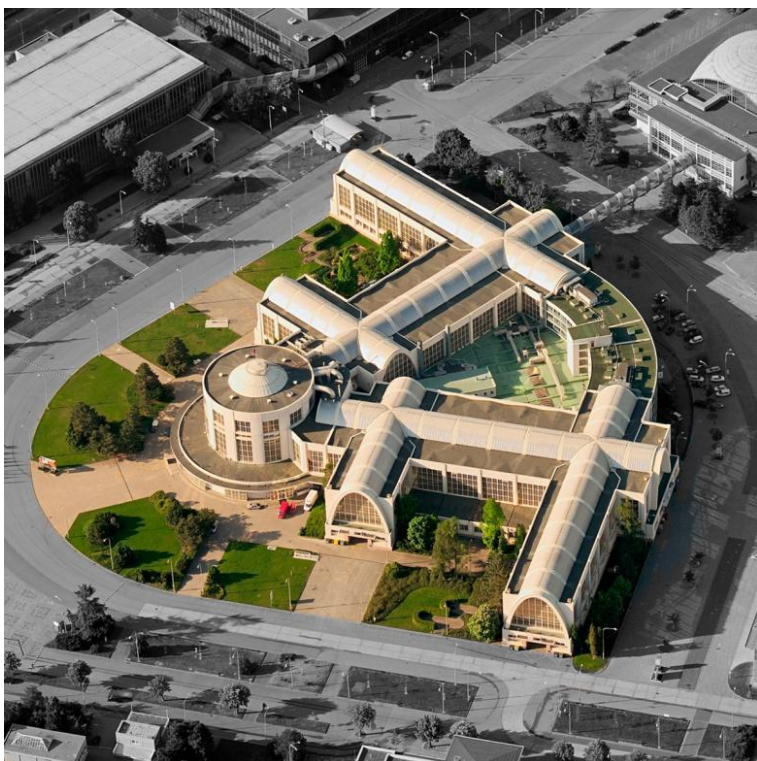


# Kardiogenní šok - stratifikace rizika

R. Rokyta, Kardiologické odd.  
CVKKP FN Plzeň



# Kardiogenní šok (KŠ) – definice

- **Hypoperfúze tkání a orgánů** způsobená srdečním selháním
- **Klinika:** chladné končetiny, oligurie, alterace mentálního stavu

- **Hemodynamika**

1) perzistující hypotenze > 30 min

(STK < 80-90 mmHg nebo pokles o > 30 mmHg)

+ tachykardie > 100/min

2) srdeční index < 1,8 l/min/m<sup>2</sup> bez podpor nebo < 2,0 – 2,2 l/min/m<sup>2</sup> s podporou při adekvátních nebo zvýšených plních tlacích LKS a PKS (PAOP  $\geq$  18 mmHg, resp. CVP  $\geq$  15 mmHg)

## MĚSTNÁNÍ (-)

## MĚSTNÁNÍ (+)

Městnání krve v plicích  
Ortopnoe/paroxysmální noční dušnost  
Otoky končetin (oboustranné)  
Zvýšená náplň krčních žil  
Hepatomegalie při městnání  
Městnání ve střevech, ascites  
Hepatojugulární reflux

## HYPOPERFUZE (-)

WARM-DRY

WARM-WET

## HYPOPERFUZE (+)

Studené a zpcené  
končetiny  
Oligurie  
Zmatenost  
Závratě  
Nízký pulsní tlak

COLD-DRY

COLD-WET

Hypoperfuze sice není synonymem pro hypotenzi, nicméně hypoperfuze je často doprovázena hypotenzí

# Kardiogenní šok - etiologie

## 1) **Akutní dysfunkce LKS nebo PKS:**

- akutní IM (75 % všech KŠ)
- akutní myokarditida
- Takotsubo KMP
- HKMP se subaortální obstrukcí výtokového traktu LKS

## 2) **postižení chlopní**

- insuficience: IE, komplikace IM, traumatická nebo degenerativní ruptura šlašinek
- akutní stress u pacientů s mitrální/aortální stenózou

## 3) **tamponáda**

## 4) **disekce aorty** – aort. insuf/IM/tamponáda

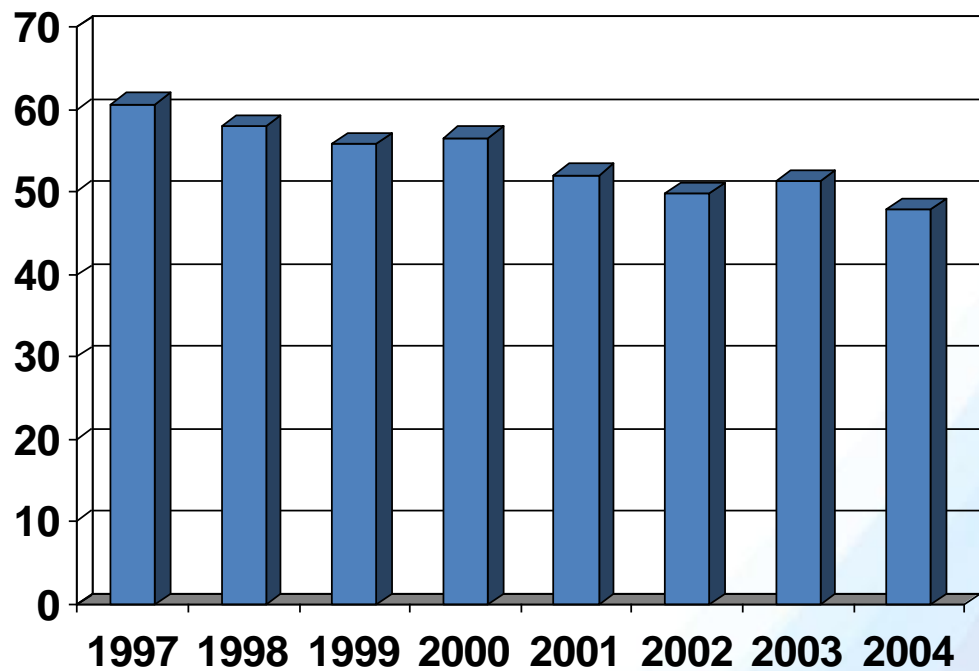
## 5) **vysoce riziková plicní embolie**



# Trends in Management and Outcomes of Patients With Acute Myocardial Infarction Complicated by Cardiogenic Shock

Anvar Babaev; Paul D. Frederick; David J. Pasta; et al.

*JAMA*. 2005;294(4):448-454 (doi:10.1001/jama.294.4.448)



Hospital mortality

Pizen

IABP-Shock II

Card-shock

CULPRIT-shock

2008-2009

2009-2012

2010-2012





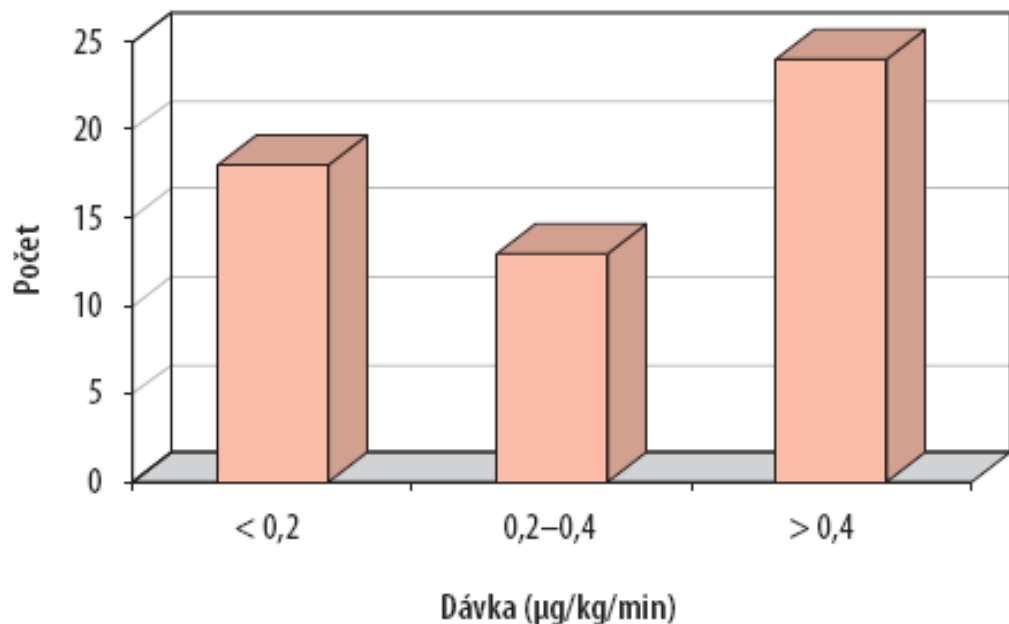
# KŠIM – tíže šoku



IABP Shock-II : cca 82 % pacientů – mechanická ventilace



# KŠIM – tíže šoku dávka katecholaminů, MSP



## IABP shock II

noradrenalin – medián

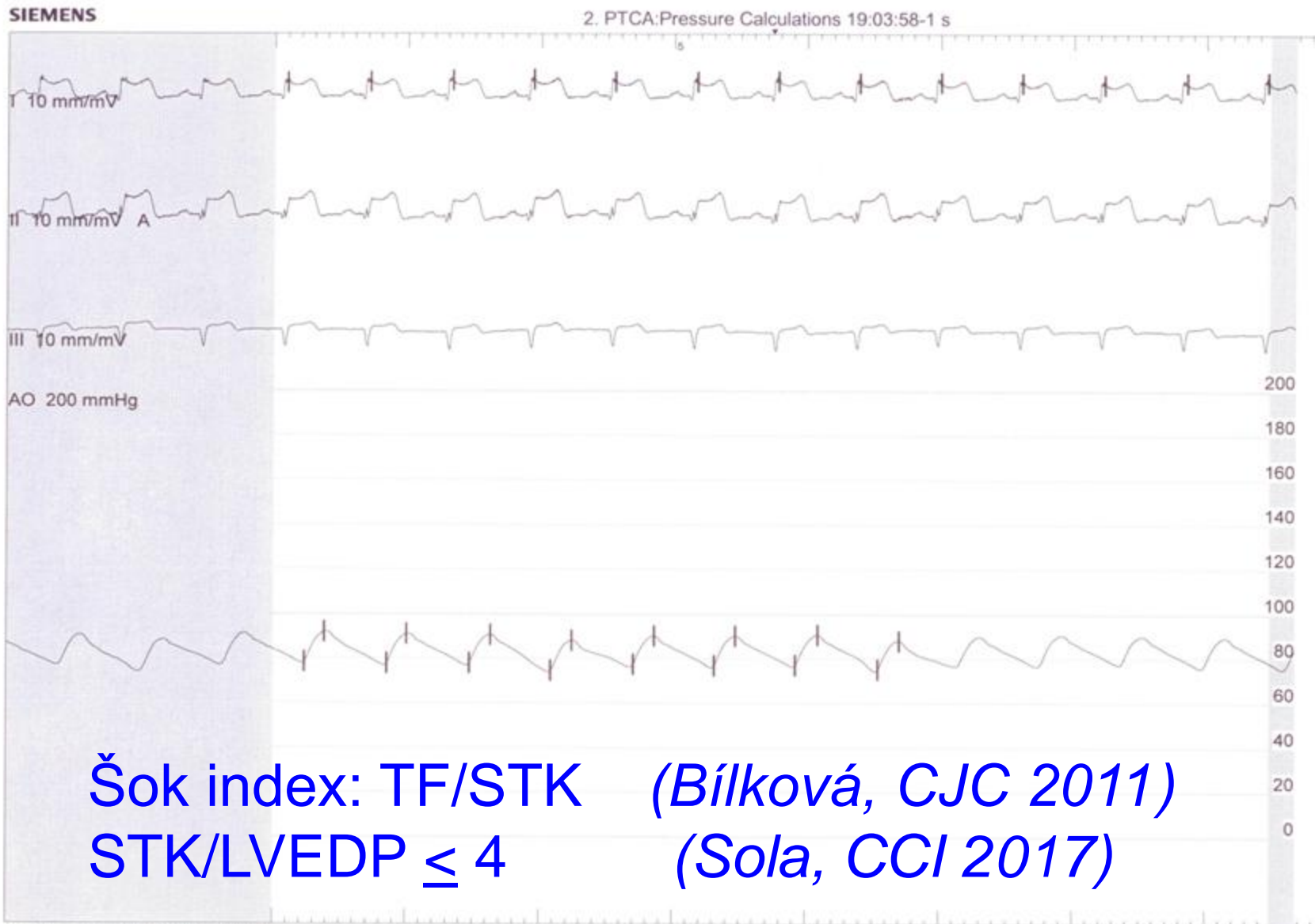
IABP – 0,3 µg/kg/min

Control – 0,4 µg/kg/min

Obrázek 4 Dávka noradrenalinu při zahájení IABK u pacientů s IM v kardiogenním šoku (n = 55)



## Example of STEMI with cardiogenic shock prior primary PCI



Šok index: TF/STK (Bílková, CJC 2011)  
STK/LVEDP  $\leq 4$  (Sola, CCI 2017)



# Stratifikace rizika - KŠIM

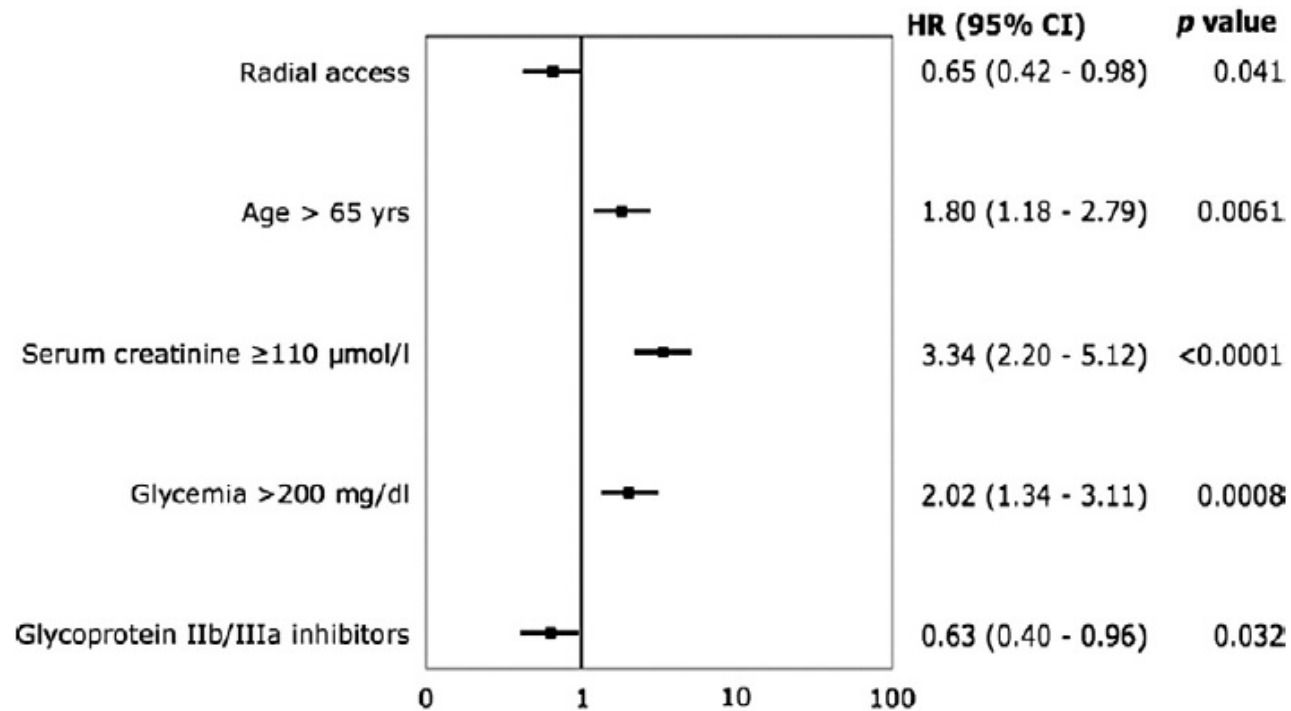
Sleeper AHJ 2010 (SHOCK) n=1217, 30 D mort	age	hypoperf	kreat >168 umol/l	anoxic brain damage	SAP	Prior CABG	Non- inferior MI
Cheng, EHJ ACC 2016, n=544, 30 D mort	age	lactate adm	kreat adm				
Vergara , AJC 2017, n = 388, 2 Y mort	>75 yrs			OHCA			failed PCI
Muller G ENCOURAGE V- A ECMO (ICM 2016) n=137, 6 M mort	>60 yrs	lactate (<2,2-8, >8)	kreat >150 umol/l	GCS<6	BMI >25	PT<50 %	female

Attaná (Acute Cardiac Care 2012) – clearance laktátu > 10 %/12 h

# Early and late outcomes after primary percutaneous coronary intervention by radial or femoral approach in patients presenting in acute ST-elevation myocardial infarction and cardiogenic shock

Ivo Bernat, MD, PhD,<sup>a</sup> Eltigani Abdelaal, MD,<sup>b</sup> Guillaume Plourde, MS,<sup>b</sup> Yoann Bataille, MD,<sup>b</sup> Jakub Cech, MD,<sup>a</sup> Jan Pesek, MD,<sup>a</sup> Jiri Koza, MD,<sup>a</sup> Stepan Jirous, MD,<sup>a</sup> Jimmy Machaalany, MD,<sup>b</sup> Jean-Pierre Déry, MD,<sup>b</sup> Olivier Costerousse, PhD,<sup>b</sup> Richard Rokyta, MD, PhD,<sup>a</sup> and Olivier F. Bertrand, MD, PhD<sup>b</sup> *Pilsen, Czech Republic and Quebec, Canada*

Am Heart J 2013;165:338-43



Adjusted hazard ratios and 95% confidence intervals for factors associated with death at 1yr

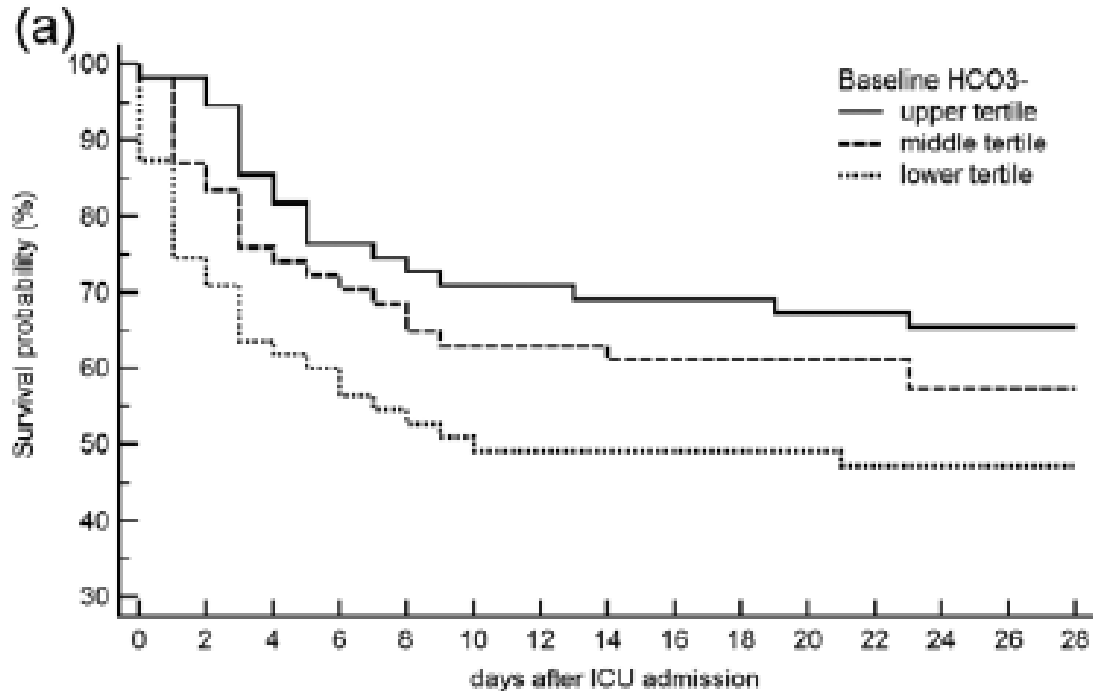
Independent predictors of 1-year mortality.



## Baseline serum bicarbonate levels independently predict short-term mortality in critically ill patients with ischaemic cardiogenic shock

European Heart Journal: Acute Cardiovascular Care  
 2018, Vol. 7(1) 45-52  
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 DOI: 10.1177/2048872616683526  
[journals.sagepub.com/home/acc](http://journals.sagepub.com/home/acc)  


Olivier Wigger<sup>1</sup>, Stefan Bloechlinger<sup>1,2</sup>, David Berger<sup>3</sup>,  
 Jonas Häner<sup>1</sup>, Thomas Zanchin<sup>1</sup>, Stephan Windecker<sup>1</sup>,  
 Lorenz Räber<sup>1</sup> and Joerg C Scheffold<sup>3</sup>



21,6 mmol/l  
 18,7 mmol/l  
 15,5 mmol/l

Number at risk		0	2	4	6	8	10	12	14	16	18	20	22	24	26	28
Group: upper tertile		54	52	45	42	40	39	39	38	38	38	37	37	36	36	36
Group: middle tertile		53	45	40	38	35	34	34	33	33	33	33	33	31	31	31
Group: lower tertile		48	39	34	31	29	27	27	27	27	27	27	27	26	26	26

28 D mortalita



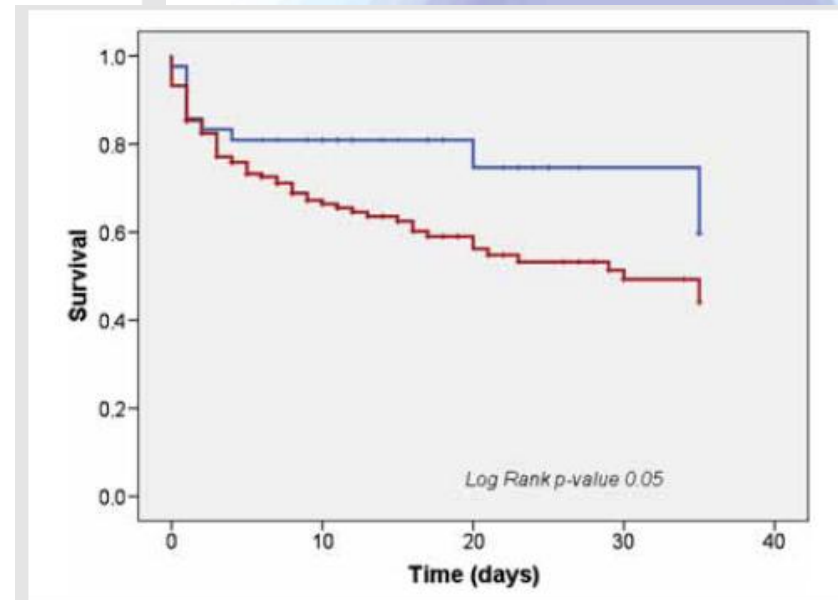
## Clinical picture and risk prediction of short-term mortality in cardiogenic shock

Veli-Pekka Harjola<sup>1\*</sup>, Johan Lassus<sup>2</sup>, Alessandro Sionis<sup>3</sup>, Lars Køber<sup>4</sup>, Tuukka Tarvasmäki<sup>5</sup>, Jindrich Spinar<sup>6</sup>, John Parissis<sup>7</sup>, Marek Banaszewski<sup>8</sup>, Jose Silva-Cardoso<sup>9</sup>, Valentina Carubelli<sup>10</sup>, Salvatore Di Somma<sup>11</sup>, Heli Tolppanen<sup>2</sup>, Uwe Zeymer<sup>12</sup>, Holger Thiele<sup>13</sup>, Markku S Nieminen<sup>2</sup>, and Alexandre Mebazaa<sup>14</sup>, for the CardShock study investigators and the GREAT network

**Table 4 The CardShock risk Score for risk prediction of in-hospital mortality in cardiogenic shock**

Variable	CardShock risk Score
Age >75 years	1
Confusion at presentation	1
Previous MI or CABG	1
ACS aetiology	1
LVEF <40%	1
Blood lactate	
<2 mmol/L	0
2–4 mmol/L	1
>4 mmol/L	2
eGFR <sub>CKD-EPI</sub>	
>60 mL/min/1.73 m <sup>2</sup>	0
30–60 mL/min/1.73 m <sup>2</sup>	1
<30 mL/min/1.73 m <sup>2</sup>	2
Maximum points	9

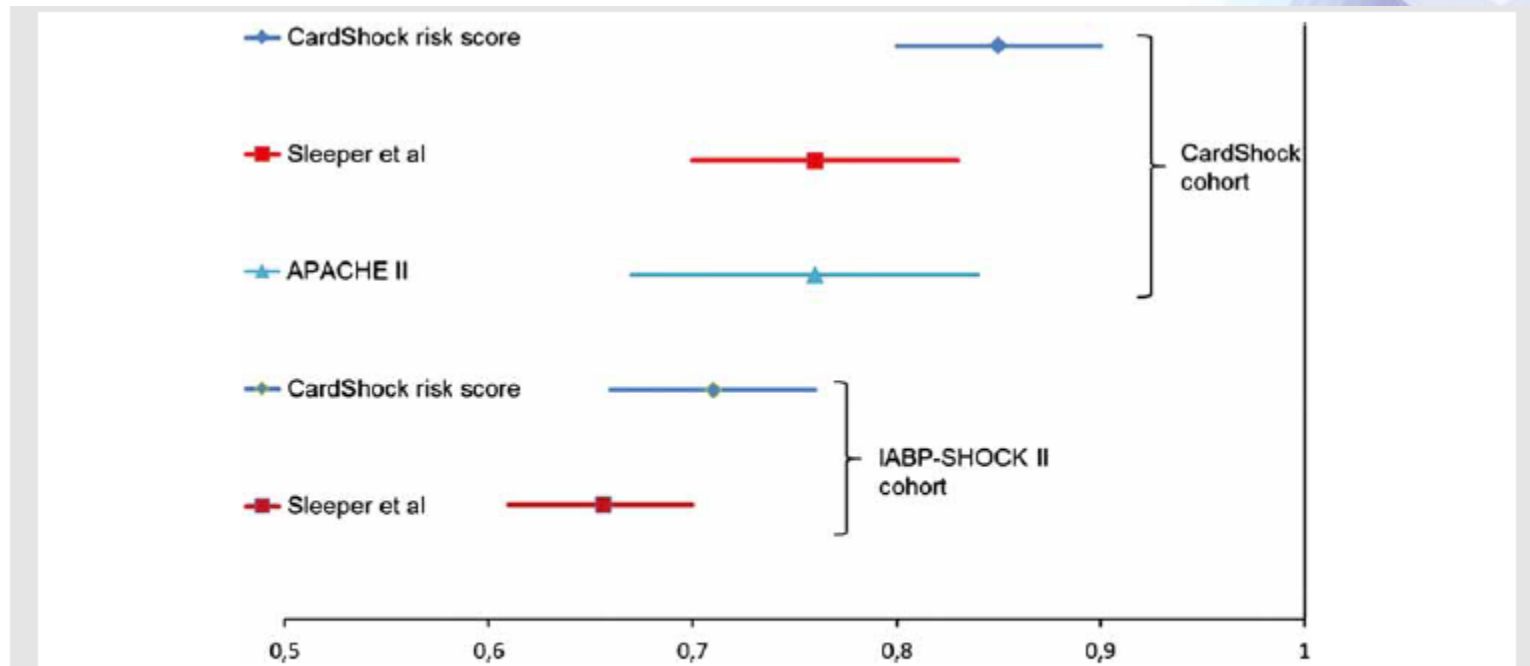
0-3 body - 9 %  
4-5 b. - 36 %  
6-9 b. - 77 %



**Figure 1** Kaplan–Meier in-hospital survival curves for cardiogenic shock patients with (red line) and without (blue line) acute coronary syndrome aetiology.

## Clinical picture and risk prediction of short-term mortality in cardiogenic shock

Veli-Pekka Harjola<sup>1\*</sup>†, Johan Lassus<sup>2†</sup>, Alessandro Sionis<sup>3</sup>, Lars Køber<sup>4</sup>, Tuukka Tarvasmäki<sup>5</sup>, Jindrich Spinar<sup>6</sup>, John Parissis<sup>7</sup>, Marek Banaszewski<sup>8</sup>, Jose Silva-Cardoso<sup>9</sup>, Valentina Carubelli<sup>10</sup>, Salvatore Di Somma<sup>11</sup>, Heli Tolppanen<sup>2</sup>, Uwe Zeymer<sup>12</sup>, Holger Thiele<sup>13</sup>, Markku S Nieminen<sup>2</sup>, and Alexandre Mebazaa<sup>14</sup>, for the CardShock study investigators and the GREAT network



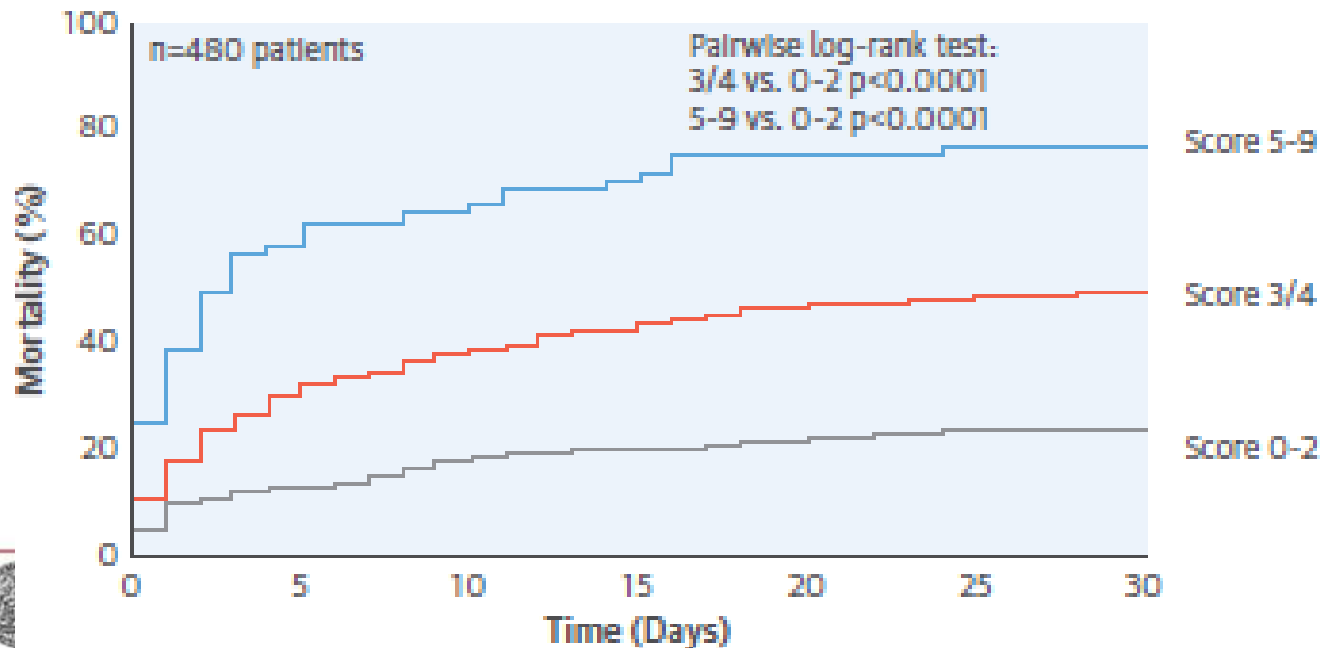
**Figure 2** C-statistics for prediction of in-hospital mortality of the CardShock risk Score. C-statistics (lines represent the 95% confidence interval) of the CardShock risk Score and the Sleeper score (SHOCK trial and registry<sup>13</sup>) in the CardShock (derivation) and IABP-SHOCK II (validation) cohorts. C-statistics for the APACHE II score (Knaus *et al.*<sup>14</sup>) in the CardShock cohort are shown for comparison.



# IABP-shock II risk score

Score	
Variable	Points
Age >73 years	1
History of stroke	2
Glucose >10.6 mmol/l (191 mg/dl)*	1
Creatinine >132.6 μmol/l (1.5 mg/dl)*	1
Arterial lactate >5 mmol/l*	2
TIMI flow grade <3 after PCI	2
Maximum	9

Risk categories	
Category	Points
Low	0-2
Intermediate	3/4
High	5-9



76,6 %

49,2 %

23,8 %

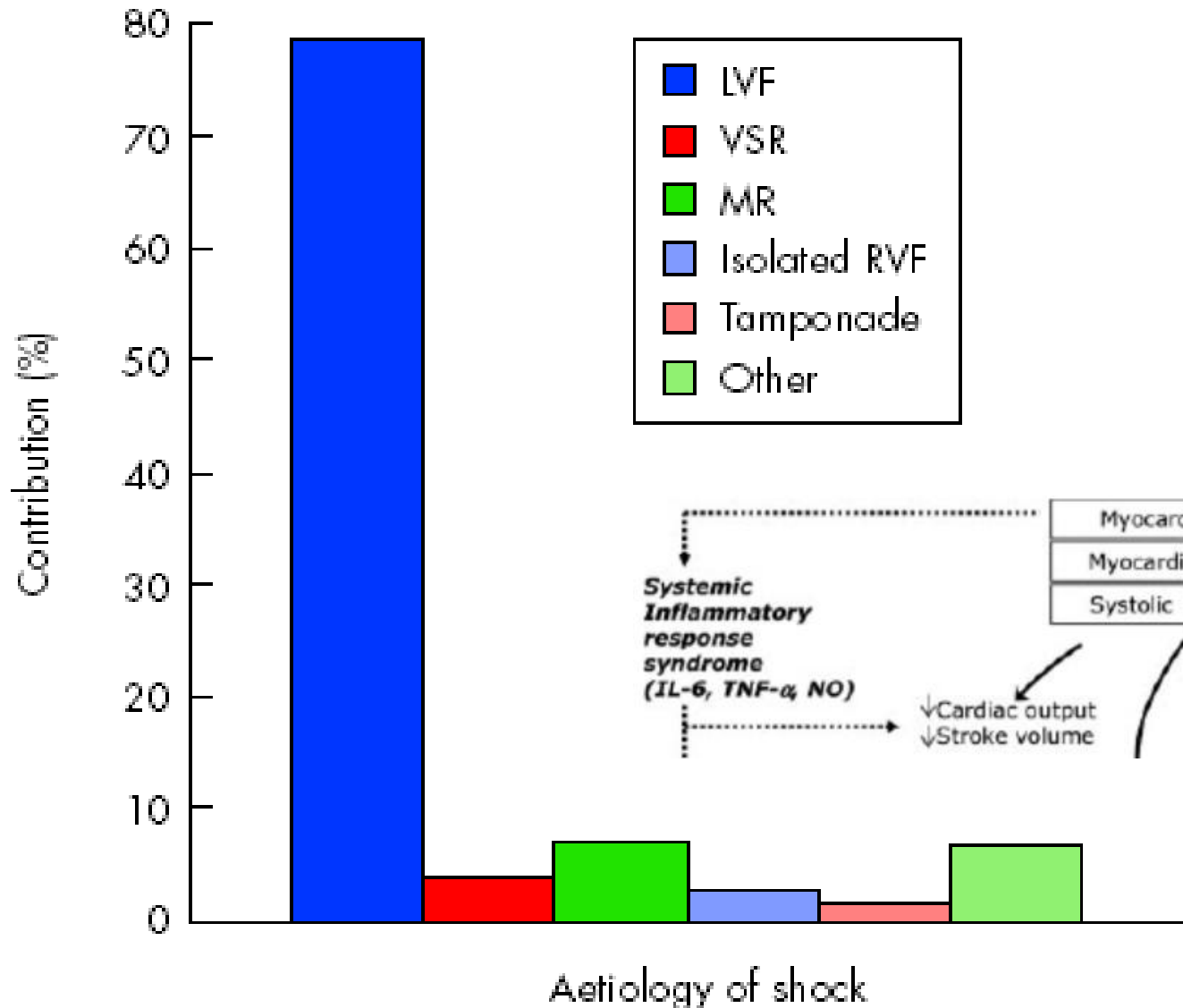
# KŠIM – stratifikace rizika – ZÁVĚRY

- 1) Mortalita kardiogenního šoku při AIM je stále vysoká
- 2) Správná a rychlá diagnóza
- 3) Časná stratifikace rizika je prospěšná a snadno proveditelná , pro další studie
- 4) Šok index,  
CardShock risk skóre  
IABP Shock II risk skóre

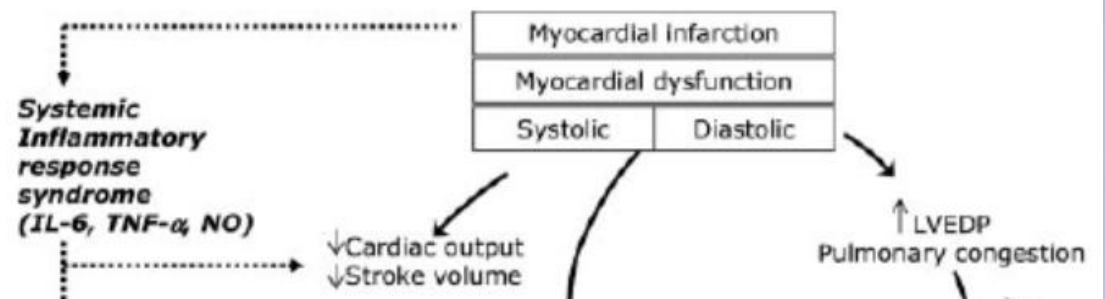




# AMI – etiology of cardiogenic shock *(Menon, Heart 2002)*



- LVF
- VSR
- MR
- Isolated RVF
- Tamponade
- Other



# Impact of access site choice on outcomes of patients with cardiogenic shock undergoing percutaneous coronary intervention: A systematic review and meta-analysis



Am Heart J 2015;170:353-361.e6.

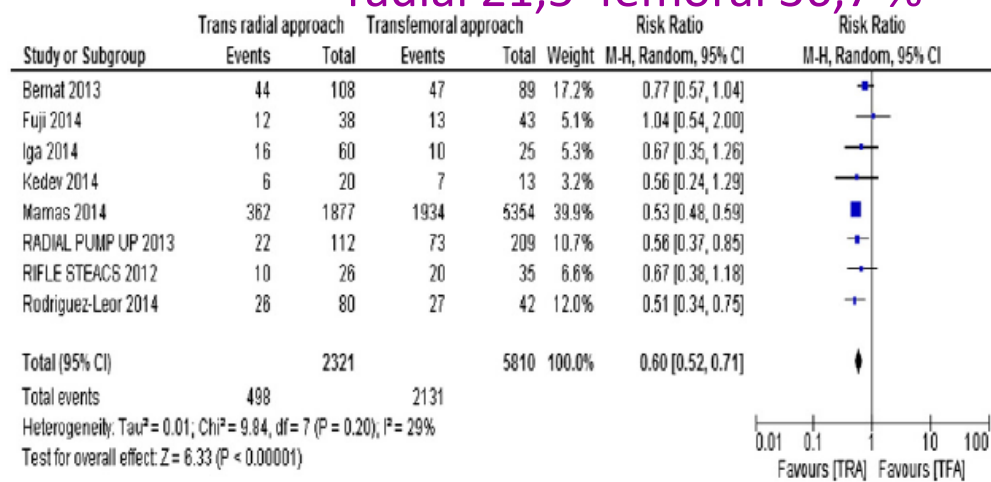
Samir B. Pancholy, MD, FACP, FACC, FSCAI,<sup>a</sup> Ghanshyam Palamaner Subash Shantha, MD,<sup>b</sup> Enrico Romagnoli, MD, PhD,<sup>c</sup> Sasko Kedev, MD, PhD,<sup>d</sup> Ivo Bernat, MD, PhD,<sup>e</sup> Sunil V. Rao, MD, FACC, FSCAI,<sup>f,j</sup> Sanjit Jolly, MD, FRCP (C),<sup>g</sup> Olivier F. Bertrand, MD, PhD, FSCAI,<sup>h</sup> and Tobias M. Bevilacqua, MD, DM, FESC, FACC, FSCAI,<sup>i</sup> Samir B. Pancholy, MD, FACP, FACC, FSCAI,<sup>a</sup>

**Table IV.** Baseline characteristics of study participants from included studies

First author	Year	No. of patients		Major bleeding (%)		Access site bleeding		30-d mortality (%)		30-d y MACCE (%)	
		TRA	TFA	TRA	TFA	TRA	TFA	TRA	TFA	TRA	TFA
Mamas	2014	1877	5354	1.5	3.5	0.05	1.1	24.7	39.8	30.5	44.9
Fuji	2014	38	43	2.6	7	0	2.3	32	30	NR	NR
Iga	2014	60	25	6.7	28	0.9	12	26.7	40	28.3	44
Rodriguez-Leor	2014	80	42	NR	NR	NR	NR	32.5	64.3	44	74
Bernat	2013	108	89	13	22	0.9	8	41	53	NR	NR
Kedev	2014	20	13	5	7	NR	NR	6	7	45	54
RIFLE-STEACS	2012	26	35	69	74	NR	NR	38	57	38	57
Radial Pump UP	2013	112	209	9.8	14.8	6.3	18.7	19.6	34.9	19.6	34.9

## Unadjusted 30 d mortality radial 21,5 femoral 36,7 %

**Figure 2**



Unadjusted 30-day mortality comparison between access sites. Forest plot comparing unadjusted 30-day mortality between TFA and TRA site choices in patients with CS.

