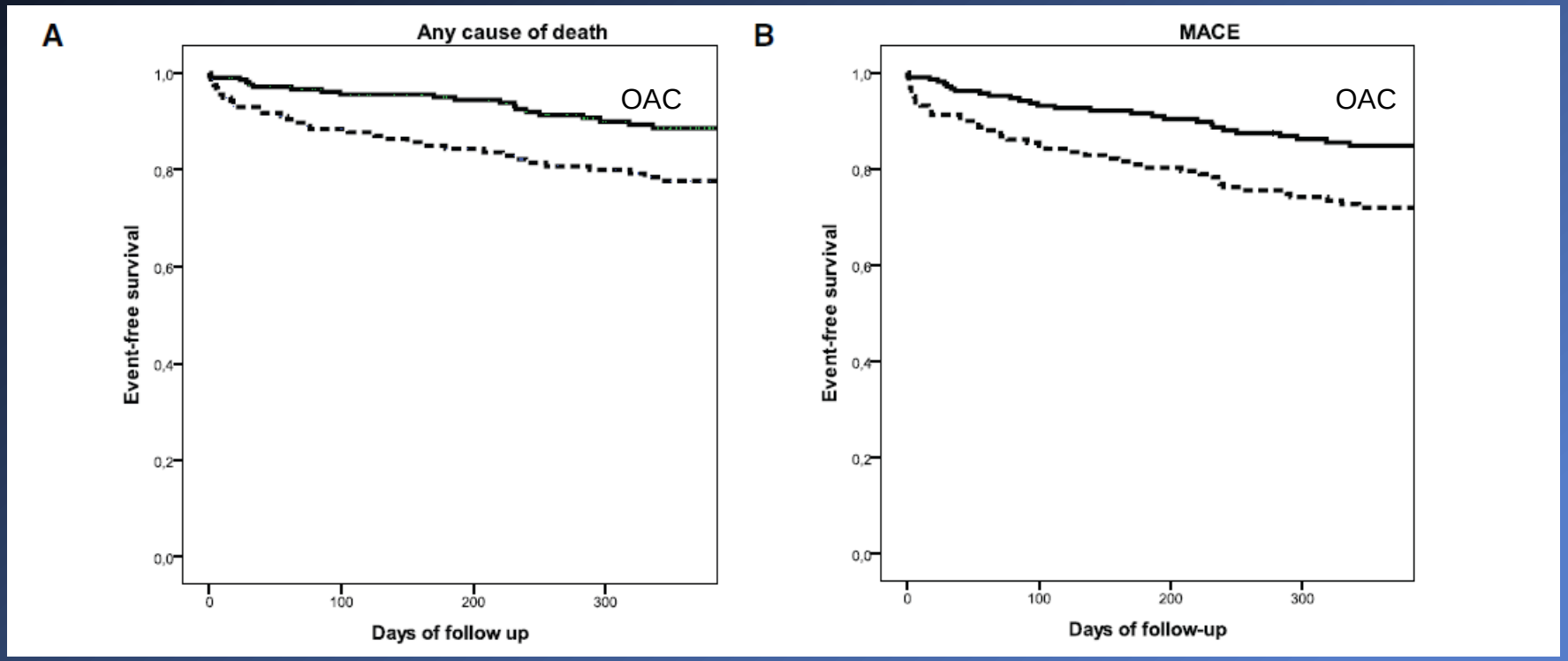


European Heart Journal (2009) **30**, 2019–2028
doi:10.1093/eurheartj/ehp213

Antithrombotic therapy and outcomes of patients with atrial fibrillation following primary percutaneous coronary intervention: results from the APEX-AMI trial

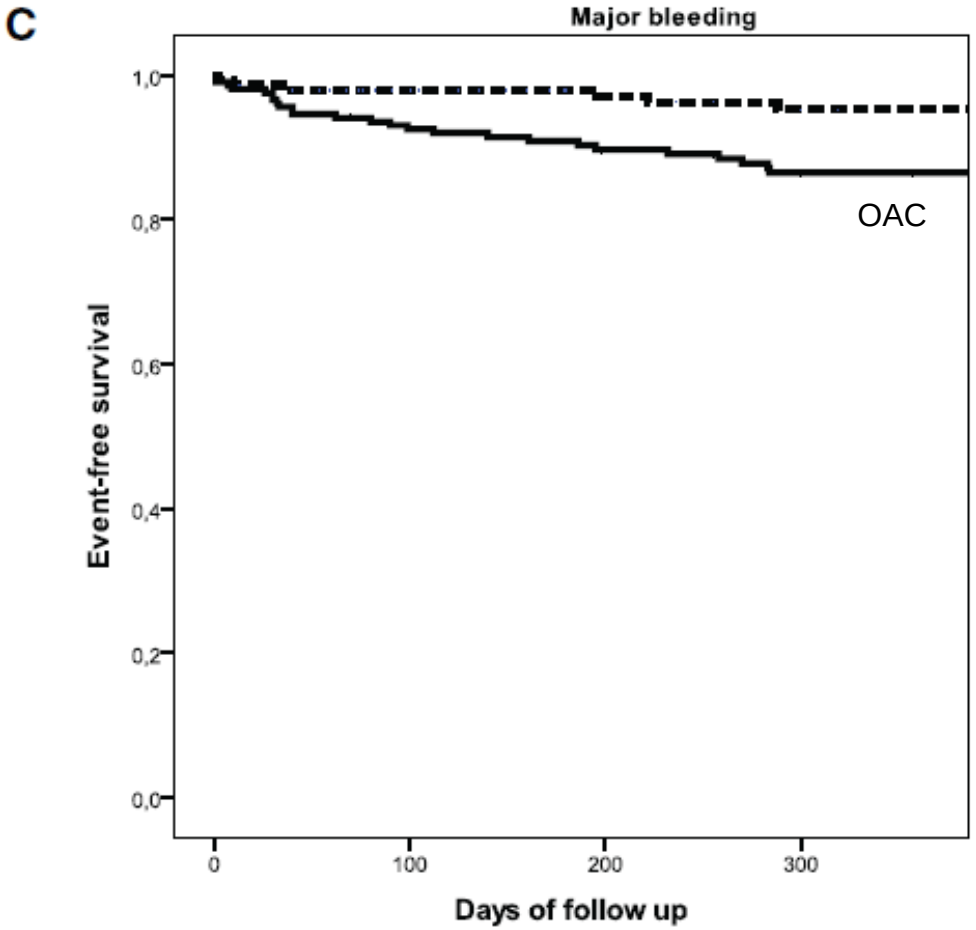
- Warfarin and Triple therapy were associated with lower risk of death and stroke

Should We Recommend Oral Anticoagulation Therapy in Patients With Atrial Fibrillation Undergoing Coronary Artery Stenting With a High HAS-BLED Bleeding Risk Score?



Circ Cardiovasc Interv. 2012;5:459-466

Should We Recommend Oral Anticoagulation Therapy in Patients With Atrial Fibrillation Undergoing Coronary Artery Stenting With a High HAS-BLED Bleeding Risk Score?

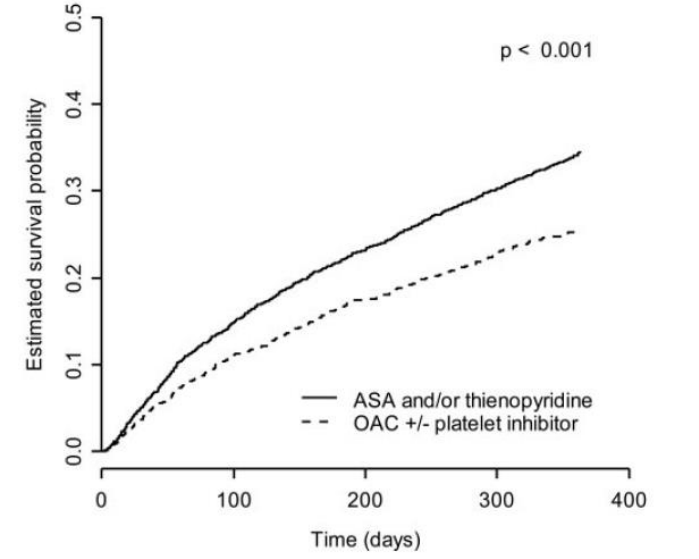


Circ Cardiovasc Interv. 2012;5:459-466

Anticoagulation Therapy in Atrial Fibrillation in Combination With Acute Myocardial Infarction Influences Long-Term Outcome

TABLE 1. Overview of Data From Patients Discharged Alive With AF and a Diagnosis of AMI Divided Into 2 Groups of Antithrombotic Therapy at Discharge

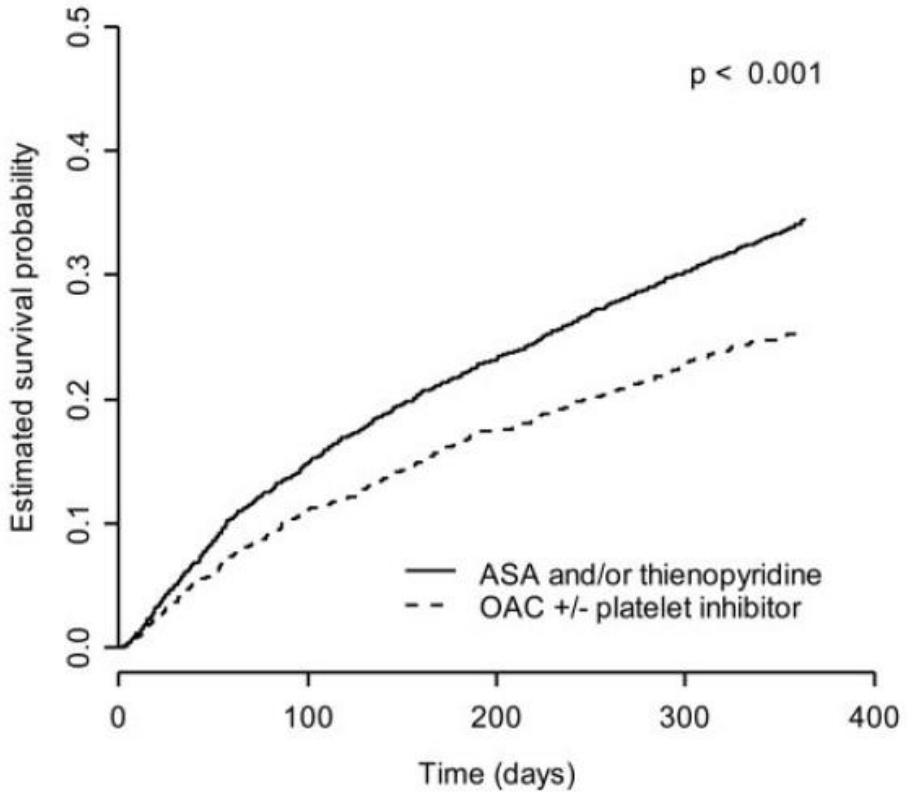
	ASA and/or Thienopyridine (n=3768)	OAC ± Platelet Inhibitor (n=1848)	*P*
Outcome			
30-Day mortality	6.1	4.1	0.002
1-Year mortality	31.4	22.4	<0.001

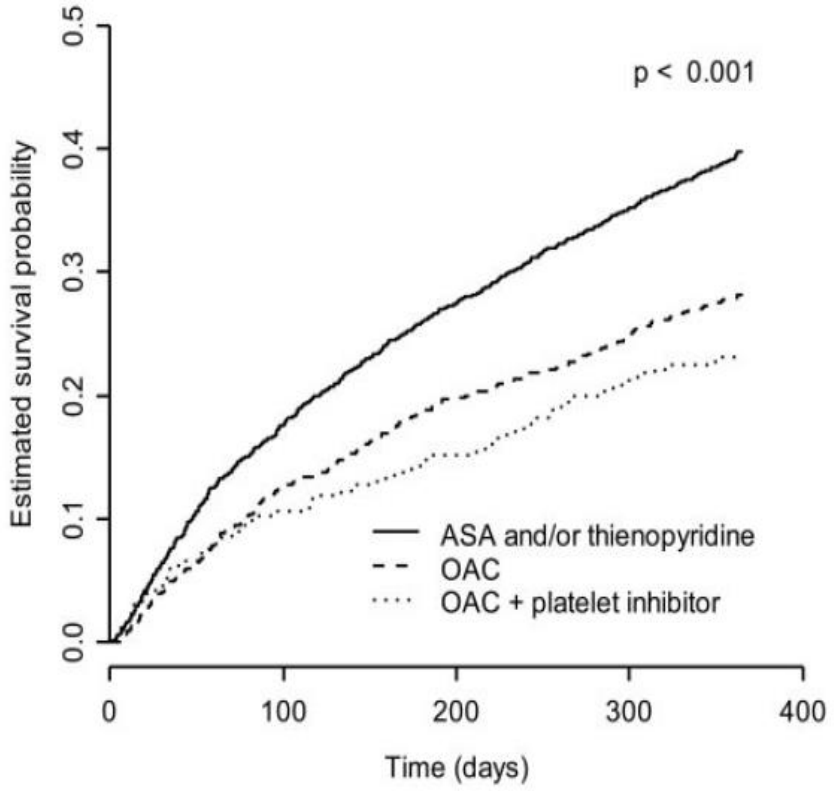


Circulation. 2005; 112:3225-3231.

Arrhythmia/Electrophysiology

Anticoagulation Therapy in Atrial Fibrillation in Combination With Acute Myocardial Infarction Influences Long-Term Outcome



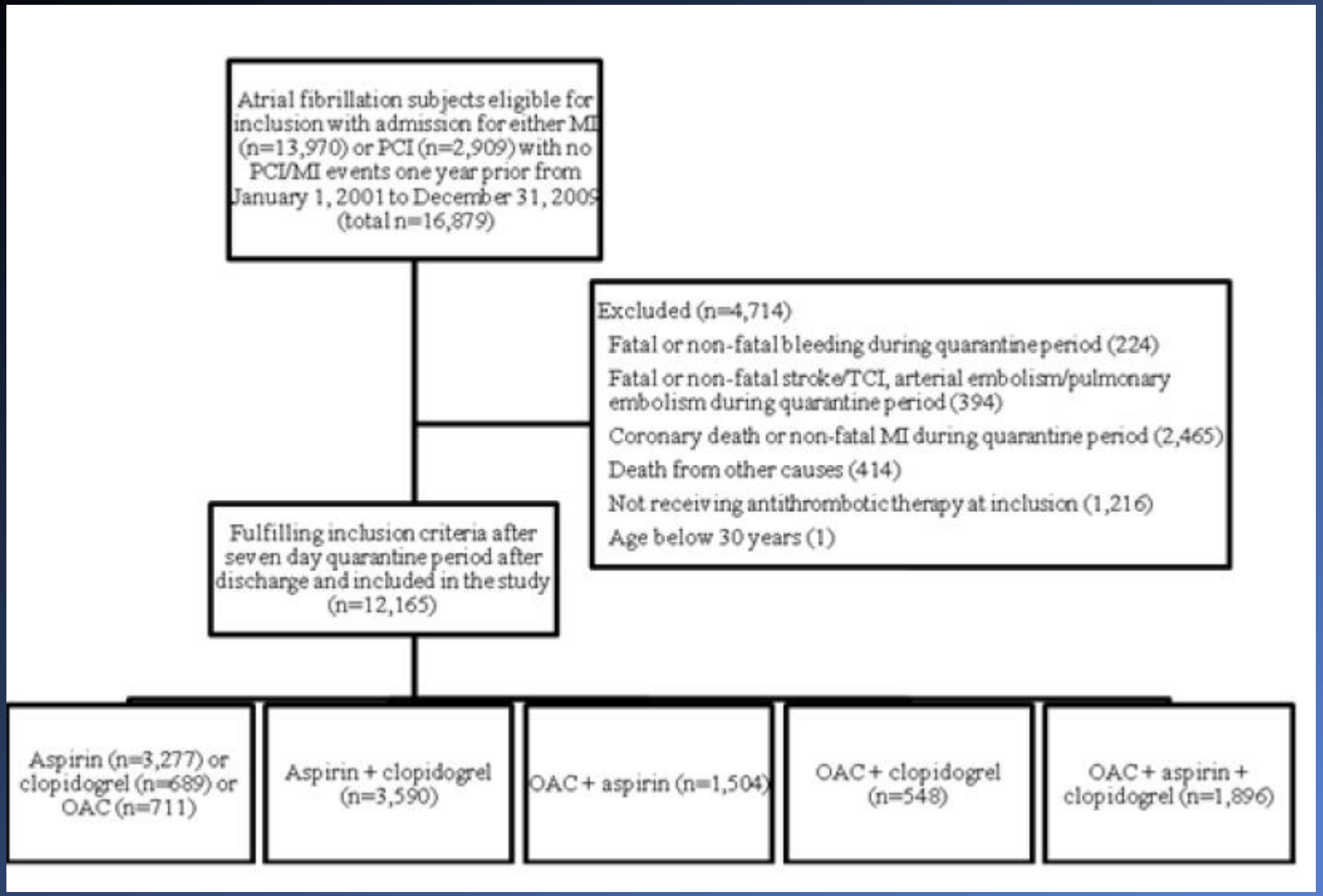


Circulation. 2005; 112:3225-3231.

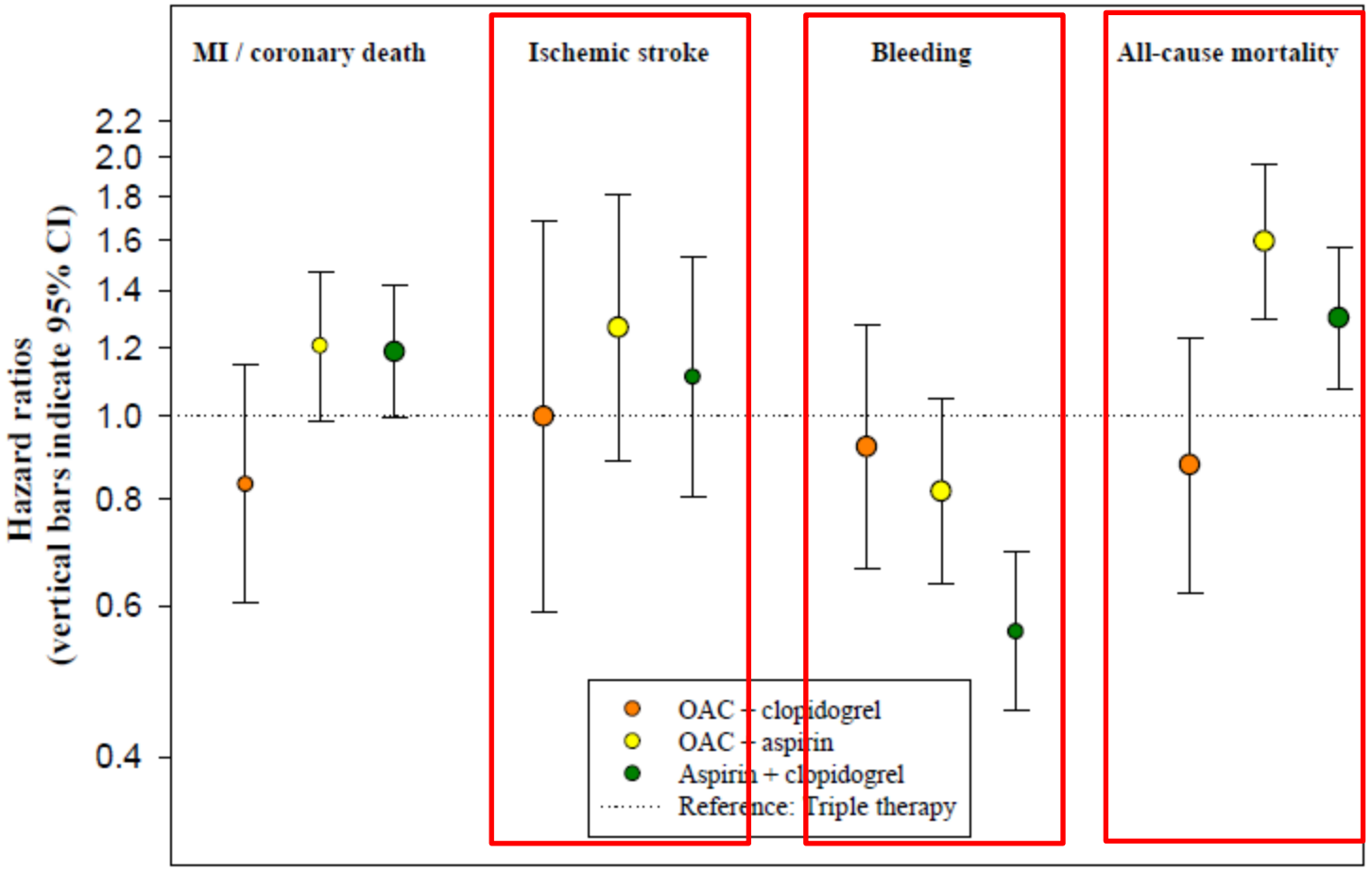
Accepted Manuscript

Oral anticoagulation and antiplatelets in atrial fibrillation patients after myocardial infarction and coronary intervention

Morten Lamberts, MD Gunnar H. Gislason, MD, PhD, (FACC) Jonas Bjerring Olesen, MD Søren Lund Kristensen, MD Anne-Marie Schjerning Olsen, MD Anders Mikkelsen, MB Christine Benn Christensen, MD Gregory Y.H. Lip, MD, (FACC) Lars Køber, MD, DMSc Christian Torp-Pedersen, MD, DMSc, (FACC) Morten Lock Hansen, MD, PhD



Only 32% of AF post MI pts were treated with OAC


MI / coronary death
Ischemic stroke
Bleeding
All-cause mortality
Hazard ratios
(vertical bars indicate 95% CI)
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
OAC + clopidogrel
OAC + aspirin
Aspirin + clopidogrel
Reference: Triple therapy

- In real-life AF patients with indication for multiple antithrombotic drugs after MI/PCI, OAC and clopidogrel was equal or better on both benefit and safety outcomes compared to triple therapy.
- Our data suggests that triple therapy management regimens might be replaced with OAC and clopidogrel without any additional risk of recurrent thrombotic events and a lower risk of bleeding

Table 11 Antithrombotic strategies following coronary artery stenting in patients with AF at moderate to high thrombo-embolic risk (in whom oral anticoagulation therapy is required)

Haemorrhagic risk	Clinical setting	Stent implanted	Anticoagulation regimen
Low or intermediate (e.g. HAS-BLED score 0–2)	Elective	Bare-metal	1 month: triple therapy of VKA (INR 2.0–2.5) + aspirin ≤100 mg/day + clopidogrel 75 mg/day Up to 12th month: combination of VKA (INR 2.0–2.5) + clopidogrel 75 mg/day[b] (or aspirin 100 mg/day) Lifelong: VKA (INR 2.0–3.0) alone
	Elective	Drug-eluting	3 (-olimus[a] group) to 6 (paclitaxel) months: triple therapy of VKA (INR 2.0–2.5) + aspirin ≤100 mg/day + clopidogrel 75 mg/day Up to 12th month: combination of VKA (INR 2.0–2.5) + clopidogrel 75 mg/day[b] (or aspirin 100 mg/day) Lifelong: VKA (INR 2.0–3.0) alone
	ACS	Bare-metal/ drug-eluting	6 months: triple therapy of VKA (INR 2.0–2.5) + aspirin ≤100 mg/day + clopidogrel 75 mg/day Up to 12th month: combination of VKA (INR 2.0–2.5) + clopidogrel 75 mg/day[b] (or aspirin 100 mg/day) Lifelong: VKA (INR 2.0–3.0) alone
High (e.g. HAS-BLED score ≥3)	Elective	Bare-metal[c]	2–4 weeks: triple therapy of VKA (INR 2.0–2.5) + aspirin ≤100 mg/day + clopidogrel 75 mg/day Lifelong: VKA (INR 2.0–3.0) alone
	ACS	Bare-metal[c]	4 weeks: triple therapy of VKA (INR 2.0–2.5) + aspirin ≤100 mg/day + clopidogrel 75 mg/day Up to 12th month: combination of VKA (INR 2.0–2.5) + clopidogrel 75 mg/day[b] (or aspirin 100 mg/day) Lifelong: VKA (INR 2.0–3.0) alone

NOAC s and AntiPlatelets

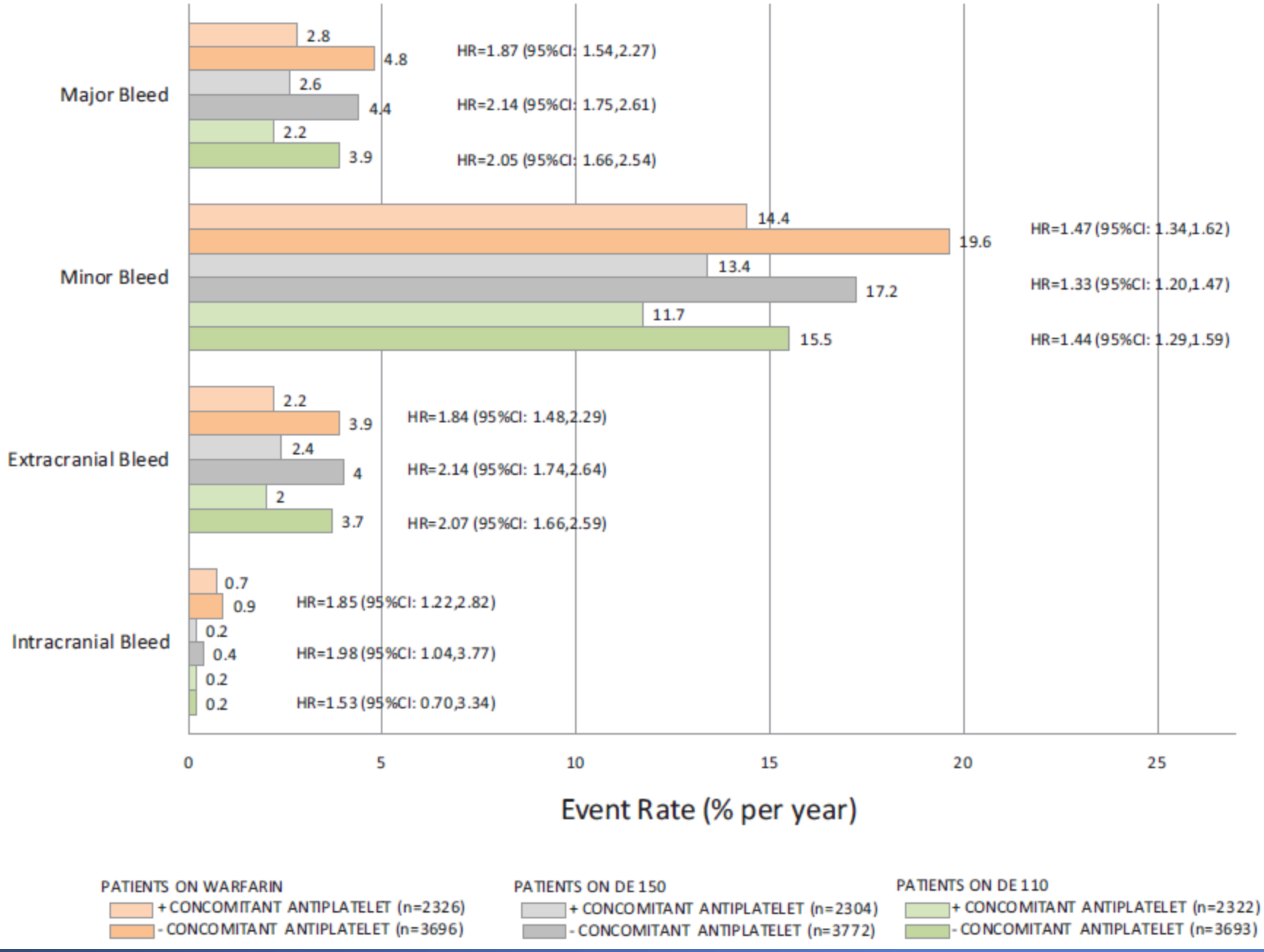
Concomitant Use of Antiplatelet Therapy with Dabigatran or Warfarin in the Randomized Evaluation of Long-Term Anticoagulation Therapy (RE-LY) Trial

Table 1. Prevalence of Antiplatelet Use at Baseline and at 4 Landmark Periods Throughout the Study

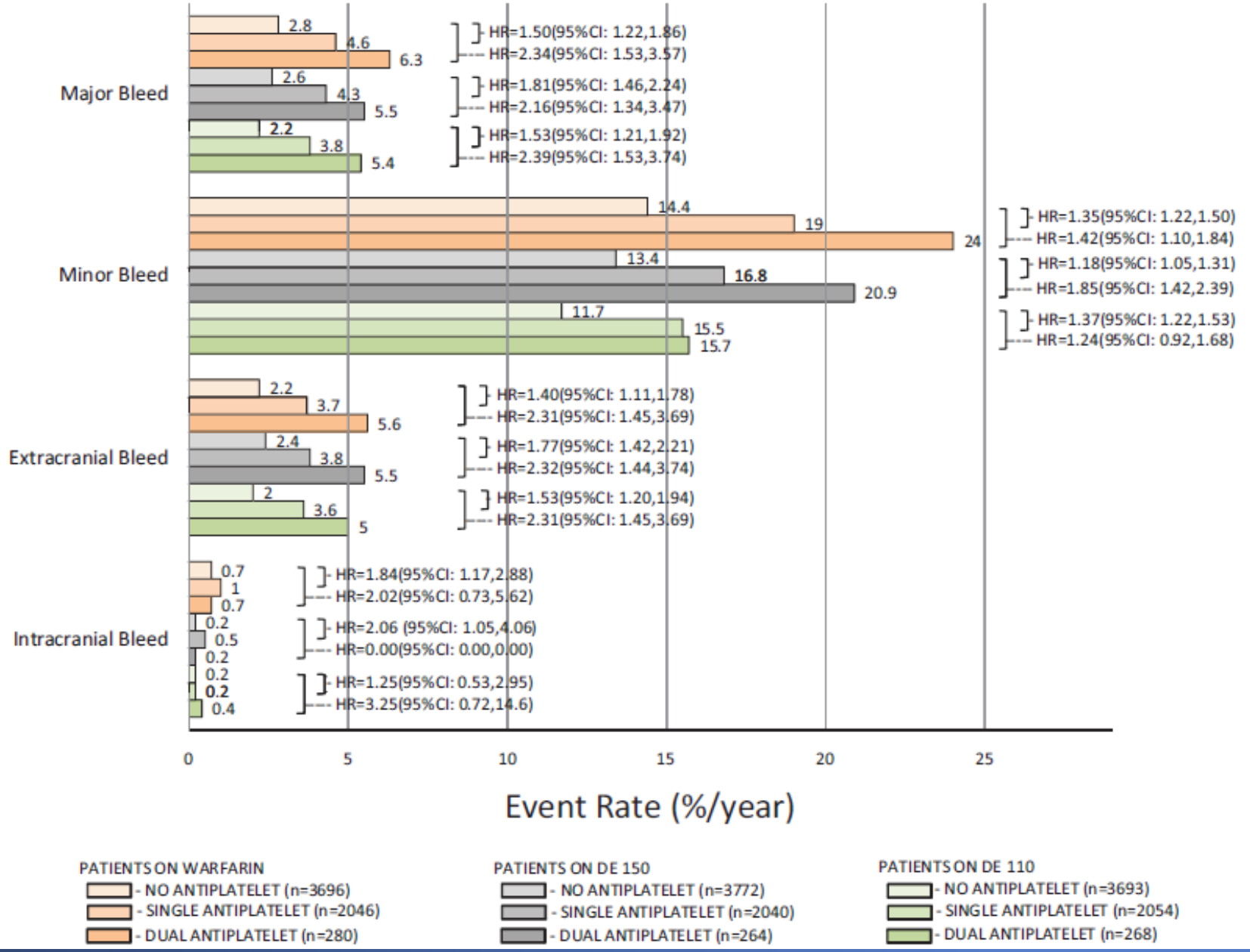
Landmark Period	DE110, n/N (%)	DE150, n/N (%)	Warfarin, n/N (%)
Day 180	1626/5901 (27.6)	1569/5966 (26.3)	1592/5909 (26.9)
Day 360	1605/5778 (27.8)	1521/5833 (26.1)	1561/5784 (27.0)
Day 540	1301/4693 (27.7)	1269/4759 (26.7)	1262/4685 (26.9)
Day 720	876/3204 (27.3)	886/3285 (27.0)	849/3164 (26.8)

DE110 indicates dabigatran etexilate 110 mg BID; DE150, dabigatran etexilate 150 mg BID.

Circulation. 2013;127: 634-640



Circulation. 2013;127: 634-640



Circulation. 2013;127: 634-640

European Heart Journal (2013) **34**, 1670–1680
doi:10.1093/eurheartj/eht049

CLINICAL RESEARCH
Acute coronary syndromes

New oral anticoagulants in addition to single or dual antiplatelet therapy after an acute coronary syndrome: a systematic review and meta-analysis

Jonas Oldgren[1,2*], Lars Wallentin[1,2], John H. Alexander[3], Stefan James[1,2], Birgitta Jönelid[1], Gabriel Steg[4,5,6], and Johan Sundström[1,2]

In patients with a recent acute coronary syndrome, the addition of a new oral anticoagulant to antiplatelet therapy

results in a modest reduction in cardiovascular events but a substantial increase in bleeding, most pronounced when new oral anticoagulants are combined with dual antiplatelet therapy

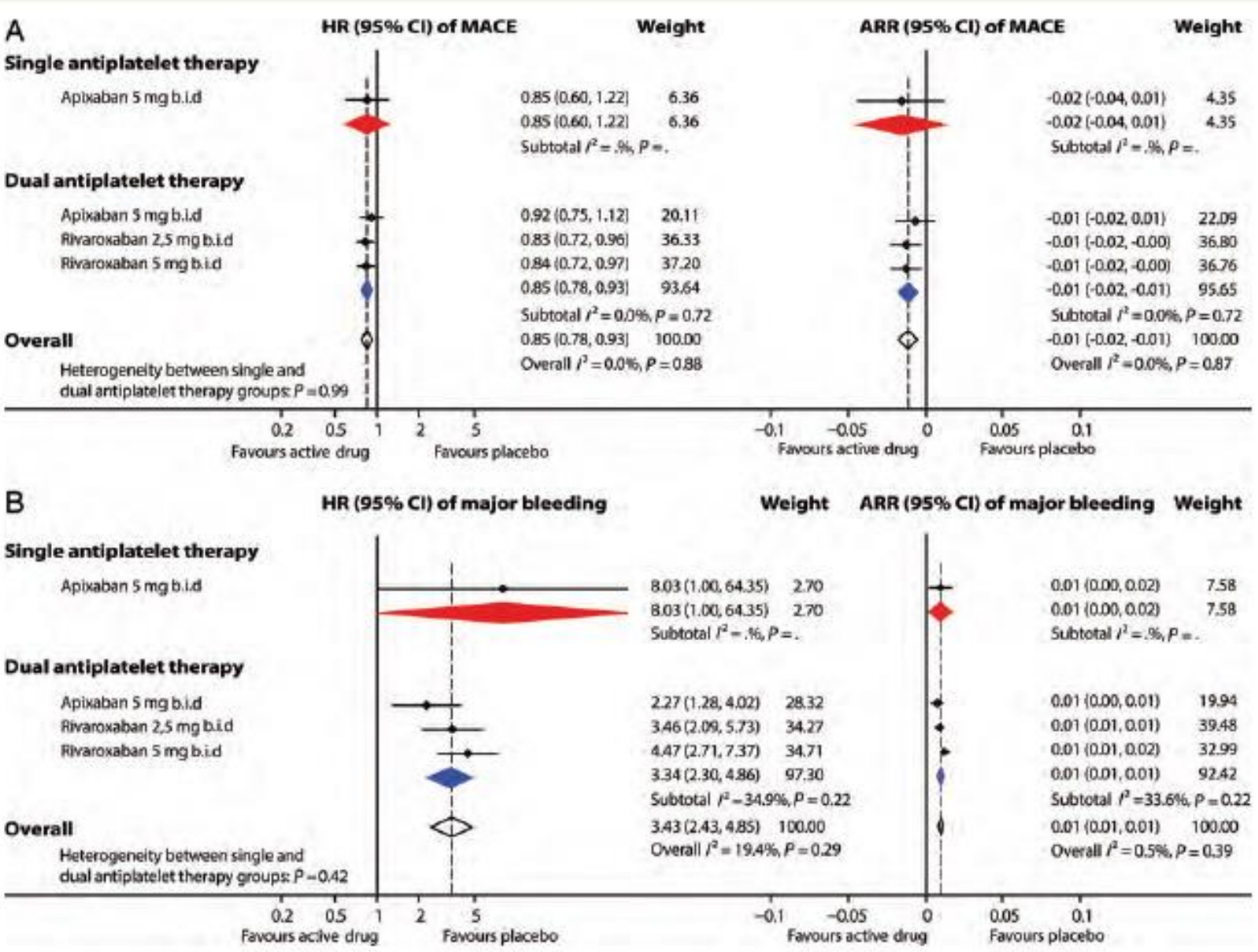


Figure 4 Effect of adding an oral anticoagulant to single (aspirin) or dual (aspirin and clopidogrel) antiplatelet therapy on rates of major adverse cardiovascular events (*A*) and TIMI major bleeding events (*B*) after an acute coronary syndrome in a subgroup of phase III studies.

Conclusions

- AF in pts with ACS is frequent (10-20%)
- The rate of AF is not declining
- AF in pts with ACS is associated with increased short and long-term mortality risk and with increased risk of stroke
- Antithrombotic management is complicated by the need to use antiplatelets after PCI

Conclusions

- It seems that a combination of dual antiplatelet therapy with OAC (including NOACS) is associated with lower rate of CV endpoints but at a price of increased risk of bleeding
- The combination of a OAC with clopidogrel may the most beneficial in terms of harm-benefit and net clinical benefit.

Thank You