Beyond one size fits all in MSP and cardiogenic shock

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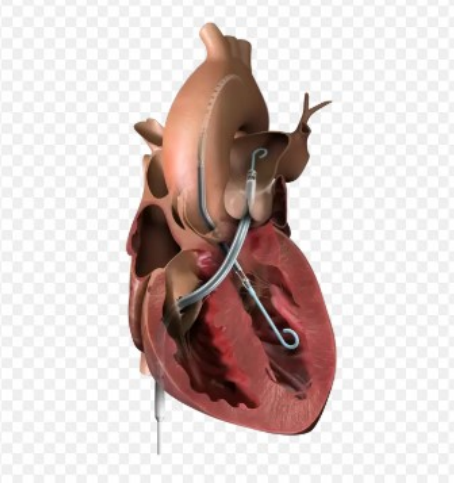
Klíčové RCTs u kardiogenního šoku na MSP

- ECMO CS = **rutinní** časná implantace ECMO u selektované populace CS versus časně konzervativní péče s možností pozdější implantace ECMO
- ECLS-SHOCK = **rutinní** časné ECMO u AMICS versus konzervativní péče umožňující použití jiné MSP
- DANGER SHOCK = **rutinní** časná Impella u STEMI-CS versus konzervativní péče umožňující použití jiné MSP

„one-size-fits-all approach“



Často kladená otázka

Měli bychom opustit použití VA ECMO u KŠ a začít více používat Impellu CP ?

Hlavní limitace ECLS shock

ECLS-SHOCK (n=417) Limitations

1. CS definition.
2. Predominance (**78%**) of patients v
about **misdiagnosis** of shock and th
death which could not be influenced
3. Use of MCS in standard arm - **28%**
interventions (12.5% crossover rate
Impella devices).
4. Involvement of a large number of
only 4.7 patients per center/year).
5. Short median duration of ECMO therapy (2.7 days).

- Systolic blood pressure <90 mmHg >30 min or catecholamines required to maintain pressure >9 mmHg during systole
- Signs of impaired organ perfusion with at least **one** of the following criteria
  - (1) Altered mental status
  - (2) Cold, clammy skin and extremities
  - (3) Oliguria with urine output <30 ml/h
- Arterial lactate >3 mmol/l

& Belohlavek, J. (2024). Current Opinion in Critical Care, 10-1097. Thiele, H., Freund, A., Giménez, M. R., et al. American heart journal, 2

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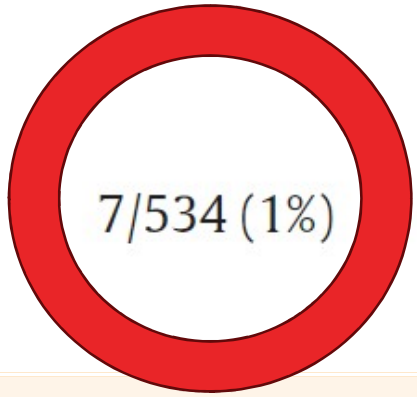
	Overall (n=697)	No prehospital ROSC (n=163)	Prehospital ROSC (n=534)	P valu
Hospitalization treatment				
ECLS	119/697 (17%)	112/163 (69%)	7/534 (1%)	**<0.0**



4. Involvement of a large number of centers (44) and with low recruitment rate (average
only 4.7 patients per center/year).

5. Short median duration of ECMO therapy (2.7 days).

D., & Belohlavek, J. (2024). Current Opinion in Critical Care, 10-1097. Rob, D., et al. (2022). Resuscitation, 175, 133-141.

Hlavní limitace ECLS shock

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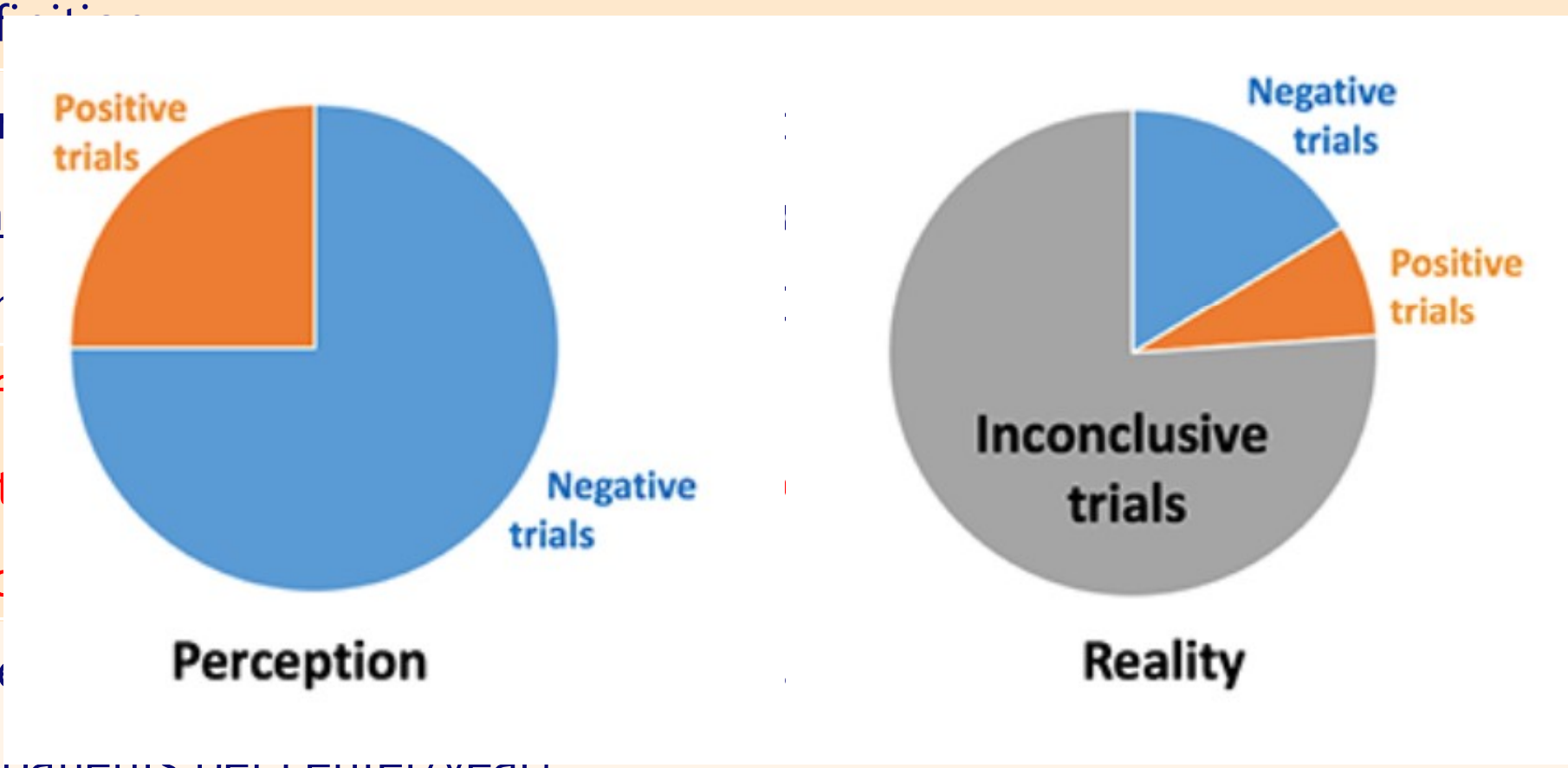

ob, D., & Belohlavek, J. (2024). Current Opinion in Critical Care, 10-1097.

https://emcrit.org/pulmcrit/relative-power/

Hlavní limitace ECLS shock

CLS-SHOCK (n=417) Limitations

. CS definition.

. Predominance (**78%**) of patients with cardiac arrest and stable ROSC raising concerns

bout **misdiagnosis** of shock and the **neurological impairment** as the leading cause of

ients receiving ECMO at hospitals with more than 30 adult annual ECMO cases had significantly lowe
ls of mortality (adjusted odds ratio, 0.61; 95% confidence interval, 0.46–0.80) compared with adults
eiving ECMO at hospitals with less than six annual cases.

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, D., & Belohlavek, J. (2024). Current Opinion in Critical Care, 10-1097.

Barbaro, Ryan P., et al. *American journal of respiratory and critic care medicine* 191.8 (2015): 894-901.

Hlavní limitace DanGer shock

ANGER-shock (n=355)

- Fragile study results, low **fragility index of 4, non-significant 180-day mortality resu**
  r the as-treated population, no signs of benefit in several predefined subgroups.
- Significant unexplained variability in mortality was observed between centers in Denma
  nd Germany.
- Randomization process spanned over **10 years** and slow recruitment, potentially
  troducing temporal variations in clinical practices.
- The use of MCS (including VA ECMO, Impella CP and Impella 5.5 **>20%** patients), in the
  ntrol arm may have confounded results.

Rob, D., & Belohlavek, J. (2024). Current Opinion in Critical Care, 10-1097.

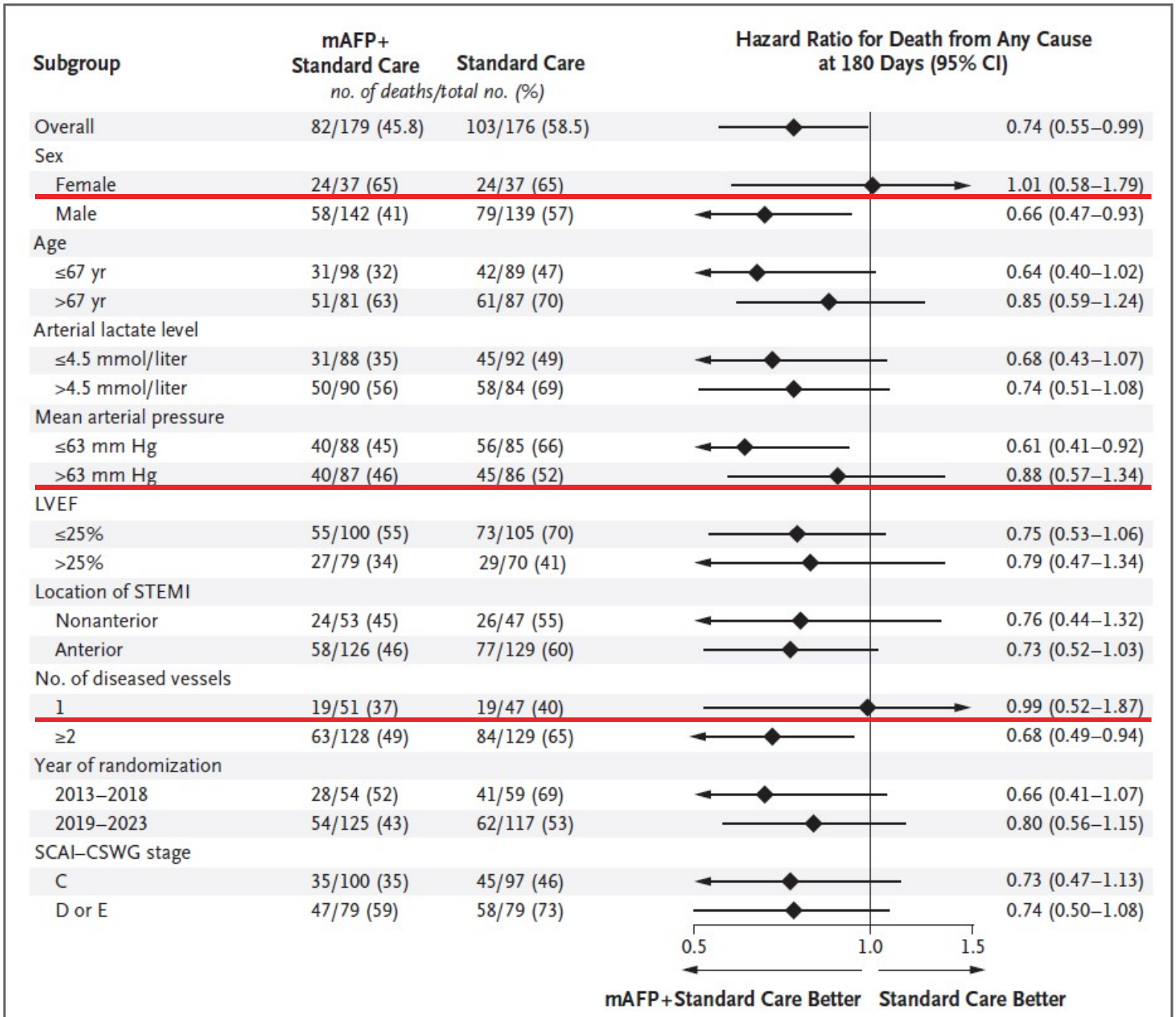

Figure 2. Subgroup Analysis of the Primary End Point.

Proč jsou studie u šoku tak obtížné?

- Kardiogenní šok je **heterogenní** a **dynamický** syndrom, a proto potřebuje vysoce **individualizovanou** léčbu !
- **Žádná RCT** nedokáže tento fakt postihnout.
- Rutinní použití jakékoli intervence u KŠ nedává smysl.

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Často kladená otázka

Měli bychom opustit použití VA ECMO u KŠ a začít více používat Impellu CP ?

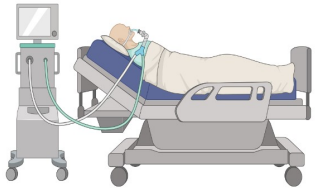
Ne a proč ?

1) RCT mají celou řadu důležitých limitací + aplikovatelnost výsledků do klinické praxe je omezená
2) Každá MSP má svoje výhody i nevýhody, různé kombinace, eskalace a de-eskalace
3) MSP v některých situacích slouží jako záchranná léčba „last treatment option“ a nemají tak náhradu (použití i v kontrolní větv

Správná otázka není ANO/NE, ale
KOMU, KDY, a JAKOU PODPORU ?

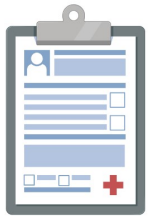
The patient-tailored management of MCS use in CS

1.

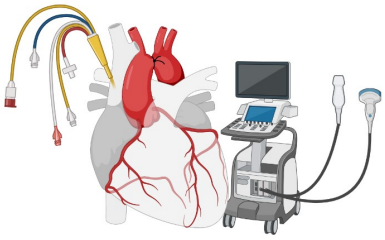


Patient characteristics

Age, comorbidities, performance status



LV, RV, valves function CO, coronary arteries

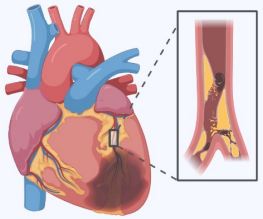


Clinical trajectory, recovery chances

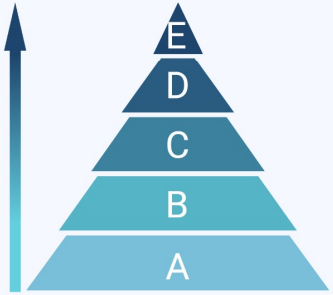
2.

Cardiogenic shock characteristics

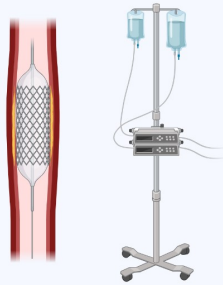
Etiology



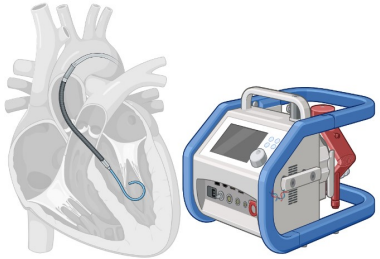
Shock severity, CO, CI



Response to therapies

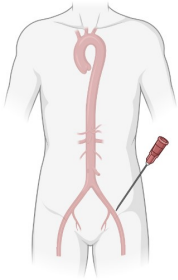


3.

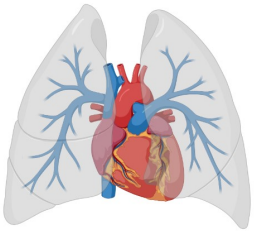


Device selection and timing

Vascular access site



Effect on LV, RV, valves, circulation, lungs



Operator experience, shock teams

Rob, D., & Belohlavek, J. (2024). Current Opinion in Critical Care, 10-1097.

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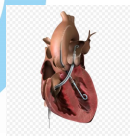
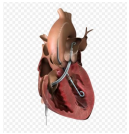
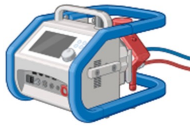


Impella CP

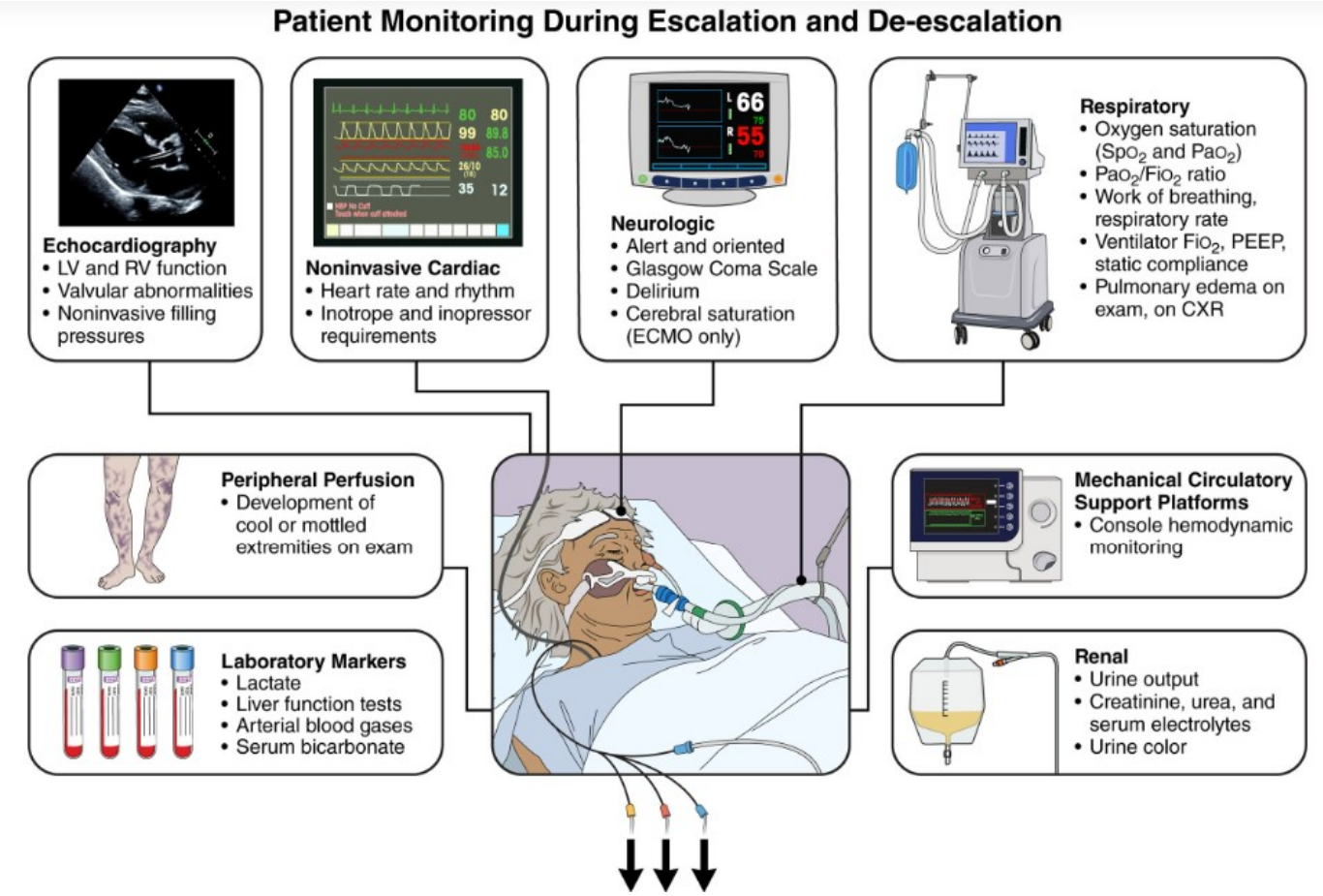




ECMO

PROS	CONS	PROS	CONS
active unloading ducing the work	**Limited LV support (maximum of 3.8 litres)**	**Powerful circulatory support (over 5 litres)**	**Absence of unloadi**
ne positive RCT in AMICS	**Absence of RV support**	**Right ventricular support**	**Higher bleeding an vascular risk**
naller sheath/cannula e	Absence of respiratory support	**Respiratory support**	Neutral or negative l
carbonate infusion for shing (heparine free)	Absence of distal perfusion cannula	Fast bedside deployment	Larger cannula size
rtic pressure easurement, CO/CPO mart-assist platform)	Risk of hemolysis and kidney injury	Variability of access sites (femoral, jugular for vein, femoral, axillary for arterial)	ECMO associated coagulopathy and thrombocytopenia
	Fluoroscopy (x-ray) needed for deployment		
	Risk of LV perforation		
	Contraindicated use in mechanical aortic valve and LV thrombus, caution in small ventricles and LVH		

Escalation and deescalation of MCS



Geller, Bram J., et al.
Circulation 146.6 (2022): e5

1. Impella CP first → ECMO for circulatory/RV/respirtory support
2. ECMO first → Impella unloading
3. Impella CP/ECMO → Impella 5.5
4. Impella/ECMO/Impella 5.5 → LVAD/Tx program

Závěr

- **Rutinní použití MSP** u KŠ není správným postupem (absence benefitu u části pacientů, riziko komplikací).
- „STATE OF THE ART" je u **dobře vybraných** pacientů s dominujícím selháním levé komory **časná** implantace Impella CP a eventuální eskalace o ECMO u refrakterního šoku v **high-volume** centrech.
- **Potřebujeme nové studie** s jiným designem a velké prospektivní registry, abychom mohli vytvořit léčebné algoritmy jejichž cílem bude **„the right device to the right patient at the right time" a studie zaměřující se na redukci komplikací.**

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REVIEW

CURRENT OPINION

Beyond one-size-fits-all in cardiogenic shock: impella, extracorporeal membrane oxygenation or tailored use of mechanical circulatory support?

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Rob, D., & Belohlavek, J. (2024). Beyond one-size-fits-all in cardiogenic shock: impella, extracorporeal membrane oxygenation or tailored use of mechanical circulatory support?. Current Opinion in Critical Care, 10-1097.