



VFN PRAHA

ŠOK TÝM

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Shock teams ?

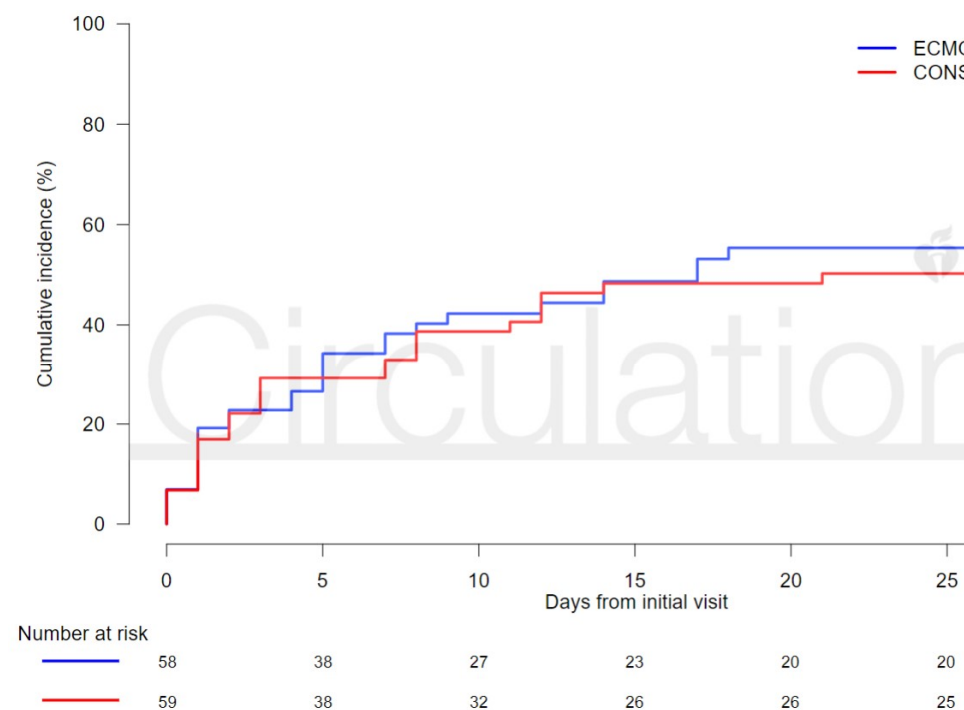
Základem péče vždy byla a bude týmová práce, tak proč shock teams?



Proč shock teams ?

mortalita pacientů s kardiogenním šokem
 zůstává velmi **vysoká (50%).**¹

velká variabilita v léčbě mezi lékaři a centry



Petr, et al. "Extracorporeal Membrane Oxygenation in the Therapy of Cardiogenic Shock: Results of the ECMO-CS Randomized Clinical Trial." *Circulation* (2022).

, A., et al. (2020). Temporary circulatory support for cardiogenic shock. *The Lancet*, 396(10245), 199-212.

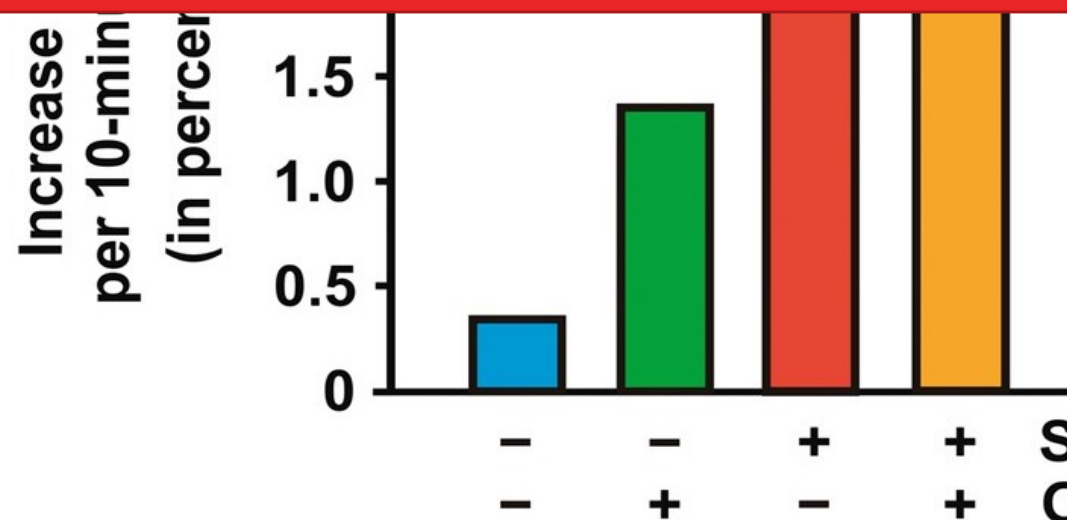
, et al. (2019). Management of cardiogenic shock complicating myocardial infarction: an update 2019. *European Heart Journal*, 40(32), 2671-2683.

Proč shock teams ?

Úspěchy pacientů s kardiogenním šokem závisí na rychlosti a časování léčby, prodlevy v diagnostice, transportu, indikaci léčby (PCI, MSP) tak mohou být jedním z klíčových problémů

NT méně než 5.

10min zpoždění = 3.31 úmrtí/100 léčených.





Situace které jste možná zažili...

Dnes máme pro tyto situace efektivní metody léčby, ale tyto metody musí být aplikovány včas.

Mnoho komplikací lze očekávat.

Připravený tým rozdíl i desítek minut.



Shock teams

- Multidisciplinární tým:
 - **kardio-intenzivista**
 - **intervenční kardiolog**
 - **specialista na srdeční selhání/MSP**
 - **kardiochirurg**
 - **zdravotní sestry, perfuzionista a další**

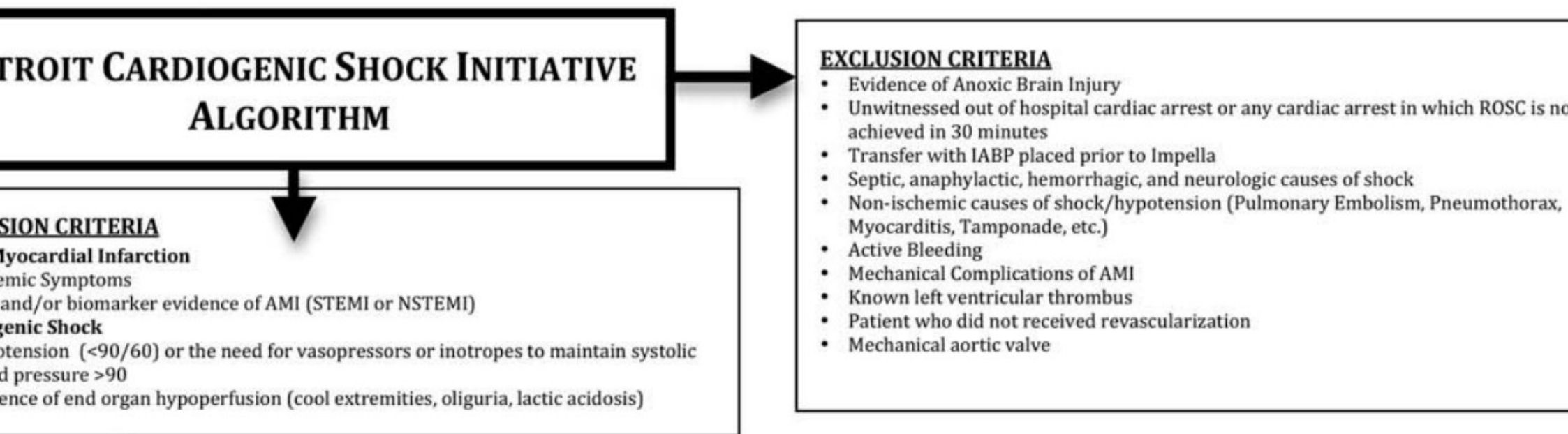


The Detroit Cardiogenic Shock Initiative and The National Cardiogenic Shock Initiative

Single-arm, prospective, observational, multicenter study

Early MCS (Impella) in AMICS treated with PCI

První fáze 4 centra (41 pacientů), druhá fáze 35 center (171 pacient)



B., Schreiber, T., Dixon, S., Alaswad, K., Patel, K., Almany, S., ... & O'Neill MD, W. W. (2018). Feasibility of early mechanical circulatory support in acute myocardial infarction complicated by cardiogenic shock: the Detroit cardiogenic shock initiative. Catheterization and Cardiovascular Interventions, 91(3), 454-461.

B., Kapur, N. K., Patel, K., Salam, M. A., Schreiber, T., Kaki, A., ... & National Cardiogenic Shock Initiative Investigators. (2019). Improved outcomes associated with treatment protocols: updates from the National Cardiogenic Shock Initiative. Catheterization and Cardiovascular Interventions, 93(7), 1173-1183.

↓

ACTIVATE CATH LAB

→

ACCESS & SUPPORT

- Obtain femoral arterial access (via direct visualization with use of ultrasound and fluoroscopy)
- Obtain venous access (Femoral or Internal Jugular)
- Obtain either Fick calculated cardiac index or LVEDP

IF LVEDP >15 or Cardiac Index < 2.2 AND anatomy suitable, place IMPELLA

QUALITY MEASURES **

Door to Support Time
≤ 90 minutes

Establish TIMI III Flow

Wash off Vasopressors &
Inotropes

Maintain CPO >0.6 W

Improve survival to
discharge to >80%

Coronary Angiography & PCI

- Attempt to provide TIMI III flow in all major epicardial vessels other than CTO
- If unable to obtain TIMI III flow, consider administration of intra-coronary vasodilators

Perform Post-PCI Hemodynamic Calculations

1. Cardiac Power Output (CPO): $\frac{\text{MAP} \times \text{CO}}{451}$

2. Pulmonary Artery Pulsatility Index (PAPI): $\frac{\text{sPAP} - \text{dPAP}}{\text{RA}}$

Wean OFF Vasopressors and Inotropes

If CPO is >0.6 and PAPI >0.9 , operators should wean vasopressors and inotropes and determine if Impella can be weaned and removed in the Cath Lab or left in place with transfer to ICU.

Escalation of Support

If CPO remains <0.6 operators should consider the following options:

- PAPI is <0.9 consider right sided hemodynamic support
- PAPI >0.9 consideration for additional hemodynamic support

Local practice patterns should dictate the next steps:

- Placement of more robust MCS device(s)
- Transfer to LVAD/Transplant center

If CPO is >0.6 and PAPI <0.9 consider providing right sided hemodynamic support if clinical suspicion for RV dysfunction/failure

Vascular Assessment

- Prior to discharge from the Cath Lab, a detailed vascular exam should be performed including femoral angiogram and Doppler assessment of the affected limb.
- If indicated, external bypass should be performed.

ICU Care

- Daily hemodynamic assessments should be performed, including detailed vascular assessment
- Monitor for signs of hemolysis and adjust Impella position as indicated

Device Weaning

Impella should only be considered for explantation once the following criteria are met:

- Weaning off from all inotropes and vasopressors
- CPO >0.6 , and PAPI >0.9

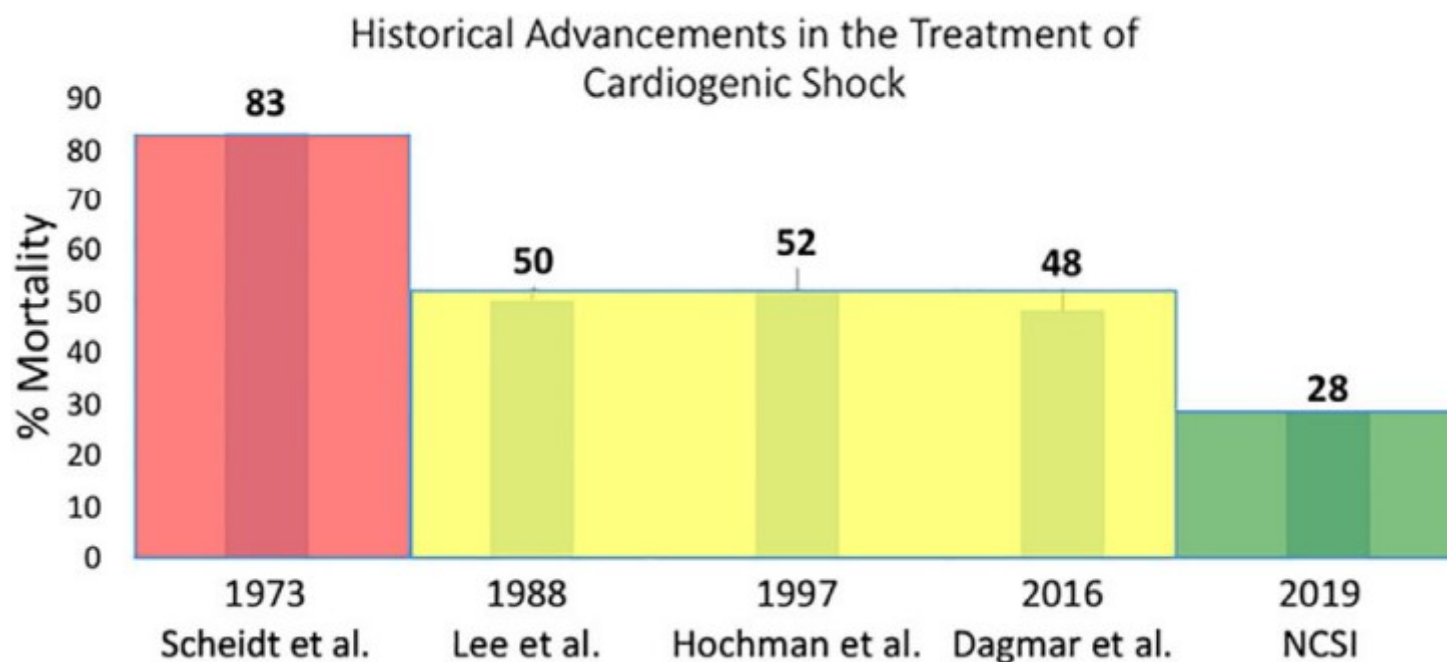
Bridge to Decision

Patients who do not regain myocardial recovery within 3-5 days, as clinically indicated, should be transferred to an LVAD/Transplant center. If patients are not candidates, palliative care options should be considered.

Výsledky

Survival to explant vs. historical controls (**85% vs 51%** $p < 0.001$)

Survival to discharge **76% a 72%**.



Celá řada limitací, single-arm, 118 pacientů z 289 excluded, selekční bias

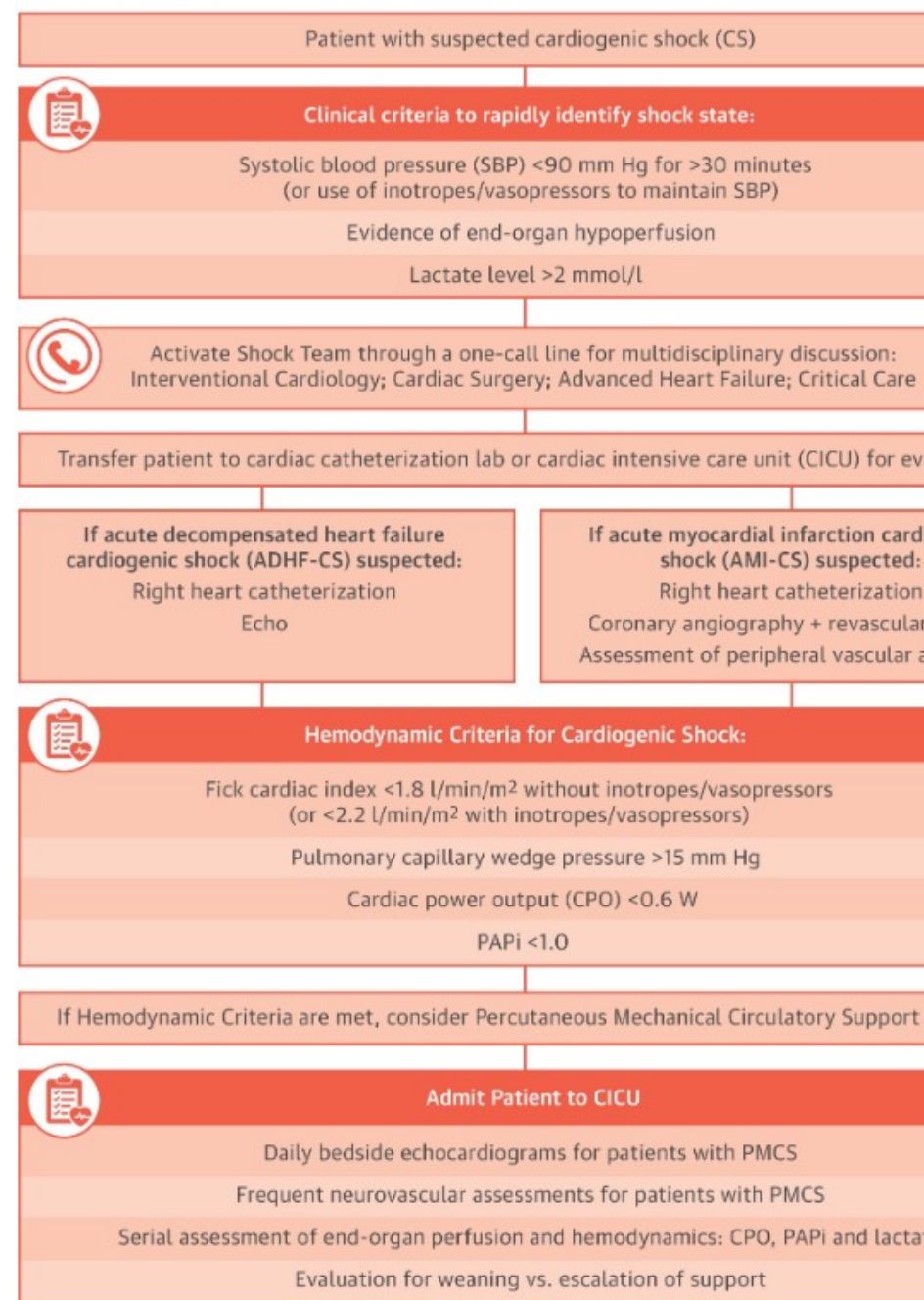


INOVA Heart and Vascular Institute Shock Team

Single center observational, retrospective
30-day survival in 2016 vs 2017 vs 2018 from
45.1% to **57.9% and 76.6%** ($p < 0.01$).

Tehrani, B. N., Truesdell, A. G., Sherwood, M. W., Desai, S., Tran, H. A., Epps, K. C., ... & C. M. (2019). Standardized team-based care for cardiogenic shock. *Journal of the American College of Cardiology*, 73(13), 1659-1669.

CENTRAL ILLUSTRATION: Cardiogenic Shock Algorithm



Tehrani. B.N. et al. *J Am Coll Cardiol*. 2019;73(13):1659-69.



Utah Cardiac Recovery Shock Team

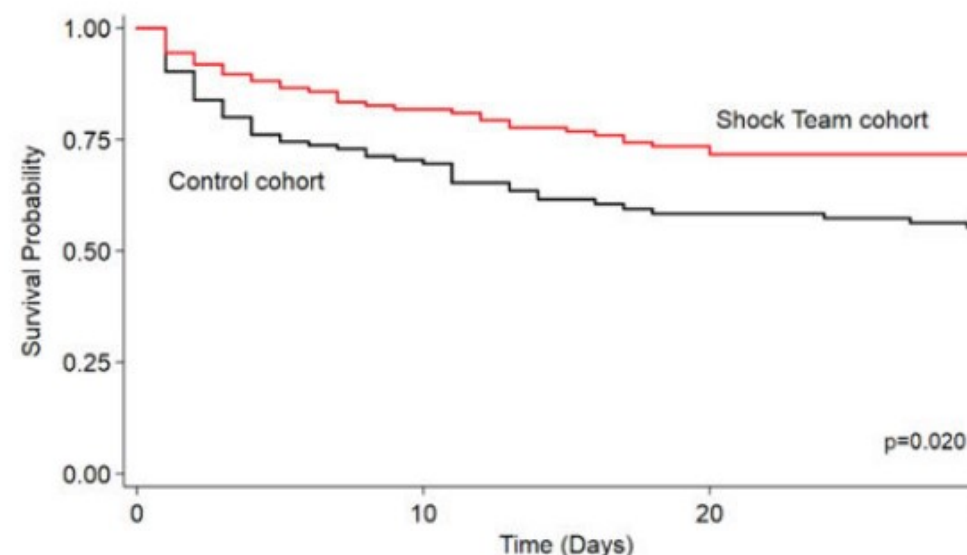
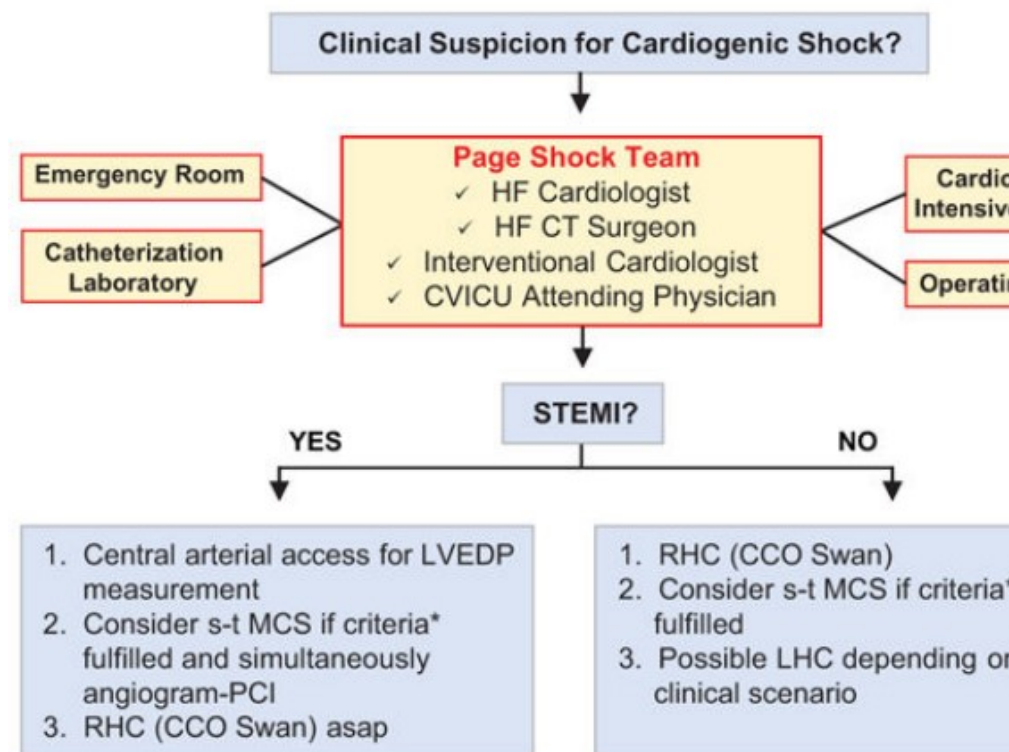
Single center observational study

23 MCS rCS vs 121 MCS rCS historických kontrol

In-hospital survival (**61.0% vs 47.9%**; $P=0.041$)

30-day mortality HR: 0.61 [95% CI, 0.41–0.93]

I., Koliopoulou, A. G., Tandar, A., McKellar, S. H., Tonna, J. E., Nativu, J., ... & Drakos, S. G. (2019). Shock team approach in refractory cardiogenic shock requiring short-term mechanical circulatory support: a proof of concept. *Circulation*, 140(1), 98-100.





University of Ottawa Heart Institute

Single center, observational, retrospective

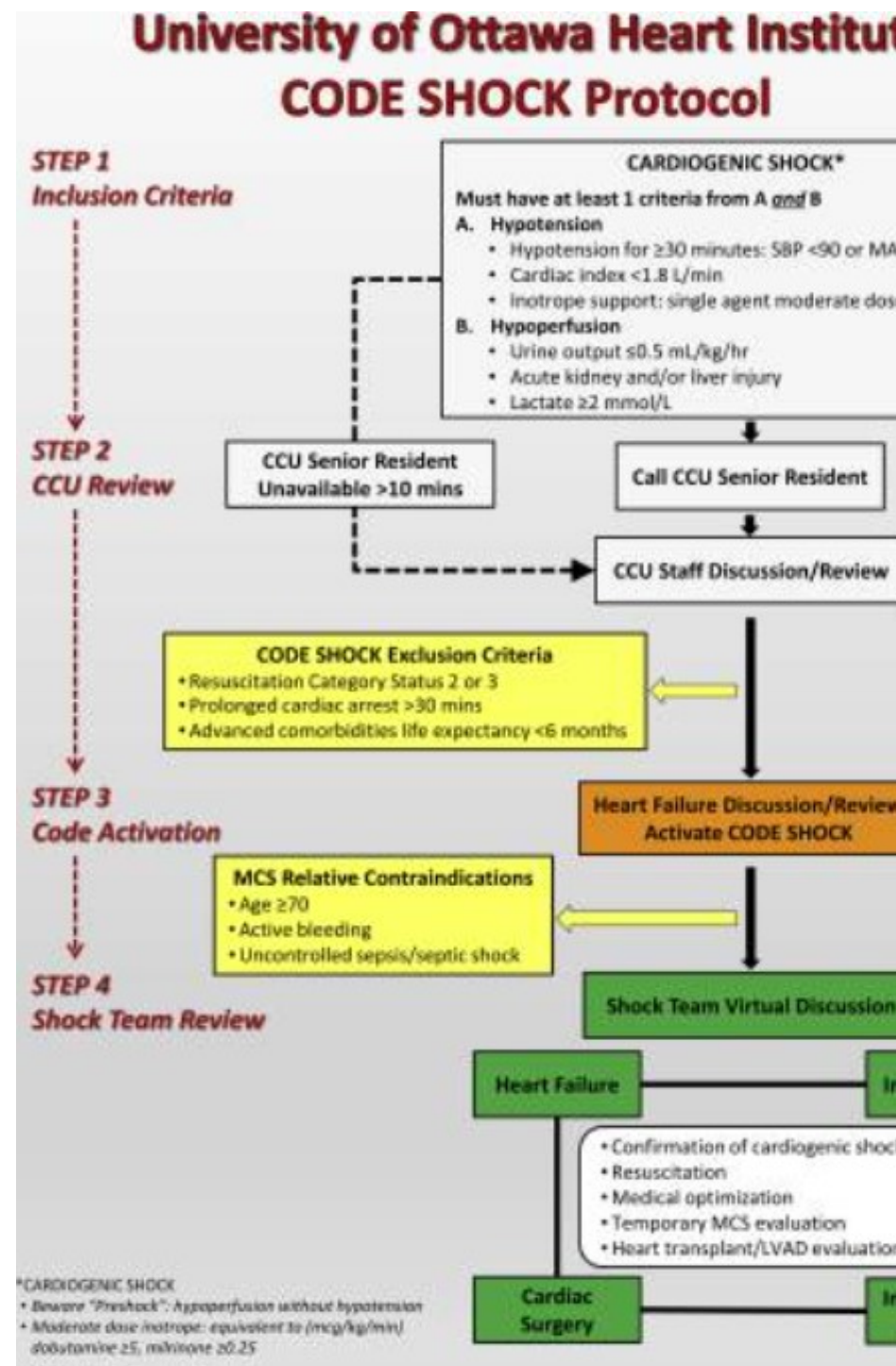
100 pts (64 shock code vs. 36 controls)

Higher use of MCS **45% vs. 28%**

No effect on 30d survival or in-hospital survival

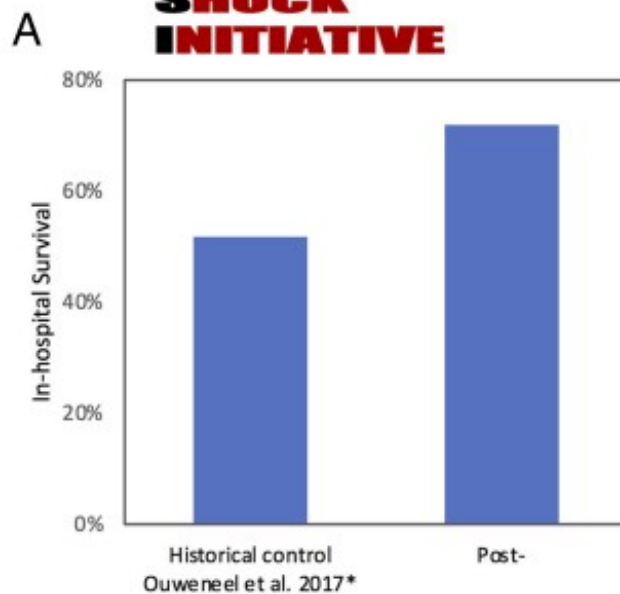
30 days follow-up, survival **67% vs 42%**

Paterson JH, Boodhwani M, McDonald B, So D, de Roock S, Rubens F, et al. Multidisciplinary code shock team for cardiogenic shock: a Canadian-center experience. CJC Open 2020: 249–

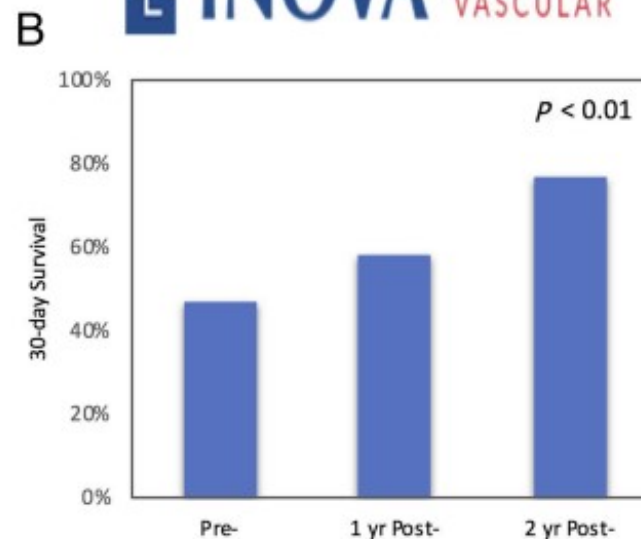




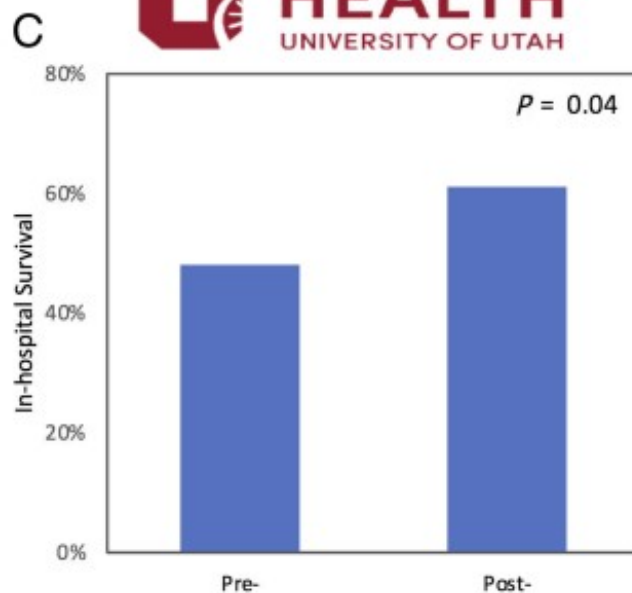
NATIONAL CARDIOGENIC SHOCK INITIATIVE



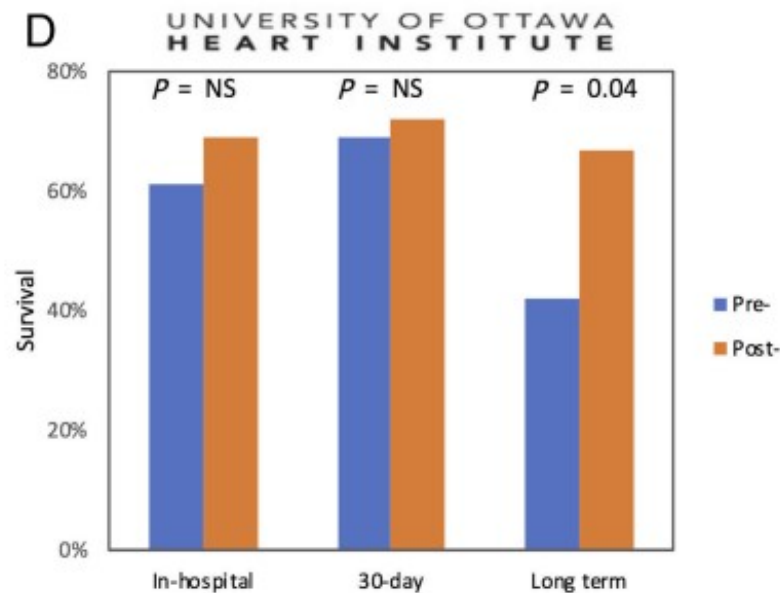
INOVA[®] HEART & VASCULAR



HEALTH UNIVERSITY OF UTAH



UNIVERSITY OF OTTAWA HEART INSTITUTE

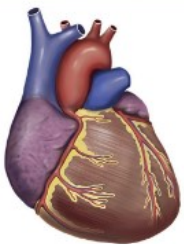




Critical Care Cardiology Trials Network

CENTRAL ILLUSTRATION
Key Outcomes

Cardiogenic Shock Suspected



Shock Team vs No Shock Team

Center Population Characteristics

Cardiogenic shock admissions (n)

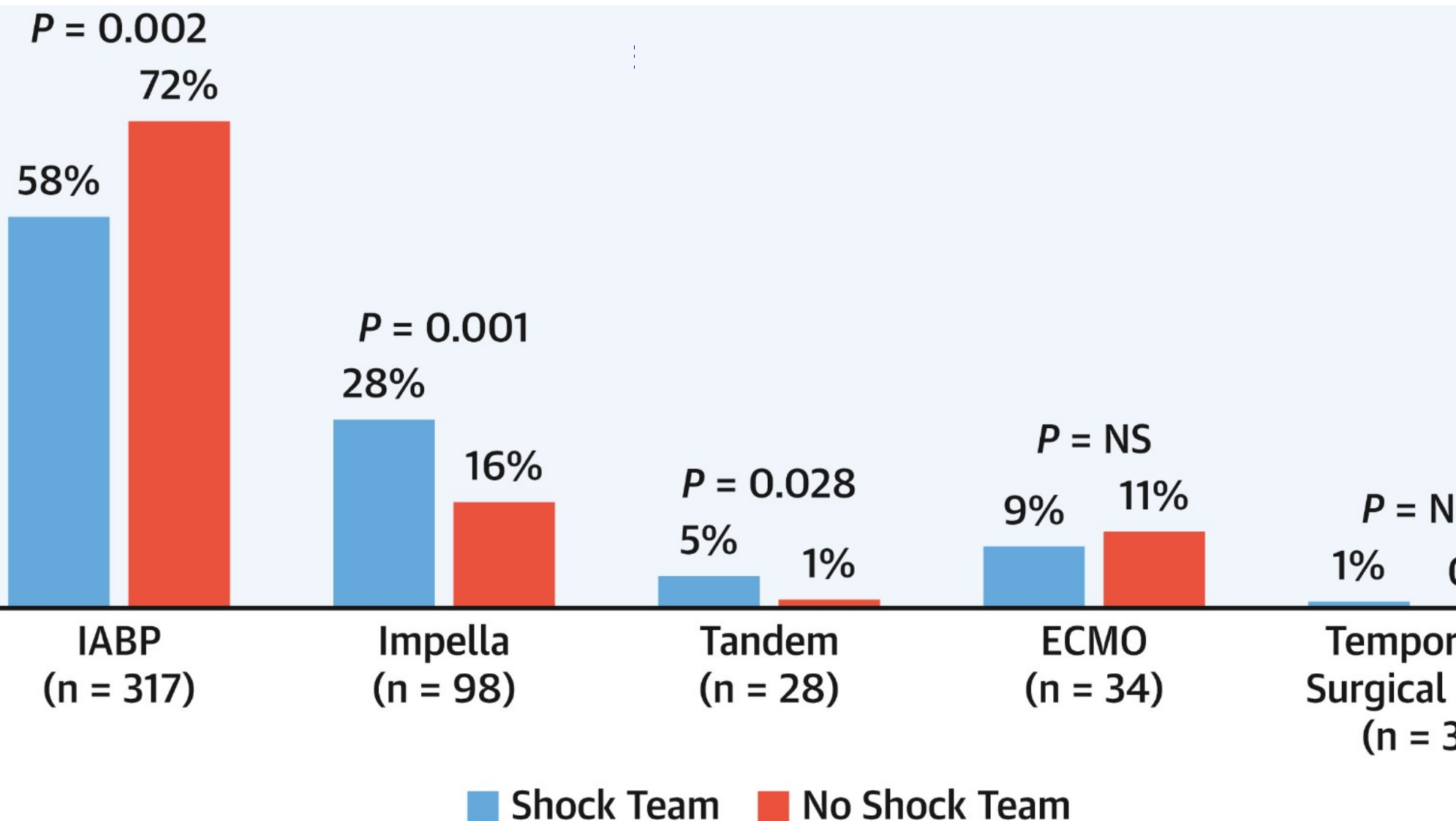
MI-CS (%)

Admission lactate (mmol/L)

MAP (mm Hg)

CO (L/min/m²)

DO₂ (W)



University Hospital of Bordeaux

Multidisciplinary cardiogenic shock team approach improves the long-term outcomes of patients suffering from refractory cardiogenic shock treated with short-term mechanical circulatory support

Population



Median age : 54 years



Acute coronary syndrome	58%
ADHF	20%
Intoxication	11%
Acute myocarditis	5%

Study Design

Refractory cardiogenic shock + **STMCS implanted**

2007-2013

2013-2019

Historical cohort

Multidisciplinary 24h Team



Anaesthetist Cardiologist Surgeon

Primary outcome

1-year survival

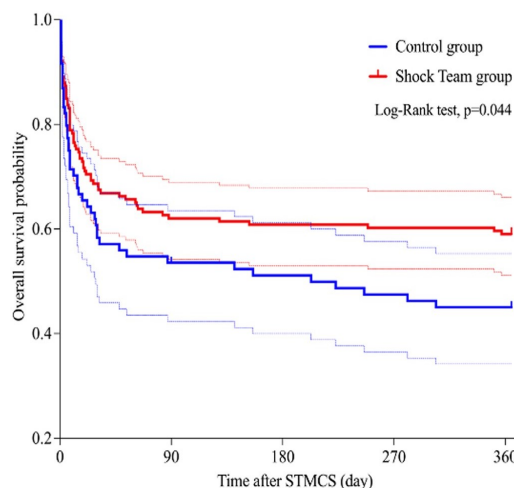
Results

Kaplan Meier

OR 0.55
(95 CI 0.32-0.94)

Cox regression

HR 0.59
(95 CI 0.39-0.88)

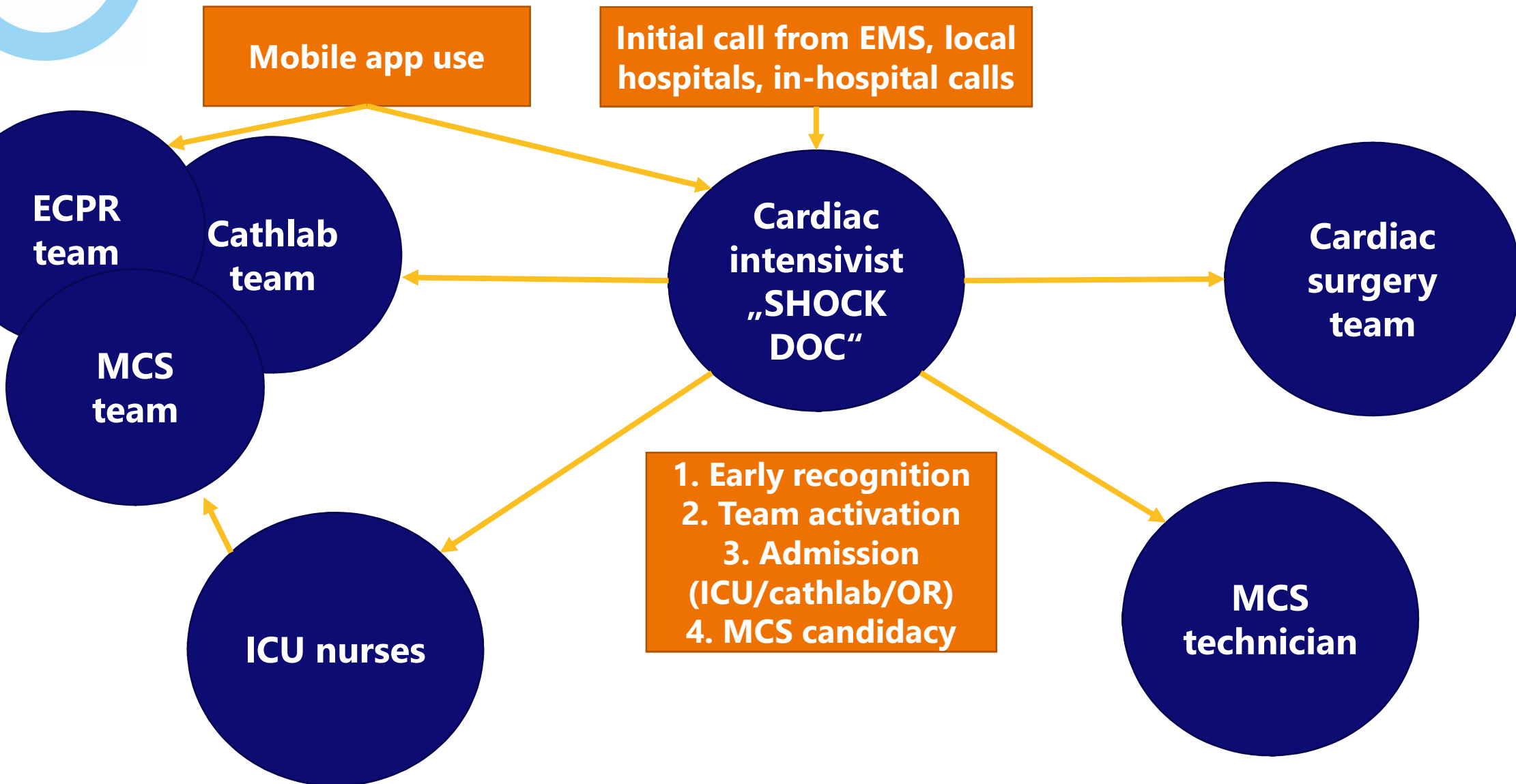


Conclusion

Team-based decision-making for STMCS implantation in refractory cardiogenic shock is associated with better 1-year survival rates.



24/7 Shock, ECPR, MCS team ve VFN





Potenciální výhody a nevýhody shock teams

Výhody

né komunikační schéma

chlejší aktivace týmu

ná identifikace rolí a zodpovědností

ížení rizika individuální chyby

ýšení expertízy – úzký okruh

právní indikace (PCI a MSP)

právní časování (PCI a MSP)

obilní shock team - specifika

Nevýhody

Personální náročnost 24/7

Riziko zpoždění léčby v případě špatně/složitě nastavené komunikace

Neshody v týmu, komunikační bariéra

Přílišné svázání protokolem, omezení individualizace léčby

Overtreatment

Navýšení byrokracie



Závěr

Léčba KŠ je vysoce komplexní a je vždy týmovou prací

Ustanovení multidisciplinárního týmu + jasného stručného protokolu
cílem rychlé identifikace, komunikace a rozhodnutí má velmi silné ratio

Potenciální výhody převažují nad nevýhodami

Observační studie ukazují zlepšení přežití při zavedení shock teams

Evidence je slabá a studie mají mnoho limitací