



Recommendations for criteria for STEMI systems of care: A focus on pharmacoinvasive strategies

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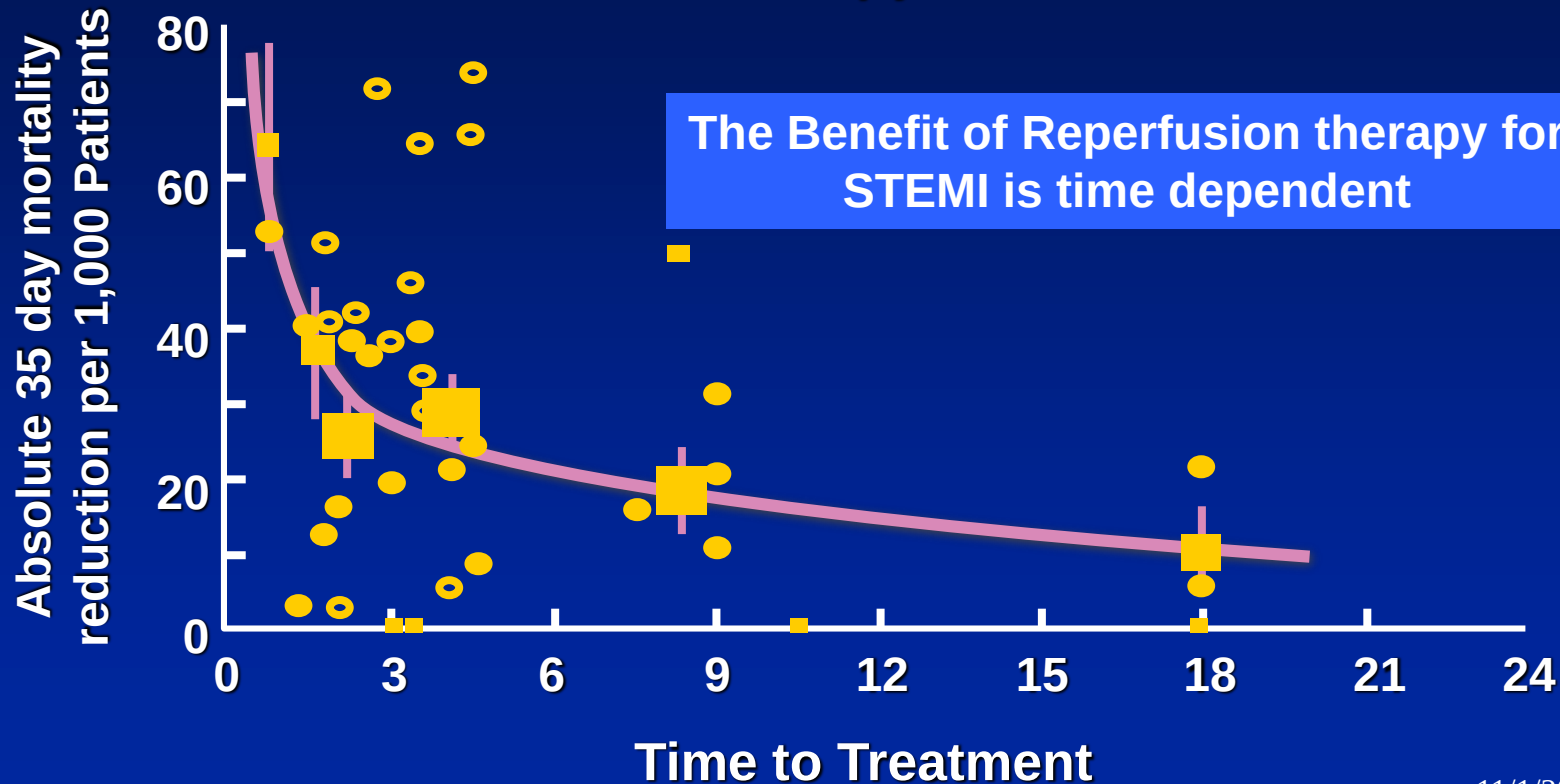


Distribution of ACS type Discharge diagnosis

ACS type	Gulf RACE 2007 (n=8176)
STEMI (%)	39
NSTEMI (%)	32
UA (%)	29

The Importance of Time to Reperfusion

A Meta-analysis of 50,246 Pts in placebo controlled trials of Lytic Therapy



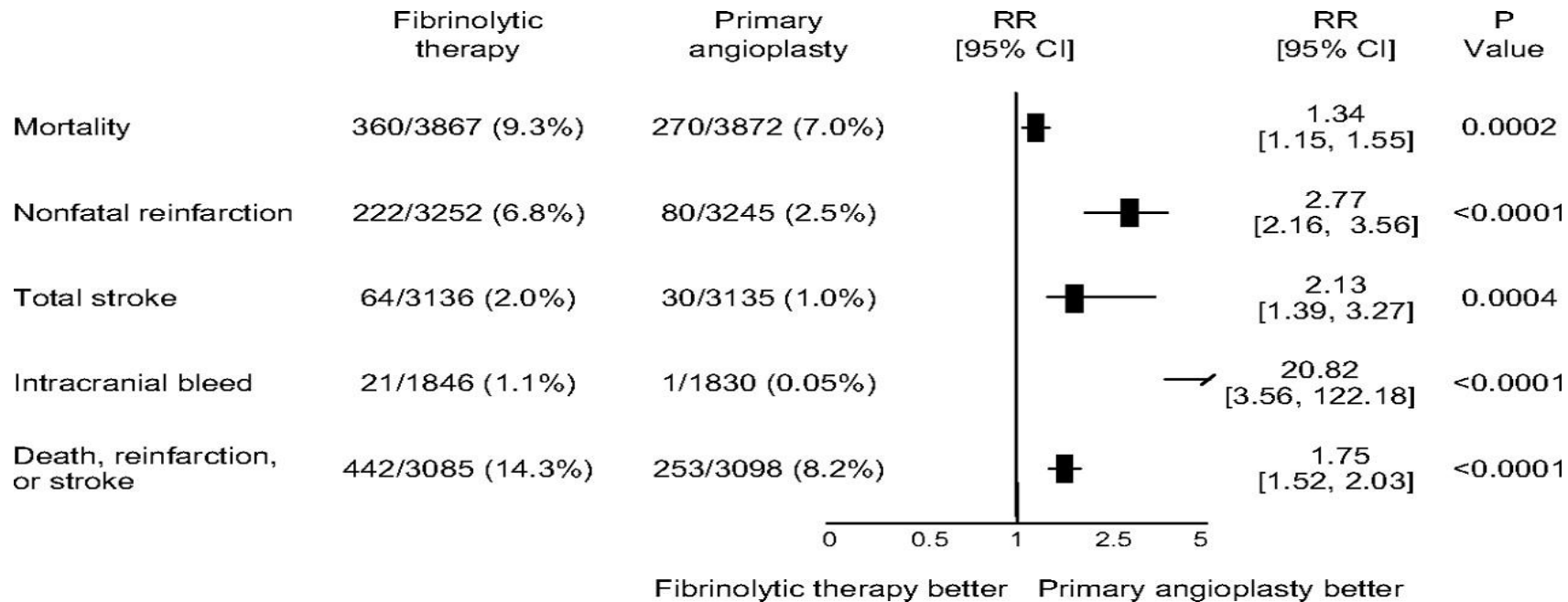


So, it's all about time

But what is the best approach?



Pooled analysis of the short-term results from 23 randomized trials comparing primary PCI and lytic therapy in 7739 patients





However,

In reality, there remains great deal of difficulty in implementing a routine primary PCI approach



Gulf COAST Registry



Gulf loCals with acute cOronAry Syndrome evenTs Registry

4 Countries

33 Hospitals

4000 patients



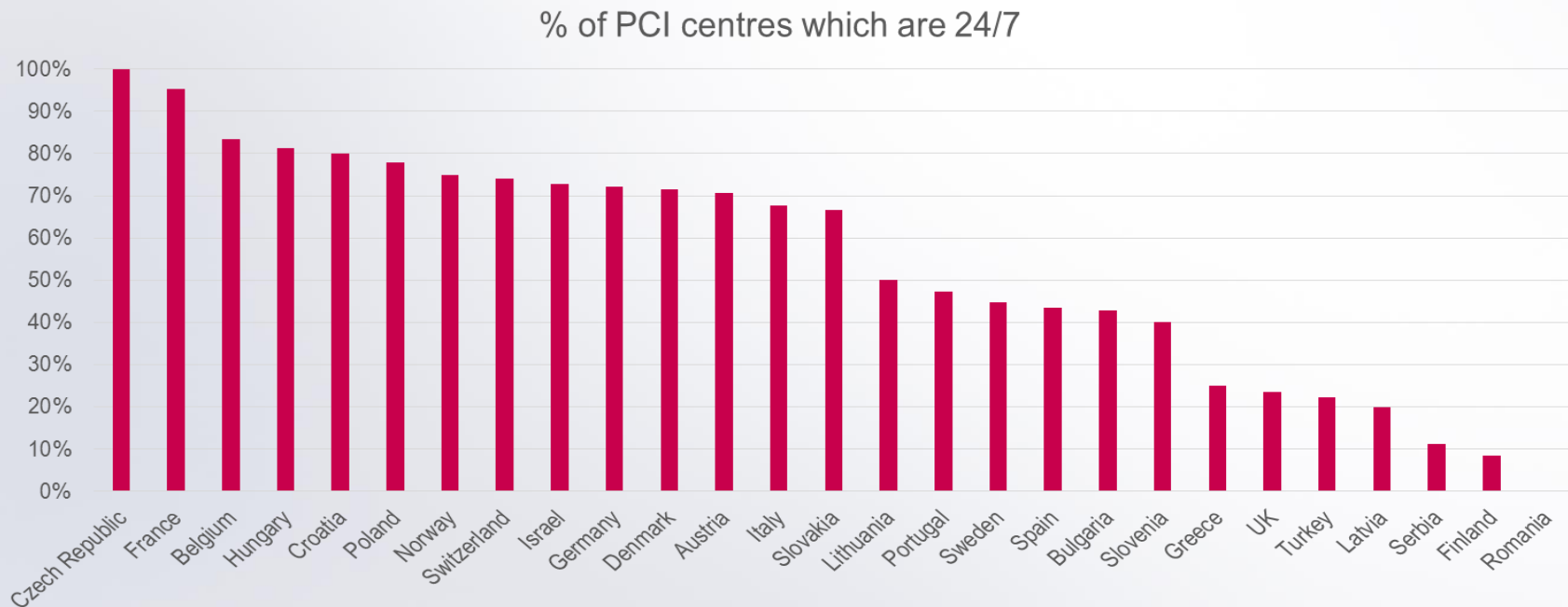
Reperfusion in eligible patients Per country



	Oman (n= 315)	Kuwait (n=259)	Bahrain (n= 119)	UAE (n= 129)
Primary PCI (%)	0.3	5.8	29.4	40.3
Lysis (%)	92.1	86.4	57.1	48.9
Shortfall (%)	7.6	7.7	13.4	10.9



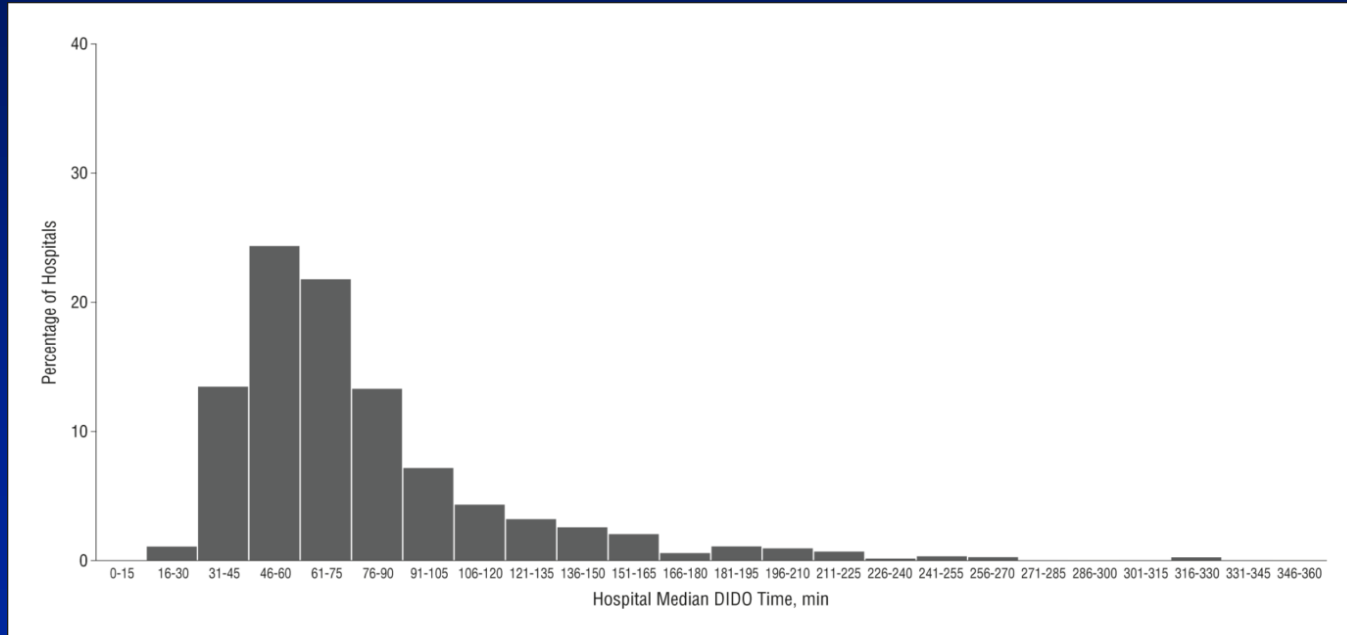
Only 55% of all PCI centres offer 24/7 PPCI service



Widimsky P et al. Eur Heart J 2010;31:943-957

Door-In to Door-Out Time Among Patients Transferred for Primary PCI in the USA

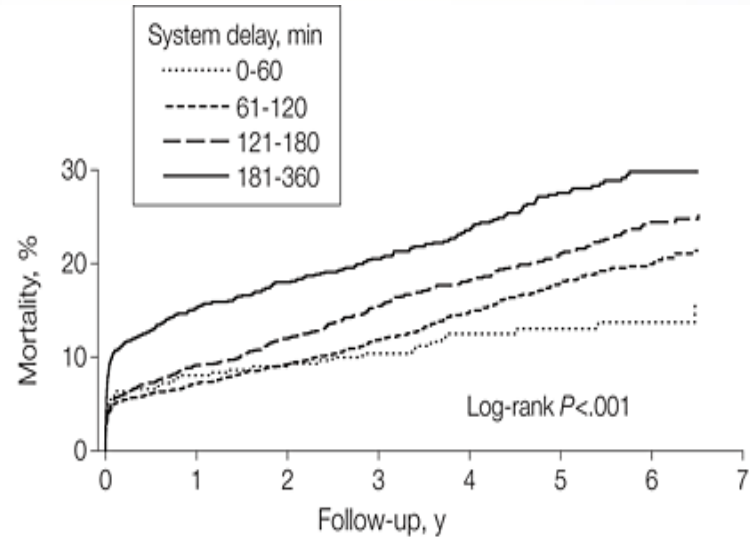
Distribution of median door-in to door-out (DIDO) times for 1034 hospitals reporting at least 5 patients in 2009





Hazards of delayed primary PCI

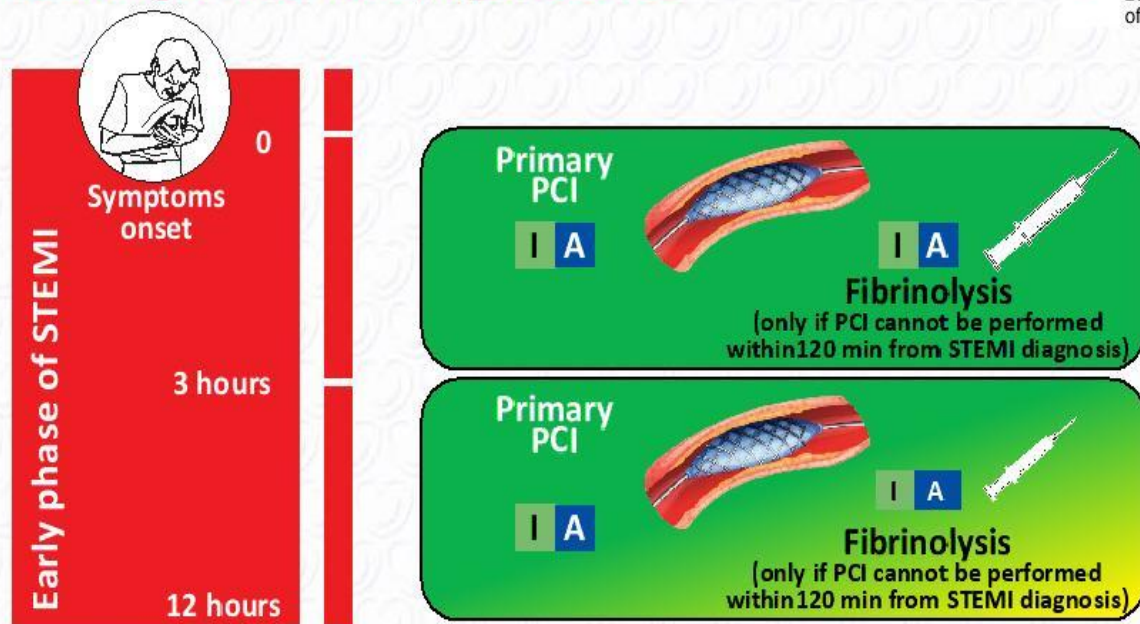
Mortality in 6209 Danish Patients With STEMI Treated With Primary PCI



No. at risk							
System delay, min							
0-60	347	311	278	230	192	138	87
61-120	2643	2339	1906	1420	1006	667	375
121-180	2092	1836	1503	1183	842	533	278
181-360	1127	923	765	647	491	332	172

2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

Reperfusion strategies in the infarct-related artery according to time from symptoms onset

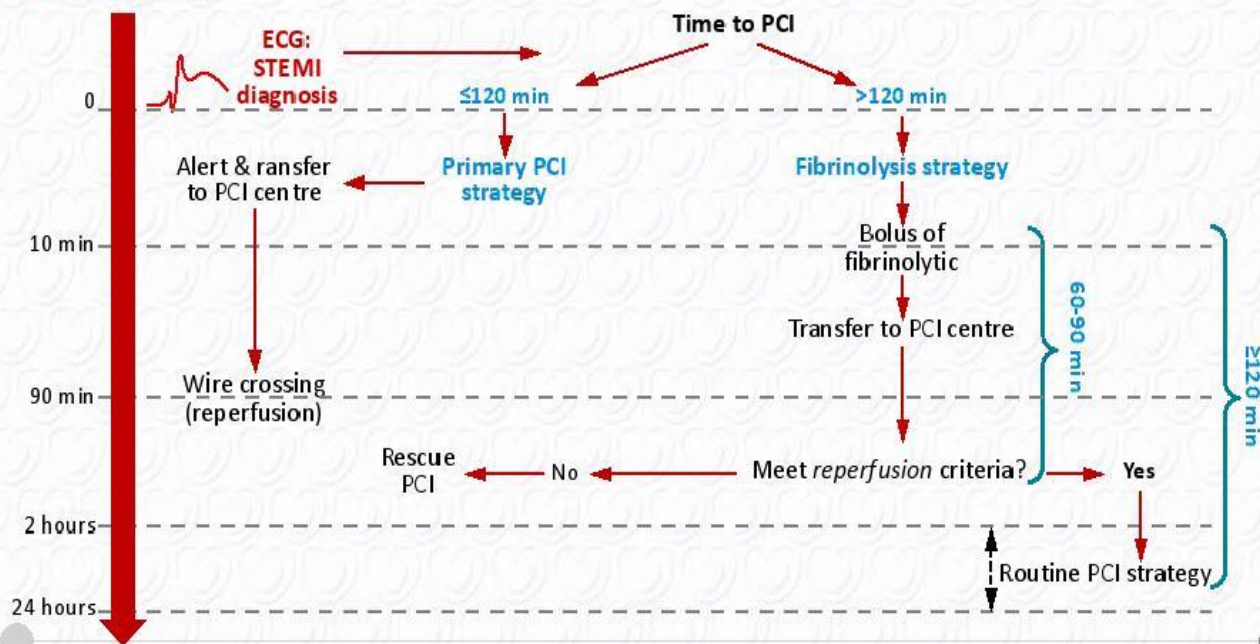


Definitions of terms related to reperfusion therapy *(continued)*

Term	Definition
Primary PCI strategy	Emergent coronary angiography and PCI of the IRA if indicated.
Rescue PCI	Emergent PCI performed as soon as possible in the case of failed fibrinolytic treatment.
Routine early PCI strategy after fibrinolysis	Coronary angiography, with PCI of the IRA if indicated, performed between 2 and 24 hours after successful fibrinolysis.
Pharmacoinvasive strategy	Fibrinolysis combined with rescue PCI (in case of failed fibrinolysis) or routine early PCI strategy (in case of successful fibrinolysis).

Maximum target times according to reperfusion strategy selection in patients presenting via EMS or in a non-PCI centre

Strategy clock





Is there an “in between” strategy?

A strategy that combines the benefits of fibrinolysis and PCI

Pharmaco-invasive strategy, a recanalization strategy by fibrinolysis followed by angiography within 6–24 hours unless rescue intervention is needed.

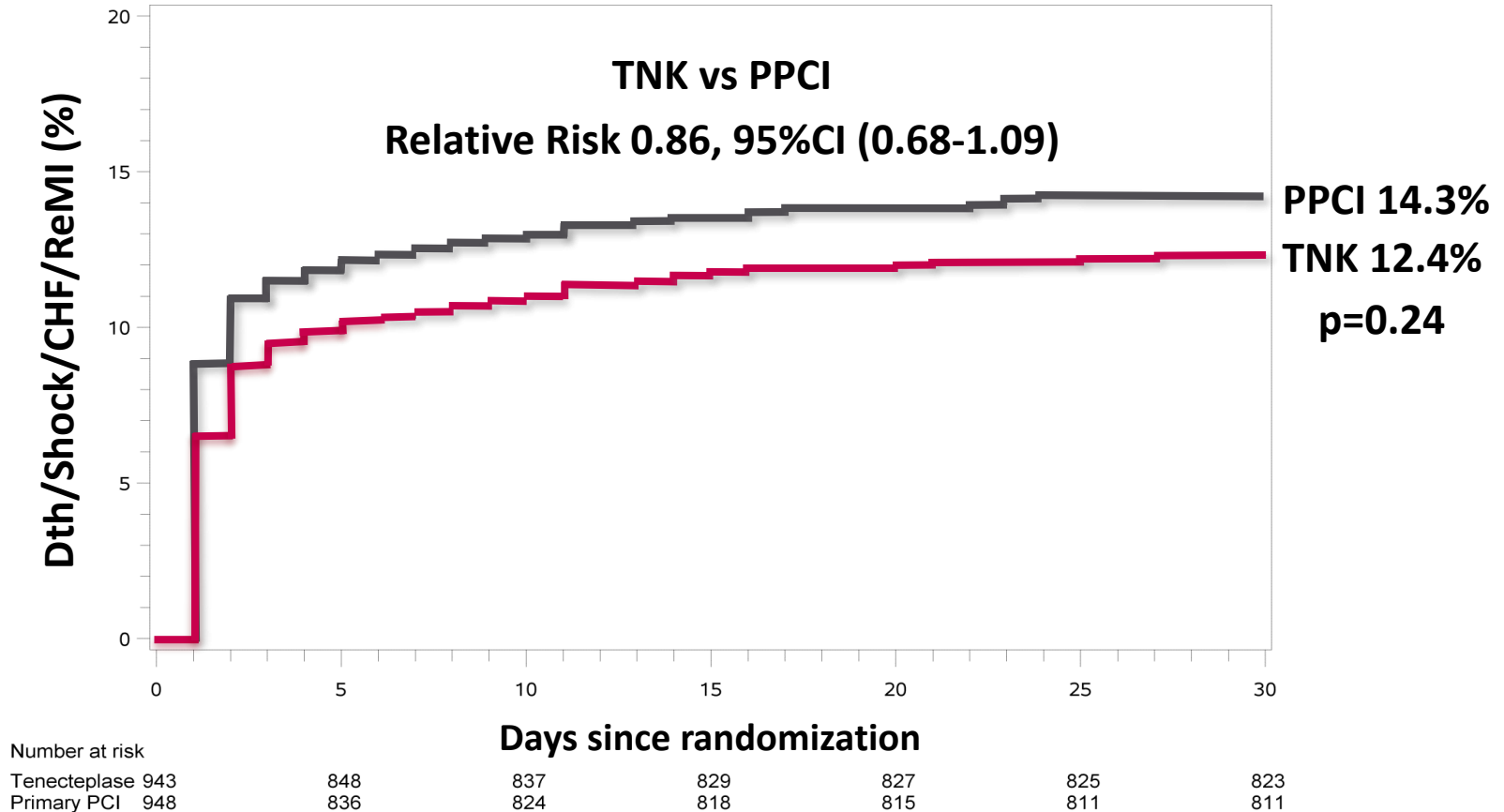
This is different from Facilitated PCI which is recanalization by primary PCI that is facilitated by the routine use of fibrinolysis.

ORIGINAL ARTICLE

Fibrinolysis or Primary PCI in ST-Segment Elevation Myocardial Infarction

Paul W. Armstrong, M.D., Anthony H. Gershlick, M.D., Patrick Goldstein, M.D.,
Robert Wilcox, M.D., Thierry Danays, M.D., Yves Lambert, M.D.,
Vitaly Sulimov, M.D., Ph.D., Fernando Rosell Ortiz, M.D., Ph.D.,
Miodrag Ostojic, M.D., Ph.D., Robert C. Welsh, M.D.,
Antonio C. Carvalho, M.D., Ph.D., John Nanas, M.D., Ph.D.,
Hans-Richard Arntz, M.D., Ph.D., Sigrun Halvorsen, M.D., Ph.D.,
Kurt Huber, M.D., Stefan Grajek, M.D., Ph.D., Claudio Fresco, M.D.,
Erich Bluhmki, M.D., Ph.D., Anne Regelin, Ph.D., Katleen Vandenberghe, Ph.D.,
Kris Bogaerts, Ph.D., and Frans Van de Werf, M.D., Ph.D.,
for the STREAM Investigative Team*

Results: Primary endpoint



Single endpoints up to 30 days

	Pharmaco-invasive (N=944)	PPCI (N=948)	P-value
All cause death	(43/939) 4.6%	(42/946) 4.4%	0.88
Cardiac death	(31/939) 3.3%	(32/946) 3.4%	0.92
Congestive heart failure	(57/939) 6.1%	(72/943) 7.6%	0.18
Cardiogenic shock	(41/939) 4.4%	(56/944) 5.9%	0.13
Reinfarction	(23/938) 2.5%	(21/944) 2.2%	0.74

Stroke rates before and after fibrinolysis dose adjustment

	Pharmaco-invasive	PPCI	P-value
TOTAL POPULATION (N=1892)			
Total stroke	15/939 (1.60%)	5/946 (0.53%)	0.03
fatal stroke	7/939 (0.75%)	4/946 (0.42%)	0.39
Haemorrhagic stroke	9/939 (0.96%)	2/946 (0.21%)	0.04
fatal haemorrhagic stroke	6/939 (0.64%)	2/946 (0.21%)	0.18
POST AMENDMENT POPULATION (N=1503)			
Total stroke	9/747 (1.20%)	5/756 (0.66%)	0.30
fatal stroke	3/747 (0.40%)	4/756 (0.53%)	0.999
Haemorrhagic stroke	4/747 (0.54%)	2/756 (0.26%)	0.45
fatal haemorrhagic stroke	2/747 (0.27%)	2/756 (0.26%)	0.999



REPERFUSE Kuwait

Started 11/11/2014

Focused observational registry that examines patients who receive reperfusion therapy across Kuwait

The main objective is to examine the efficiency of delivering reperfusion and patients' outcomes



REPERFUSE KUWAIT

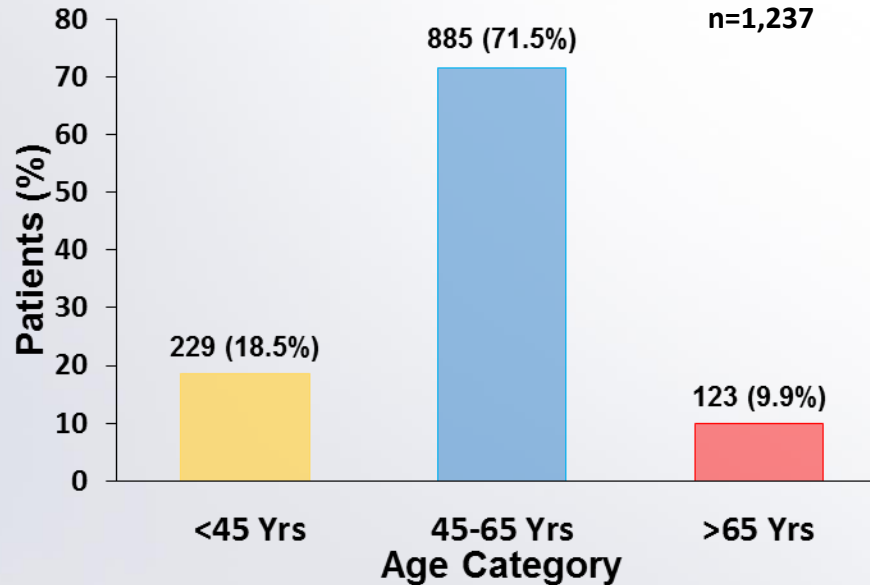
Baseline Characteristics

Variable	REPERFUSE Kuwait (n=1,237)
Age (mean)	53.23 ± 10.01
Male, n (%)	1153 (93.2)
DM, n (%)	406 (32.8)
Smoking (Current/Recent) n (%)	611 (49.4)



REPERFUSE KUWAIT

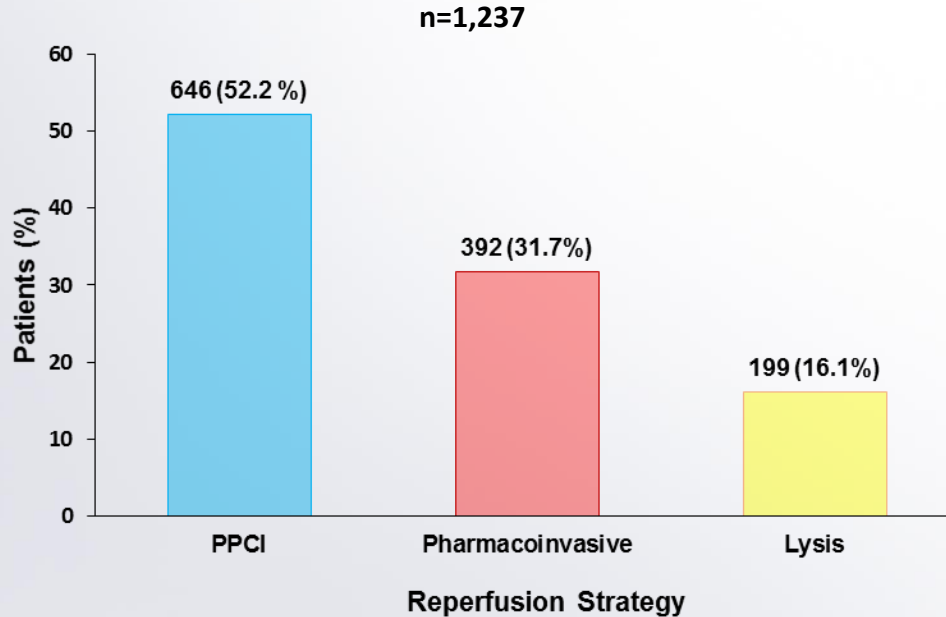
Distribution of patients according to Age Category





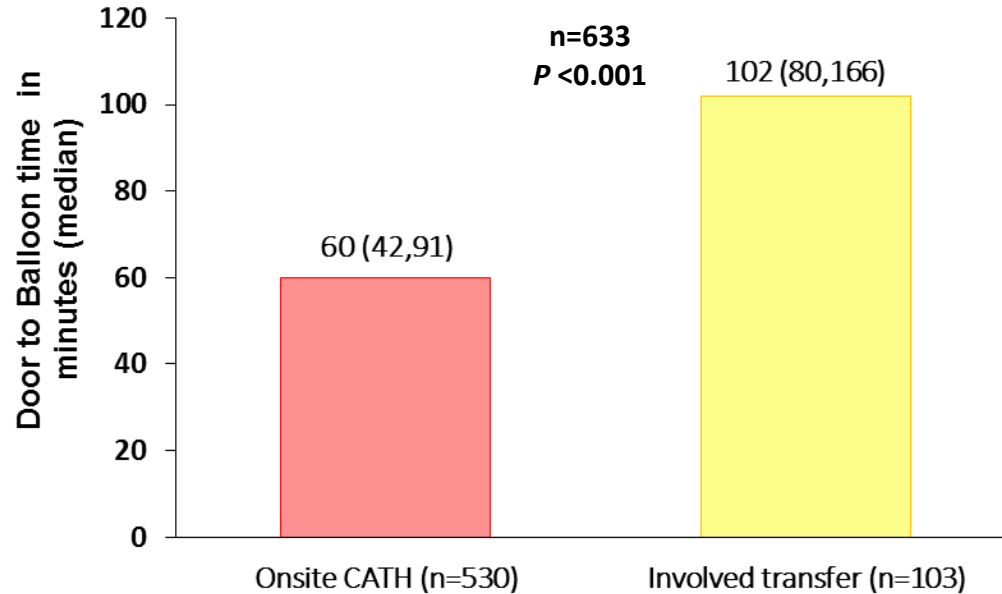
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Distribution of patients according to Reperfusion Strategy



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Door to Balloon time according to hospital presentation in
Primary PCI patients





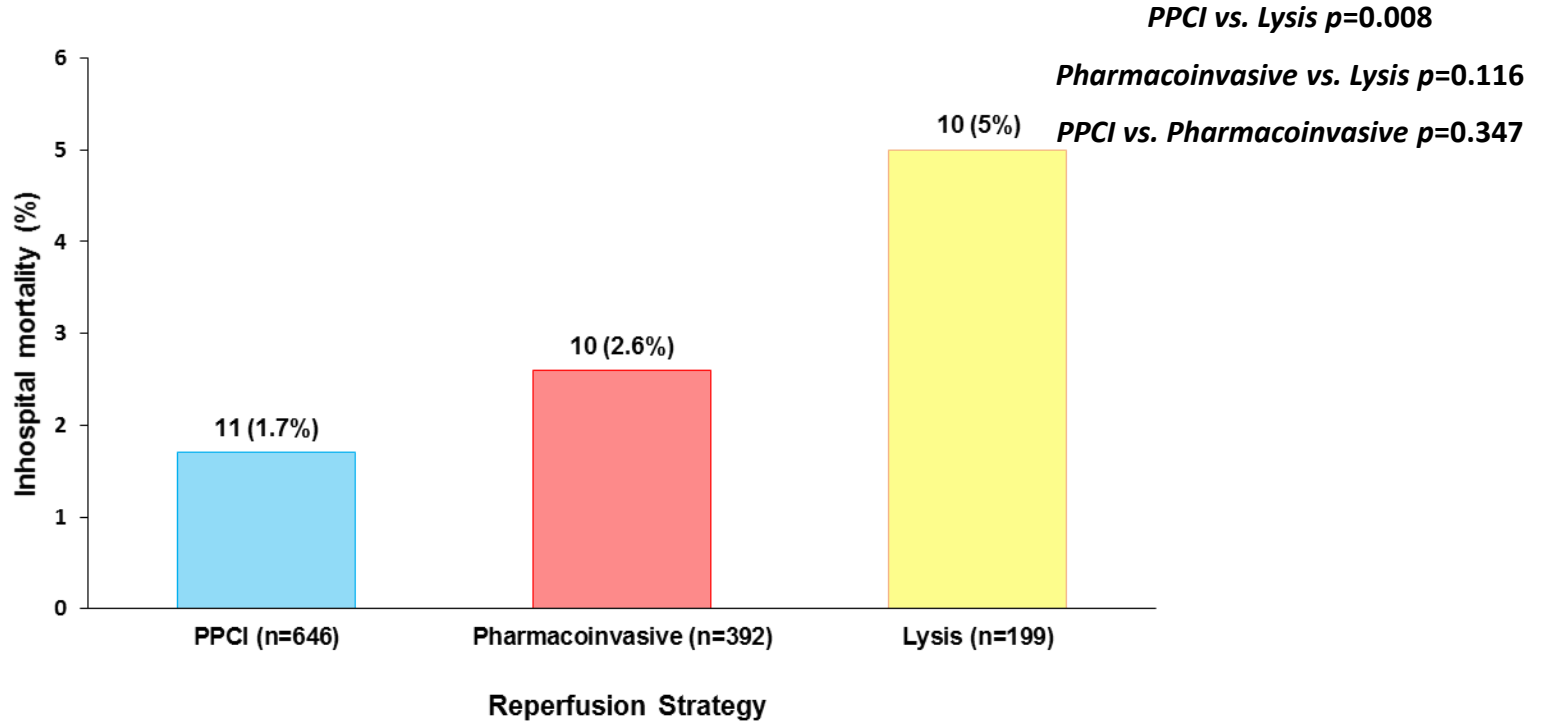
Effectiveness

Comparison of Mortality



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Inhospital mortality according to Reperfusion Strategy





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Symptom onset to Door time

n=1,219

Symptom onset to hospital arrival (Median, IQR)

112 (60,196)

Utilization of EMS (%)

195 (16)

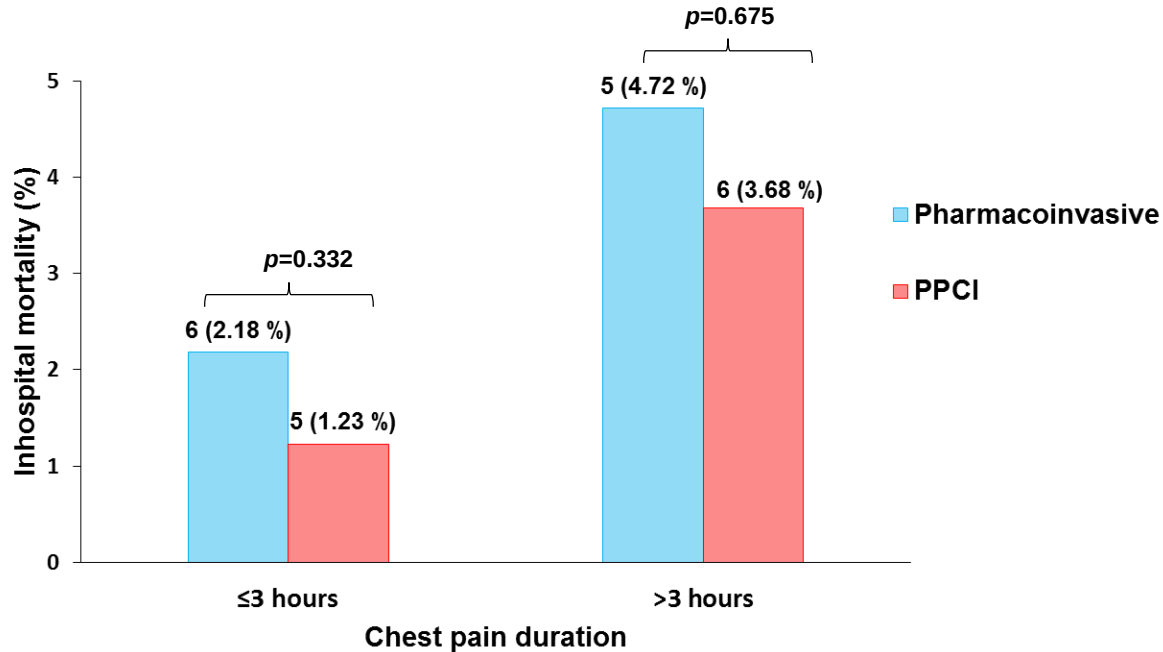
Symptom onset to hospital arrival ≤ 3 hours (%)

889 (72.93)



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Inhospital mortality according to chest pain duration in PPCI and pharmacoinvasive groups



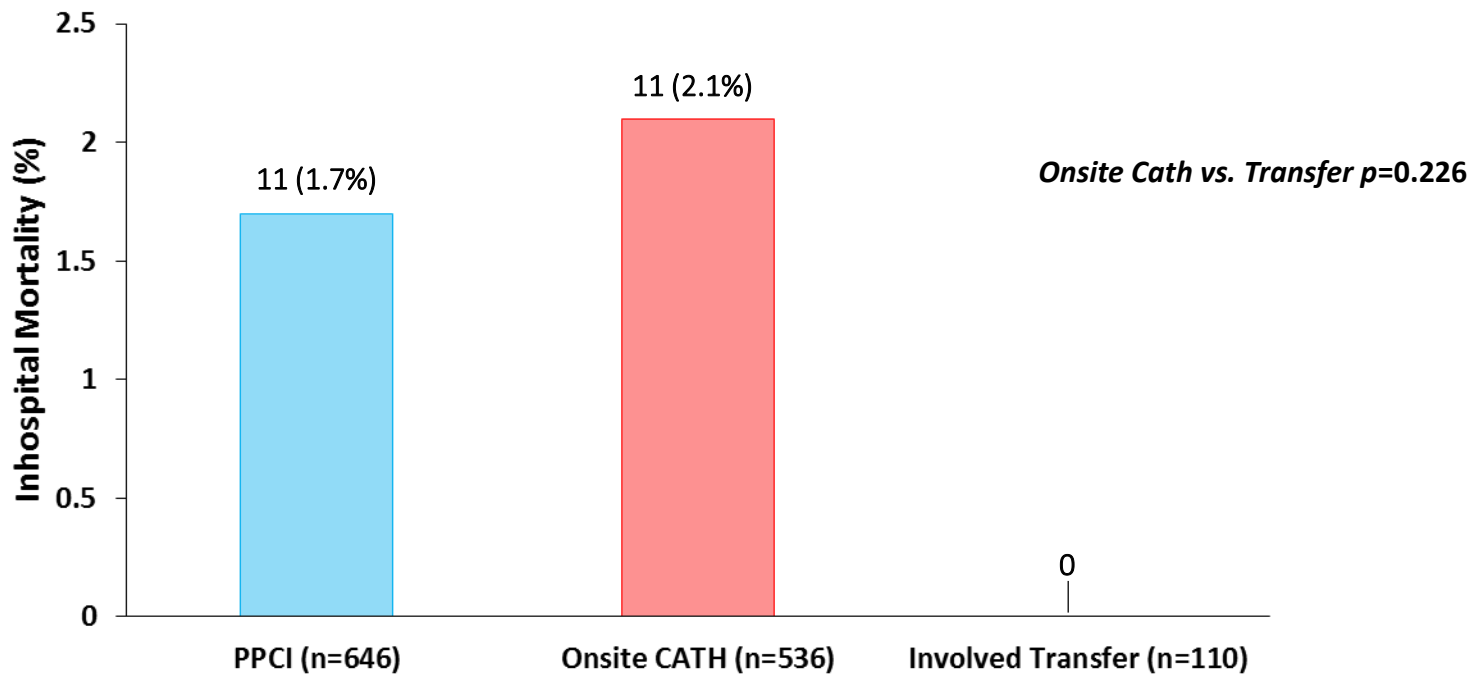
Pharmacoinvasive:
≤3 hrs. vs. > 3 hrs. $p=0.185$

PPCI:
≤3 hrs. vs. > 3 hrs. $p=0.054$



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Inhospital Mortality according to hospital presentation in primary PCI Patients





Safety

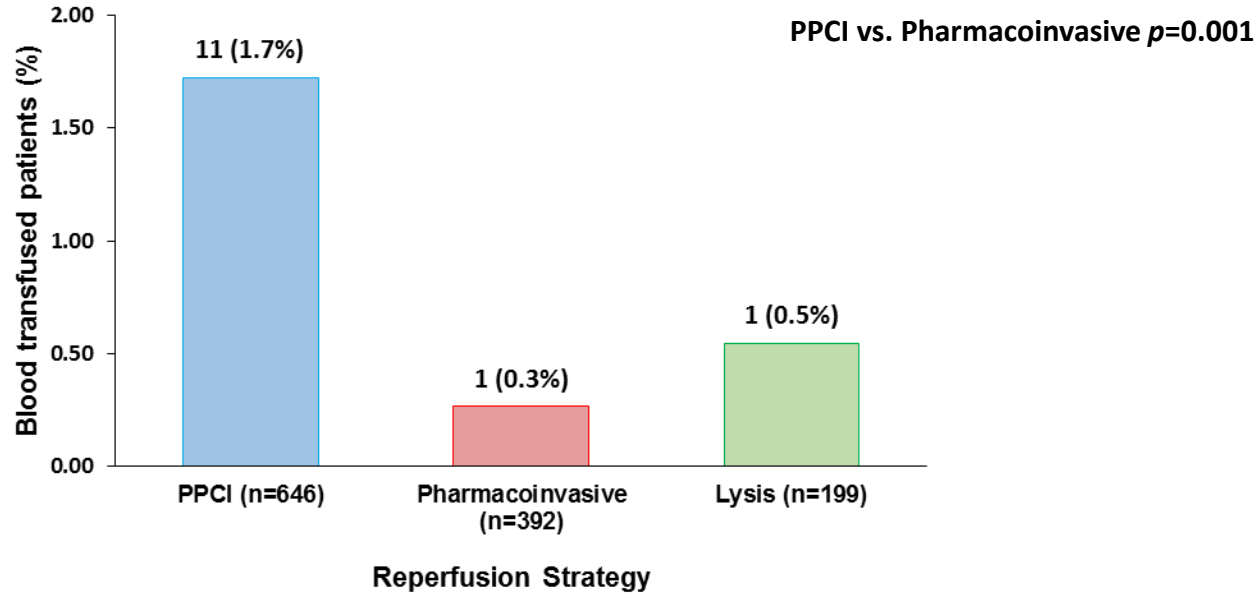
Transfusion

Stroke



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Blood Transfusion According to Reperfusion Strategy

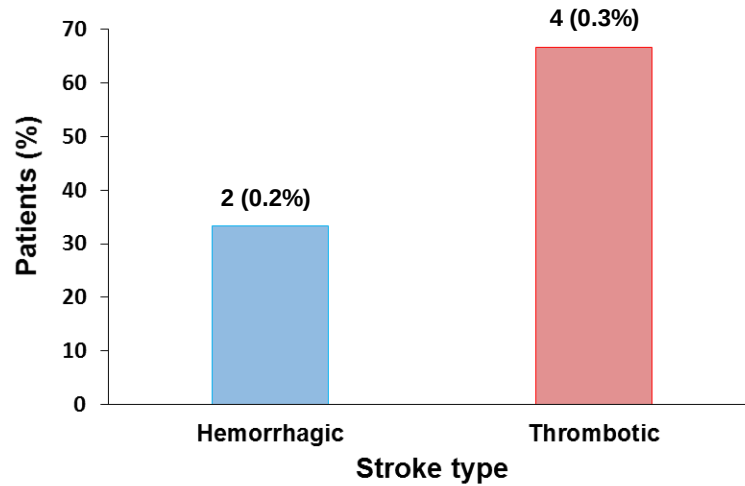




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Outcomes during hospital stay (Stroke)

Total strokes= 6 (0.5%)

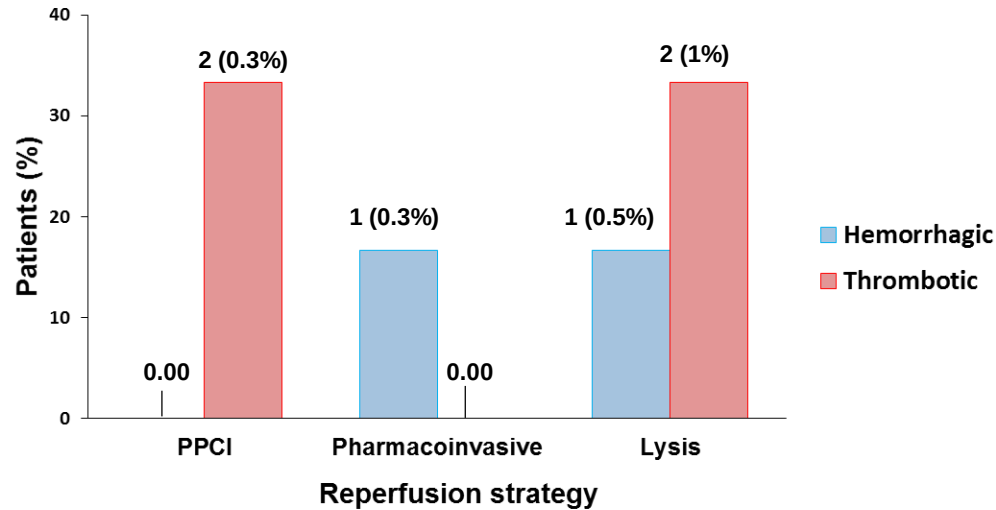




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Types of Stroke According to Reperfusion Strategy (inhospital)

Total strokes= 6 (0.5%)





REPERFUSE KUWAIT

Follow up Status (n=1,237)

	Yes
12 month follow up done	1176 (95.06 %)
Type of follow up	
Lost to follow up	200 (16.7 %)
Patient visit	473 (39.6 %)
Phone call	521 (43.6 %)



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Patient Characteristics and unadjusted inhospital and one-year MACE[‡] outcomes

Characteristics	PPCI (n=646)	PI (n=392)	P value
Age (mean $\pm$ SD*)	54 $\pm$ 10	53 $\pm$ 10	0.112
Age < 45 years, no. (%)	117 (18)	73 (19)	
Female, no. (%)	41 (6.4)	20 (5.1)	
Type 2 Diabetes, no. (%)	218 (34)	122 (31)	0.171
Smoking, no. (%)	325 (50)	188 (48)	0.463
Renal Impairment, no. (%)	29 (4.5)	14 (3.6)	0.520
Symptom onset to hospital arrival time ($\leq$ 3hr), no. (%)	466 (72)	281 (72)	0.875
Killip Class (II-IV), no. (%)	71 (11)	25 (6.4)	0.013
Anterior STEMI, no. (%)	295 (46)	156 (40)	0.064
Unadjusted Inhospital Outcomes			
Composite of stroke, major bleeding or death, no. (%)	16 (2.5)	11 (2.8)	0.747
Stroke, no. (%)	2 (0.3)	1 (0.3)	0.889
Major bleeding, no. (%)	6 (0.9)	1 (0.3)	0.199
Death, no. (%)	11 (1.7)	10 (2.6)	0.347
Unadjusted one year mortality, no. (%)	17/550 (3.1)	12/339 (3.5)	0.714

Notes: *SD= Standard Deviation, [‡]IQR= Inter Quartile Range, [‡]MACE = Major Adverse Cardiac Events, PPCI=primary percutaneous coronary intervention, PI=pharmacoinvasive, Lysis= fibrinolysis, STEMI=ST-segment elevation myocardial infarction.



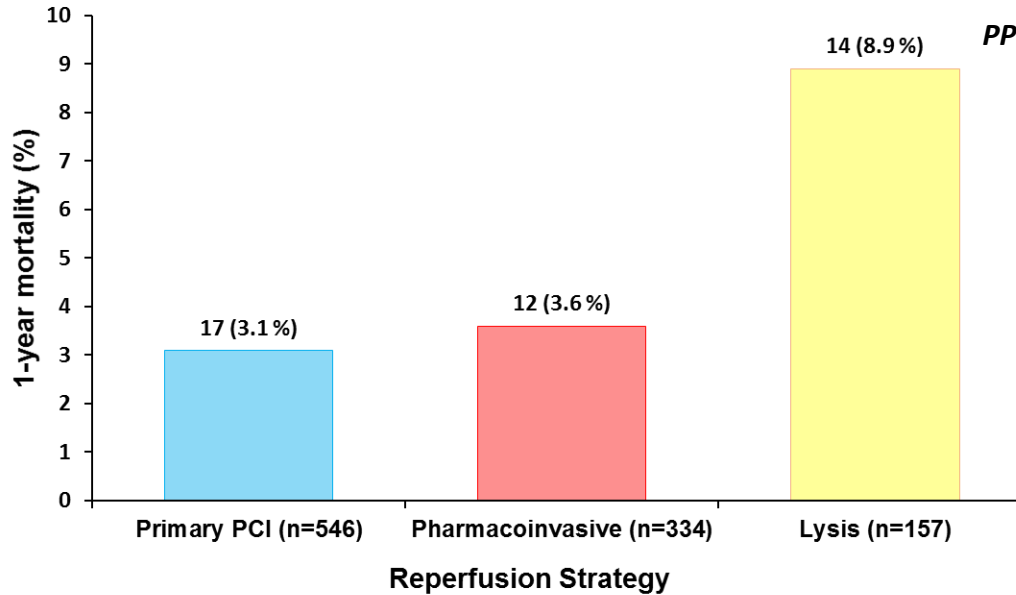
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1-year Mortality Among 1,037 (85 %) with full follow up data
According to Reperfusion strategy

PPCI vs. Lysis $p=0.002$

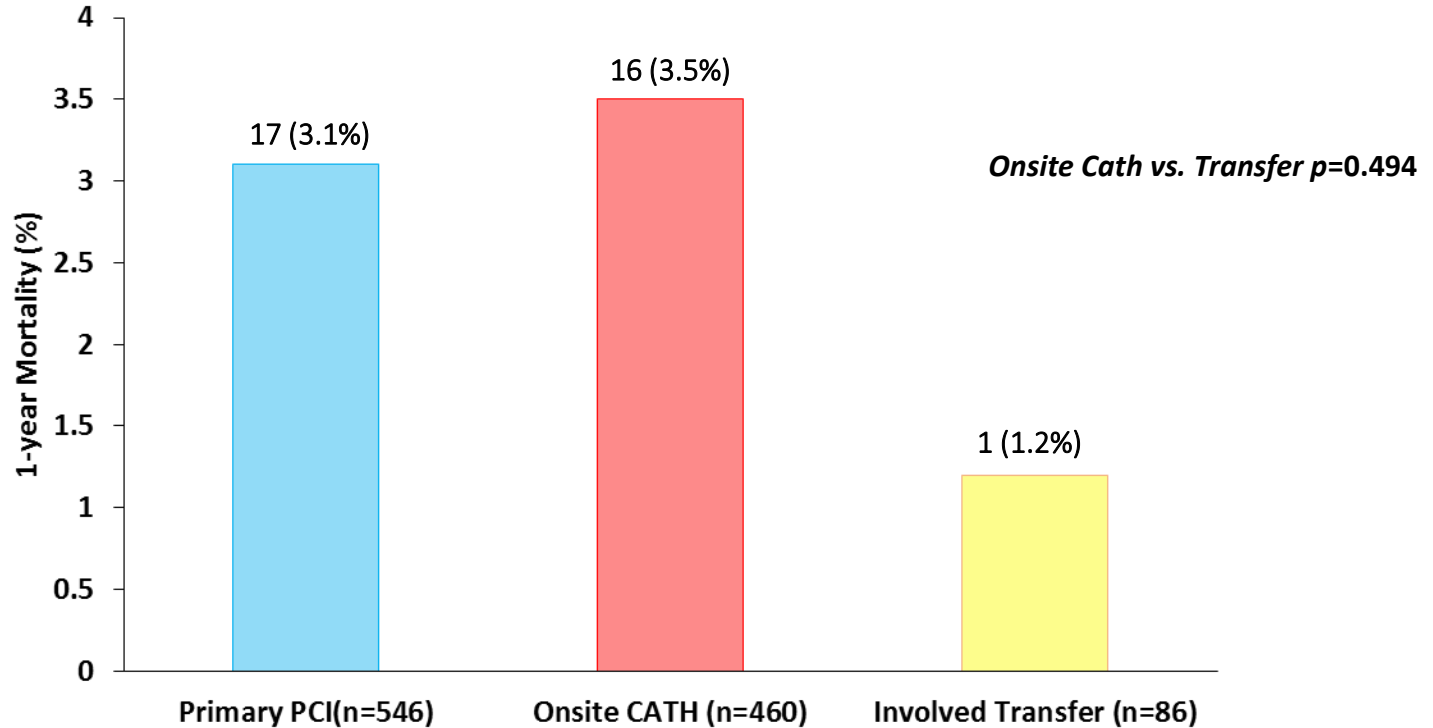
Pharmacoinvasive vs. Lysis $p=0.014$

PPCI vs. Pharmacoinvasive $p=0.699$



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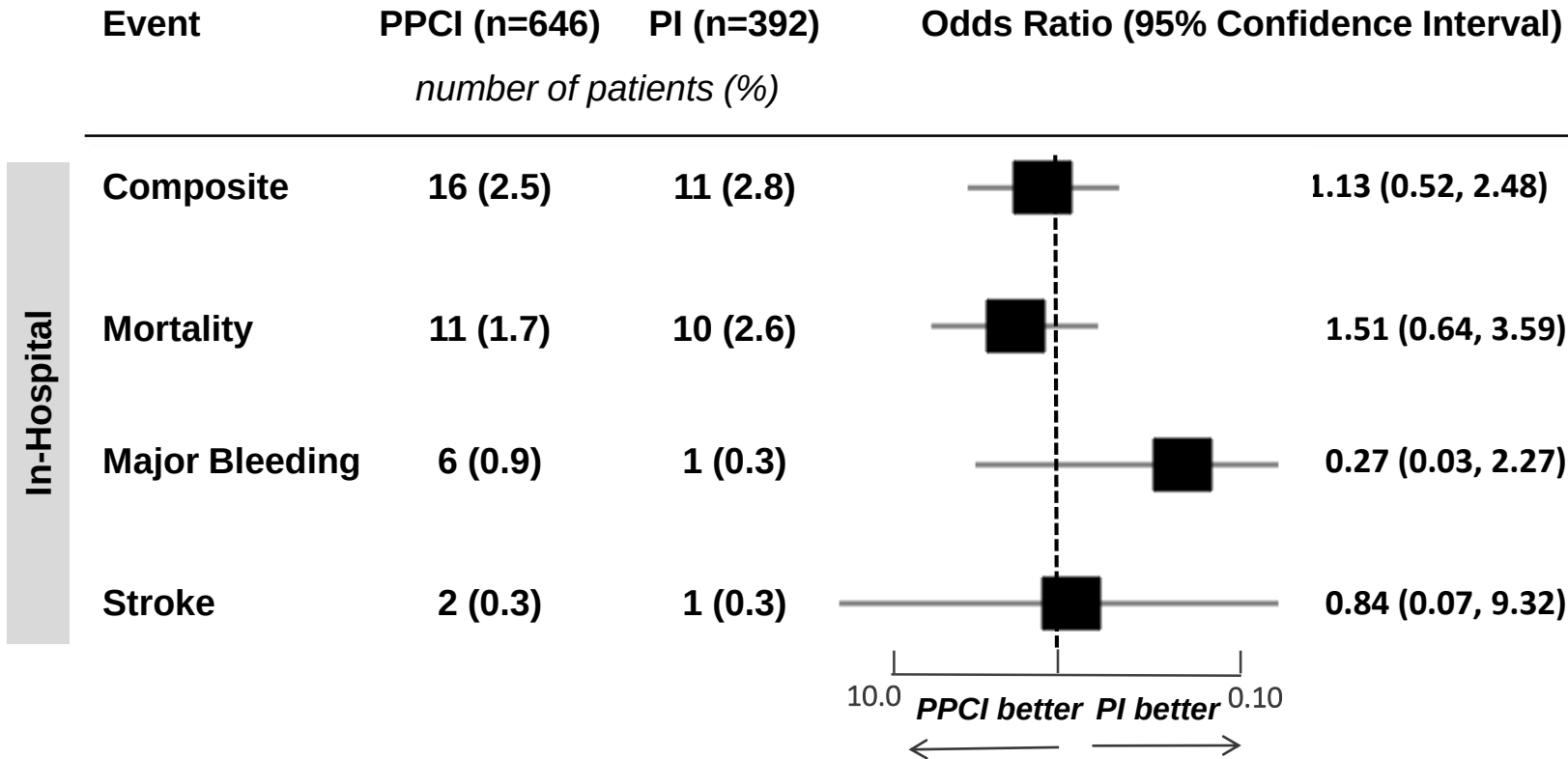
1-year Mortality Among PPCI patients with full follow up data
According to Patient Presentation





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Inhospital mortality and MACE in Primary PCI vs Pharmacoinvasive strategy



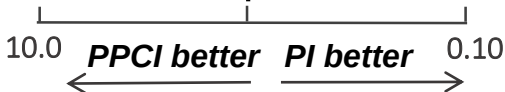


REPERFUSE KUWAIT

One year mortality and MACE in Primary PCI vs Pharmacoinvasive strategy

One Year

Event	PPCI (n=646) <i>number of patients (%)</i>	PI (n=392) <i>number of patients (%)</i>	Odds Ratio (95% Confidence Interval)
Composite	28/550 (5.1)	14/339 (4.1)	0.80 (0.42, 1.55)
Mortality	17/550 (3.1)	12/339 (3.5)	1.15 (0.54, 2.44)
Major Bleeding	10/550 (1.8)	1/339 (0.3)	0.16 (0.02, 1.25)
Stroke	4/550 (0.7)	2/339 (0.6)	0.81 (0.15, 4.44)





Conclusions

- Primary PCI is superior to fibrinolytic therapy when performed early.
- For many reasons, primary PCI can't be adopted for a large segment of STEMI patients.
- In Kuwait, over an entire year, country-wide, we tested the different reperfusion strategies that cardiologists practiced.
- Pharmaco-invasive strategy proved efficient, effective and safe.