Revascularization in Patients with STEMI and Multivessel Disease

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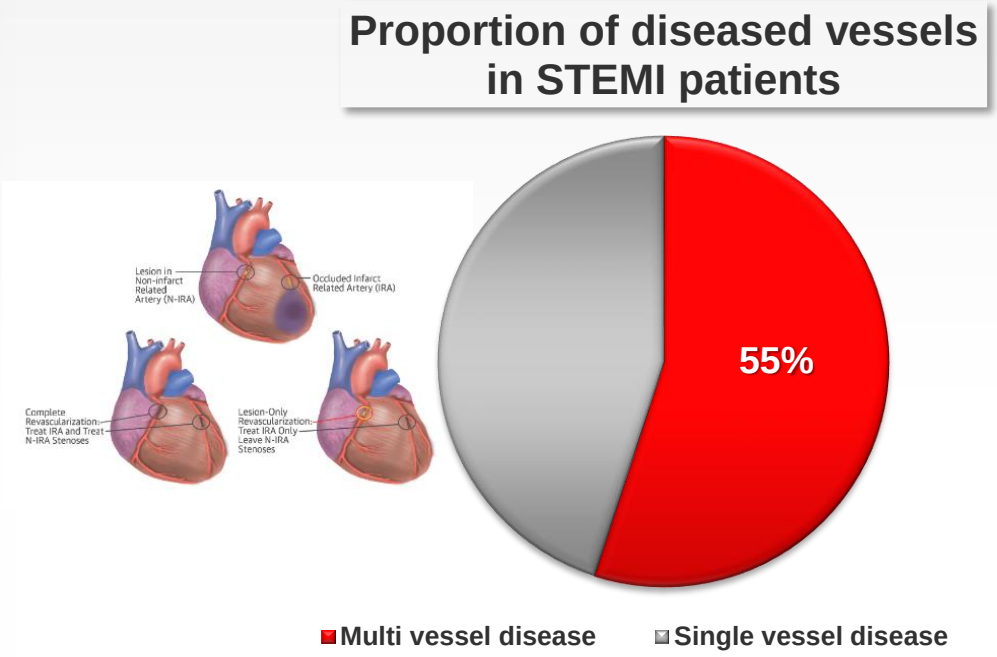
Disclosure Statement of Financial Interest

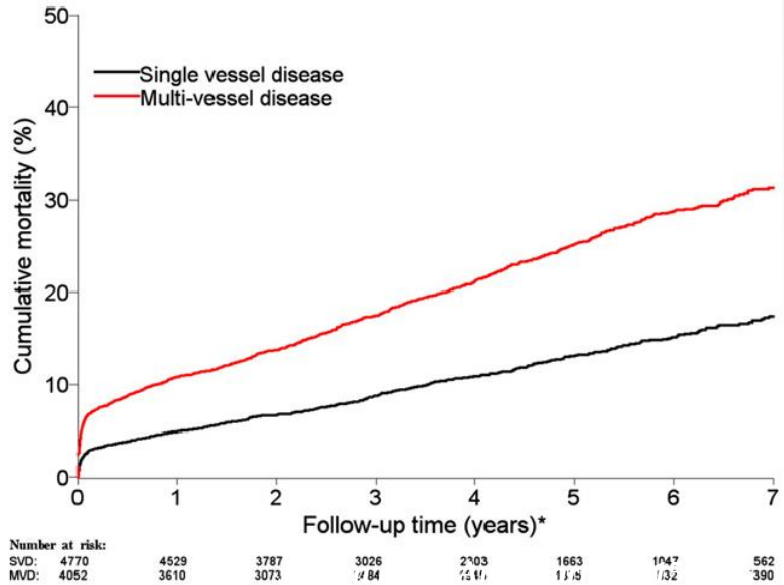
I, Adnan Kastrati DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

Multivessel disease in STEMI

Proportion of diseased vessels in STEMI patients

Long term follow up mortality rate in STEMI patients





Widimsky and Holmes, Eur Heart J 2011

What is new in 2017 Guidelines on STEMI

Complete Revascularization
PRAMI, DANAMI-3-PRIMULTI, CVLPRIT, Compare-Acute

2012

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

Recommendations	Class	Level
Non-IRA strategy		
Routine revascularization of non-IRA lesions is not recommended in STEMI patients with multivessel disease during primary PCI.	III	B

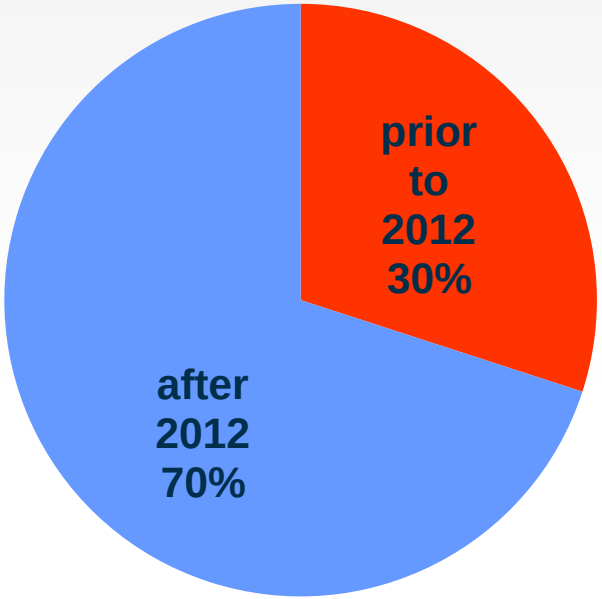
2017

Recommendations	Class	Level
Non-IRA strategy		
Routine revascularization of non-IRA lesions should be considered in STEMI patients with multivessel disease before hospital discharge.	IIa	A

Available evidence

Trial	No of pts	Year of publication
COMPARE ACUTE	885	2017
CVLPRIT	296	2015
Dambrink/Ghani et al.	121	2010
DANAMI-3 PRIMULTI	627	2015
EXPLORE	304	2016
HELP-AMI	69	2004
Politi et al.	214	2010
PRAGUE-13	214	2015
PRAMI	465	2013

10 RCTs, 3295 STEMI patients

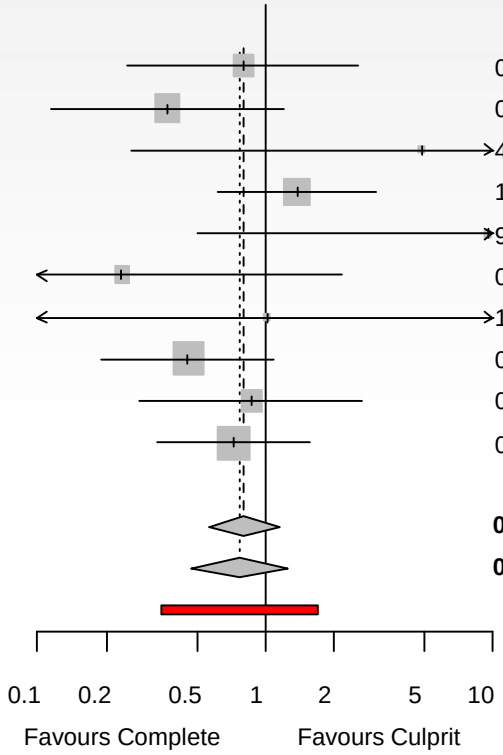


After 2012:
7 RCTs, 2891 STEMI patients (88%)

Meta-analysis Mortality

Study	Complete Events	Complete Total	Culprit Events	Culprit Total	OR	95%-CI	Weight (fixed)	Weight (random)
COMPARE ACUTE	4	295	10	590	0.80	[0.25; 2.56]	9.5%	10.9%
CVLPRIT	4	150	10	146	0.37	[0.11; 1.22]	14.3%	10.7%
Dambrink/Ghani et al.	4	80	0	41	4.88	[0.26; 92.92]	0.9%	2.0%
DANAMI-3 PRIMULTI	15	314	11	313	1.38	[0.62; 3.05]	15.2%	19.8%
EXPLORE	4	150	0	154	9.49	[0.51; 177.84]	0.7%	2.0%
Hamza et al.	1	50	4	50	0.23	[0.03; 2.18]	5.7%	3.4%
HELP-AMI	1	52	0	17	1.02	[0.04; 26.19]	1.1%	1.7%
Politi et al	10	130	13	84	0.46	[0.19; 1.09]	21.1%	17.2%
PRAGUE-13	6	106	7	108	0.87	[0.28; 2.67]	9.5%	11.6%
PRAMI	12	234	16	231	0.73	[0.34; 1.57]	22.1%	20.6%
Fixed effect model	**61**	**1561**	**71**	**1734**	**0.81**	**[0.57; 1.15]**	**100.0%**	**--**
Random effects model					**0.77**	**[0.47; 1.26]**	**--**	**100.0%**
Prediction interval						**[0.35; 1.70]**		

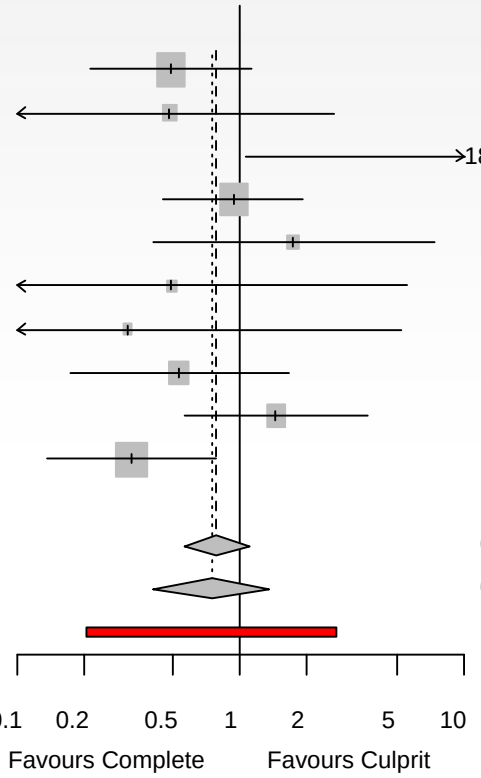
Heterogeneity: I^2 = 14% , τ^2 = 0.0701 , p = 0.31



Meta-analysis Recurrent myocardial infarction

Study	Complete Events	Complete Total	Culprit Events	Culprit Total	Odds Ratio	OR	95%-CI	Weight (fixed)	Weight (random)
COMPARE ACUTE	7	295	28	590		0.49	[0.21; 1.13]	23.0%	15.9%
CVLPRIT	2	150	4	146		0.48	[0.09; 2.66]	5.1%	6.8%
Dambrink/Ghani et al.	14	80	0	41		18.10	[1.05; 311.54]	0.7%	2.9%
DANAMI-3 PRIMULTI	15	314	16	313		0.93	[0.45; 1.92]	19.3%	17.8%
EXPLORE	5	150	3	154		1.74	[0.41; 7.39]	3.6%	8.6%
Hamza et al.	1	50	2	50		0.49	[0.04; 5.58]	2.5%	3.8%
HELP-AMI	1	52	1	17		0.31	[0.02; 5.31]	1.9%	2.9%
Politi et al	6	130	7	84		0.53	[0.17; 1.64]	10.3%	11.8%
PRAGUE-13	11	106	8	108		1.45	[0.56; 3.75]	9.0%	14.1%
PRAMI	7	234	20	231		0.33	[0.13; 0.79]	24.7%	15.2%
Fixed effect model	**69**	**1561**	**89**	**1734**		**0.79**	**[0.56; 1.10]**	**100.0%**	--
Random effects model						**0.74**	**[0.41; 1.34]**	--	**100.0%**
Prediction interval							**[0.20; 2.72]**		

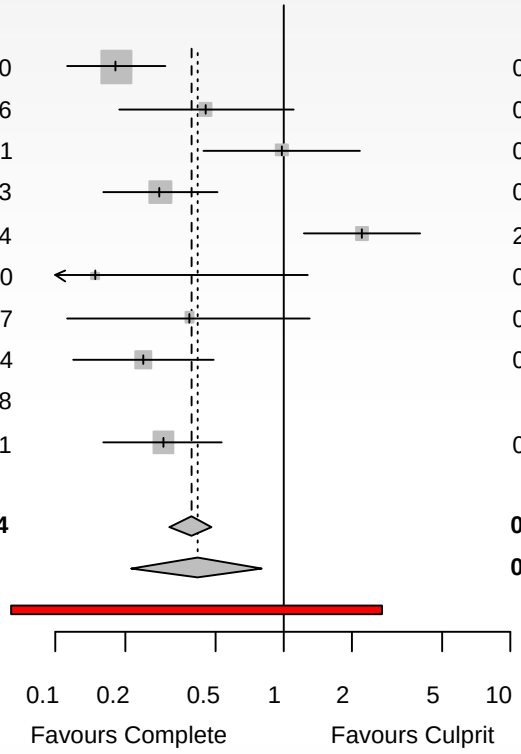
Heterogeneity: I^2 = 36% , τ^2 = 0.2486 , p = 0.12



Meta-analysis Need for revascularization

Study	Complete Events	Complete Total	Culprit Events	Culprit Total	Odds Ratio	OR	95%-CI	Weight (fixed)	Weight (random)
COMPARE ACUTE	19	295	161	590		0.18	[0.11; 0.30]	35.9%	13.4%
CVLPRIT	8	150	16	146		0.46	[0.19; 1.11]	5.5%	10.9%
Dambrink/Ghani et al.	27	80	14	41		0.98	[0.44; 2.17]	4.4%	11.5%
DANAMI-3 PRIMULTI	17	314	52	313		0.29	[0.16; 0.51]	17.6%	13.0%
EXPLORE	39	150	21	154		2.23	[1.24; 4.00]	5.5%	12.9%
Hamza et al.	1	50	6	50		0.15	[0.02; 1.29]	2.1%	4.7%
HELP-AMI	9	52	6	17		0.38	[0.11; 1.31]	2.7%	8.7%
Politi et al	14	130	28	84		0.24	[0.12; 0.49]	10.9%	12.1%
PRAGUE-13	.	106	.	108				0.0%	0.0%
PRAMI	16	234	46	231		0.30	[0.16; 0.54]	15.4%	12.8%
Fixed effect model	**150**	**1561**	**350**	**1734**		**0.39**	**[0.32; 0.49]**	**100.0%**	**--**
Random effects model						**0.42**	**[0.22; 0.81]**	**--**	**100.0%**
Prediction interval							**[0.06; 2.72]**		

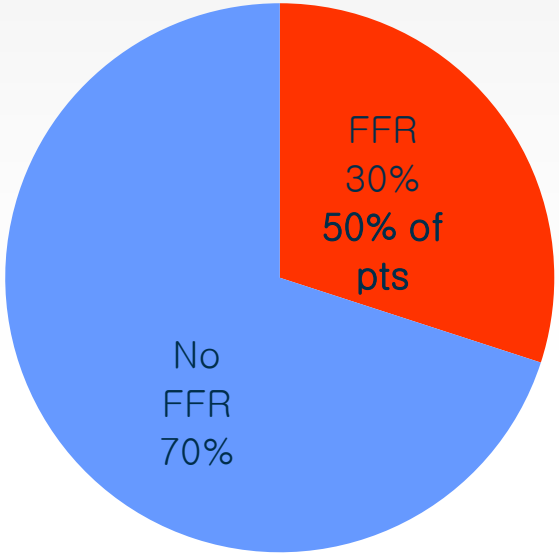
Heterogeneity: I^2 = 85% , τ^2 = 0.547 , p < 0.01



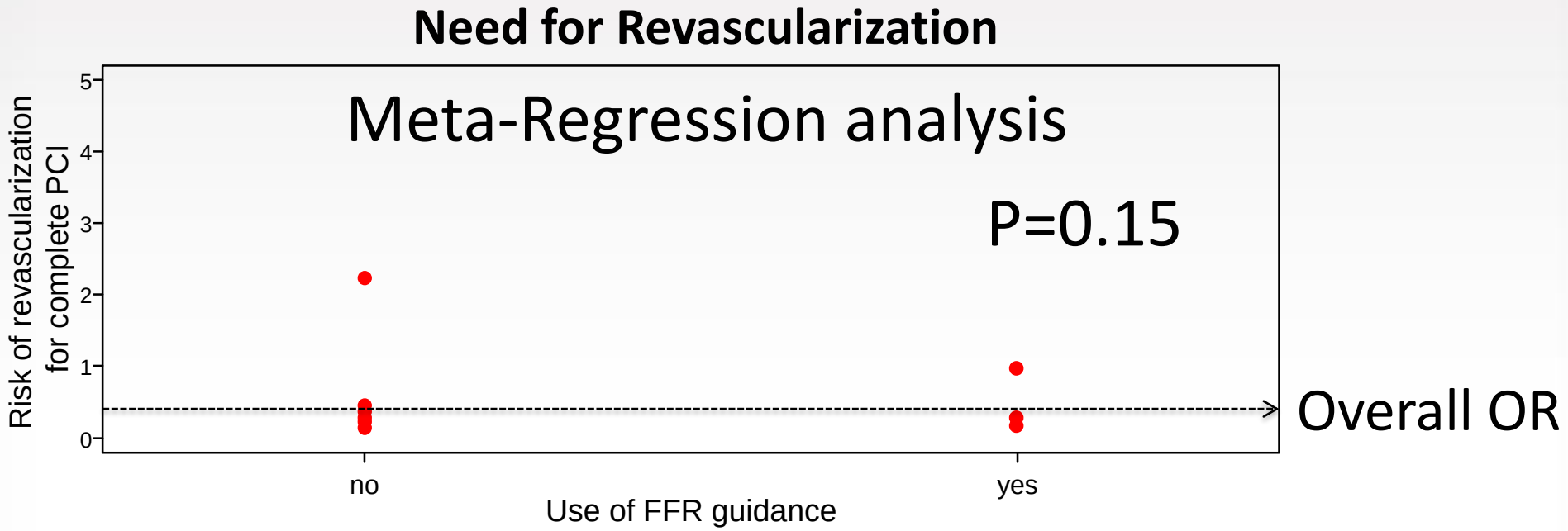
FFR-Guided PCI of non-culprit vessel

Trial	No of pts	FFR Guidance
COMPARE ACUTE	885	**Yes**
CVLPRIT	296	No
Dambrink/Ghani et al.	121	**Yes**
DANAMI-3 PRIMULTI	627	**Yes**
EXPLORE	304	No
Hamza et al.	100	No
HELP-AMI	69	No
Politi et al.	214	No
PRAGUE-13	214	No
PRAMI	465	No

10 RCTs, 3295 STEMI patients

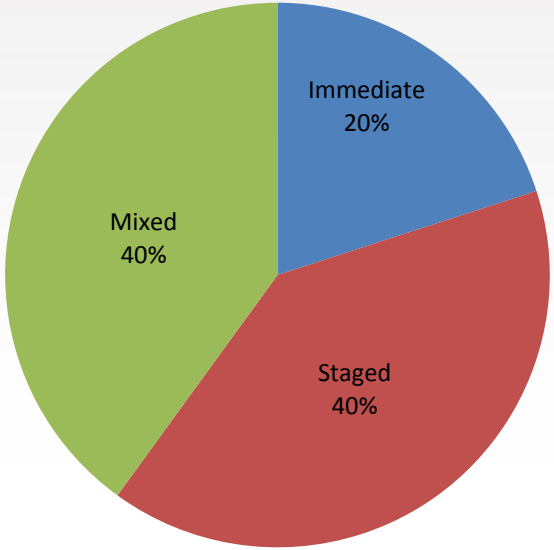


Does use of FFR-guidance enhance the superiority of complete revascularization?

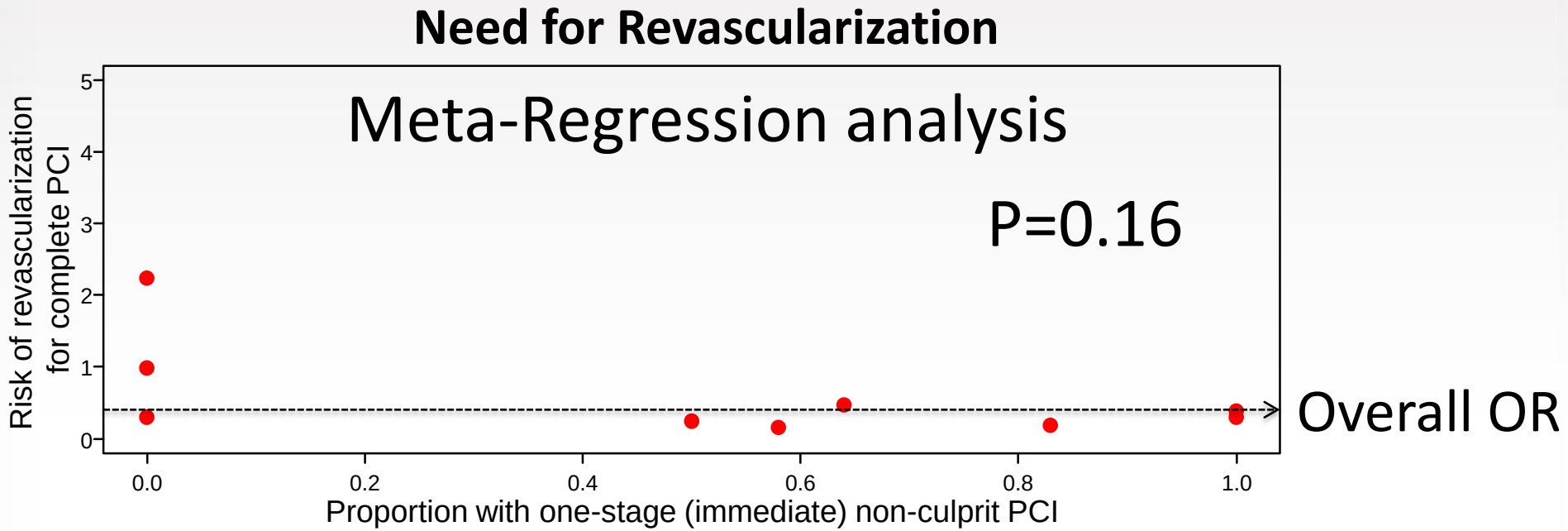


Timing of complete revascularization

Trial	No of pts	Timing of non-culprit PCI	Timing of staged non-culrit PCI
COMPARE ACUTE	885	Immediate or staged	Pre discharge (17%)
CVLPRIT	296	Immediate or staged	Pre discharge (36%)
Dambrink/Ghani et al.	121	Staged	Pre discharge or ≤3wks
DANAMI-3 PRIMULTI	627	Staged	Pre discharge
EXPLORE	304	Staged	≤7 days
Hamza et al.	100	Immediate or staged	Pre discharge (42%)
HELP-AMI	69	Immediate	NA
Politi et al.	214	Immediate or staged	56.8±12.9 days (50%)
PRAGUE-13	214	Staged	3-40 days
PRAMI	465	Immediate	NA



Does timing of complete revascularization affect the benefit of complete revascularization?



Understanding the need of revascularization on top of pPCI of culprit vessel

Complete revascularisation versus treatment of the culprit lesion only in patients with ST-segment elevation myocardial infarction and multivessel disease (DANAMI-3—PRIMULTI): an open-label, randomised controlled trial

Lancet 2015; 386: 665–71

	Infarct-related artery only (n=313)	Complete revascularization (n=314)
Staged non-culprit PCI/CABG @ 3days	11 (4%)	199 (63%)
Primary endpoint*	68 (22%)	40 (13%)
All cause mortality	11 (4%)	15 (5%)
Non-fatal reinfarction	16 (5%)	15 (5%)
Ischemia driven revascularization	52 (17%)	17 (5%)
Revascularizations in addition to pPCI	21%	68%

Understanding the need of revascularization on top of pPCI of culprit vessel

COMPARE-ACUTE

Table 2. Procedural Data.*

Type of Data	Complete Revascularization (N=295)	Infarct-Artery-Only Treatment (N=590)
Mean FFR value	0.78±0.12	0.79±0.12
Patients with treated (FFR-guided) non–infarct-related coronary artery lesions — no./total no. (%)	163/295 (55.3)†	NA
During index PCI procedure	136/163 (83.4)	
Delayed during index hospitalization‡	27/163 (16.6)	

Table 3. Prespecified Clinical End Points at 1 Year.

End Point	Complete Revascularization (N=295)	Infarct-Artery-Only Treatment (N=590)
	number (percent)	
Revascularization	18 (6.1)	103 (17.5)
PCI	15 (5.1)	98 (16.6)
Coronary-artery bypass graft	3 (1.0)	5 (0.8)
Cerebrovascular event	0	4 (0.7)

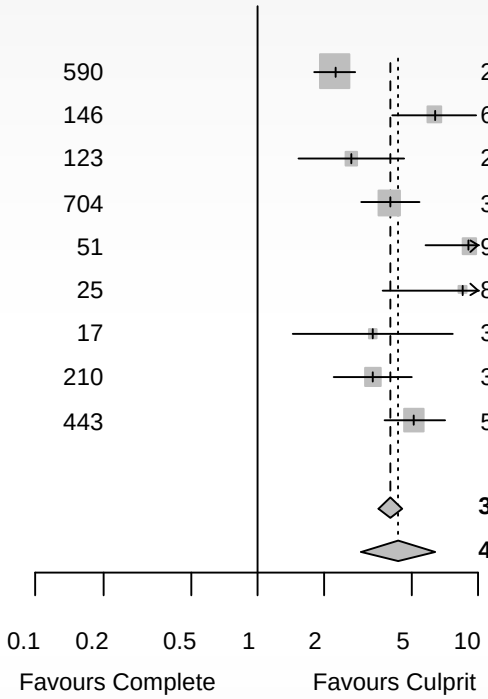
61.4% **17.5%**

COMPARE-ACUTE, NEJM 2017

Understanding the need of revascularization on top of pPCI of culprit vessel

Study	Complete Events	Complete Pat*yrs	Culprit Events	Culprit Pat*yrs	Incidence Rate Ratio	IRR	95%-CI	Weight (fixed)	Weight (random)
COMPARE ACUTE	182	295	162	590		2.25	[1.82; 2.78]	33.6%	13.5%
CVLPRIT	150	150	23	146		6.35	[4.09; 9.85]	7.3%	11.6%
Dambrink/Ghani et al.	78	240	15	123		2.66	[1.53; 4.63]	6.2%	10.5%
DANAMI-3 PRIMULTI	216	707	54	704		3.98	[2.96; 5.37]	16.8%	12.9%
EXPLORE	186	50	21	51		9.03	[5.75; 14.19]	6.5%	11.5%
Hamza et al.	51	25	6	25		8.50	[3.65; 19.81]	1.9%	7.7%
HELP-AMI	61	52	6	17		3.32	[1.44; 7.69]	2.8%	7.8%
Politi et al	144	325	28	210		3.32	[2.22; 4.98]	10.6%	11.9%
PRAMI	239	449	46	443		5.13	[3.74; 7.03]	14.4%	12.7%
Fixed effect model						**3.98**	**[3.52; 4.49]**	**100.0%**	--
Random effects model						**4.33**	**[2.97; 6.32]**	--	**100.0%**

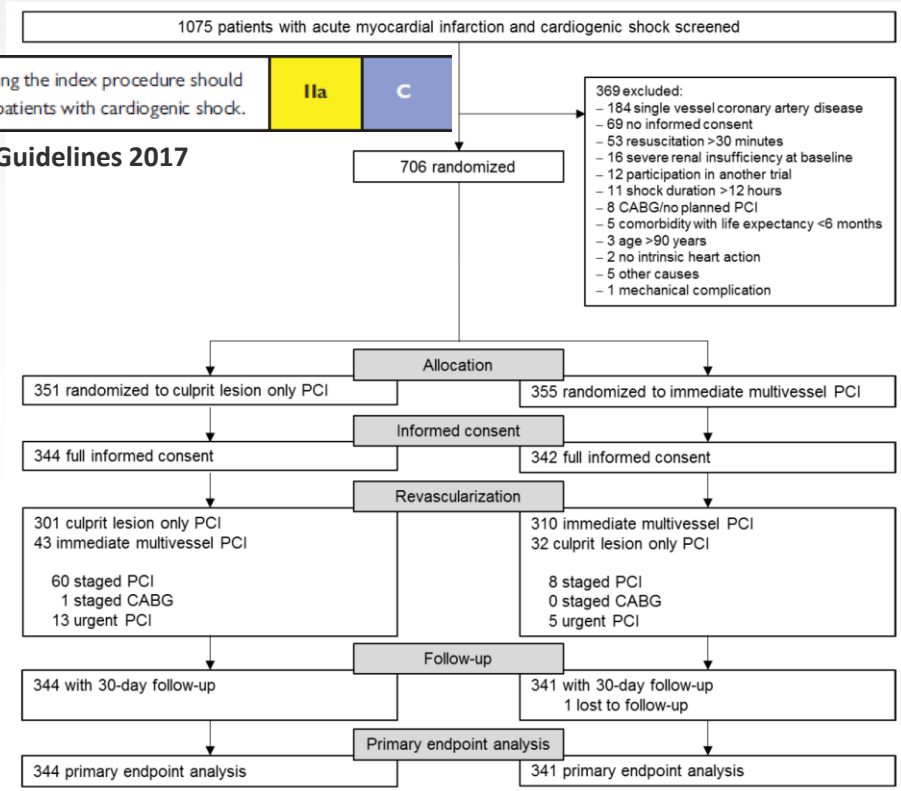
Heterogeneity: I^2 = 85% , τ^2 = 0.2223 , p < 0.01

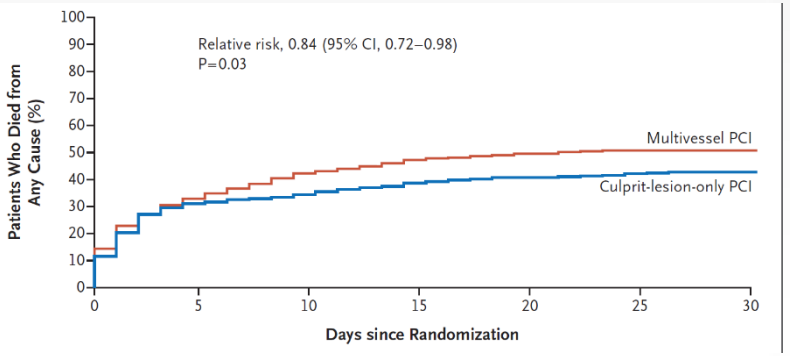


CULPRIT-SHOCK: First big failure of complete revascularization in STEMI

Non-IRA PCI during the index procedure should be considered in patients with cardiogenic shock.	IIa	C

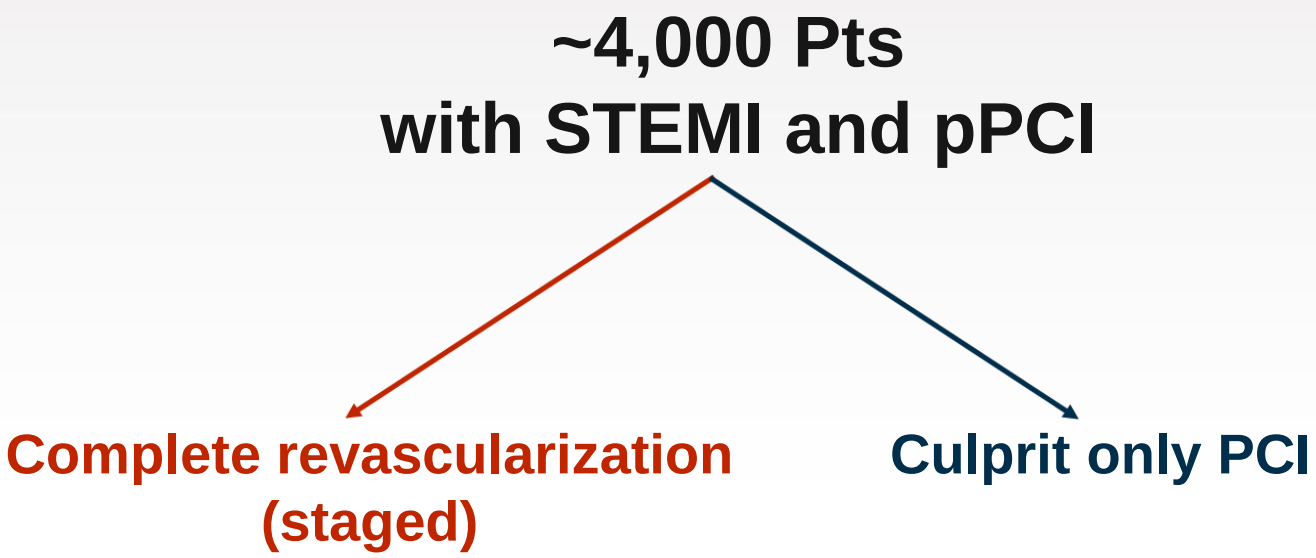
ESC STEMI Guidelines 2017





CULPRIT-SHOCK, NEJM 2017

Ongoing trials: COMPLETE trial



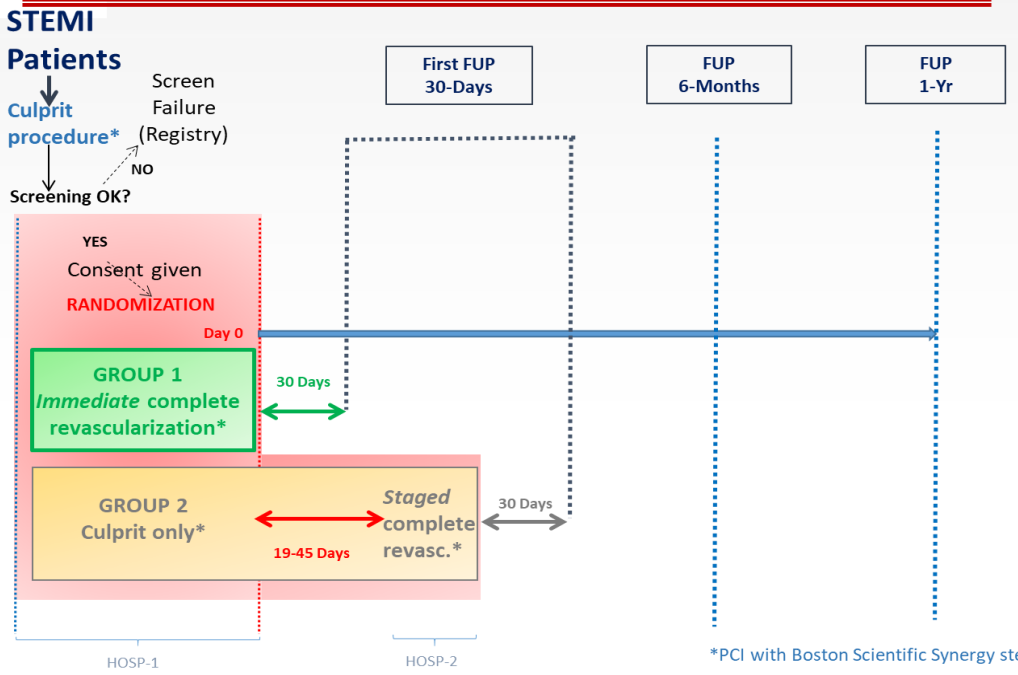
ClinicalTrials.gov Identifier: NCT01740479

MULTISTARS trial

MULTivessel Immediate versus STAged RevaScularization in Acute Myocardial Infarction - The MULTISTARS - AMI Trial

University of Zurich | UniversityHospital Zurich

Trial Design



Planned 1,200 pts

Randomization occurres AFTER the revascularization of the culprit lesion, if Inclusion/Exclusion criteria are fulfilled.

University of Zurich | UniversityHospital Zurich

ClinicalTrials.gov Identifier: NCT03135275

Thank you for your attention!