Functional versus Culprit-only Revascularization in Elderly Patients with Myocardial Infarction and Multivessel Disease

The FIRE trial

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on behalf of the FIRE trial Investigators

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Declaration of interest

- **Research grants:** SMT, Medis, Siemens, Amgen, GE, Insight Lifetech, Abbott, Pulse Medical, Pie Medical
- **Speaker's fee:** SMT, Medis, Siemens, Abbott
- **Advisory board activity:** Siemens

Background

- Complete revascularization in older patients with myocardial infarction and multivessel disease has been shown to reduce cardiovascular death or myocardial infarction **at one year**.[1]
- The durability of this benefit over **longer follow-up** periods has been questioned by recent studies.[2]

1. Biscaglia S, N Engl J Med. 2023;389:889-898. 2. Campo G, Circulation. 2024;150:1508-1516.

Research question

To investigate whether, in older patients with MI and multivessel disease, complete revascularization based on coronary physiology is superior to a culprit-only revascularization strategy at 3 years

Organization

3 countries: Italy, Spain, Poland

34 centers

Study PI: Simone Biscaglia

Study Chair: Gianluca Campo

Executive Committee: Javier Escaned, Dariusz Dudek, Raul Moreno, Matteo Tebaldi, Emanuele Barbato

CEC: Rita Pavasini, Paolo Cimaglia

CRC: Veronica Lodolini, Martina Viola

Stats: Elisa Maietti, Anna Zanetti, Nicola Pesenti

CROs: AdvicePharma, Impulsae Consulting, KCRI

Investigator-driven trial

FIRE TRIAL

CFR Consorzio Futuro in Ricerca

Università degli Studi di Ferrara

Contributors

SMT

Medis Medical Imaging Systems

EUKON Future Healthcare Now

SIEMENS Healthineers

GE Healthcare

Insight Lifetech

AMGEN

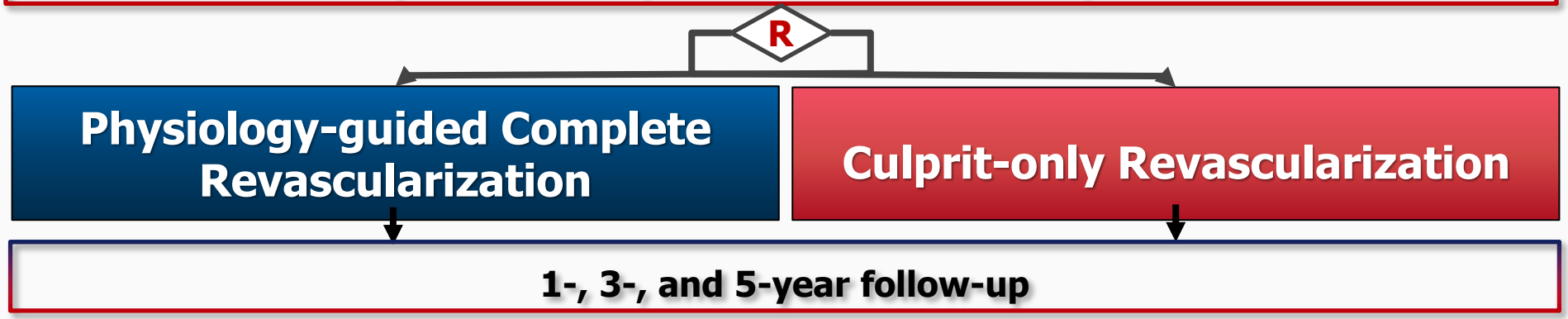
Design

All comers, prospective, randomized, multicenter, open-label trial with blinded adjudicated evaluation of outcomes (PROBE).

Pts ≥75 ys hospitalized for MI (STE or NSTE) with indication to invasive management

Multivessel disease at coronary artery angiography

Culprit lesion clearly identifiable and successfully treated

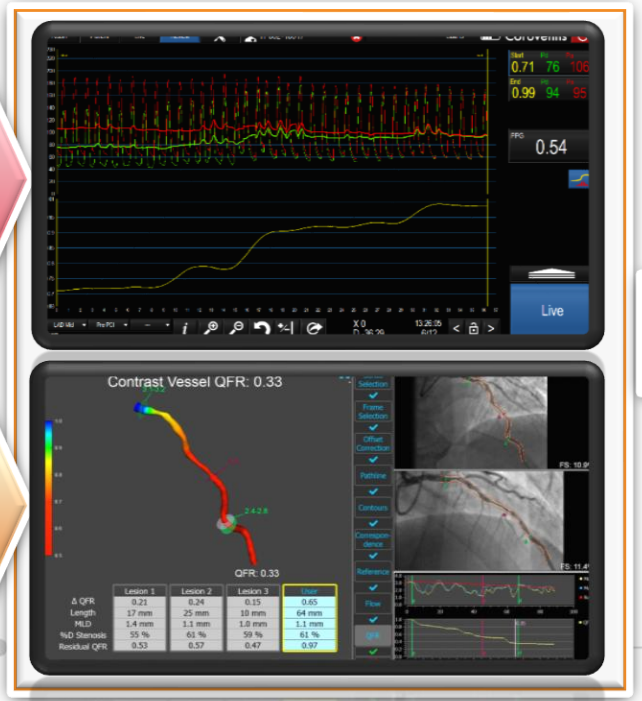


Follow-up complete in 98.8% of patients at 3 years

Coronary Physiology & Stents

- **Non-culprit lesions were assessed with either wire-based FFR, resting index or angiography-derived FFR**
- **Flow-limiting lesions (FFR≤0.80, resting ≤0.89) had to be revascularized with biodegradable-polymer sirolimus ultra-thin stent(s)**

OR



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Endpoints

Primary

Death, any MI, any stroke, or ID-revascularization

Key secondary

Cardiovascular death or MI

Landmark analysis

MI, heart failure

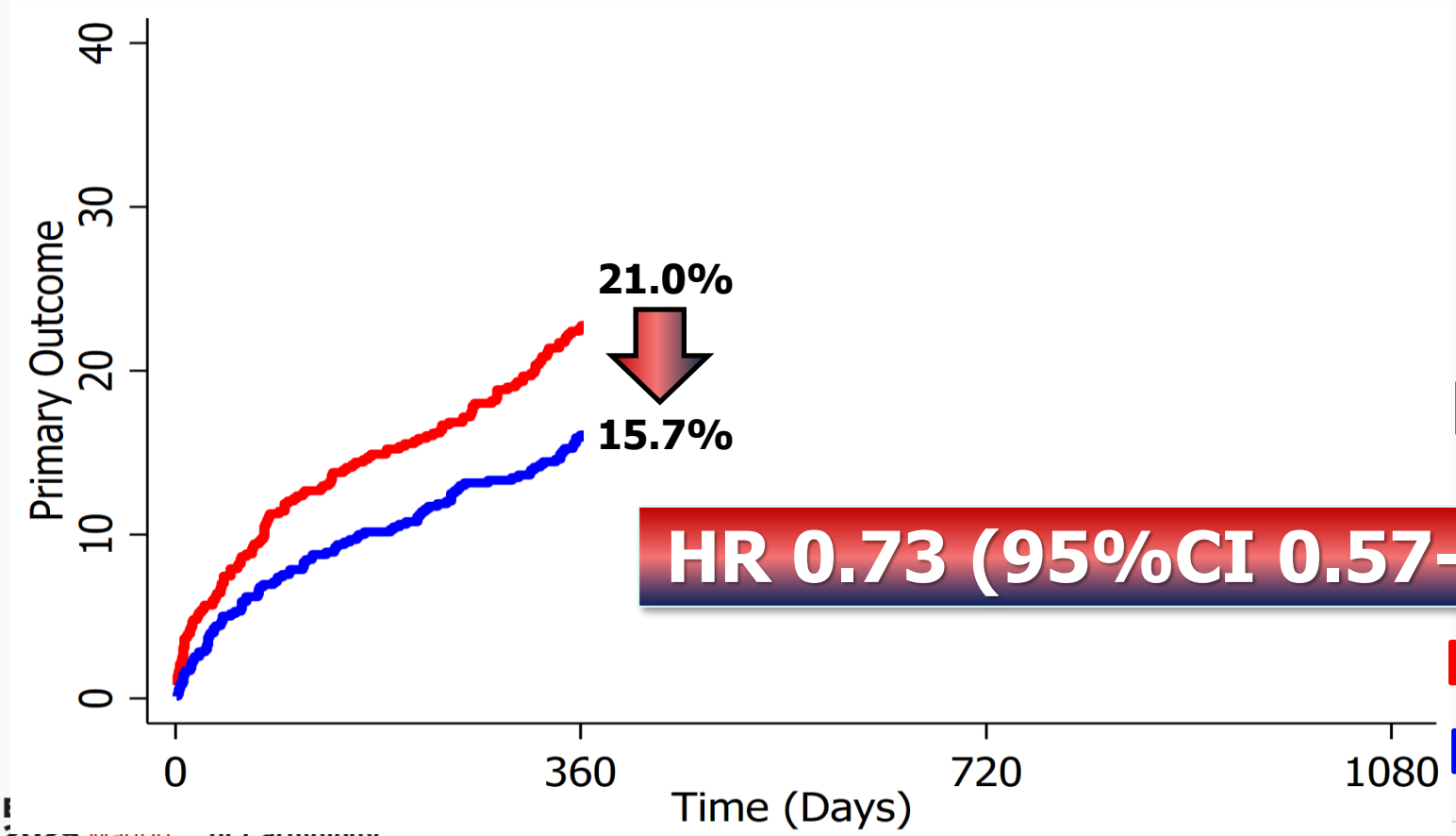
Baseline & Procedural Characteristics

Characteristic	Culprit-Only (N=725)	Physiology-Guided Complete (N=720)
Age (IQR) – yr	80 (77-84)	81 (77-84)
Female sex	265 (36.6)	263 (36.5)
Comorbidities		
Hypertension	592 (81.7)	593 (82.4)
Diabetes	233 (32.1)	230 (31.9)
Prior MI	116 (16)	104 (14.4)
eGFR <60 ml/min	332 (45.8)	330 (45.8)
Clinical presentation		
STEMI	256 (35.3)	253 (35.1)
NSTEMI	469 (64.7)	467 (64.9)

Characteristic	Culprit-Only (n=725)	Physiology-Guided Complete (N=720)
Percent diameter stenosis		
50-69%	401 (42.2)	390 (41.1)
70-89%	378 (39.7)	380 (40.1)
90-99%	172 (18.1)	178 (18.8)
Functionally significant NCL	-	425 (44.8)
Location of non-culprit vessels		
LAD	291 (30.6)	296 (31.2)
LCX	319 (33.5)	308 (32.5)
RCA	320 (33.6)	310 (32.7)
RI	21 (2.2)	34 (3.6)

Primary endpoint

All-cause death, any MI, stroke, or ID-revascularization



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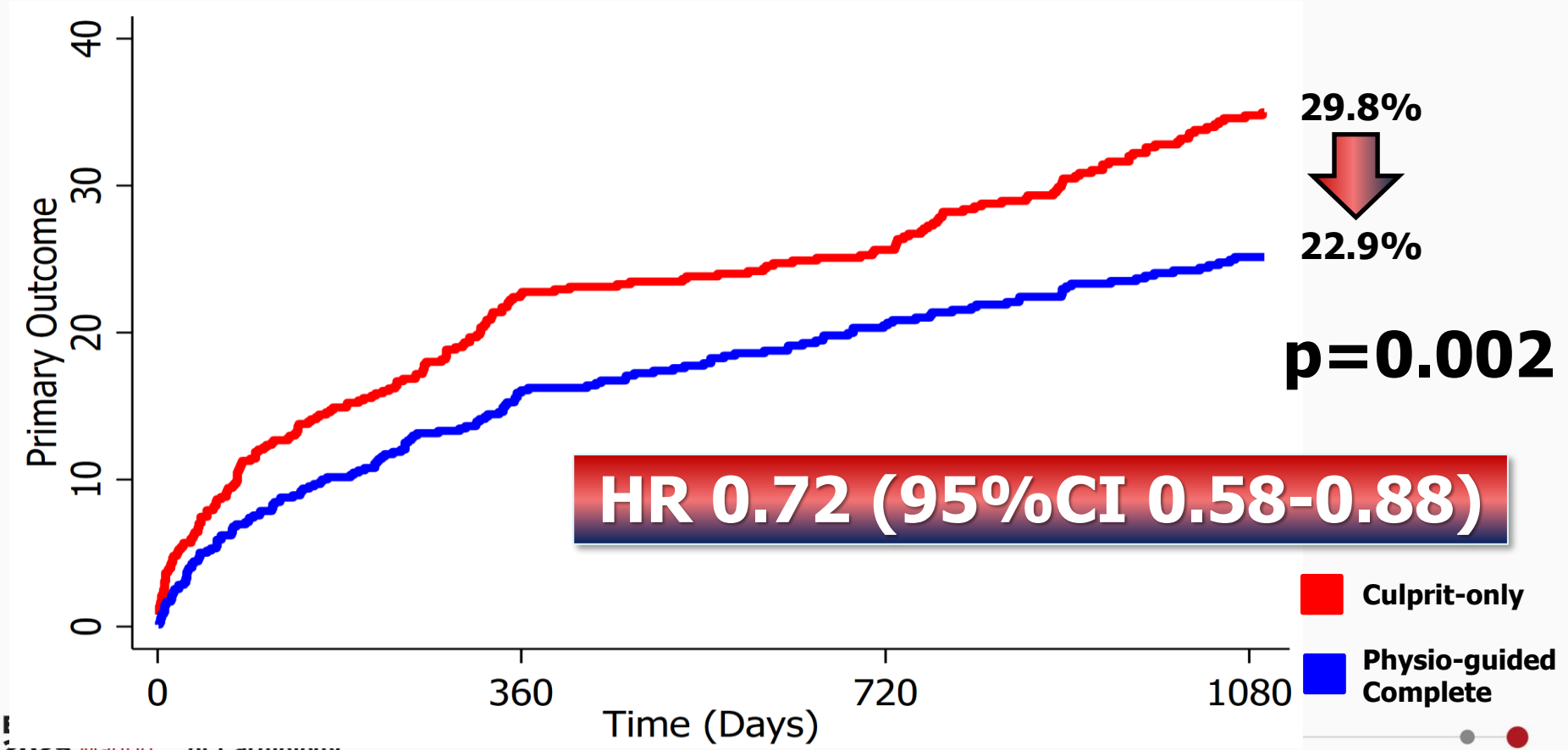
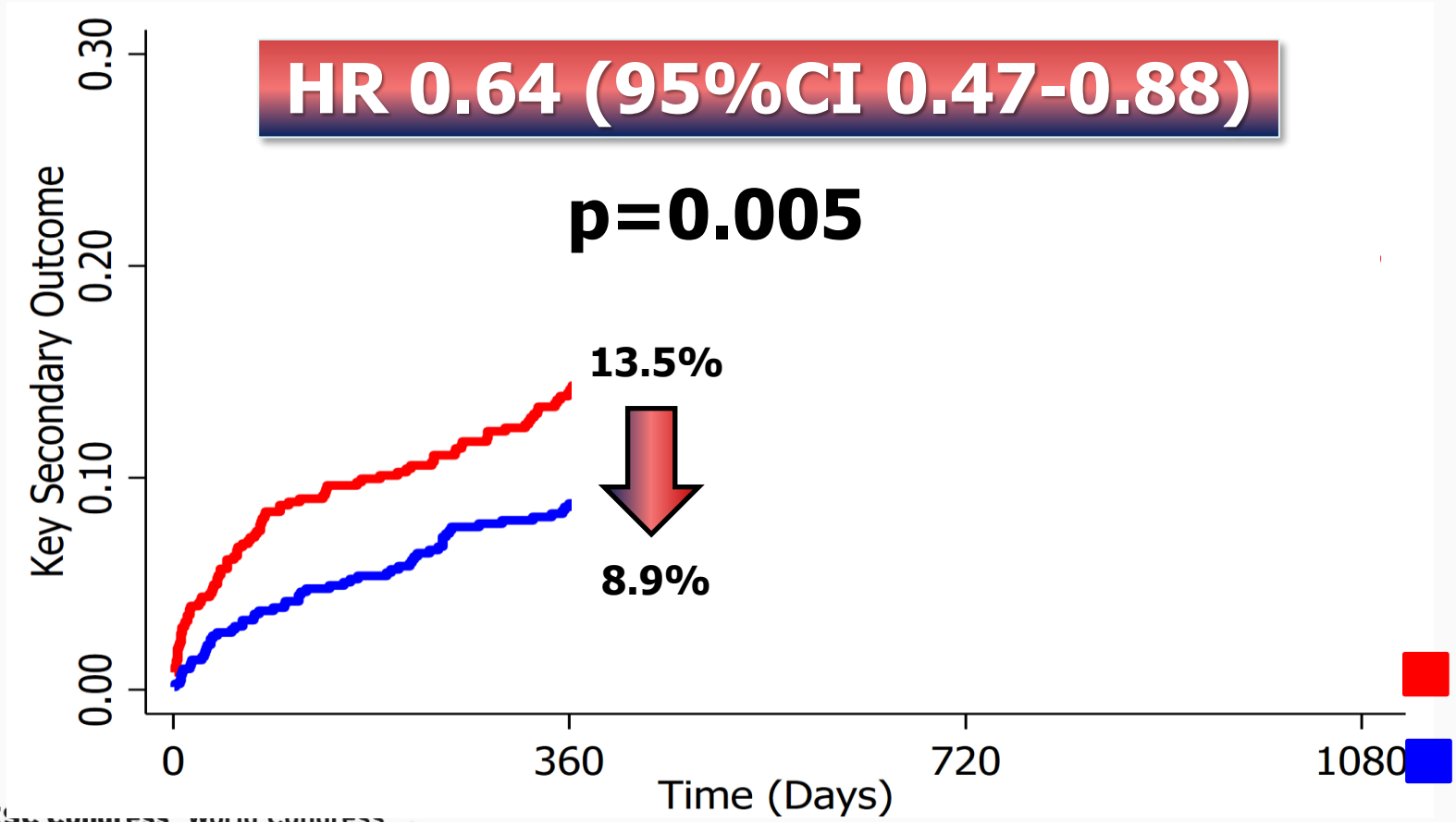


Key secondary endpoint

CV death or MI



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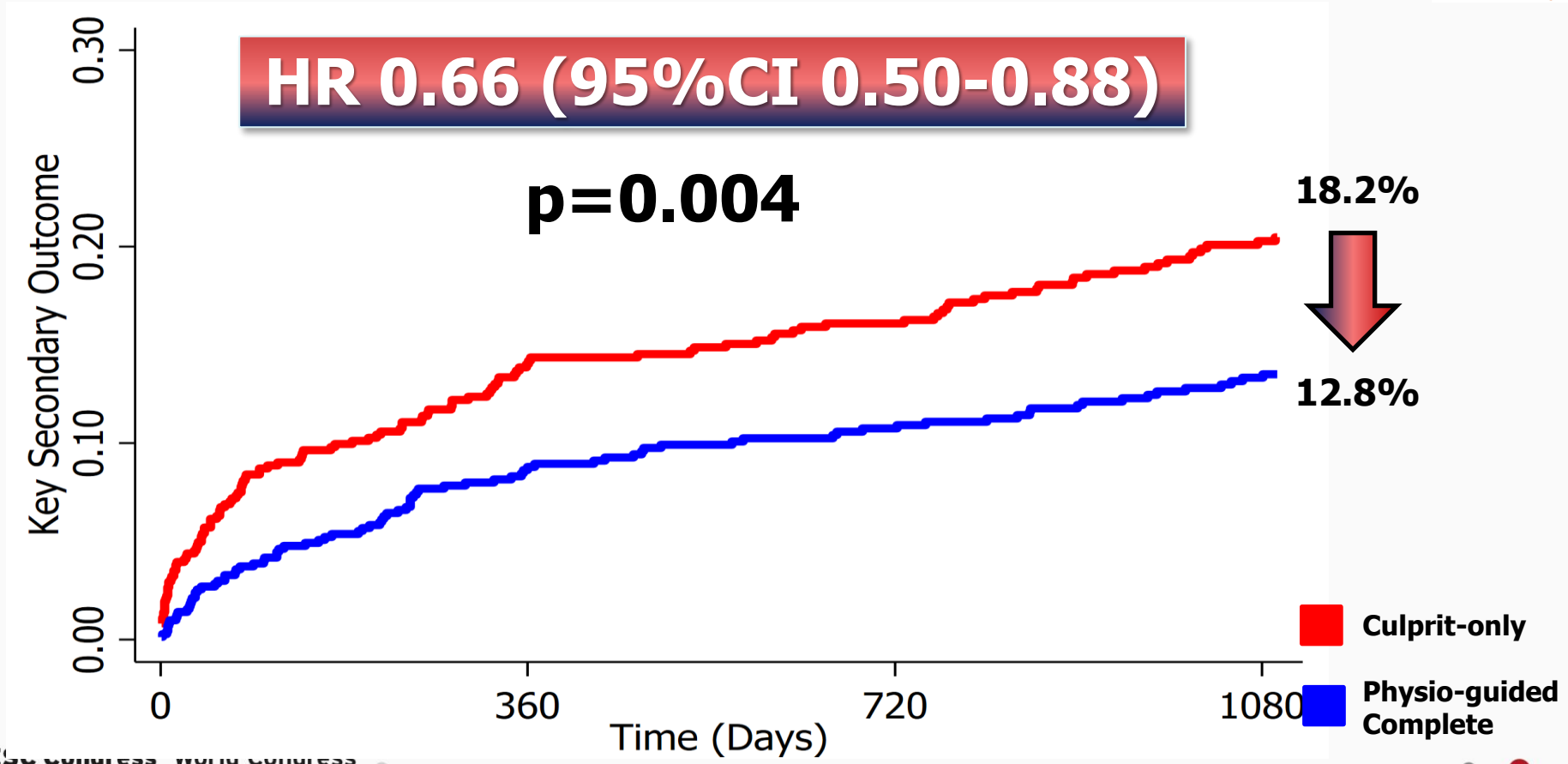
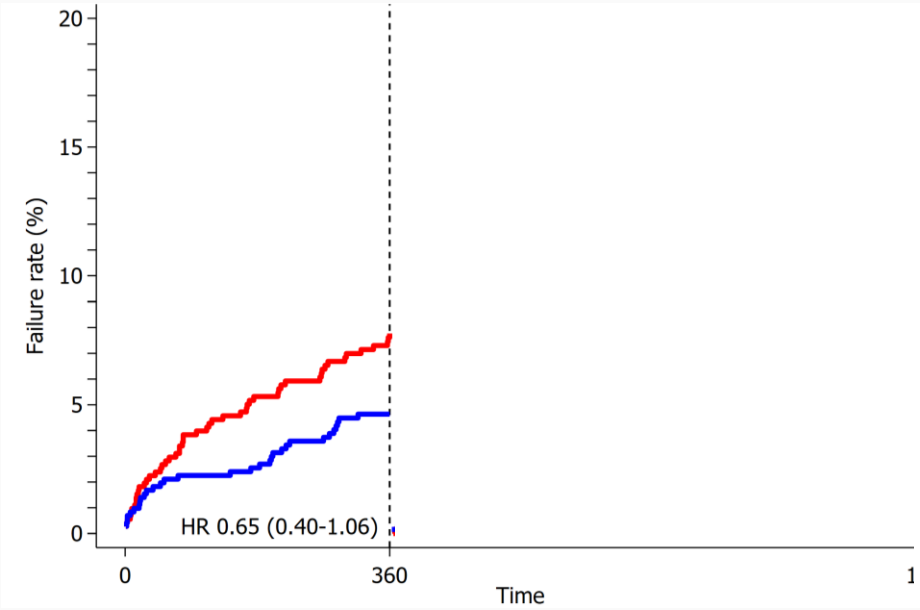
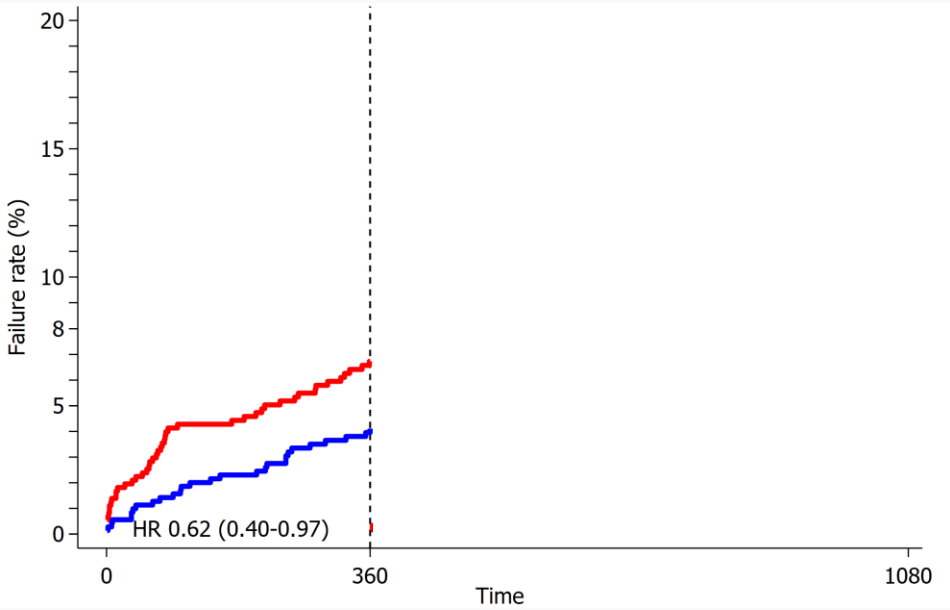


Landmark analysis

Heart failure



Myocardial infarction

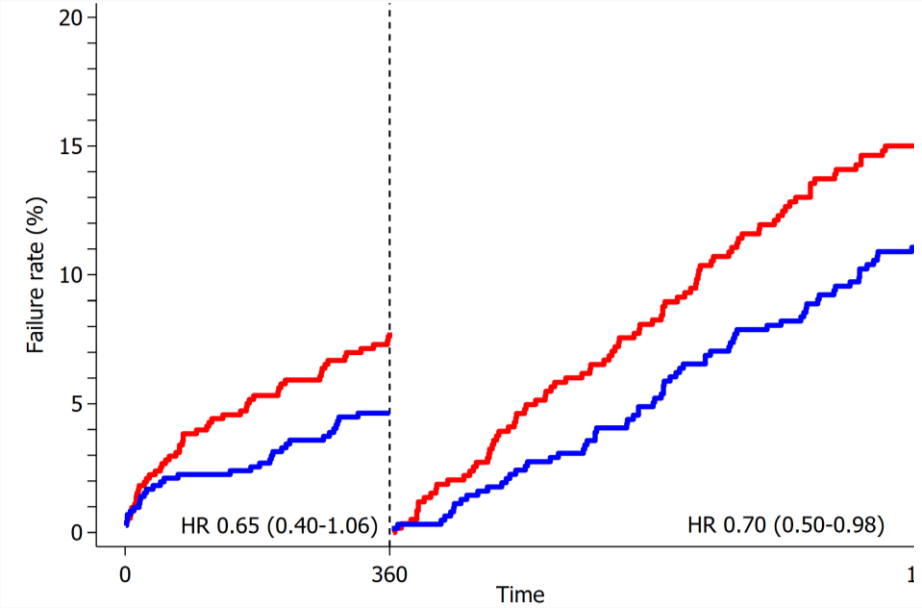


Culprit-only

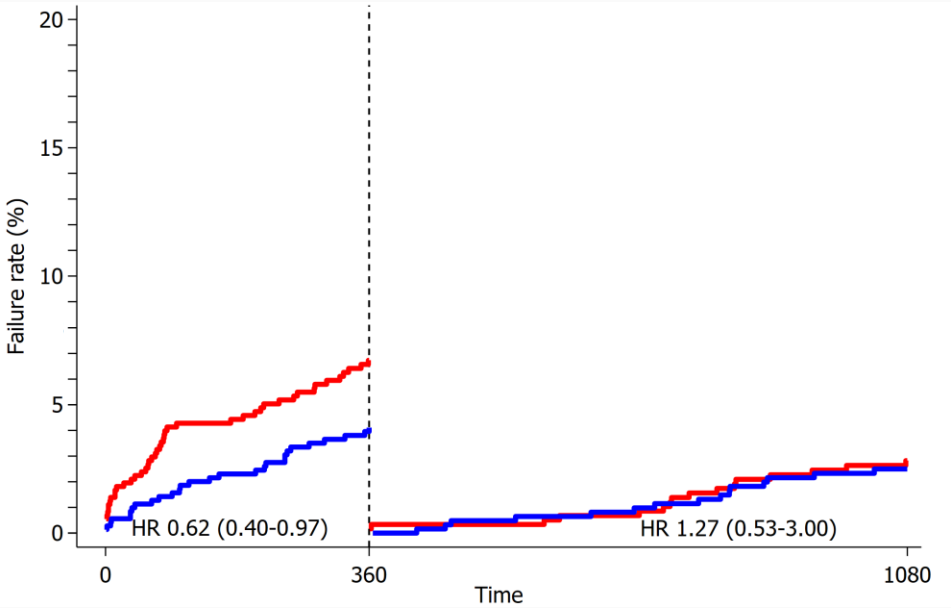
Physio-guided Complete

Landmark analysis

Heart failure



Myocardial infarction



Culprit-only

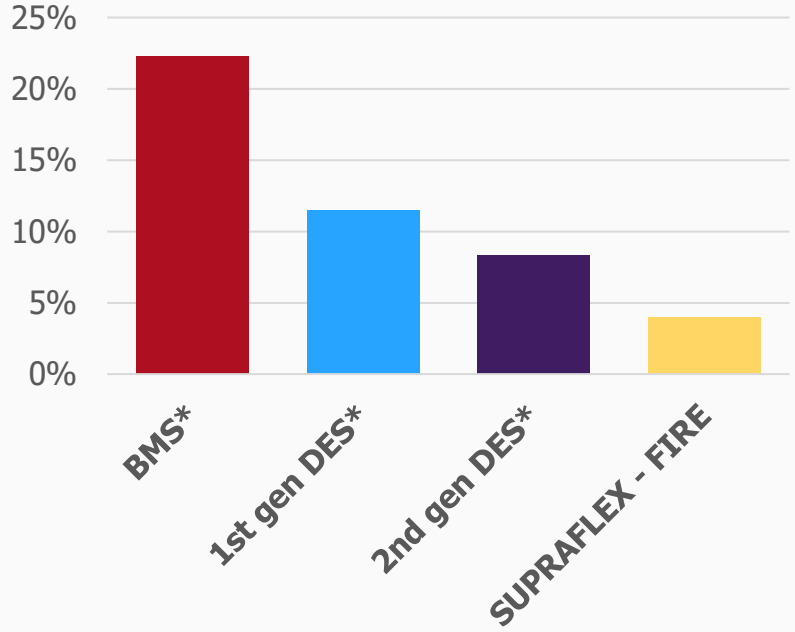
Physio-guided Complete

Secondary Endpoints

Outcome	Culprit-Only (n=725) no. (%)	Complete (n=720) no. (%)	Hazard Risk (95% CI)	P
Death	150 (20.7)	108 (15.0)	**0.70 (0.54-0.89)**	**0.004**
Cardiovascular death	81 (11.2)	52 (7.2)	**0.62 (0.43-0.88)**	**0.007**
Non-cardiovascular death	69 (9.5)	56 (7.8)	0.82 (0.57-1.16)	0.257
Stroke	14 (1.9)	18 (2.5)	1.35 (0.57-3.21)	0.494
Myocardial infarction	65 (9.0)	47 (6.5)	0.79 (0.49-1.27)	0.326
ID-revascularization	67 (9.2)	45 (6.3)	**0.64 (0.41-0.99)**	**0.046**
Heart failure	143 (19.7)	103 (14.3)	**0.73 (0.54-0.97)**	**0.030**

Stent related events at 3 years

TVR



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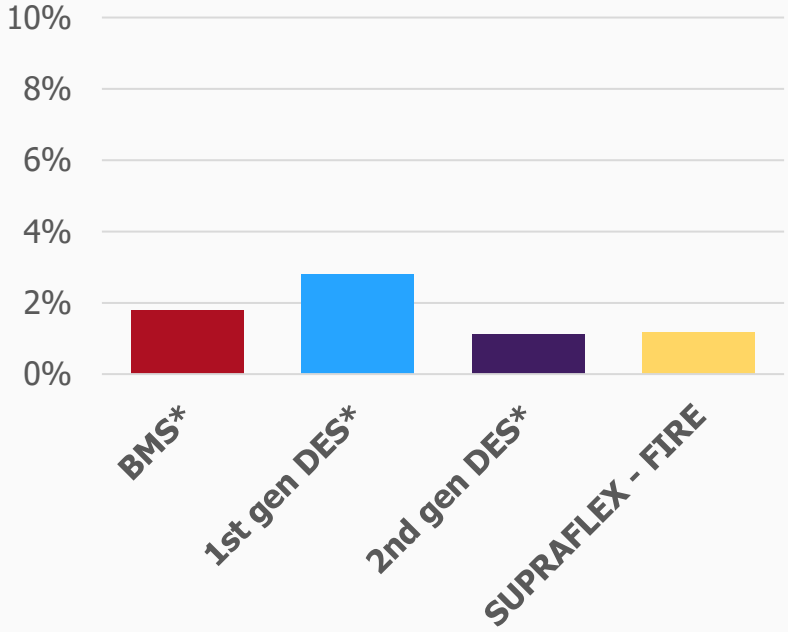

* Data from Madhavan MV, J Am Coll Cardiol. 2020;75:590-604
25.000 patients, 26% MI, 16% MV-PCI

Conclusions

- At a 3-year follow-up, among older patients with MI and multivessel disease, physiology-guided complete revascularization, as compared to a culprit-only revascularization strategy, reduced the primary and key secondary endpoints
- Reduction in CV death is associated with reduction of MI at short term (1 y) and of HF at longer term (3ys)
- Waiting for the 5 years results!

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Physiology-Guided Complete Revascularization in Older Patients With Myocardial Infarction

Three-Year Outcomes of a Randomized Clinical Trial

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