

# PLACE

PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

**ROMA**

Centro Congressi  
di Confindustria

**Auditorium  
della Tecnica**

**9<sup>a</sup> Edizione**

**30 Settembre**

**1 Ottobre**

**2022**

## SHOCK CARDIOGENO

# Sala di emodinamica: terapie percutanee

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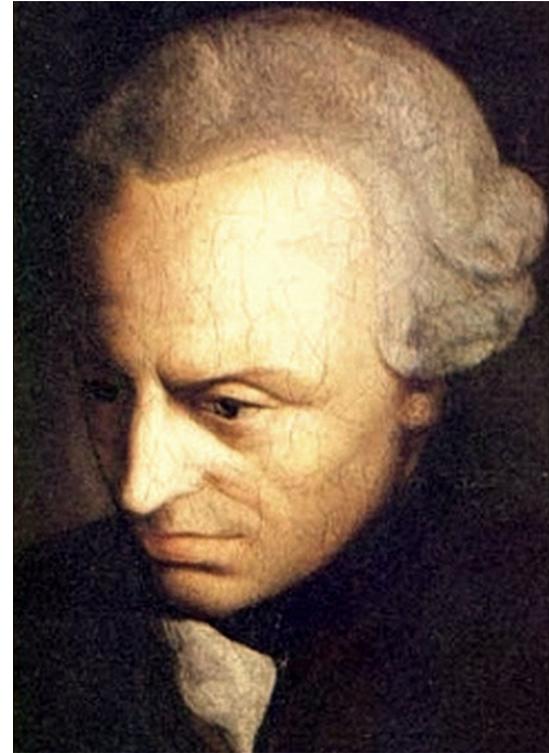




# Disclosure

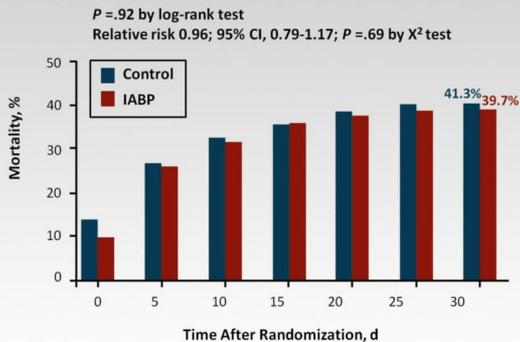
A priori in filosofia è un concetto che si riferisce a **tutto ciò che si può conoscere indipendentemente dall'esperienza** ed è quindi opposto a a posteriori, che indica una conoscenza fondata su dati sensibili desunti dall'esperienza

**Nel caso dei sistemi di supporto meccanico la conoscenza priori è risultata fallace**





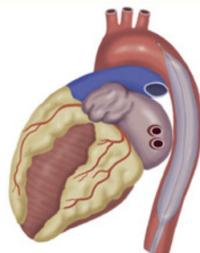
## IABP-SHOCK II: 30-day Mortality



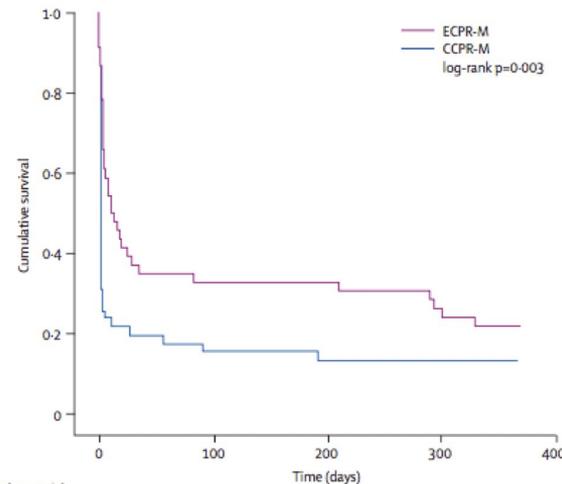
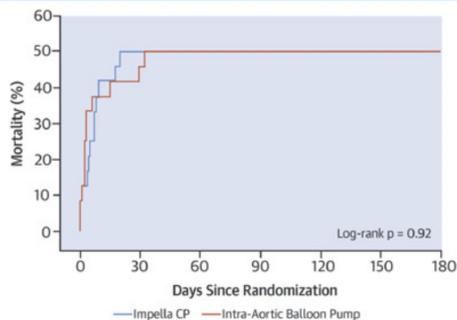
A. Impella CP



B. Intra-Aortic Balloon Pump

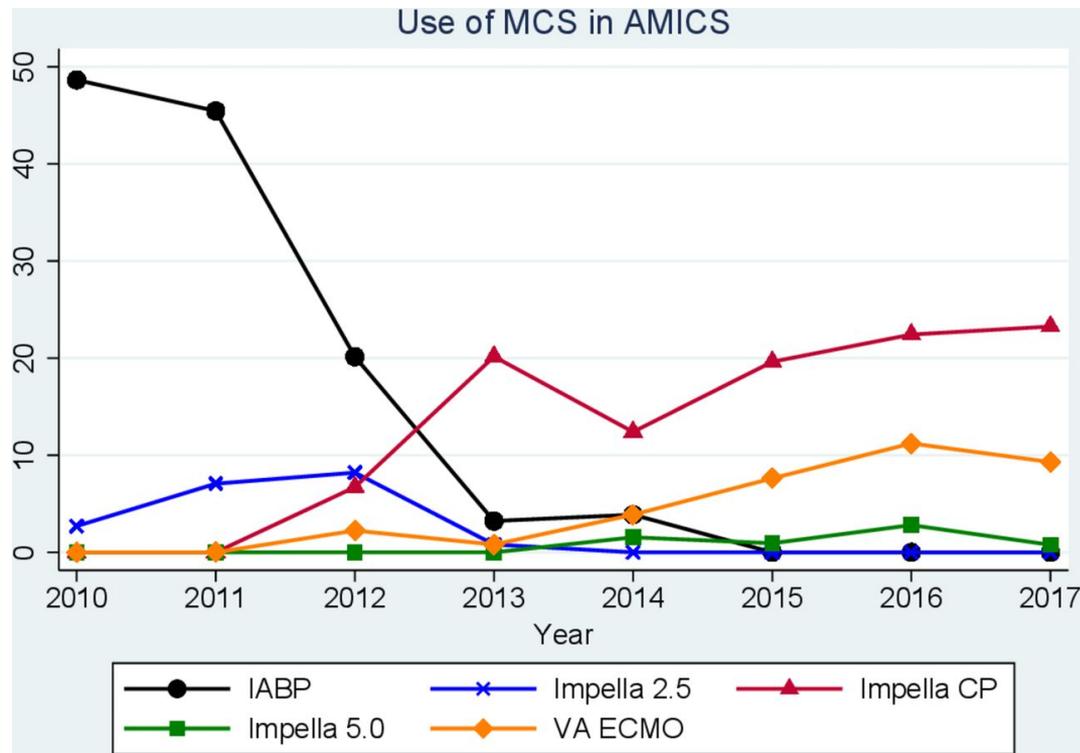


C. All-cause Mortality,  $\leq 6$  Months

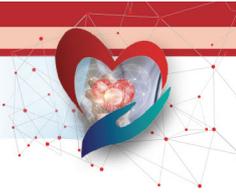


	0	100	200	300
Number at risk	46	15	15	7
Extracorporeal CPR-M	46	7	6	3
Conventional CPR-M	46	7	6	3

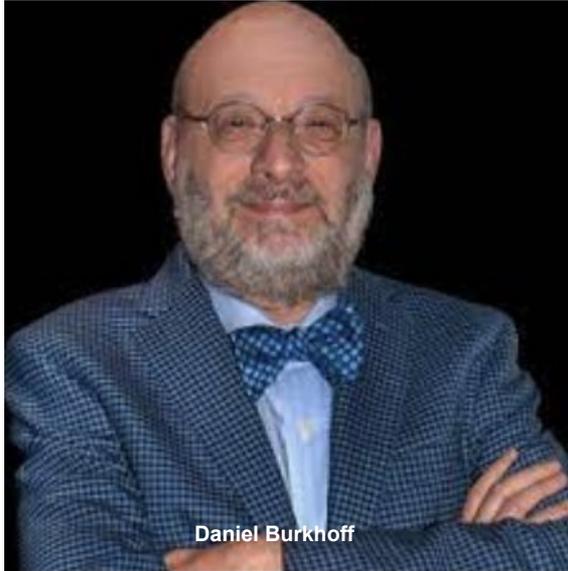
Theiele H, et al. N Eng J Med 2012;367:1287-1297  
 Ouweeneel D.M. al. J Am Coll Cardiol 2017;69(3)278-87  
 Chen YS, et al. Lancet 2008; 372: 554-61.



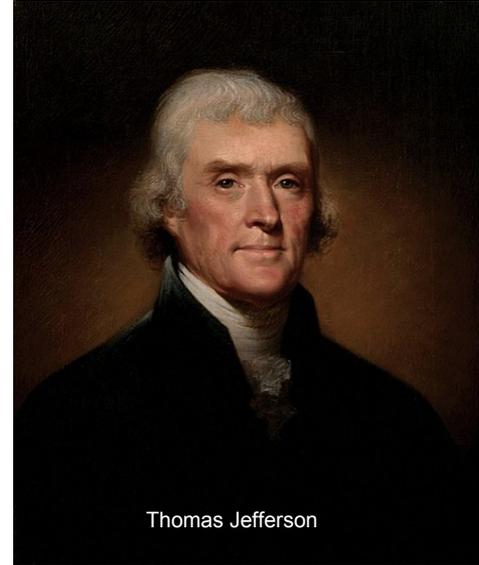
Helgestad OKL, et al. Contemporary trends in use of mechanical circulatory support in patients with acute MI and cardiogenic shock. *Open Heart* 2020;7:e001214



**All men are created equal**



Daniel Burkhoff



Thomas Jefferson

**Not all shocks are Created Equal**



# Identification and Stratification

**Cardiometabolic shock**



**Cardiogenic shock**





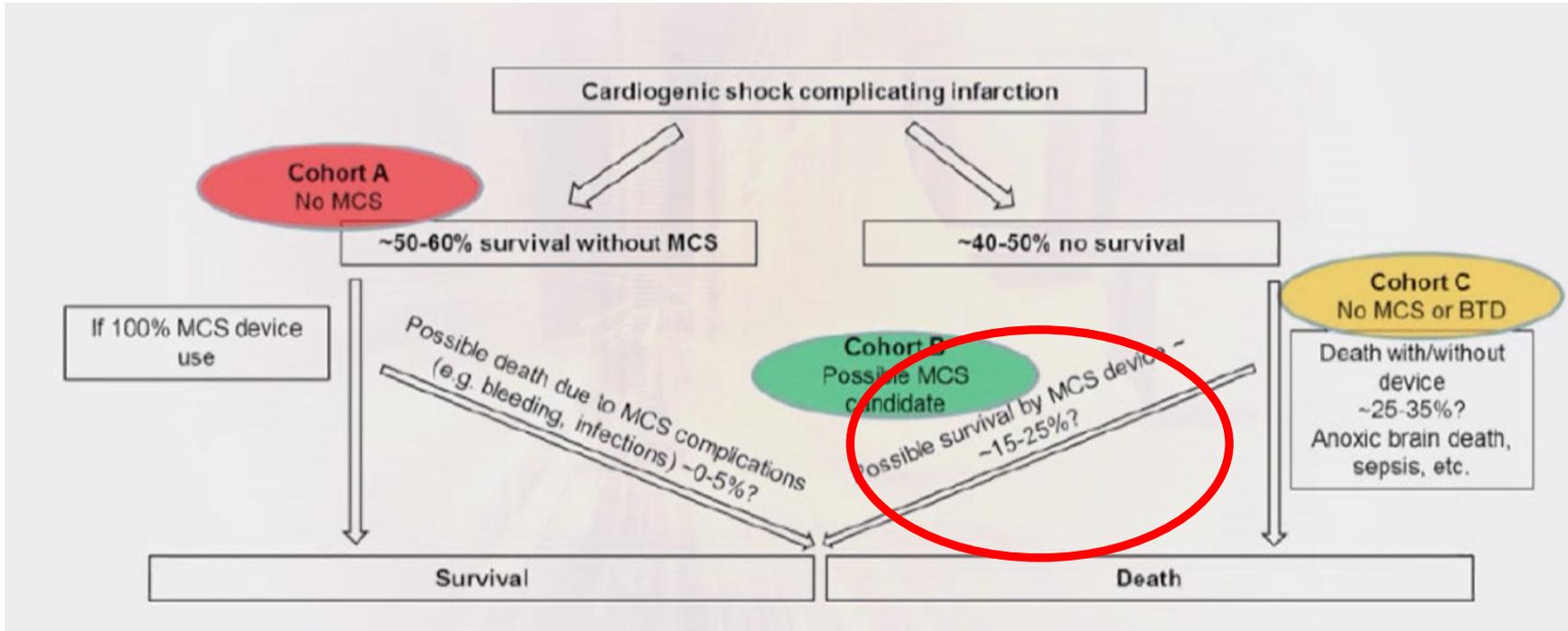
# Phenotypization

Hemodynamic Variables	Preshock Normotensive Hypoperfusion <sup>25,26</sup>	Preshock Hypotensive Normoperfusion <sup>26</sup>	LV Dominant Shock <sup>1</sup>	RV Dominant Shock <sup>23,24</sup>	BiV Shock <sup>24</sup>
Systolic arterial pressure, mm Hg	>90	<90	<90	<90	<90
CVP, mm Hg	Variable	Variable	<14	>14	>14
PCWP, mm Hg	Variable	Variable	>18	<18	Variable
CVP/PCWP	Depends on degree of LV and RV involvement	Depends on degree of LV and RV involvement	<0.86	>0.86	>0.86
PAPI (PAS – PAD)/RA <sup>24,28–30</sup>	Depends on degree of RV involvement	Depends on degree of RV involvement	>1.5	<1.5*	<1.5
Cardiac index, L/min/m <sup>2</sup>	<2.2	≥2.2	<2.2	<2.2	<2.2
SVR, dynes-s/cm <sup>-5</sup>	>1600	800–1600	800–1600	800–1600	800–1600
CPO, W <sup>27</sup>	Variable	Variable	<0.6	<0.6	<0.6

**Bilanciare con MCS il deficit di pompa**

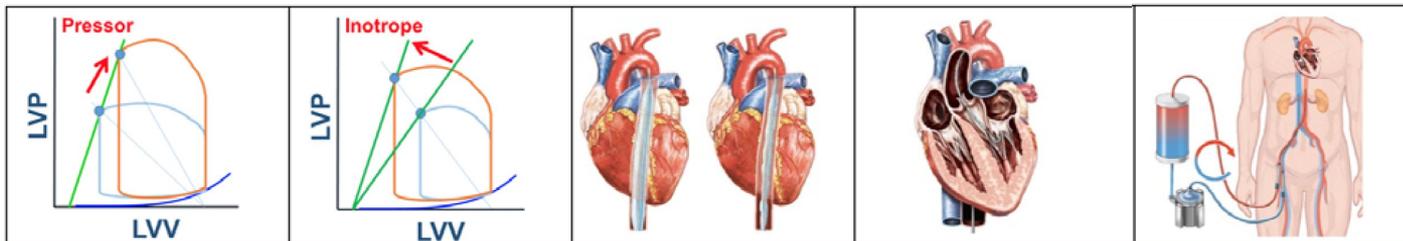


# Identification of the candidate (Risk Modifiers)





# Identification of the device



	Vasopressor	Inotrope	IABP	IMPELLA	VA-ECMO
<b>Mechanism</b>	Peripheral vasoconstriction	Increased myocyte calcium cycling	Aortic counter-pulsation	Left ventricle (LV) to aorta transvalvular circulatory support (LVADs)	Right atrium (RA) to peripheral artery circulatory support with gas exchange unit
LV Contractility	↔ or ↑	↑	↔	↔	↔
TPR	↑	↔ or ↑ or ↓	↔	↔	↔
LV Flow	↓	↑	↑	↓	↓
Total CO	↓	↑	↑	↑↑	↑↑↑
CVP	↔ or ↑	↔	↔ or ↓	↔ or ↓	↓
PCWP	↔ or ↑	↔ or ↓	↔ or ↓	↓	↔ or ↑
MAP	↑	↑	↑	↑↑	↑↑
Total CPO	↔ or ↑	↑	↑	↑↑	↑↑
PVA	↑	↑	↔ or ↓	↓↓	↑↑
MVO2	↑	↑	↓	↓↓	↑↑
Sheath size	NA	NA	7-8 French arterial	14 French arterial	15 – 17 French arterial 21-23 French venous

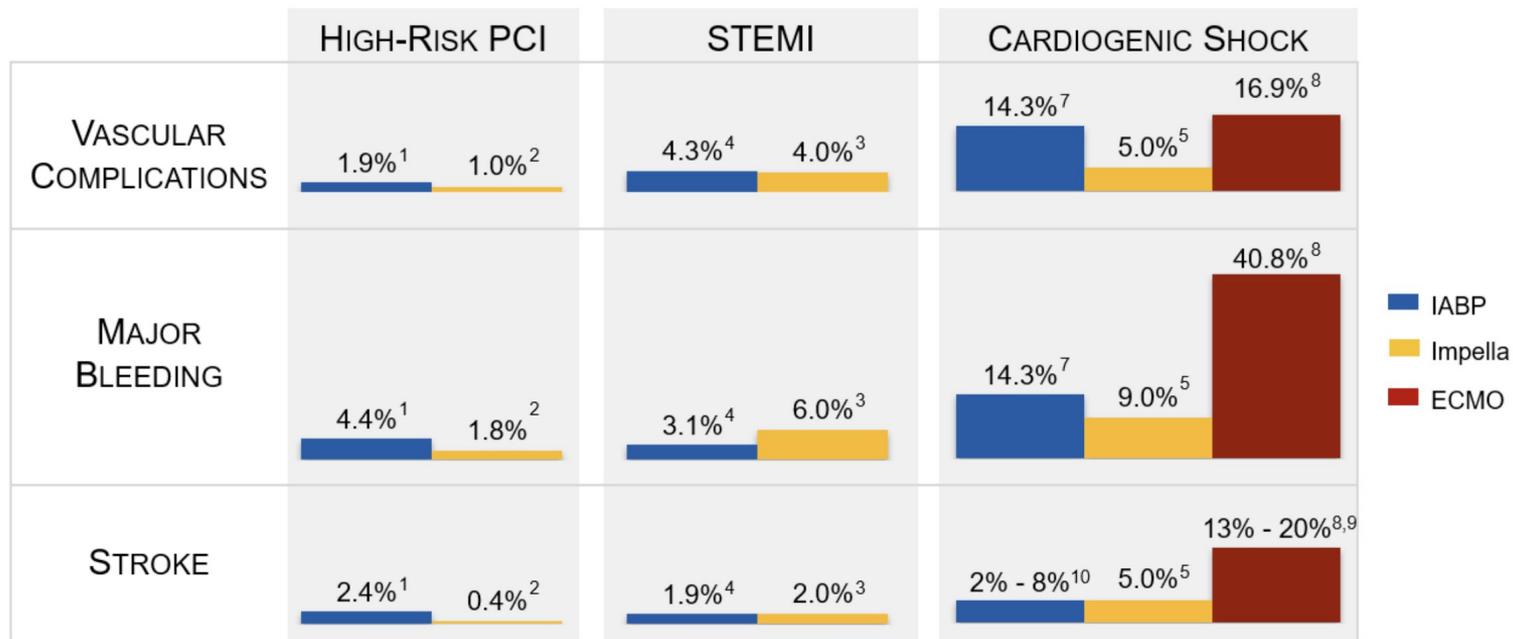
No effect on SatO2%

No effect on SatO2%

SatO2% ↑↑



## SUMMARY OF SAFETY DATA BY DEVICES\*



\* Impella data is derived from 7 FDA studies and 5 post-approval studies. PROTECT II FDA Randomized Controlled Trial compared adverse events directly to IABP. There are no independent FDA IDE studies for ECMO and IABP. Impella is the only FDA approved device for High-Risk PCI and Cardiogenic Shock.



# Clinical Case

52 years old female

CVRF: hypertensive, smoker

April 2022 admitted to II° level spoke center for anterior STEMI

Primary PCI complicated by distal LAD vessel dissection, repeated intrastent thrombosis, Gp2b3a infusion.

At 4h Clinical and laboratory signs of CS Lactates 12 mmol/L, Ph 7.1, Venous O2 sat 47%

dobutamine infusion 5 y/kg/min and noradrenaline 0.2 y/kg/min

Echocardiography: EF 25%, mild MR, moderate RV disfunction (TAPSE 13 mm)



## Right heart catheterization

LVEDP 19 mmHg,  
PCWP 19 mmHg,  
PA 31/19/22 mmHg,  
RV 30/10 mmHg,  
RAP 10 mmHg

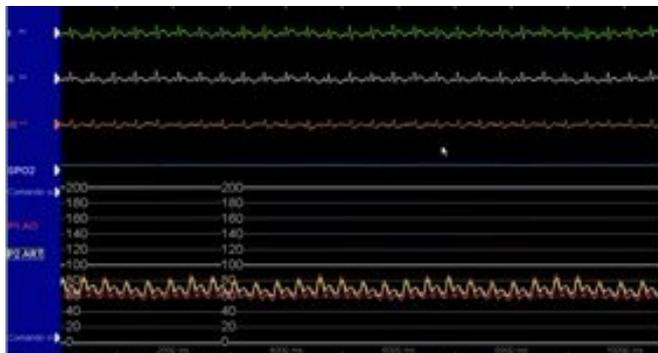
**CPO 0.3**

**PAPi 1.2**



**Biventricular CS**



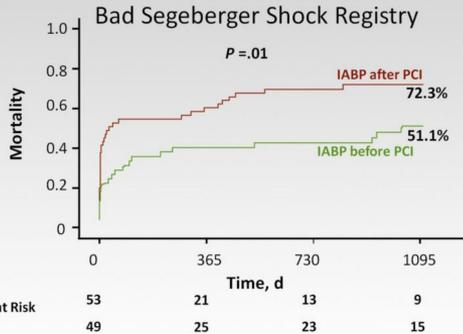




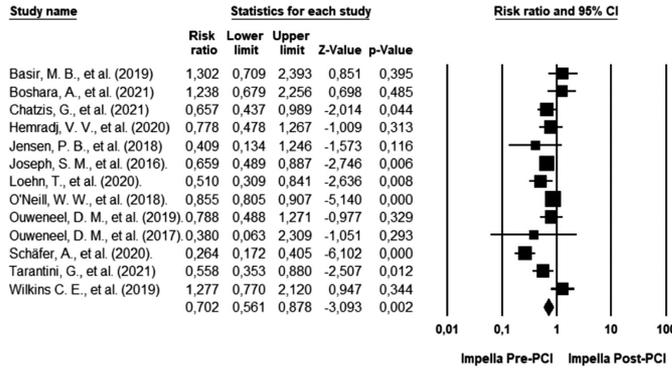
# Timing

## IABP Prior to PCI vs IABP After PCI

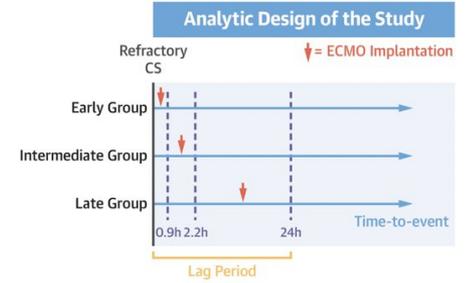
Mortality at 3 years according to IABP-timing (unadjusted)



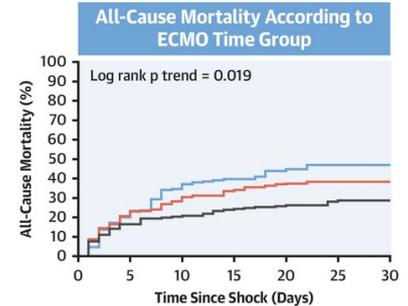
### Short term mortality



## B



## C

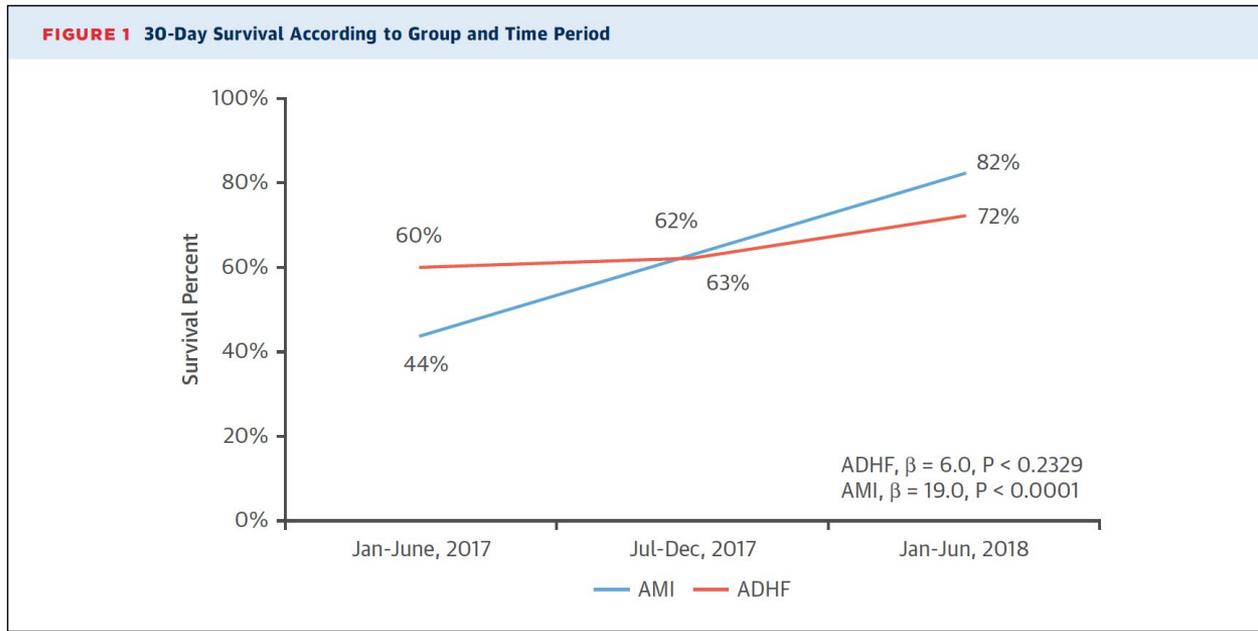


No. at risk:	83	66	53	46	43	40	40
— Late Group	83	66	53	46	43	40	40
— Intermediate Group	102	81	73	68	64	61	60
— Early Group	84	70	67	63	61	57	57

Thiele H, et al. N Eng J Med 2012;367:1287-1297  
 Iannaccone et al Int J Cardiol 2022  
 Lee H-H et al, J Am Cardiol Intv 2021;14(10):1109-19



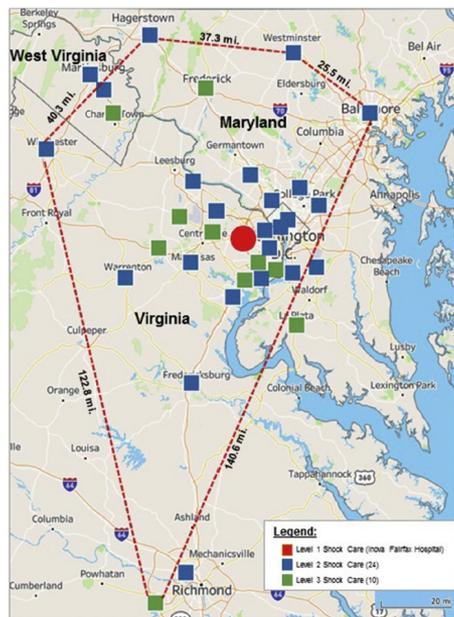
# Impact of the Shock Team



Tehrani BN, Truesdell AG, Sherwood MW, et al. Standardized Team-Based Care for Cardiogenic Shock [published correction appears in *J Am Coll Cardiol*. 2019 Jul 23;74(3):481]. *J Am Coll Cardiol*. 2019;73(13):1659-1669



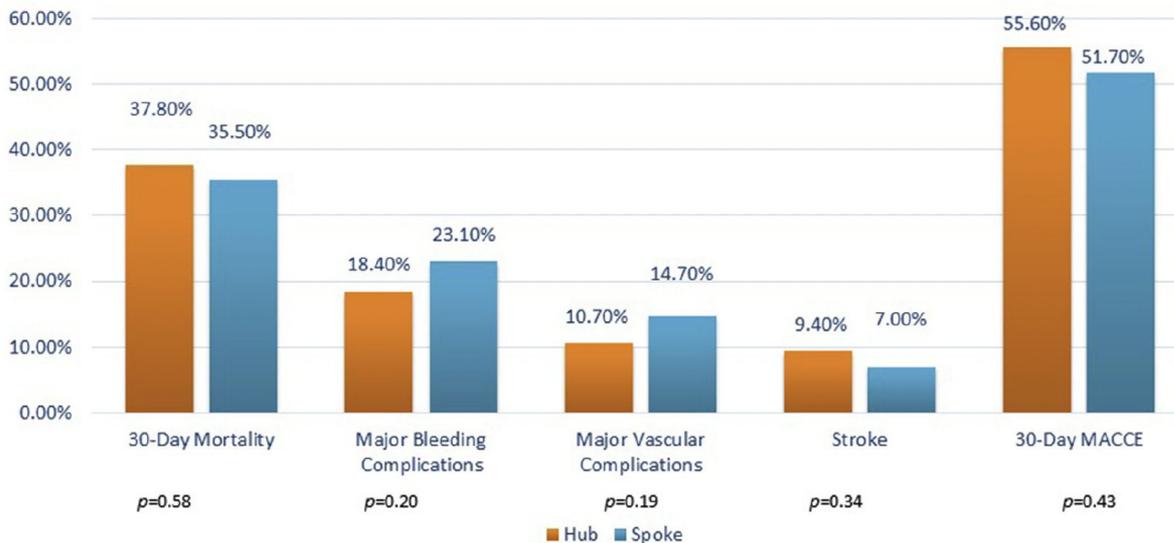
**FIGURE 2** The Inova Health System Regionalized Care Network for Cardiogenic Shock



Map depicting regionalized cardiogenic shock network spanning Northern/Central Virginia, Maryland, the District of Columbia, and West Virginia.

**FIGURE 3** Short-Term Clinical Outcomes

### Comparison of Short-Term Outcomes Between Spoke and Hub Patients





# Conclusioni

1. Per scegliere il corretto sistema di supporto meccanico è fondamentale fenotipizzare lo shock cardiogeno
2. I sistemi di supporto meccanici non sono tecnologie competitive, ma complementari
3. E' importante bloccare la spirale che porta lo shock cardiogeno a diventare cardiometabolico, in quest'ottica un utilizzo precoce dei MCS può essere utile, specialmente in quadri di sindrome coronarica acuta
4. Lo shock cardiogeno è un lavoro di squadra, ed un corretto management multidisciplinare è fondamentale oltre che un ottimale progettazione della rete territoriale.



# Grazie per l'attenzione