Treating Non Culprit Lesion in the Non-Shock Primary PCI STEMI Setting May Increase Patient Risk!

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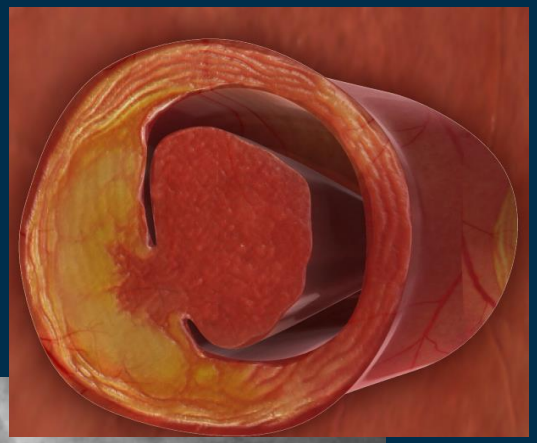
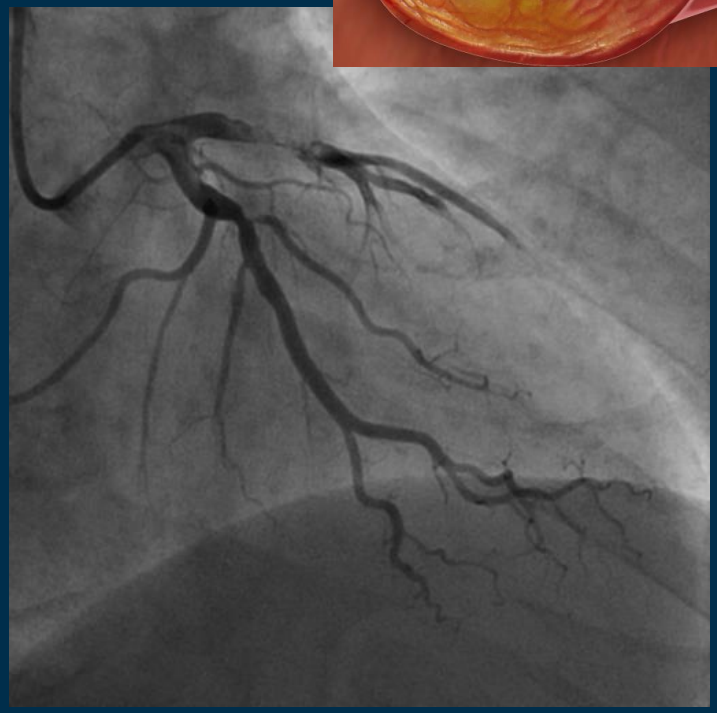
Disclosure Statement of Financial Interest

I, (Ran Kornowski, MD) DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

The Goal of Primary PCI in STEMI

- Restore flow in the culprit artery.
- Optimize myocardial perfusion.
- Preserve LV function.
- Prevent mechanical complications.
- Reduce mortality!





European Heart Journal
doi:10.1093/eurheartj/ehs215

ESC GUIDELINES
2012

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

The Task Force on the management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology (ESC)

Approximately 50% of STEMI patients have significant multivessel disease. Only the infarct-related artery should be treated during the initial intervention. There is no current evidence to support emergency intervention in non-infarct-related lesions.[75,76] The only exceptions, when multivessel PCI during acute STEMI is justified, are in patients with cardiogenic shock in the presence of multiple, truly critical (≥90% diameter) stenoses or highly unstable lesions (angiographic signs of possible thrombus or lesion disruption), and if there is persistent ischaemia after PCI of the supposed culprit lesion. However, in patients with multivessel disease and cardiogenic shock, non-culprit lesions without critical stenoses should not routinely be stented.[77] See also *section 3.5.4.9*.

Primary PCI should be limited to the culprit vessel with the exception of cardiogenic shock and persistent ischaemia after PCI of the supposed culprit lesion.	IIa	B

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association®

ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial

ACC/AHA PRACTICE GUIDELINES—FULL TEXT

ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of Patients With Acute Myocardial Infarction)
Developed in Collaboration With the Canadian Cardiovascular Society

Class III

1. **PCI should not be performed in a noninfarct artery at the time of primary PCI in patients without hemodynamic compromise. *(Level of Evidence: C)***

Circulation
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American Heart Association®

2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction: Executive Summary : A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

Patrick T. O'Gara, Frederick G. Kushner, Deborah D. Ascheim, Donald E. Casey, Jr, Mina K. Chung, James A. de Lemos, Steven M. Ettinger, James C. Fang, Francis M. Fesmire, Barry A. Franklin, Christopher B. Granger, Harlan M. Krumholz, Jane A. Linderbaum, David A. Morrow, L. Kristin Newby, Joseph P. Ornato, Narith Ou, Martha J. Radford, Jacqueline E. Tamis-Holland, Carl L. Tommaso, Cynthia M. Tracy, Y. Joseph Woo and David X. Zhao

Circulation. published online December 17, 2012;

The ACCF/AHA Guidelines on MV & STEMI have not changed since 2004 up to date!

Table 2. Primary PCI in STEMI

	COR	LOE
Ischemic symptoms <12 h	I	A
Ischemic symptoms <12 h and contraindications to fibrinolytic therapy irrespective of time delay from FMC	I	B
Cardiogenic shock or acute severe HF irrespective of time delay from MI onset	I	B
Evidence of ongoing ischemia 12 to 24 h after symptom onset	IIa	B
PCI of a noninfarct artery at the time of primary PCI in patients without hemodynamic compromise	III: Harm	B

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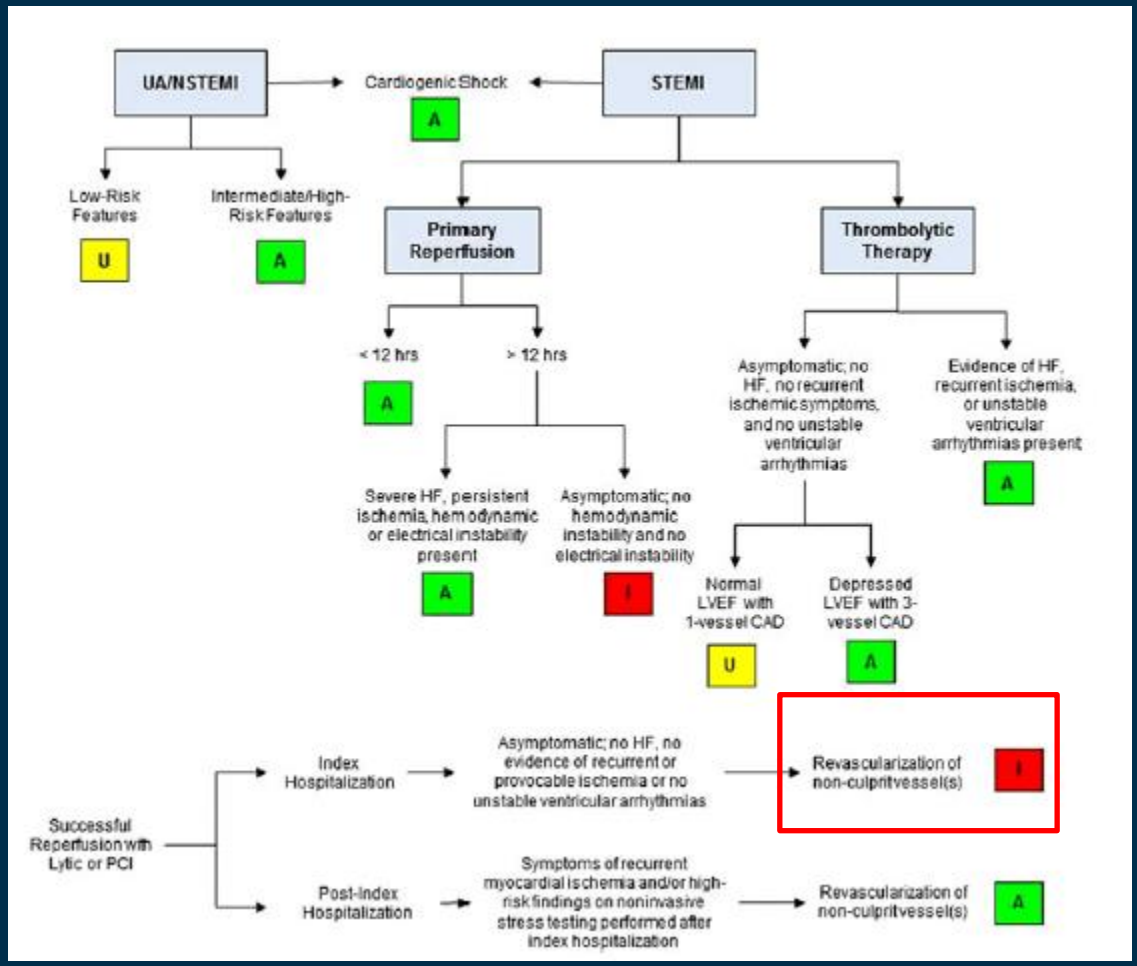
APPROPRIATE USE CRITERIA

ACCF/SCAI/STS/AATS/AHA/ASNC/HFSA/SCCT 2012 Appropriate Use Criteria for Coronary Revascularization Focused Update



J Am Coll Cardiol 2012;59:857-881.

Prognostic Impact of Staged Versus "One-Time" Multivessel Percutaneous Intervention in Acute Myocardial Infarction

Analysis From the HORIZONS-AMI (Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction) Trial

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Petach Tikva and Tel Aviv, Israel; Rochester, Minnesota; New York, New York; Berlin, Germany; Bergamo, Italy; and Krakow, Poland

Objectives The purpose of this study was to compare a one-time primary percutaneous coronary intervention (PCI) of the culprit and nonculprit lesions with PCI of only the culprit lesion and staged nonculprit PCI at a later date in patients with ST-segment elevation myocardial infarction (STEMI) and multivessel disease.

Background In patients with STEMI and multivessel disease, it is unknown whether it is safe or even desirable to also treat the nonculprit vessel during the primary PCI procedure.

Methods In the HORIZONS-AMI (Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction) trial, 668 of the 3,602 STEMI patients enrolled (18.5%) underwent PCI of culprit and nonculprit lesions for multivessel disease. Patients were categorized into a single PCI strategy (n = 275) versus staged PCI (n = 393). The endpoints analyzed included the 1-year rates of major adverse cardiovascular events and its components, death, reinfarction, target-vessel revascularization for ischemia, and stroke.

Results Single versus staged PCI was associated with higher 1-year mortality (9.2% vs. 2.3%; hazard ratio [HR]: 4.1, 95% confidence interval [CI]: 1.93 to 8.86, $p < 0.0001$), cardiac mortality (6.2% vs. 2.0%; HR: 3.14, 95% CI: 1.35 to 7.27, $p = 0.005$), definite/probable stent thrombosis (5.7% vs. 2.3%; HR: 2.49, 95% CI: 1.09 to 5.70, $p = 0.02$), and a trend toward greater major adverse cardiovascular events (18.1% vs. 13.4%; HR: 1.42, 95% CI: 0.96 to 2.1, $p = 0.08$). The mortality advantage favoring staged PCI was maintained in a subgroup of patients undergoing truly elective multivessel PCI. Also, the staged PCI strategy was independently associated with lower all-cause mortality at 30 days and at 1 year.

Conclusions A deferred angioplasty strategy of nonculprit lesions should remain the standard approach in patients with STEMI undergoing primary PCI, as multivessel PCI may be associated with a greater hazard for mortality and stent thrombosis. (Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction [HORIZONS-AMI]; NCT00433966) (J Am Coll Cardiol 2011;xx:xxx)

Kornowski R et al. J Am Coll Cardiol. 2011;58:704-11.

HORIZONS AMI

≥3602* pts with STEMI with symptom onset ≤12 hours
Randomized into UFH + GP IIb/IIIa inhibitor
vs. Bivalirudin monotherapy (± provisional GP IIb/IIIa)
and to Express™ BMS vs. Taxus™ Stent

668 Patients (18.5%)
with multivessel CAD underwent PCI of
the culprit and non-culprit lesion

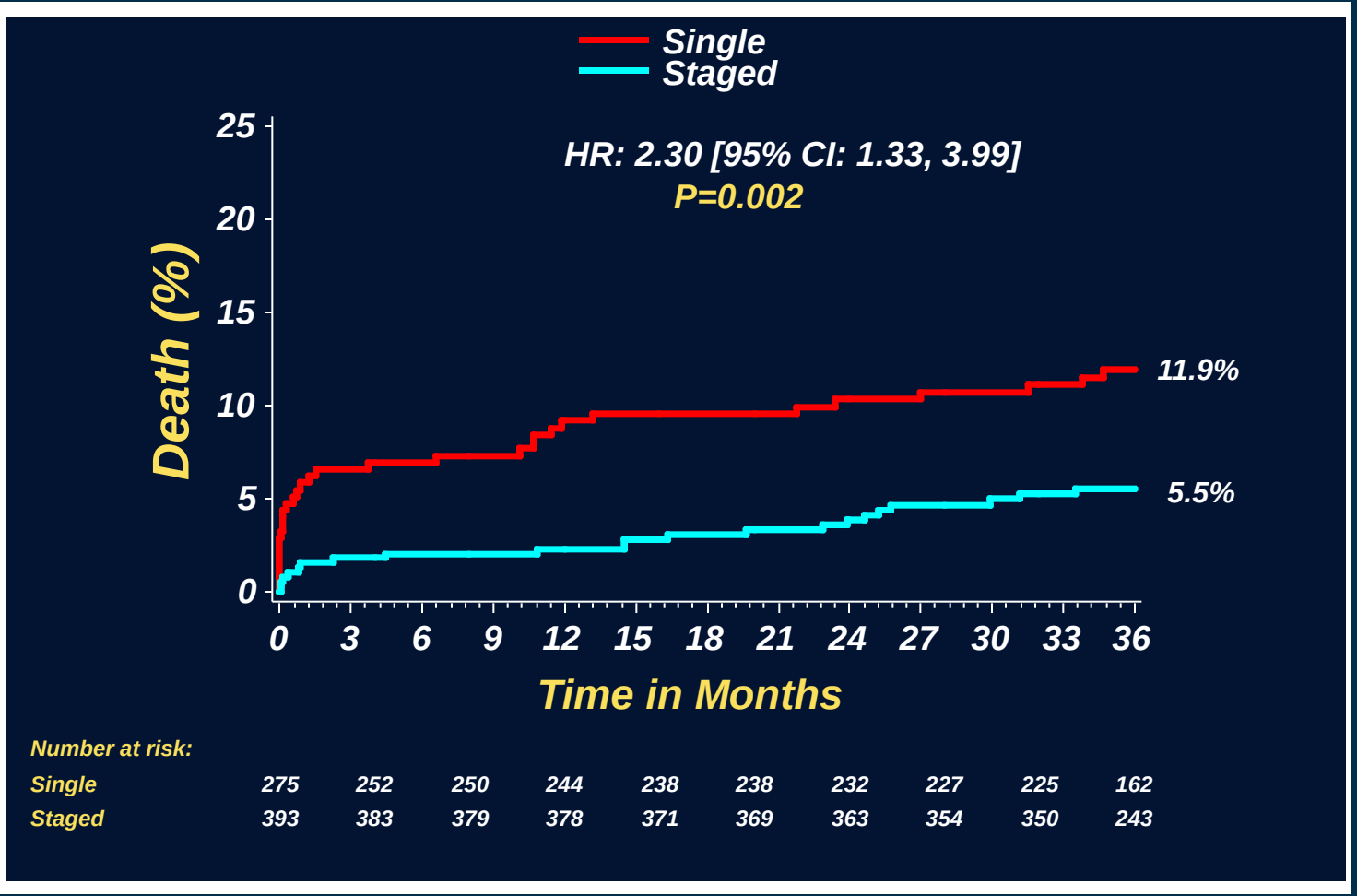
Therapeutic strategy

'Single/One time' PCI (N=275)

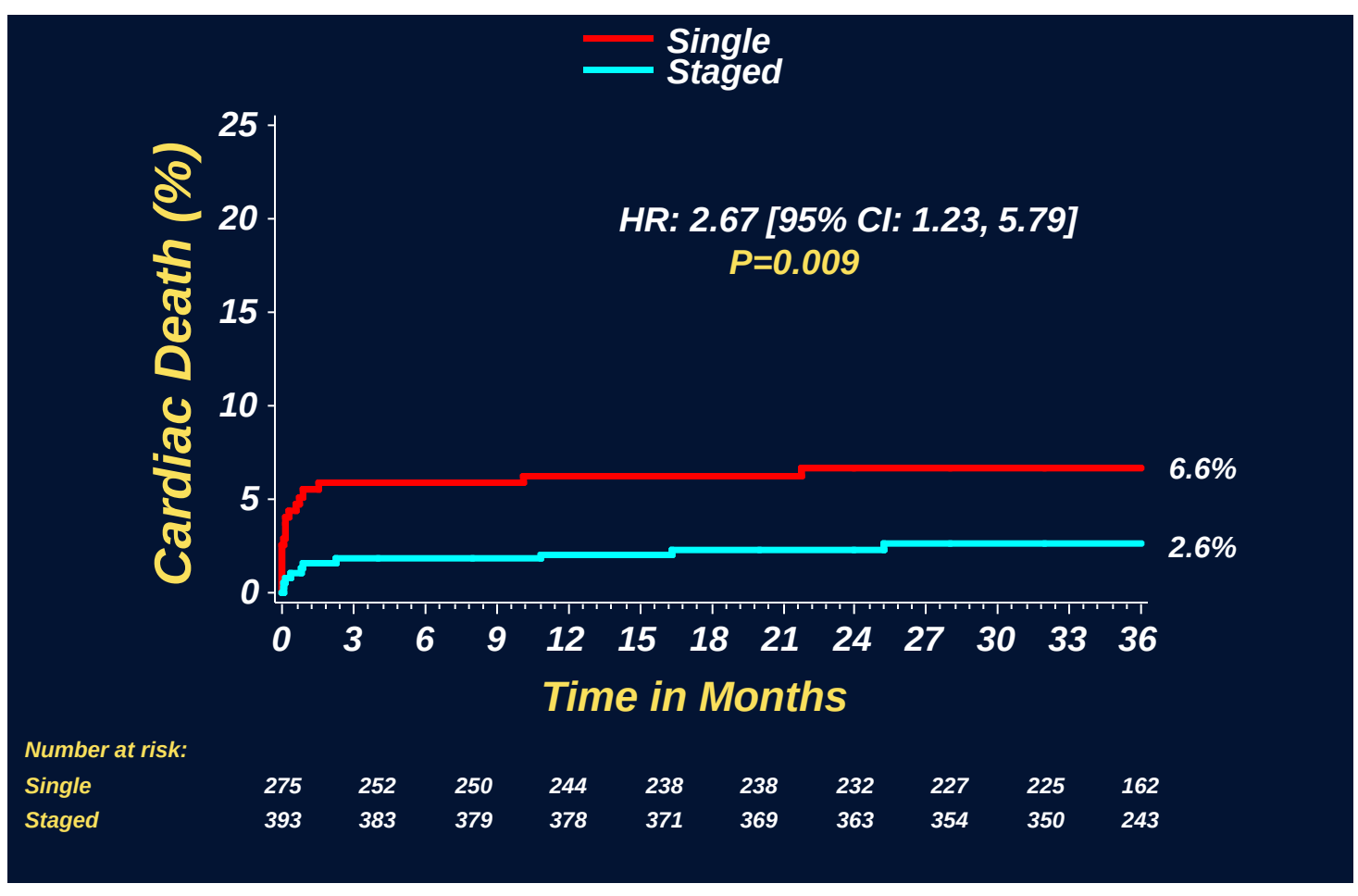
'Staged' PCI (N=393)

Retrospective analysis - 1 and 3 year Outcomes

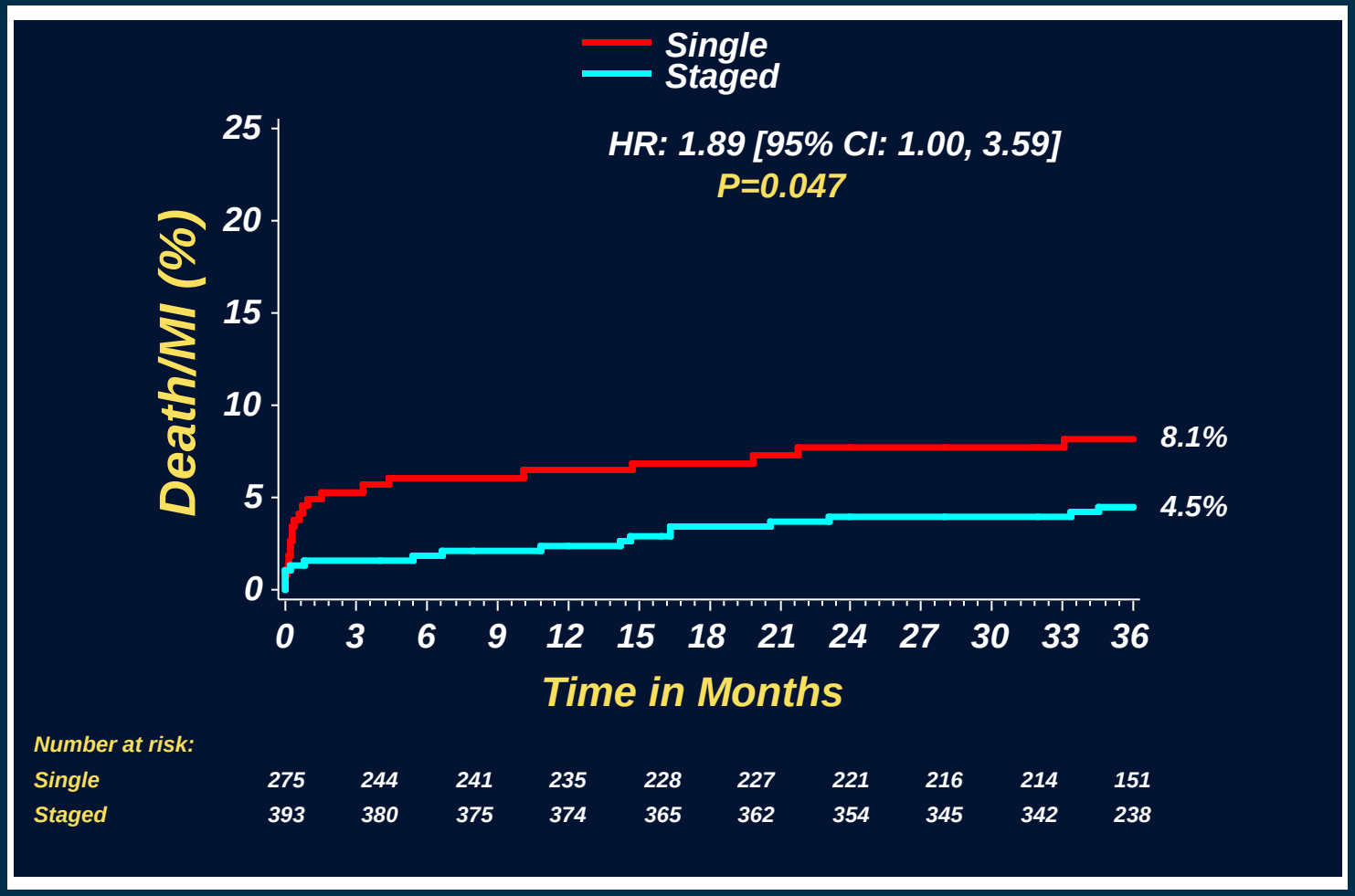
3 Year Cumulative Mortality Rates



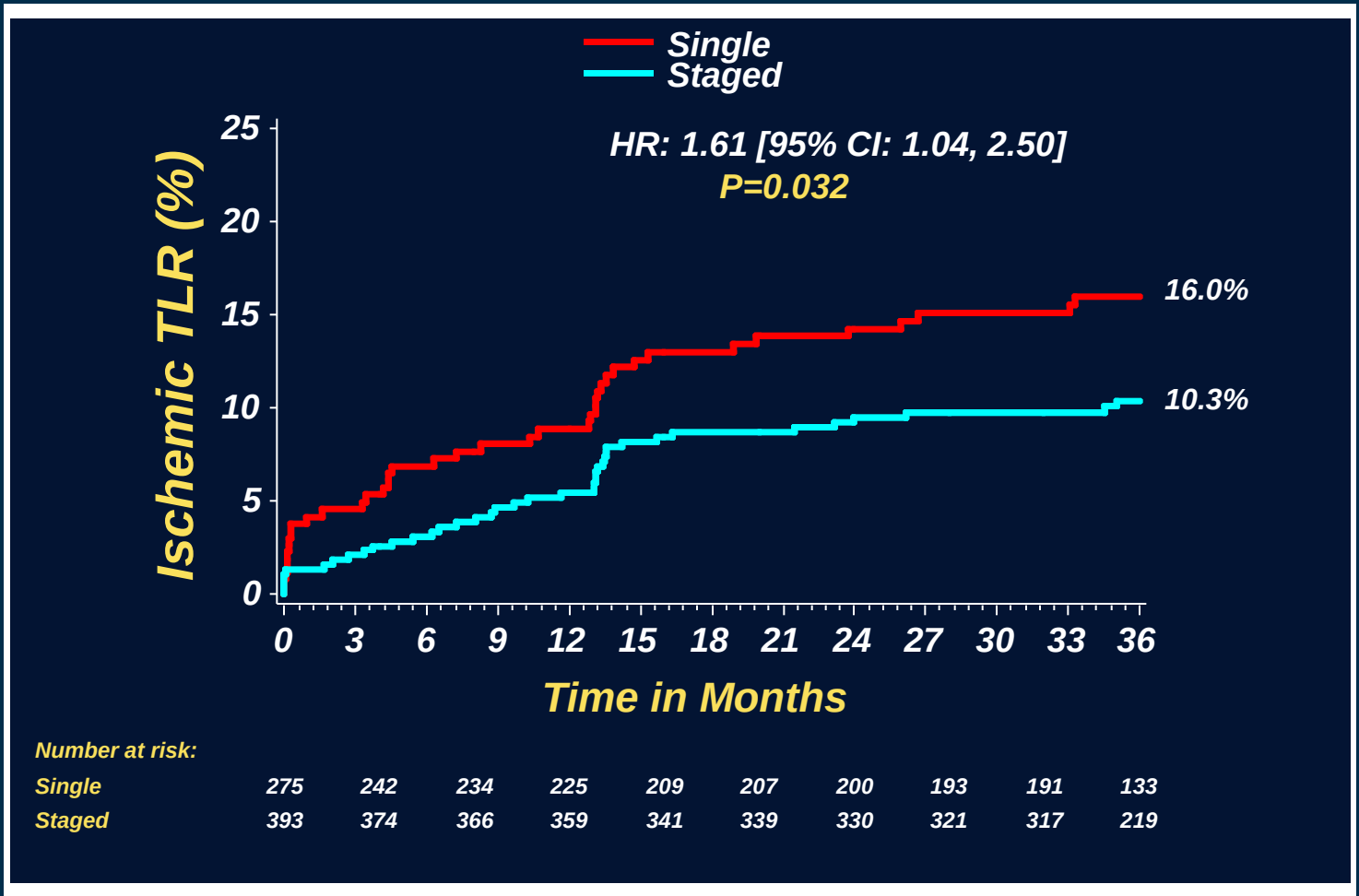
3 Year Cardiac-Death Rates



3 Year Cumulative Death/MI Rates

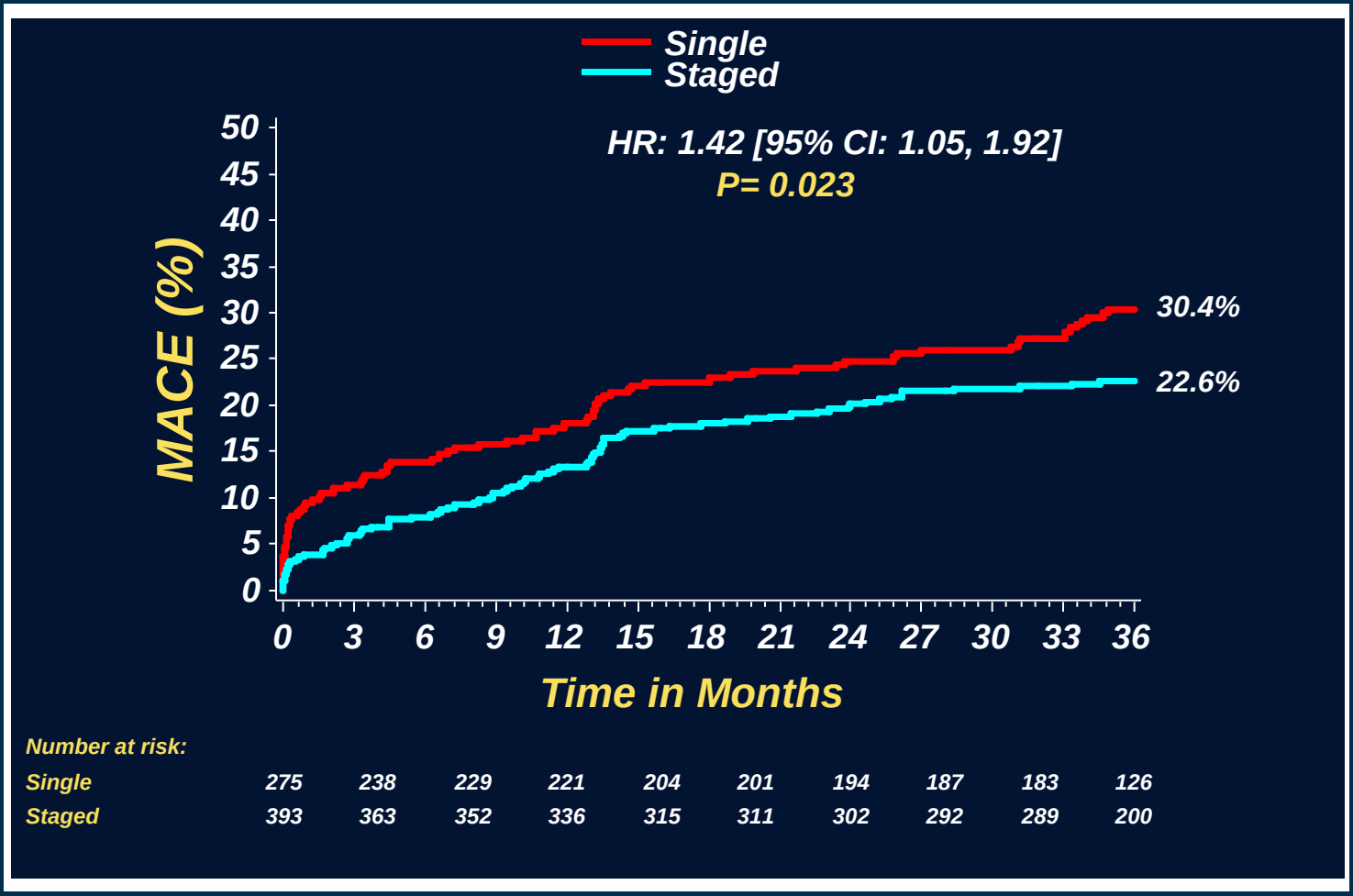


3 Year Cumulative Ischemic TLR



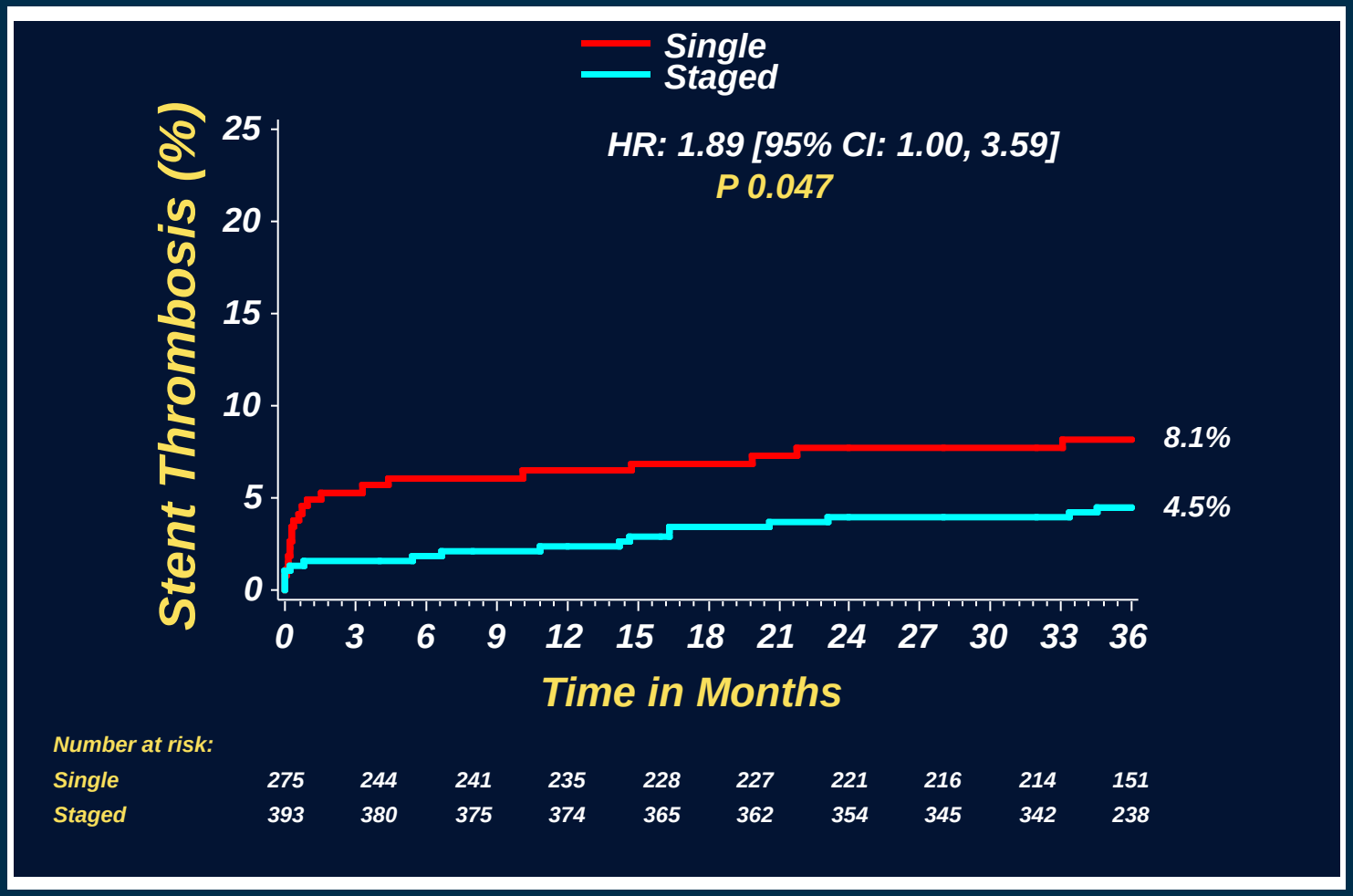
*TLR=Target lesion revascularization

3 Year Cumulative MACE*



*MACE = All cause death, reinfarction, ischemic TVR or stroke

3 Year Cumulative Stent Thrombosis*



*Any stent thrombosis = definite or probable or possible (per protocol ARC defined)

Multivariate Analysis Model
3 Years Outcomes

Death		
Staged PCI (vs. Single)	0.0086	0.48 [0.27, 0.83]
Age (10 yr increase)	<0.0001	1.95 [1.50, 2.54]
Killip Class 2-4	0.0015	2.85 [1.49, 5.44]
Cardiac death		
Staged PCI (vs. Single)	0.0195	0.40 [0.18, 0.86]
Age (10 yr increase)	0.0229	1.49 [1.06, 2.11]
Killip Class 2-4	0.0366	2.64 [1.06, 6.55]
MACE		
Staged PCI (vs. Single)	0.0783	0.73 [0.51, 1.04]
Age (10 yr increase)	0.090	1.15 [0.98, 1.35]
LVEF (10% decrease)	0.0004	1.28 [1.11, 1.46]

Covariates - age, killip class 2-4, LVEF, diabetes, baseline TIMI 0/1, LAD disease, bivalirudin (vs. UFH+IIb/IIIa), symptom to first balloon time, clopidogrel loading dose 600ng, pre-randomization heparin

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Interventional Cardiology

Culprit Vessel Only Versus Multivessel and Staged Percutaneous Coronary Intervention for Multivessel Disease in Patients Presenting With ST-Segment Elevation Myocardial Infarction

A Pairwise and Network Meta-Analysis

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Objectives The purposes of this study were to investigate whether, in patients with ST-segment elevation myocardial infarction (STEMI) and multivessel disease (MVD), percutaneous coronary intervention (PCI) should be confined to the culprit or also nonculprit vessels and, when performing PCI for nonculprit vessels, whether it should take place during primary PCI or staged procedures.

Background A significant percentage of STEMI patients have MVD. However, the best PCI strategy for nonculprit vessel lesions is unknown.

Methods Pairwise and network meta-analyses were performed on 3 PCI strategies for MVD in STEMI patients: 1) culprit vessel only PCI strategy (culprit PCI), defined as PCI confined to culprit vessel lesions only; 2) multivessel PCI strategy (MV-PCI), defined as PCI of culprit vessel as well as ≥1 nonculprit vessel lesions; and 3) staged PCI strategy (staged PCI), defined as PCI confined to culprit vessel, after which ≥1 nonculprit vessel lesions are treated during staged procedures. Prospective and retrospective studies were included when research subjects were patients with STEMI and MVD undergoing PCI. The primary endpoint was short-term mortality.

Results Four prospective and 14 retrospective studies involving 40,280 patients were included. Pairwise meta-analyses demonstrated that staged PCI was associated with lower short- and long-term mortality as compared with culprit PCI and MV-PCI and that MV-PCI was associated with highest mortality rates at both short- and long-term follow-up. In network analyses, staged PCI was also consistently associated with lower mortality.

Conclusions This meta-analysis supports current guidelines discouraging performance of multivessel primary PCI for STEMI. When significant nonculprit vessel lesions are suitable for PCI, they should only be treated during staged procedures. (J Am Coll Cardiol 2011;58:692–703) © 2011 by the American College of Cardiology Foundation

*Vlaar PJ et al. JACC 2011;58:692-703

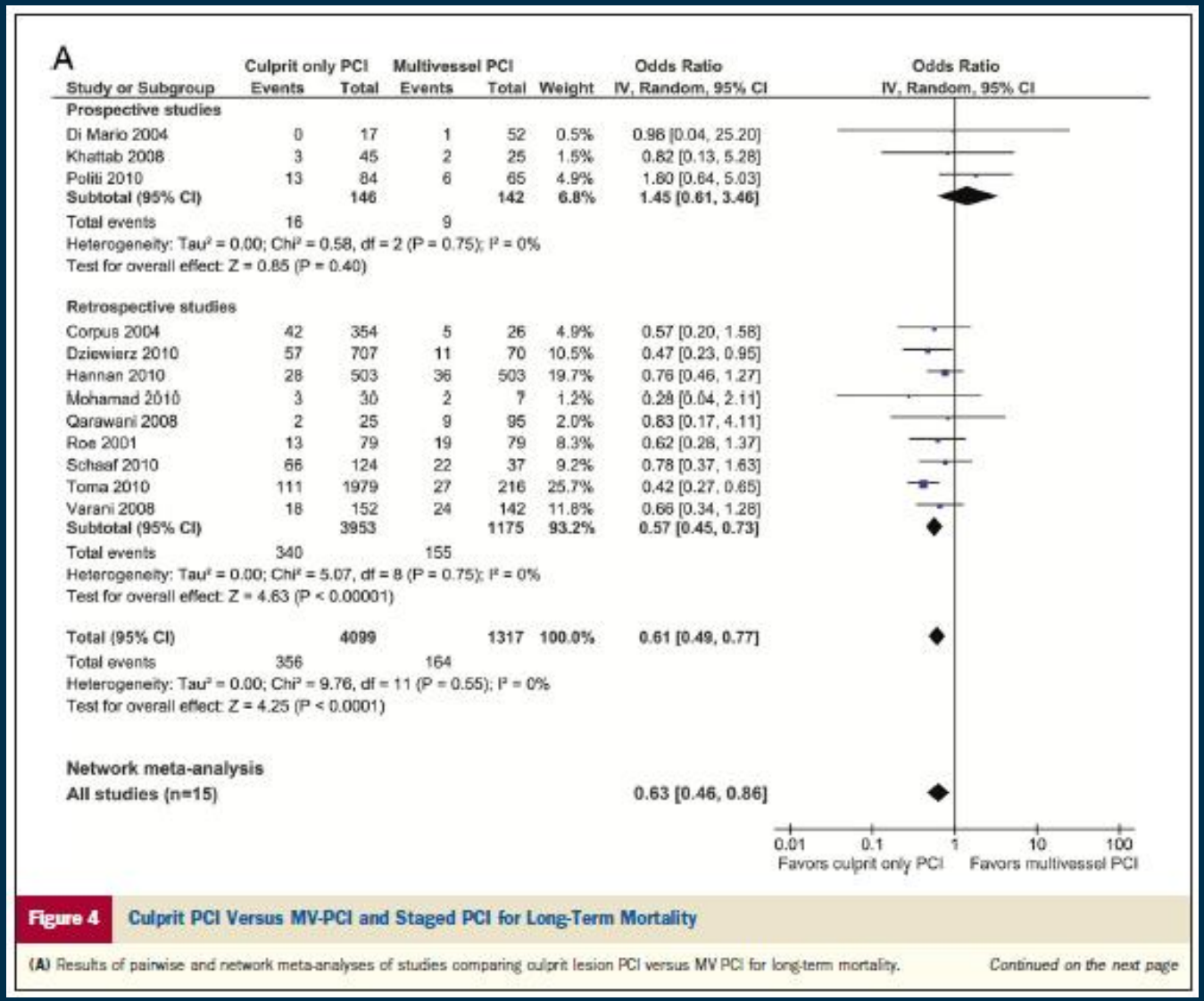

Figure 4 **Culprit PCI Versus MV-PCI and Staged PCI for Long-Term Mortality**

(A) Results of pairwise and network meta-analyses of studies comparing culprit lesion PCI versus MV PCI for long-term mortality.

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**Vlaar PJ et al. JACC 2011;58:692-703*

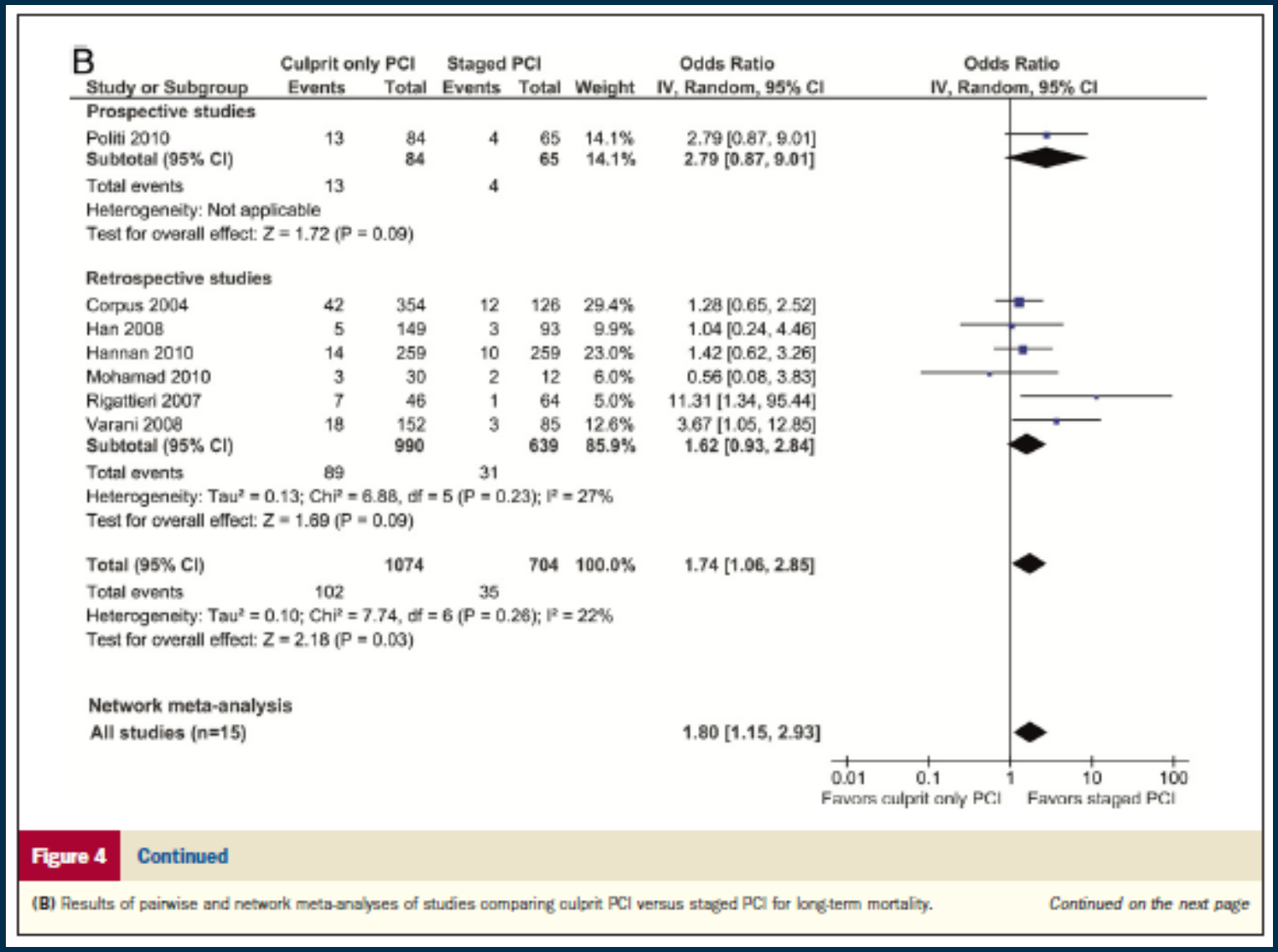

Figure 4 Continued

(B) Results of pairwise and network meta-analyses of studies comparing culprit PCI versus staged PCI for long-term mortality.

Continued on the next page

*Vlaar PJ et al. JACC 2011;58:692-703

Culprit only or multivessel percutaneous coronary interventions in patients with ST-segment elevation myocardial infarction and multivessel disease

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EuroIntervention 2012;8:456-464

Table 4. Relative risk estimates for death for patients with single versus multivessel disease PCI.

	Single vessel disease	Multivessel PCI	Multivessel PCI at the time of PPCI	Multivessel PCI staged in-hospital	Multivessel PCI within 60 days
	reference	HR, 95% CI	HR, 95% CI	HR, 95% CI	HR, 95% CI
In-hospital mortality - n (%)		0.92 (0.51-1.66)	2.09 (1.11-3.94)	0.44 (0.11-1.81)	–
30-day mortality - n (%)		0.83 (0.56-1.25)	2.11 (1.36-3.25)	0.35 (0.09-1.40)	0.12 (0.03-0.48)
12-month mortality - n (%)		0.76 (0.56-1.03)	1.53 (1.07-2.18)	0.60 (0.28-1.26)	0.28 (0.14-0.54)
24-month mortality - n (%)		0.84 (0.66-1.08)	1.66 (124-2.24)	0.57 (0.29-1.10)	0.38 (0.23-0.61)
Overall mortality - n (%)		0.96 (0.80-1.14)	1.60 (1.27-2.01)	0.75 (0.49-1.14)	0.62 (0.49-0.86)

Relative risk estimates adjusted for age, gender, and comorbidity index.

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Culprit Vessel Percutaneous Coronary Intervention Versus Multivessel and Staged Percutaneous Coronary Intervention for ST-Segment Elevation Myocardial Infarction Patients With Multivessel Disease

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Table 5. Mortality Rates (%) for Propensity Matched Multivessel Disease STEMI Patients by Revascularization Strategy During the Index Procedure

Outcome by Subgroup	Culprit Vessel Revascularization at the Time of PPCI	Multivessel Revascularization at the Time of PPCI	Percentage Difference	p Value
All patients	n = 503	n = 503		
Death, %				
In-hospital	2.0	3.4	1.4	0.14
12 months	5.5	7.1	1.6	0.23
24 months	6.6	8.6	2.0	0.17
42 months	10.8	11.8	1.0	0.23
Patients without hemodynamic instability, LVEF <20%, malignant ventricular arrhythmia	n = 458	n = 458		
Death, %				
In-hospital	0.9	2.4	1.5	0.04
12 months	4.2	5.8	1.6	0.13
24 months	4.9	7.2	2.3	0.07
42 months	6.7	10.4	3.7	0.08

Multivessel versus culprit-only revascularisation in ST elevation acute myocardial infarction: facts and criticism

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EuroIntervention 2012;8:423-425

- *A final conclusion cannot yet be drawn in this field of investigation as most data addressing this question were derived from retrospective investigations or post hoc analyses.*
- *Most reports described significant baseline differences between the two analysed groups, which may have influenced the clinical outcomes.*
- *It is possible that patients treated with acute multivessel PCI were sicker and at greater cardiac risk regardless of the treatment strategy.*
- *Given the risk of residual confounding, a randomised trial is required to definitively address this issue.*

Conclusions

- According to the most contemporary dat and Guidelines documents, in patients with STEMI who are undergoing primary PCI and not in cardiogenic shock, a deferred angioplasty strategy of non-culprit lesions should be the standard approach in patients with MVD.
- Multivessel PCI during the course of STEMI may be associated with a greater hazard for mortality, cardiac-mortality, stent thrombosis and MACE compared to staged PCI.

Final Quote

“Facts are stubborn, but statistics are more pliable”

Mark Twain (1835 -1910)