

Timing of Staged Non-Culprit Revascularization in ST-Segment Elevation Myocardial Infarction: Insights from the COMPLETE trial

David A Wood, MD on behalf of the
COMPLETE Trial Executive & Steering Committees & Investigators

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Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest, arrangement, or affiliation with the organization(s) listed below:

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COMPLETE TRIAL

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*We thank all investigators,
study coordinators and participants*



COMPLETE Trial Design

STEMI WITH MULTIVESSEL CAD AND SUCCESSFUL PCI TO THE CULPRIT LESION

MVD defined as at least one additional non-culprit lesion ≥ 2.5 mm diameter and $\geq 70\%$ stenosis or 50-69% with FFR ≤ 0.80

Exclusion Criteria: Intent to revascularize NCL, planned surgical revascularization, prior CABG

RANDOMIZATION

Stratified for intended timing of NCL PCI:
During initial hospitalization or after discharge (max 45 d)

COMPLETE REVASCULARIZATION

Routine staged PCI* of all suitable non-culprit lesions with the goal of complete revascularization
N=2016

CULPRIT-LESION-ONLY REVASCULARIZATION

No further revascularization of non-culprit lesions, guideline-directed medical therapy alone
N=2025

*Everolimus-eluting stents strongly recommended

Guideline-Directed Medical Therapy

ASA, P2Y12 inhibitor (Ticagrelor strongly recommended), Statin, BB, ACE/ARB + Risk Factor Modification

MEDIAN FOLLOW-UP: 3 YEARS

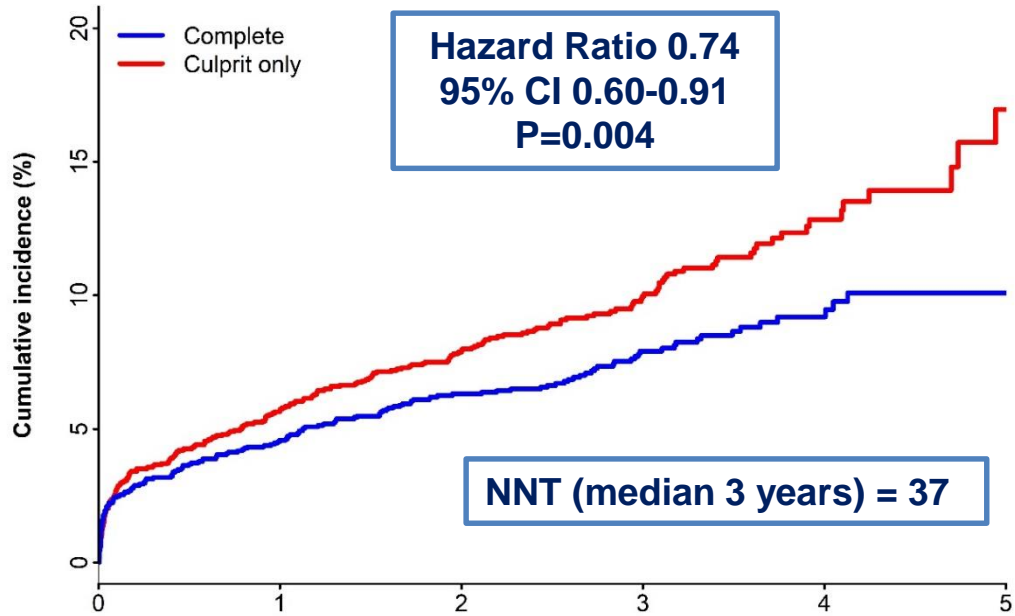
CO-PRIMARY OUTCOMES:

1. Composite of CV death or new MI
2. Composite of CV death, new MI or IDR

KEY SECONDARY OUTCOME: CV death, new MI, IDR, unstable angina, NYHA class IV heart failure

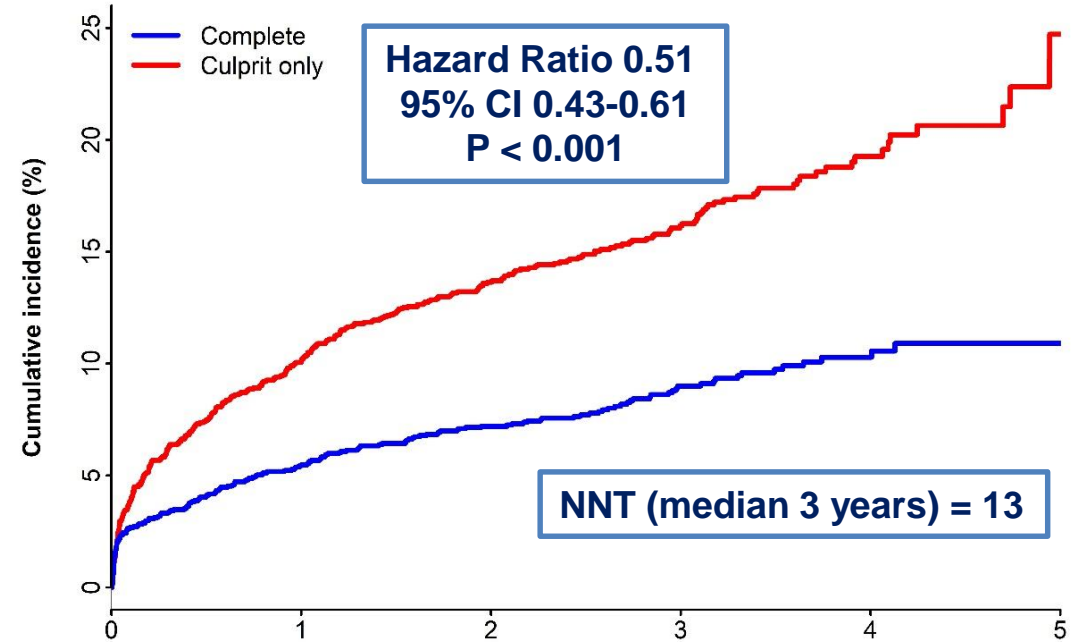
Co-Primary Outcomes

Co-primary #1: CV Death or New MI



No. at Risk	Years of Follow-up					
	0	1	2	3	4	5
Complete	2016	1904	1677	938	337	70
Culprit only	2025	1897	1666	933	310	59

Co-primary #2: CV Death, New MI, or IDR



No. at Risk	Years of Follow-up					
	0	1	2	3	4	5
Complete	2016	1886	1659	925	329	66
Culprit only	2025	1808	1559	865	294	57

Timing of Staged Non-Culprit Revascularization

Objectives

1. To determine if there is a difference in the benefit of a strategy of complete revascularization versus culprit-lesion-only PCI according to the intended timing of non-culprit PCI
2. To examine the time course of the benefits of complete vs culprit-lesion-only PCI



COMPLETE Timing Analysis

STEMI WITH MULTIVESSEL CAD AND SUCCESSFUL PCI TO THE CULPRIT LESION

STRATIFY

BY INTENDED TIMING OF NON-CULPRIT LESION (NCL) PCI

**INDEX HOSPITALIZATION
N = 2702**

**AFTER DISCHARGE
N = 1339**

RANDOMIZE

RANDOMIZE

**STAGED NCL PCI
(Median 1 day)**

**CULPRIT-LESION-ONLY
PCI**

**STAGED NCL PCI
(Median 23 days)**

**CULPRIT-LESION-ONLY
PCI**

Guideline-Directed Medical Therapy

MEDIAN FOLLOW-UP: 3 YEARS

CO-PRIMARY OUTCOMES:

- 1. Composite of CV death or new MI**
- 2. Composite of CV death, new MI or IDR**





Baseline Characteristics

Characteristic	Intended timing of complete revascularization		P value
	Index hospitalization (N=2702)	After discharge (N=1339)	
Actual complete revascularization	1353 (50.1)	663 (49.5)	
Age – year	62.2±10.7	61.7±10.7	0.18
Gender (male)	2151 (79.6)	1074 (80.2)	0.65
Diabetes	552 (20.4)	235 (17.6)	0.03
Chronic renal insufficiency	61/2586 (2.4)	20/1201 (1.7)	0.17
Prior stroke	88 (3.3)	38 (2.8)	0.47
Body mass index (BMI) – kg/m²	28.3±5.6	28.3±5.0	0.97
Prior myocardial infarction	188 (7.0)	114 (8.5)	0.08
Prior PCI	184 (6.8)	99 (7.4)	0.49
Time from symptom onset to primary PCI			0.34
• <6 hours	1821/2678(68.0)	903/1316 (68.6)	
• 6-12 hours	468/2678(17.5)	208/1316 (15.8)	
• >12 hours	389/2678(14.5)	205/1316 (15.6)	
Killip class ≥2	293/2674 (11.0)	137/1317 (10.4)	0.59

Procedural Characteristics



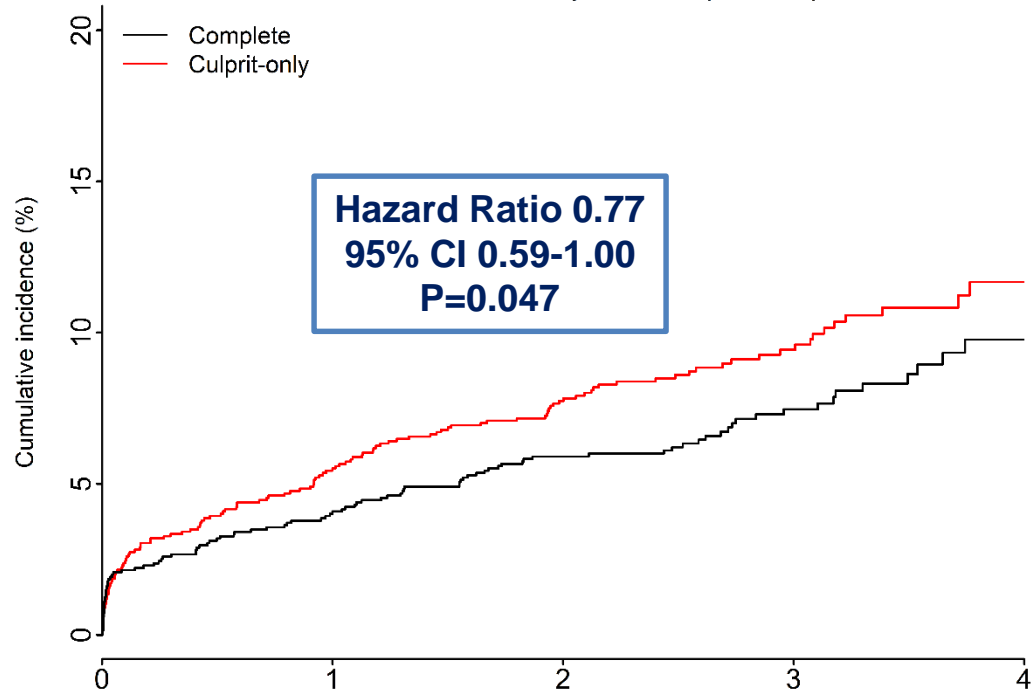
COMPLETE TRIAL

Characteristic	Intended timing of complete revascularization		P-value
	Index hospitalization (N=2702)	After discharge (N=1339)	
SYNTAX score			
• Baseline (including STEMI culprit)	16.1±6.8	16.4±6.6	0.12
• Residual (after index PCI)	7.1±4.8	7.2±4.8	0.48
• Lesion specific (STEMI culprit)	8.6±5.3	8.9±5.3	0.04
• Lesion specific (Non-culprit)	4.5±2.7	4.7±2.7	0.04
• Post NCL lesion PCI=0 (Complete revascularization achieved)	1095/1200 (91.3)	525/598 (87.8)	0.02
Non-culprit lesions location			
• Left main	7/3543 (0.2)	6/1812 (0.3)	0.77
• Left anterior descending	1379/3543 (38.9)	738/1812 (40.7)	0.20
• Circumflex	1293/3543 (36.5)	633/1812 (34.9)	0.26
• Right coronary artery	864/3543 (24.4)	435/1812 (24.0)	0.83
Non-culprit lesion diameter stenosis			0.12
• 50-69%	28/3468 (0.8)	9/1720 (0.5)	
• 70-79%	1435/3468 (41.4)	805/1720 (46.8)	
• 80-89%	1214/3468 (35.0)	500/1720 (29.1)	
• 90-99%	734/3468 (21.2)	357/1720 (20.8)	
• 100%	57/3468 (1.6)	49/1720 (2.8)	
Index procedure for STEMI			
• Primary PCI	2479 (91.7)	1259 (94.0)	0.01
• Pharmaco-invasive PCI	87 (3.2)	38 (2.8)	0.51
• Rescue PCI	136 (5.0)	42 (3.1)	0.006
Radial access	2143 (79.3)	1120 (83.6)	0.001
Thrombus aspiration	609/2573 (23.7)	323/1166 (27.7)	0.008

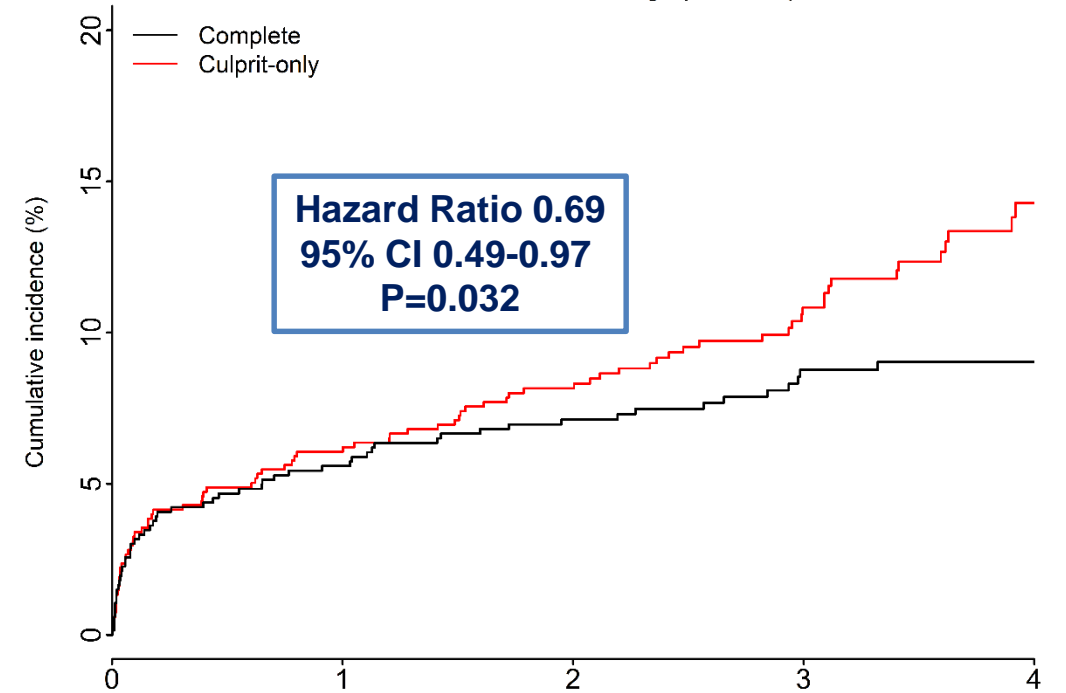
First Co-Primary Outcome CV Death or New MI

Index Hospitalization

After Discharge



No. at Risk	Years of Follow-up from randomization				
	0	1	2	3	4
Complete	1353	1282	1104	539	151
Culprit-only	1349	1262	1092	540	143



No. at Risk	Years of Follow-up from randomization				
	0	1	2	3	4
Complete	663	622	573	399	186
Culprit-only	676	635	574	393	167

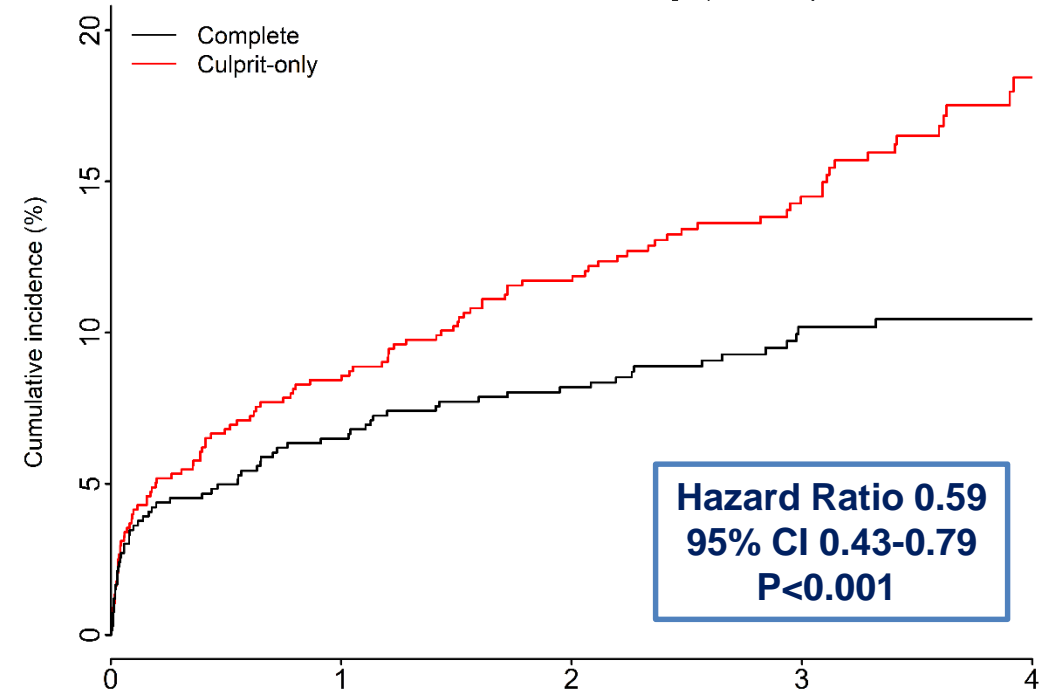
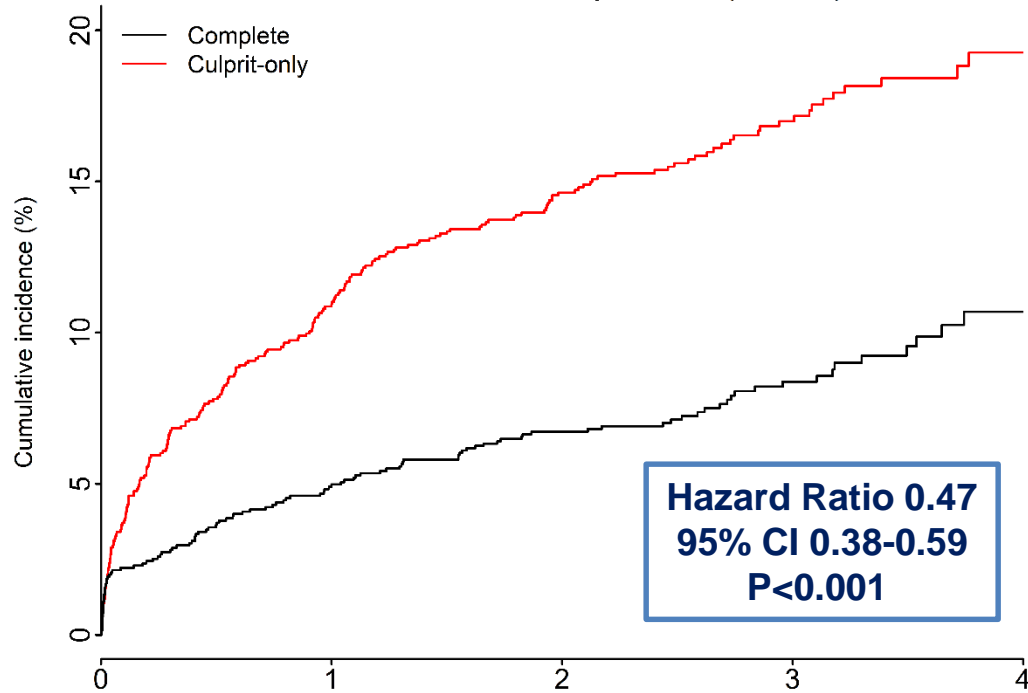
Interaction P= 0.62

Second Co-Primary Outcome

CV Death, New MI or IDR

Index Hospitalization

After Discharge

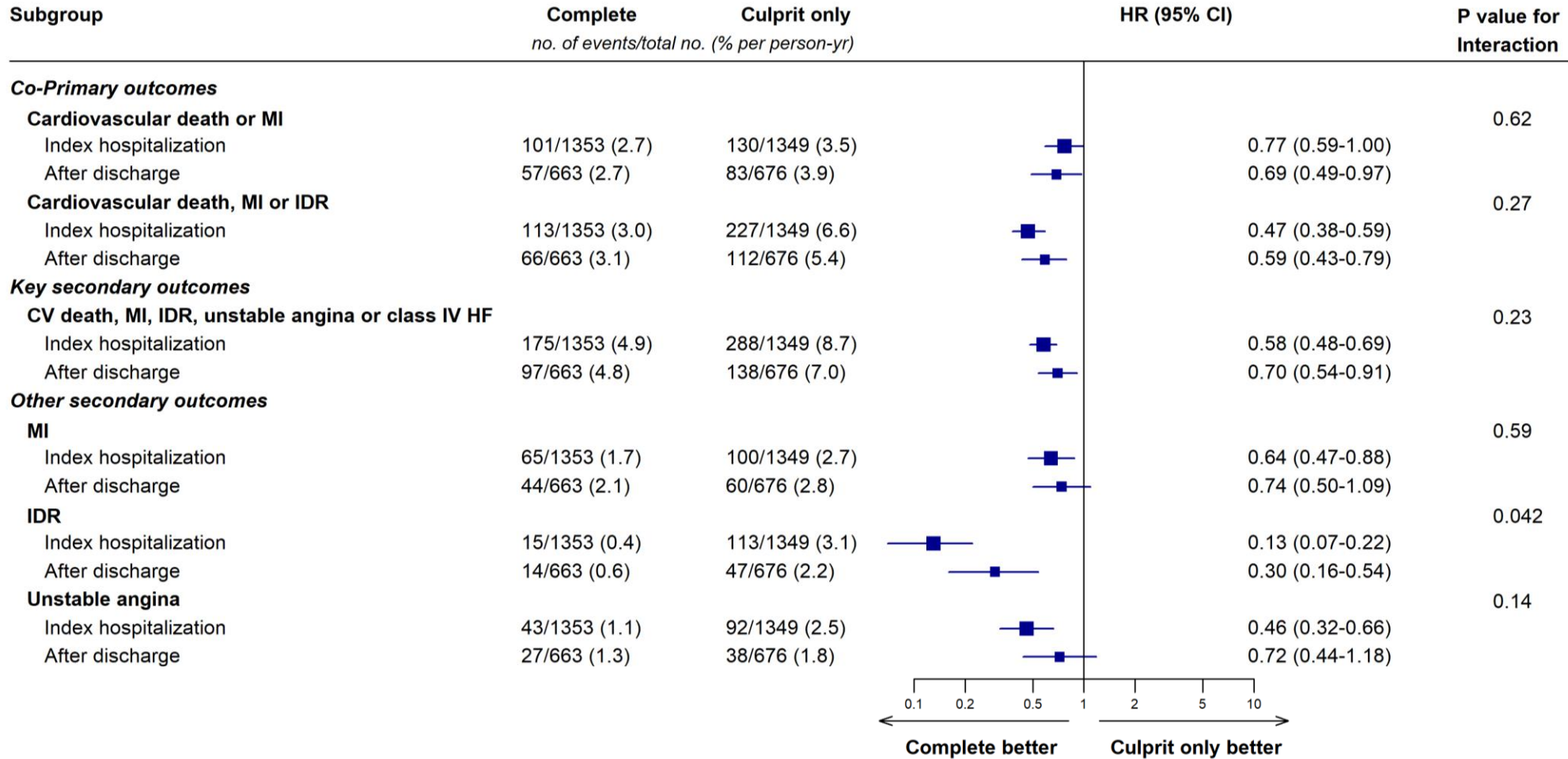


No. at Risk	Years of Follow-up from randomization				
	0	1	2	3	4
Complete	1353	1270	1093	533	149
Culprit-only	1349	1189	1008	489	132

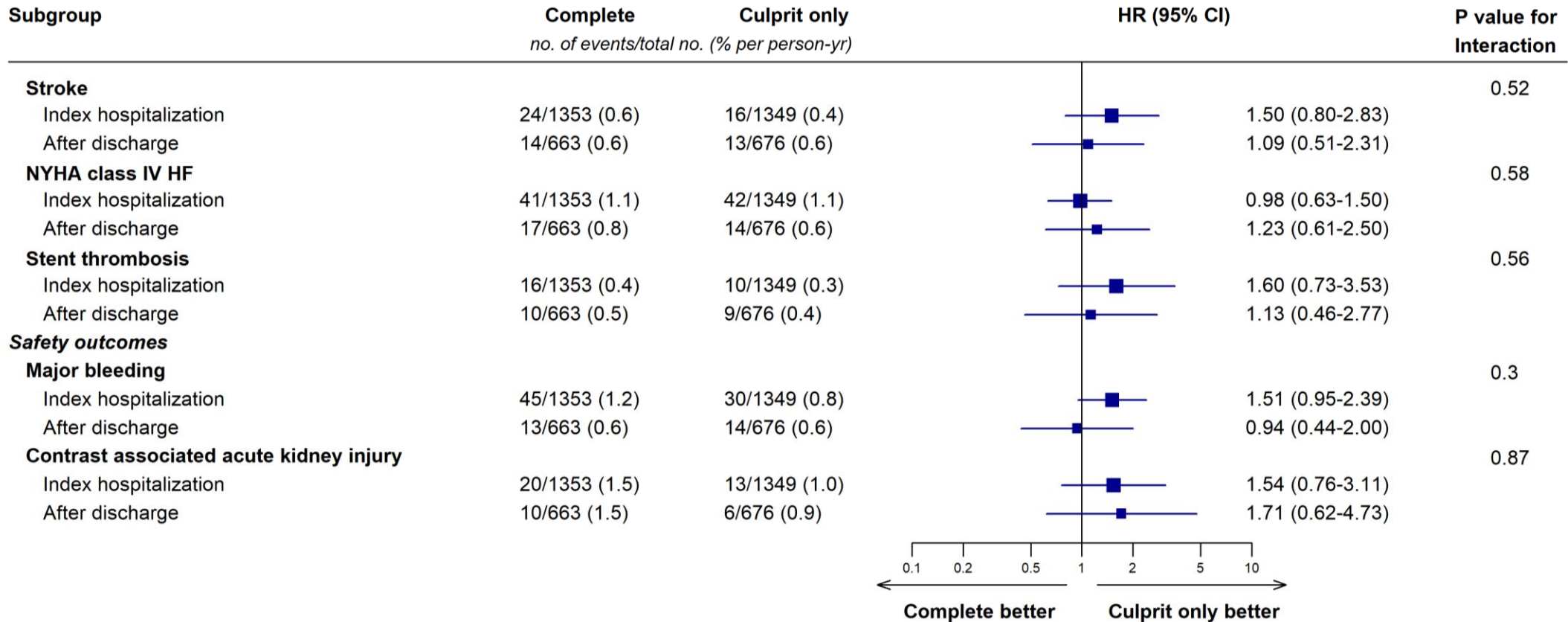
No. at Risk	Years of Follow-up from randomization				
	0	1	2	3	4
Complete	663	616	566	392	180
Culprit-only	676	619	551	376	162

Interaction P=0.27

Efficacy Outcomes According to Timing of NCL PCI



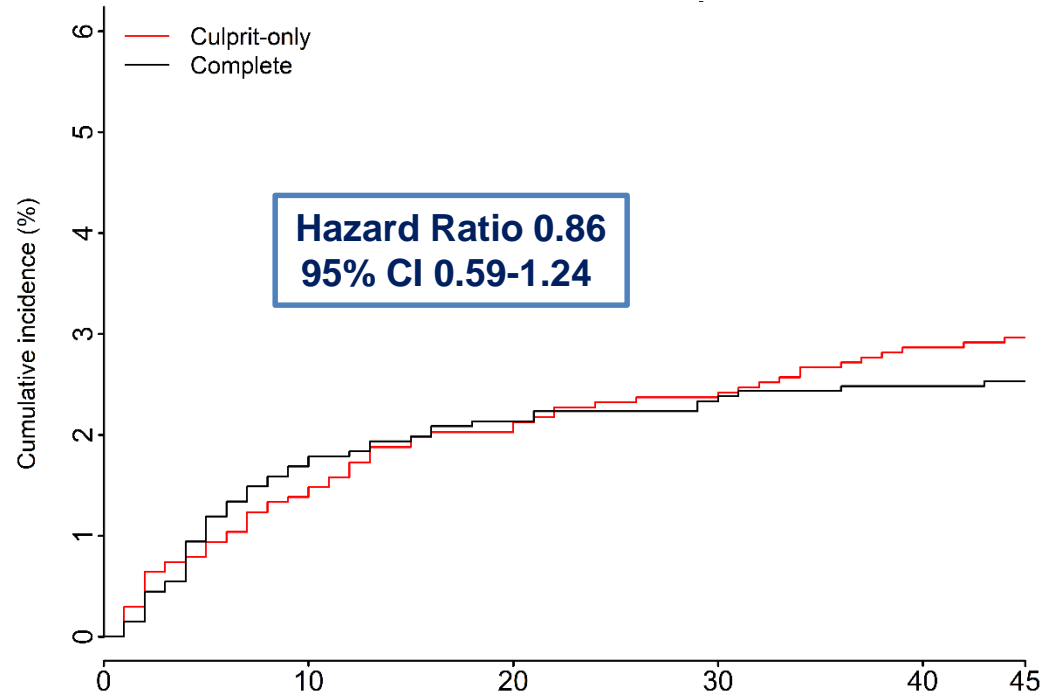
Safety Outcomes According to Timing of NCL PCI



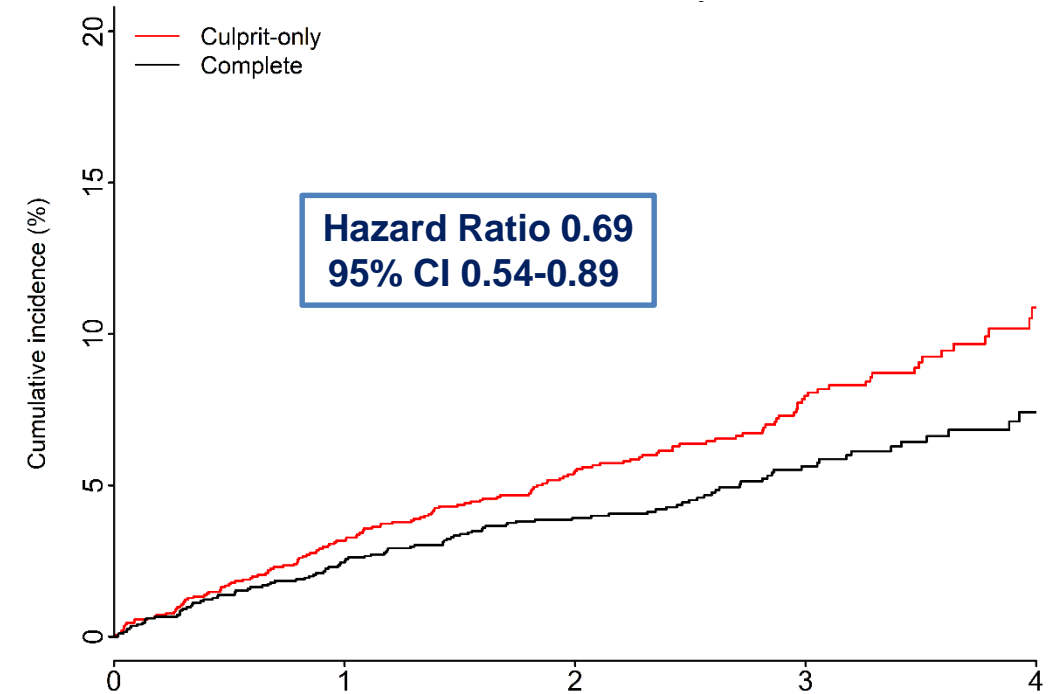
Landmark Analysis Before and After 45 days CV Death or New MI

Randomization to 45 Days

>45 days to Study End



No. at Risk	Days of Follow-up from randomization					
Culprit-only	2025	1995	1982	1975	1964	1961
Complete	2016	1979	1970	1966	1963	1962

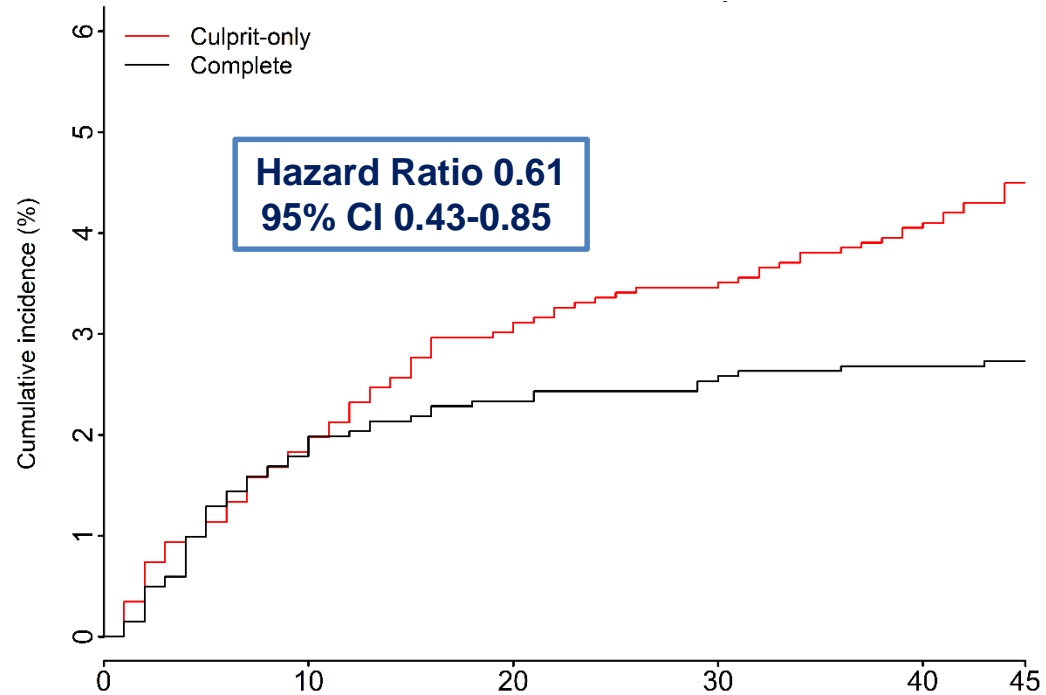


No. at Risk	Years of Follow-up from 45 days				
Culprit-only	1961	1883	1537	834	244
Complete	1962	1892	1568	842	274

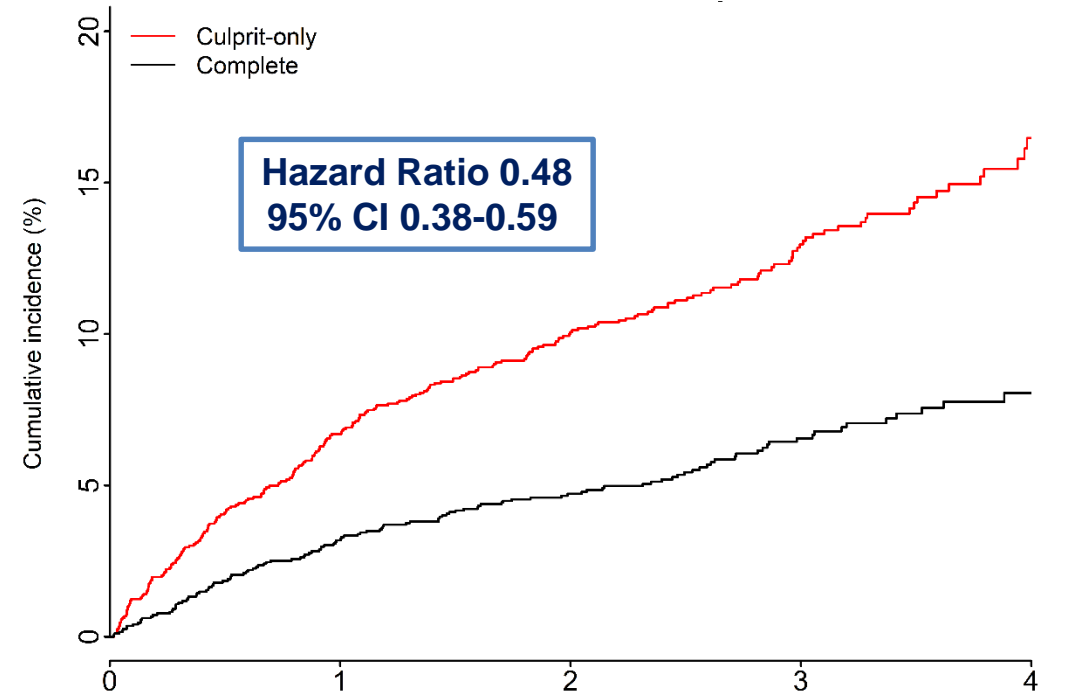
Landmark Analysis Before and After 45 days CV Death, New MI or IDR

Randomization to 45 Days

>45 days to Study End

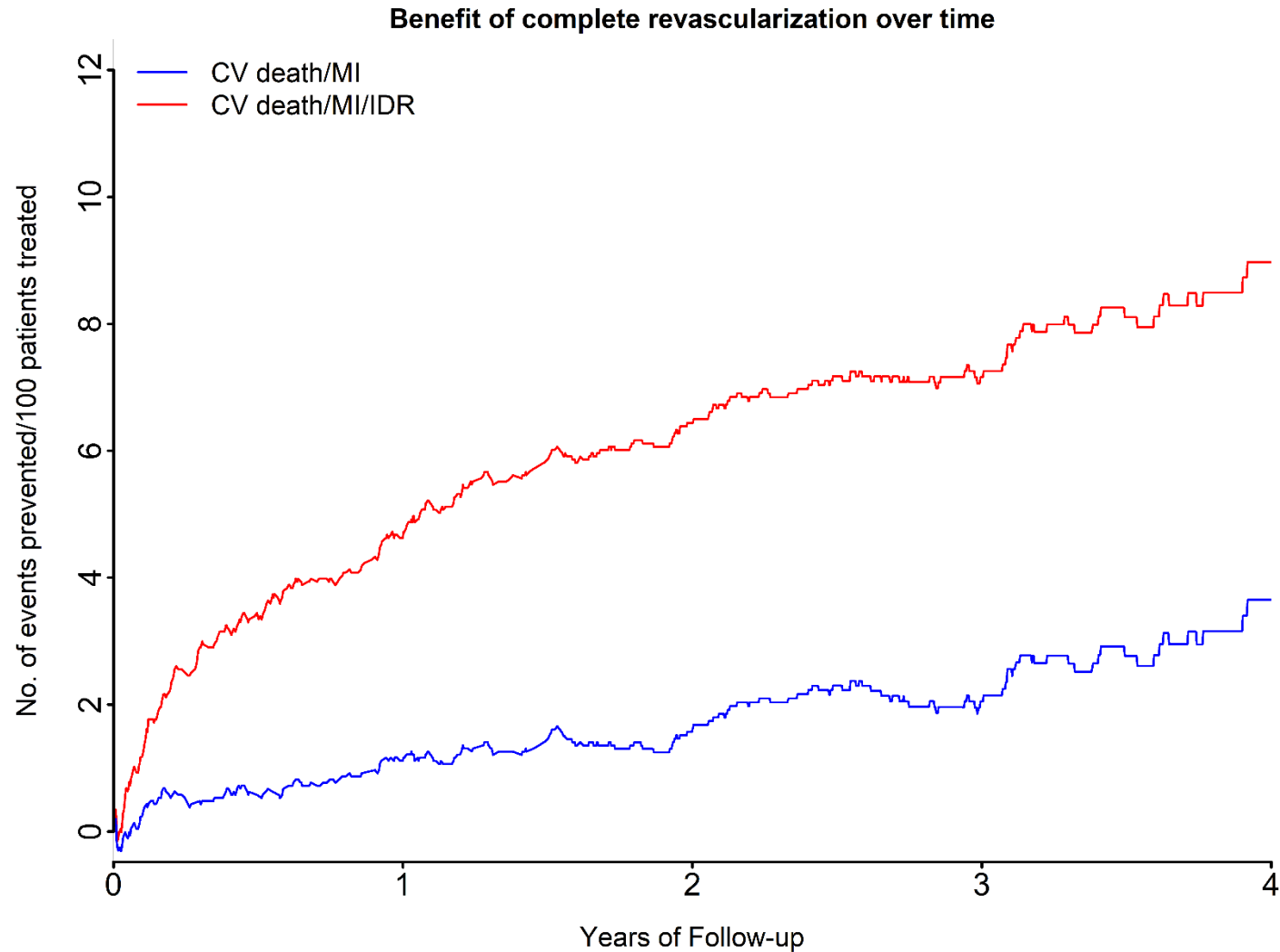


No. at Risk		Days of Follow-up from randomization					
		0	10	20	30	40	45
Culprit-only	2025	1986	1962	1953	1940	1930	
Complete	2016	1977	1966	1962	1959	1958	



No. at Risk		Years of Follow-up from 45 days				
		0	1	2	3	4
Culprit-only	1930	1786	1438	774	230	
Complete	1958	1874	1550	829	267	

Cumulative Outcome Differences between Complete and Culprit-Lesion-Only PCI over Time



Conclusions

- Compared with culprit-lesion only PCI, a strategy of non-culprit lesion PCI with the goal of complete revascularization **performed early during index hospitalization (median 1 day) or after discharge (median 23 days)** confers similar benefit on major CV events.
- The **benefit** of complete revascularization on hard outcomes (CV death or MI) **emerges mainly over the long term (>45 days)**.
- **There were no statistically significant differences in safety outcomes** between randomly allocated therapy (complete vs culprit lesion only PCI) in either the index hospitalization or the after discharge non-culprit PCI strata.



COMPLETE TRIAL

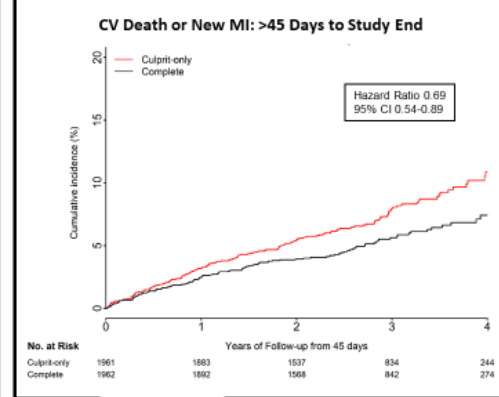
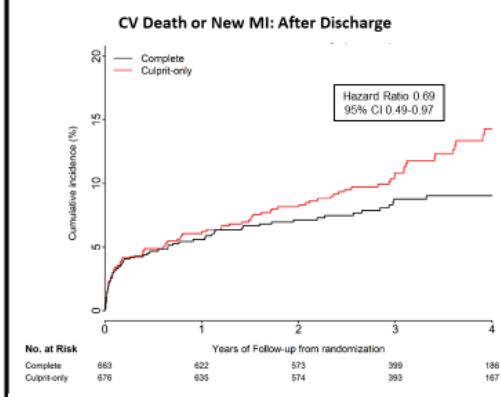
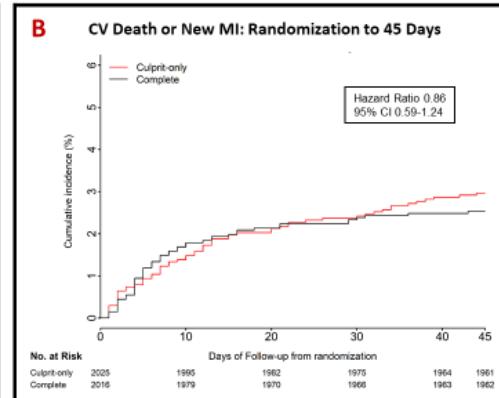
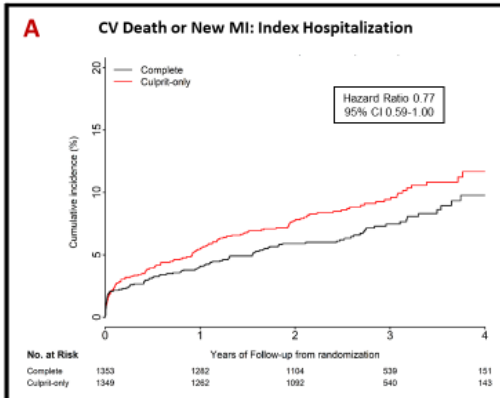
TIMING OF COMPLETE REVASCULARIZATION and TIME COURSE of BENEFIT



Index hospitalization



After discharge



Reduction of CV Death or MI with complete revascularization: Results by non-culprit PCI intended timing strata

Upper panel: Kaplan Meier (KM) curves for complete revascularization vs culprit lesion only PCI in the group with non-culprit lesion PCI intended during index hospitalization. Lower panel: KM curves for the group with non-culprit PCI intended after discharge.

Reduction of CV Death or MI with complete revascularization: Results by follow-up time

Upper panel: KM curves for complete revascularization vs culprit lesion only PCI up to 45 days follow-up. Lower panel: KM curves from after 45 days to the end of follow-up.