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PROGNOSIS OF CARADIOGENIC SHOCK FOLLOWING ACUTE MYOCARDIAL INFARCTION

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DECLARATION OF INTERESTS

Nothing to declare

FUNDING

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- Charles University Research Program COOPERATIO – Cardiovascular Science and by the Ministry of Health of the Czech Republic, Grant No. NV19-02-00086.



BACKGROUND

Clinical definition	ESC guidelines	SHOCK Trial	IABP-SHOCK II
Cardiac disorder that results in both clinical and biochemical evidence of tissue hypoperfusion	Systolic blood pressure under 90 mmHg with appropriate fluid resuscitation with clinical (cold sweated extremities, oliguria, mental confusion, dizziness, narrow pulse pressure) and laboratory (elevated serum lactate and creatinine, metabolic acidosis) signs of hypoperfusion	Clinical criteria (hypotension—a systolic blood pressure under 90 mmHg for at least 30 min or above 90 mmHg with supportive measures, signs of end-organ hypoperfusion (cool extremities or a urine output of <30 mL per hour, and a heart rate of ≥ 60 beats per minute) OR Hemodynamic criteria (cardiac index of no more than 2.2 L/min/m ² and a pulmonary-capillary wedge pressure of at least 15 mmHg)	At least one sign of impaired end-organ perfusion: (altered mental status; cold, clammy skin and extremities; oliguria < 30 mL/h; or serum lactate ≥ 2.0 mmol/L)

BACKGROUND

- Cardiogenic shock complicates 5-12 % of cases of acute myocardial infarction
- In-hospital mortality from CS complicating AMI remains consistently high at about 50%
- The number of patients treated with CS-AMI is approximately 40.000-50.000 in the United States and 60.000-70.000 in Europe per year

AIM OF THE STUDY

- To examine the incidence and outcomes of patients with cardiogenic shock complicating acute myocardial infarction in Czech Republic
- To analyze predictive factors of patients with cardiogenic shock complicating acute myocardial infarction

STUDY POPULATION

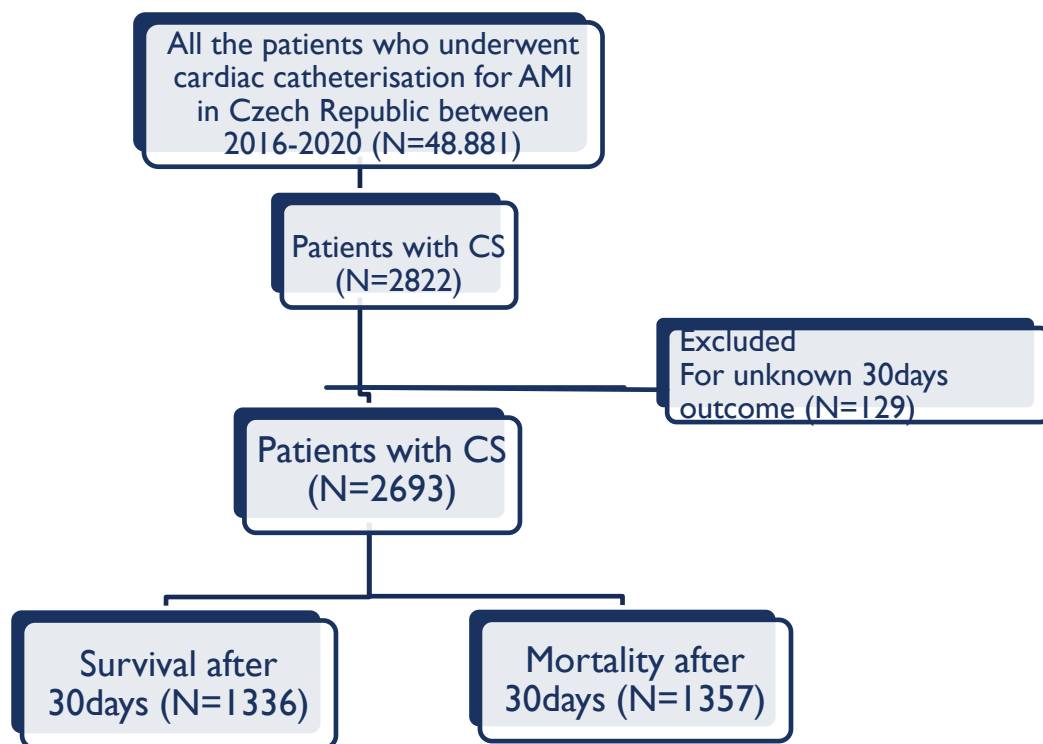


Figure. Patients inclusion flow chart

Data source:

- The National Registry of Cardiovascular Surgery and Interventions: Module of Cardiovascular Interventions (a part of the National Health Information System defined in §70 par. I of the Act No. 372/2011 Coll., on Health Services and Conditions of Their Provision (Act on Health Services))
- The National Registry of Deaths

METHODOLOGY

- Standard descriptive statistic
- Univariate and multivariate logistic regression, forward stepwise selection algorithm
- Survival:
 - Kaplan-Meier methodology
 - Cox-proportional hazards model
- Deyo-Charlson Comorbidity index based on the International Classification of Diseases codes
- Analysis with SPSS 28.0.1.1, $p=0.05$ - the level of statistical significance

BASIC CHARACTERISTICS

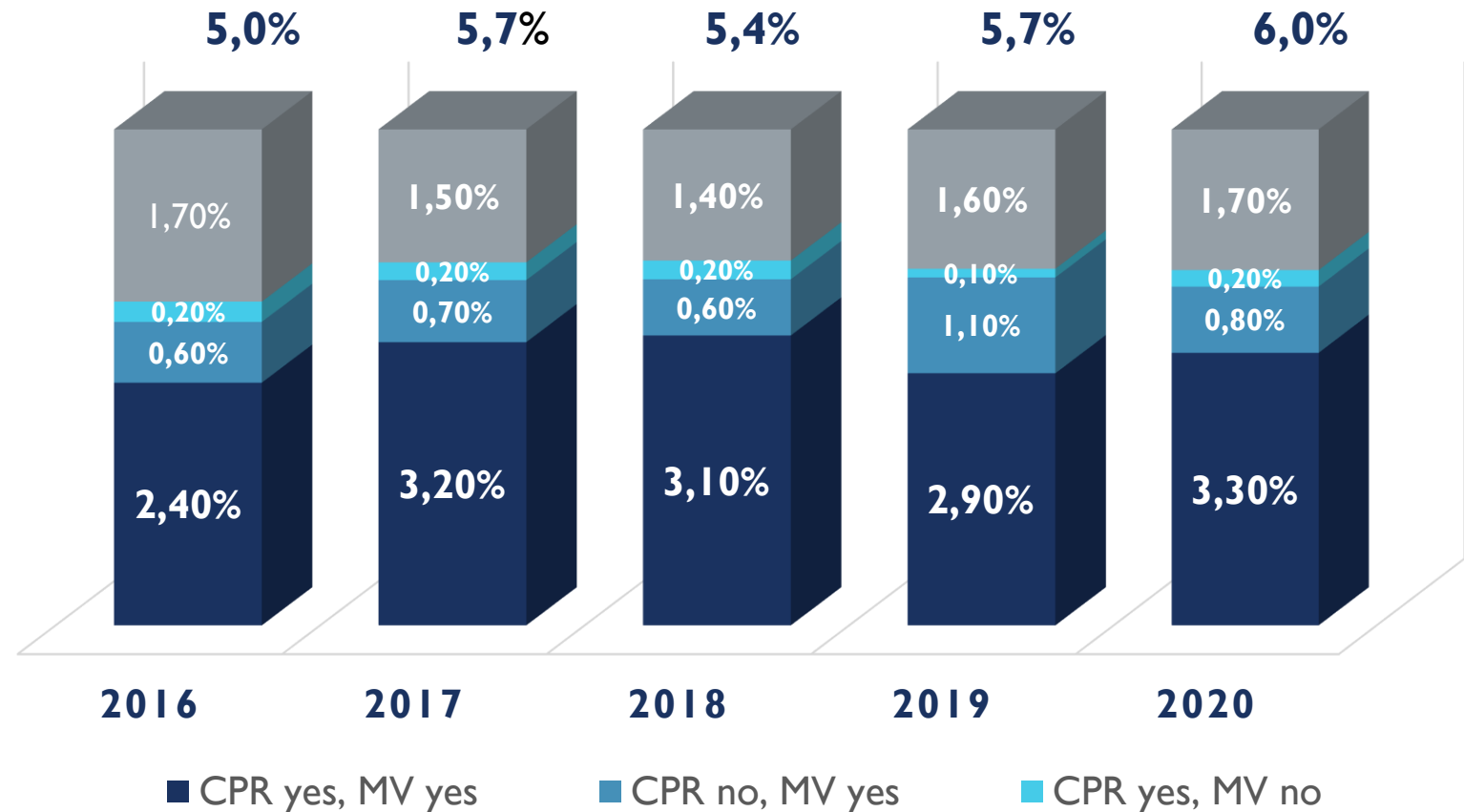
Predictor	Totally in group	30days mortality	p
Total, N	2693	1357	
Female, %	27.4	54.1	0.018
Age, mean ± SD	67.6 ± 12.0	70.4 ± 11.6	<0.001
Age, %	<40	1.1	40.0
	40-49	6.5	33.7
	50-59	16.1	32.8
	60-69	31.7	46.1
	70-79	28.3	58.5
	>80	16.3	69.5
Diabetes mellitus, %	23.1	59.8	
Chronic kidney disease, %	8.1	61.9	<0.001
Previous PCI, %	17.7	54.1	0.077
Previous CABG, %	5.6	46.7	0.357
After CPR, %	57.4	52.6	0.010
Mechanical ventilation, %	68	52.8	<0.001
DCCI	0-1	10.7 %	10.6 %
	2-3	31.3 %	29.0 %
	4-6	37.9 %	39.8 %
	>6	20.2 %	20.7 %

Predictor	Totally in group	30days mortality	p
Indication, %	STEMI acute	65.5	48.4
	STEMI subacute	14.7	58.2
	NSTEMI	19.9	51.0
Time from symptoms onset to PCI, hours (only for acute STEMI), %	<2	14.4 %	46.3 %
	2-3	18.8 %	42.8 %
	3-4	10.3 %	49.6 %
	4-8	11.7 %	53.2 %
	>8	7.5 %	55.9 %
Multivessel disease, %	1VD	25.7 %	42.3 %
	2VD	28.5 %	47.5 %
	3VD	40.5 %	56.8 %
Left main stenosis, %	17.3	57.4	<0.001
Localization, %	Anterior	36.3	50.3
	Inferior	21.2	45.5
	Lateral	4.3	41.9
	LBBB	3.5	55.8
TIMI flow before PCI, %	0	57.3 %	53.0 %
	1	10.1 %	50.0 %
	2	14.8 %	46.4 %
	3	17.8 %	45.4 %
TIMI flow after PCI	0	9.2 %	69.5 %
	1	4.6 %	69.9 %
	2	10.4 %	72.2 %
	3	75.8 %	43.9 %

Predictor	Totally in group	30days mortality	p
Season	Spring, %	27.1	49.2
	Summer, %	23.0	46.0
	Autumn, %	25.9	54.2
	Winter, %	24.0	51.8
Daytime	Working hours, %	34.8	49.3
	Afterworking hours, %	30.3	47.6
	Unknown, %	34.9	53.9
Weekday	Weekday, %	74.45	50.03
	Weekend, %	25.55	51.45

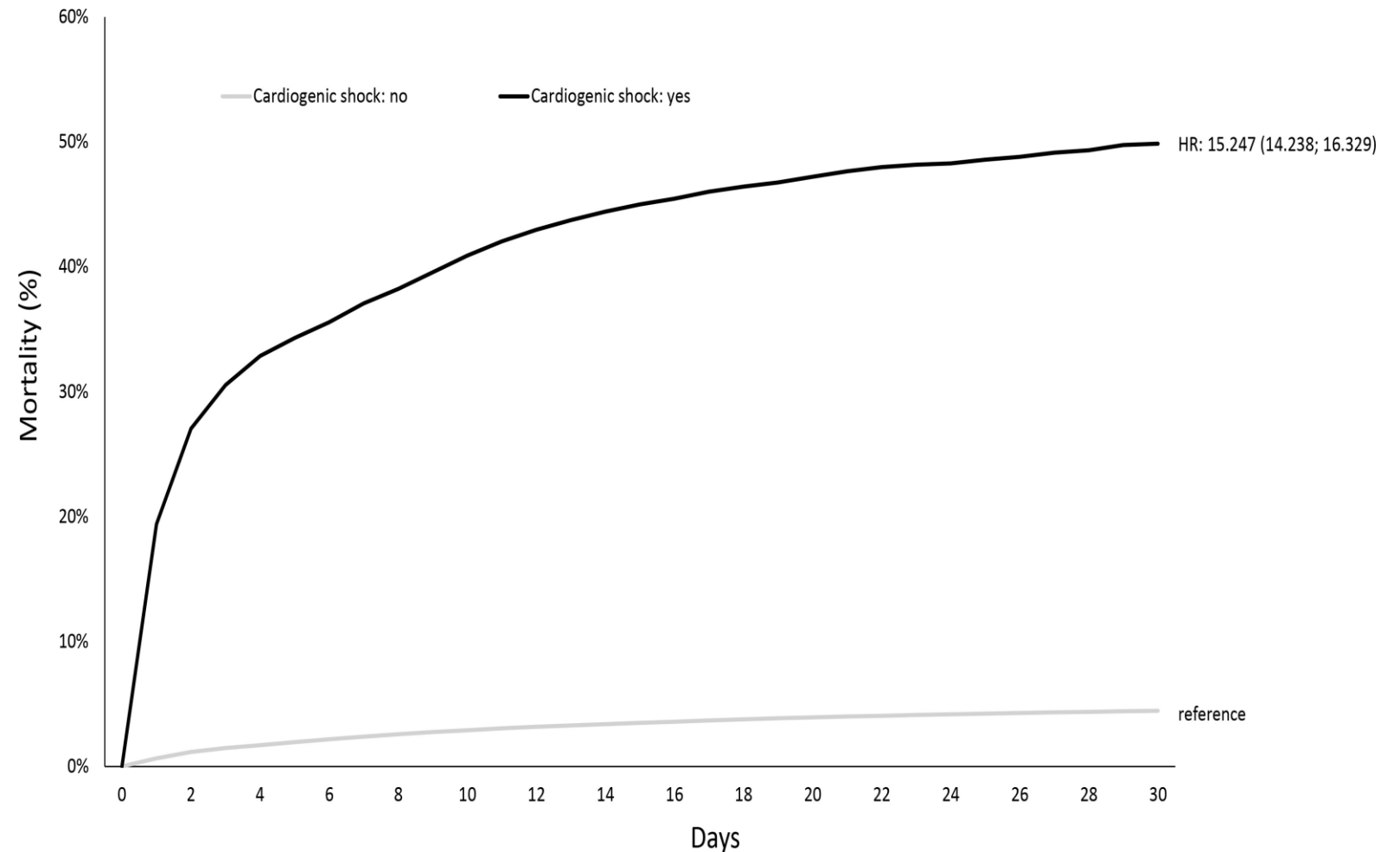
INCIDENCE OF CS-AMI DURING 2016-2020

- 56.7 % of patients required cardiopulmonary resuscitation (both out- and in-hospital)
- 67.1 % required mechanical ventilation
- 53.5 % required both mechanical ventilation and CPR

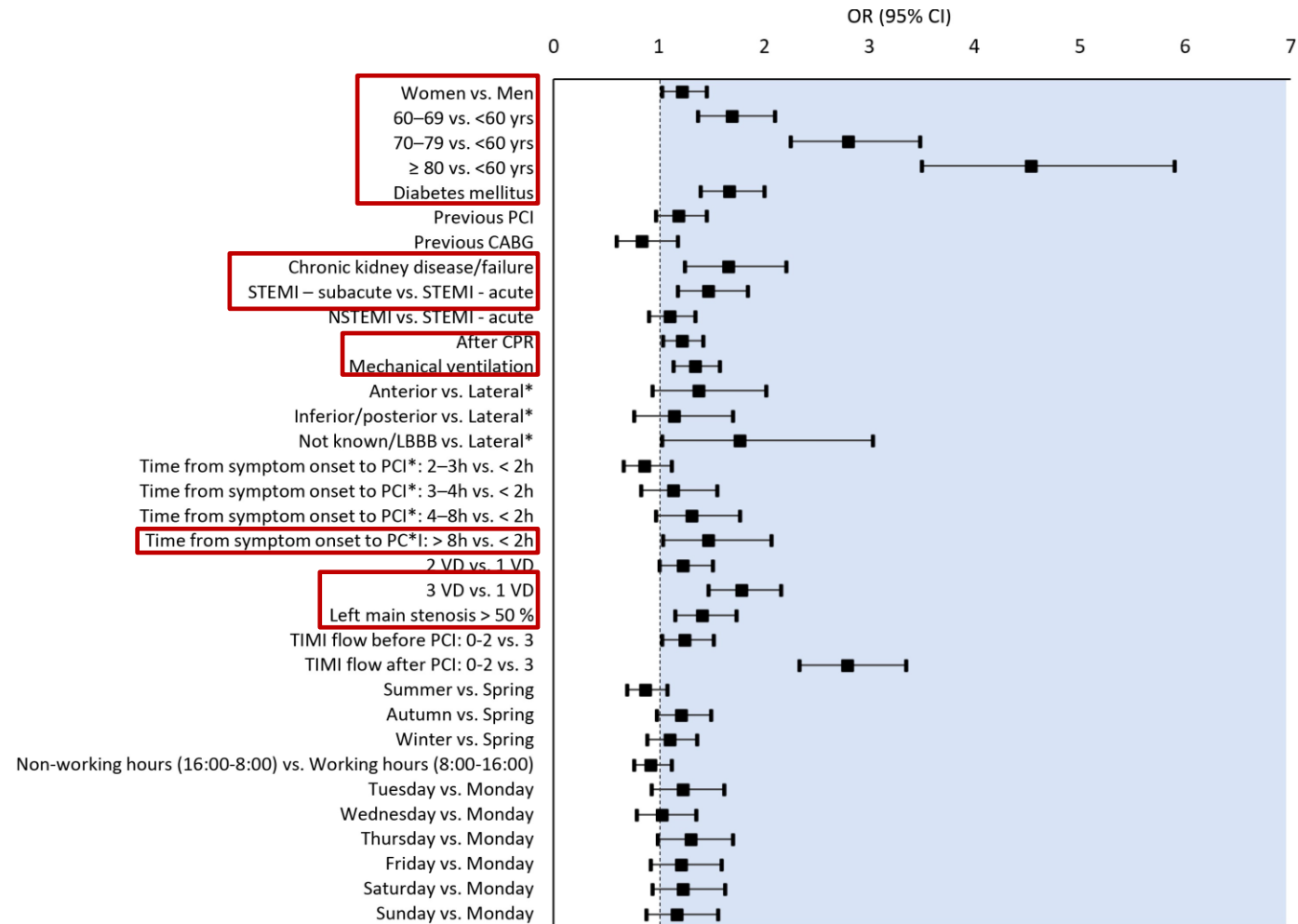


MORTALITY (2016-2020)

Year	30days mortality, %
2016	53,7
2017	51,6
2018	49,7
2019	49,3
2020	47,9
Total	50,4

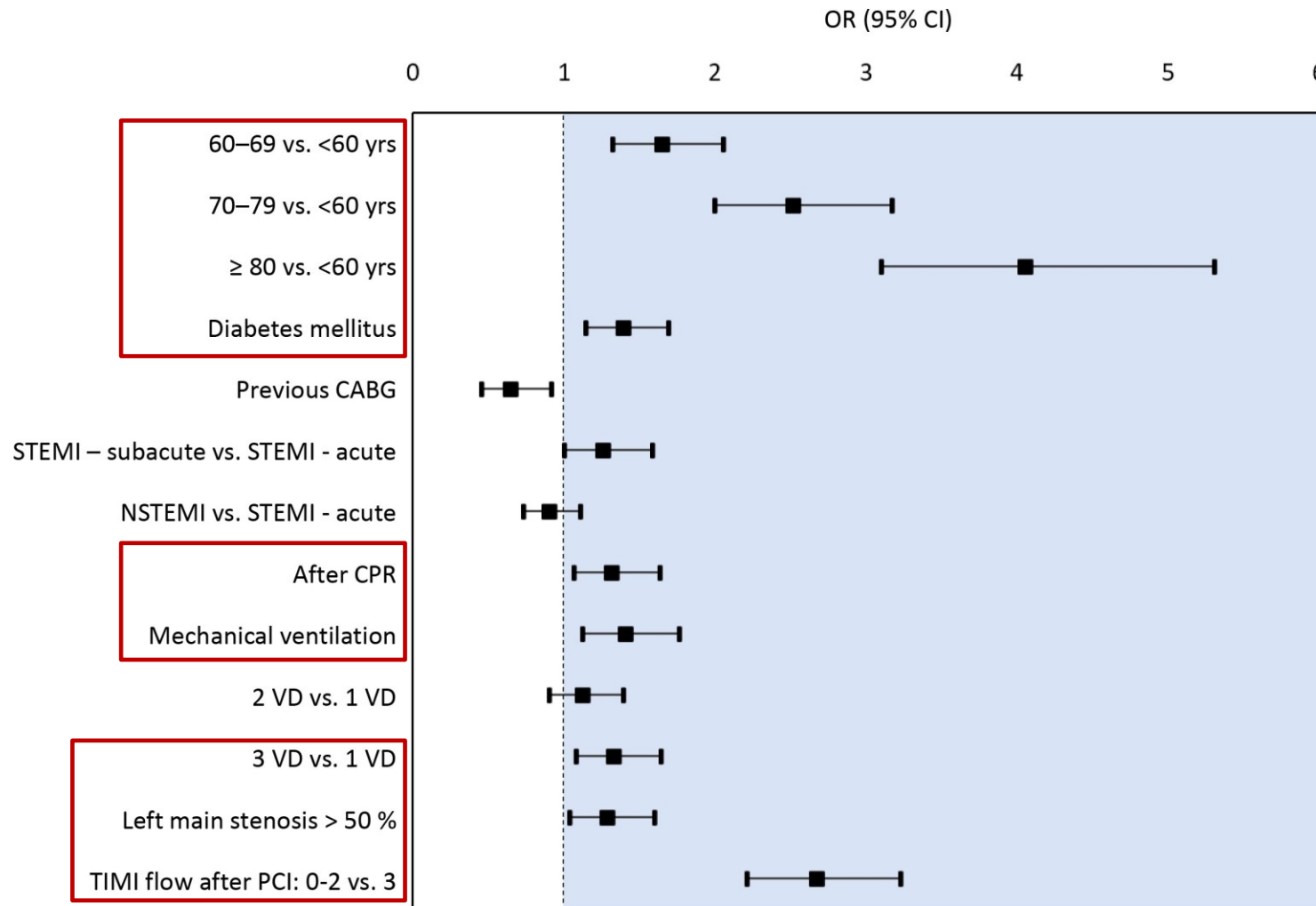


CHARACTERISTICS INFLUENCING 30DAYS MORTALITY OF CARDIOGENIC SHOCK – UNIVARIATE ANALYSIS



* acute STEMI only

CHARACTERISTICS INFLUENCING 30DAYS MORTALITY OF CARDIOGENIC SHOCK – MULTIVARIATE ANALYSIS



CONCLUSION

- Cardiogenic shock complicates 5,6% of AMI cases in Czech Republic, the mortality of cardiogenic shock complicating acute myocardial infarction is 50,4%
- Outcome of patients with CS-AMI is highly affected by the patient's degree of instability, as documented by mechanical ventilation and resuscitation, and the timing of successful revascularization.
- The independent impact of comorbidities and nontraditional factors on the prognosis of these patients has not been confirmed.

PUBLISHED RESULTS

The Prognosis of Cardiogenic Shock Following Acute Myocardial Infarction— an Analysis of 2693 Cases From a Prospective Multicenter Registry

Dtsch Arztebl Int 2023; 120: 538-9. DOI: [10.3238/arztebl.m2023.0102](https://doi.org/10.3238/arztebl.m2023.0102)

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PREDICTIVE SCORING SYSTEMS

APACHE-II and APACHE-III	SAPS-II	CARD-SHOCK	GRACE	Other published clinical, imaging and hemodynamic variables
<p>13 physiological variables measured during the first 24 hours after ICU admission</p> <p>+ pathogenesis of shock, sex, race, and comorbidities</p> <p>>17 000 ICU patients in US</p>	<p>2 physiological and 3 disease-related variables</p> <p>12 997 patients from 12 countries used to predict in-hospital mortality</p>	<p>7 variables associated with in-hospital mortality</p> <p>219 patients with all-cause CS</p> <p>lacked external validation</p>	<p>Good discrimination and calibration for in-hospital and long-term mortality among all patients presenting with ACS, but it is not applicable to non-ACS presentations</p> <p>- not applicable to non-ACS presentations</p>	<p>Anoxic brain damage, end-organ hypoperfusion, elevated lactate, prior CABG, ACS pathogenesis, LV ejection fraction, RV function, pulmonary artery pulsatility index (defined as the ratio of pulmonary artery pulse pressure to right atrial pressure), mitral regurgitation, LV stroke work, cardiac power output, SBP, number of vasopressors, systemic inflammatory response syndrome, and TIMI (Thrombolysis in Myocardial Infarction) flow</p>