

# UTILIZATION OF INVASIVE HEMODYNAMIC MONITORING AT TIME OF MECHANICAL CIRCULATORY SUPPORT IMPLANTATION FOR THE TREATMENT OF ACUTE MYOCARDIAL INFARCTION CARDIOGENIC SHOCK: INSIGHTS FROM THE BMC2 REGISTRY

Aaron Lopacinski<sup>1</sup>, Milan Seth<sup>2</sup>, Eric Cantey<sup>1</sup>, Siddharth Gandhi<sup>3</sup>, Brett Wanamaker<sup>1</sup>, Mir B. Basir<sup>4</sup>, Amir Kaki<sup>5</sup>, Ryan Madder<sup>6</sup>, Devraj Sukul<sup>6</sup>, Hitinder Gurm<sup>1</sup>

<sup>1</sup>University of Michigan, Ann Arbor, MI; <sup>2</sup>BMC2, Ann Arbor, MI; <sup>3</sup>McLaren Northern Michigan Hospital, Petoskey, MI; <sup>4</sup>Henry Ford Health, Detroit, MI; <sup>5</sup>Henry Ford-St. John Hospital, Detroit, MI; <sup>6</sup>Corewell Health West, Grand Rapids, MI

## BACKGROUND

- Acute myocardial infarction-cardiogenic shock (AMI-CS) complicates 8-10% of ST-segment elevation myocardial infarctions (STEMI) with in-hospital mortality rates approaching 50% <sup>[1]</sup>
- The Danish-German (DanGer) Cardiogenic Shock Trial suggests a mortality benefit of mAFP for AMI-CS, despite an increased hazard of device-related complications
- Data from the C3TN registry suggest only 32% of patients with AMI-CS met the rigid DanGer Shock inclusion criteria <sup>[2]</sup>
- Measurement of invasive hemodynamics with RHC is crucial for the identification, phenotyping, and longitudinal management of AMI-CS <sup>[3]</sup>

## AIMS

- To evaluate the prevalence of RHC utilization at the time of MCS implantation in a “DanGer Shock”- like cohort of AMI-CS in the state of Michigan

## METHODS

- The BMC2 registry is a quality improvement initiative of 48 non-federal hospitals that perform percutaneous coronary intervention (PCI) in Michigan<sup>[4]</sup>
- Inclusion criteria- All primary PCIs for STEMI complicated by AMI-CS (NCDR definition) from April 2018 to March 2024
- Exclusion criteria- Patients with persistent neurological deficit after cardiac arrest and the use of right ventricular MCS
- The “DanGer Shock”-like cohort was divided into four groups by MCS treatment strategy: No MCS, intra-aortic balloon pump (IABP), mAFP, and other MCS
- Reported site-specific utilization of RHC as median rates and interquartile ranges (IQR)

There is significant heterogeneity in the use of intracardiac hemodynamics to guide intraprocedural acute myocardial infarction-cardiogenic shock management

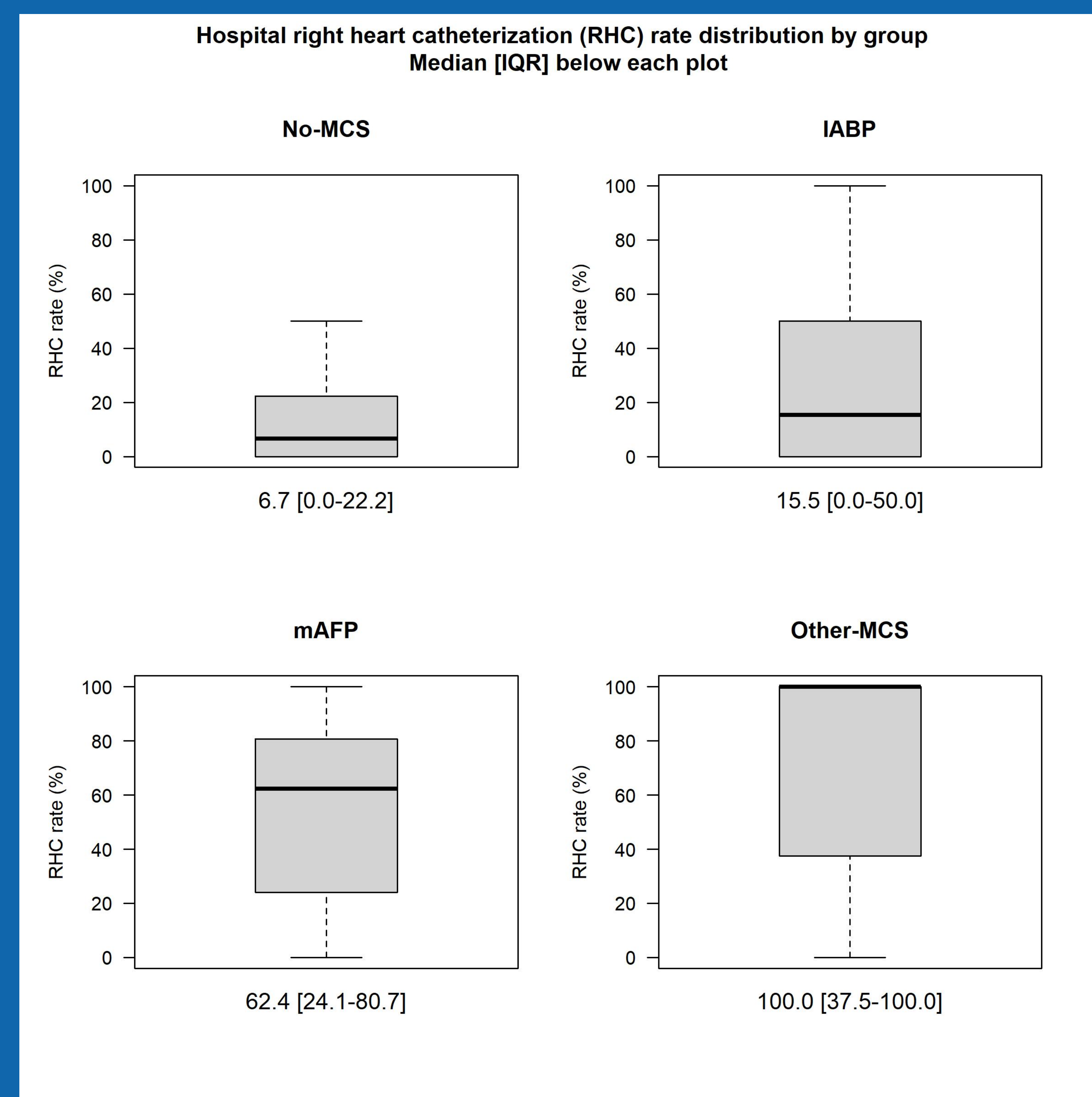


Figure 2- Rate of RHC utilization by site displayed as median [IQR]. Hospital specific data demonstrates significant variability across different sites.

In the post-DanGer Shock era, efforts are needed to improve the early recognition, phenotyping, and risk stratification of AMI-CS with RHC



## RESULTS

- AMI-CS complicated 9.7% (n=2,392) of primary PCI for STEMI
- 38.8% (n=927) were excluded, primarily due to persistent neurologic deficit after cardiac arrest
- Among the 1,465 patients in the “DanGer Shock”-like cohort- 49.4% were treated without MCS, 24.2% with IABP, 24.8% with mAFP and 1.5% with other MCS
- There were significant differences in baseline comorbidities, procedural characteristics, and outcomes among the four groups
- Overall rate of RHC use for AMI-CS was 30.5%.
- RHC use varied with MCS technique (Figure 1)
  - No MCS: 13.5% (95% CI 58.5-68.4%)
  - IABP: 29.3% (95% CI 24.6-34.0%)
  - mAFP: 63.5% (95% CI 58.5-68.4%)
  - Other MCS: 63.6% (95% CI 43.5-83.7%)
- RHC use correlated with site volume of AMI-CS ( $r = 0.38$ ,  $p = 0.006$ )

## CONCLUSION

In a real-world, “DanGer Shock”-like cohort from the state of Michigan-

- There was low utilization of RHC to guide AMI-CS management
- There is significant heterogeneity in the utilization of RHC by MCS treatment strategy

## IMPLICATIONS OF FINDINGS

- Further efforts are needed to standardize all facets of AMI-CS care, particularly through the use of shock protocols
- Efforts are needed to increase the utilization of intracardiac hemodynamics to guide AMI-CS care, particularly to enhance early recognition, guide appropriate MCS support strategy, and prompt escalation in the case of inadequate support

## REFERENCES

- Moller, J.E., et al., *Microaxial Flow Pump or Standard Care in Infarct-Related Cardiogenic Shock*. N Engl J Med, 2024. **390**(15): p. 1382-1393.
- O'Brien, C.G., et al., *Using Selection Criteria From the DanGer Shock Trial in a Contemporary Cohort With Cardiogenic Shock*. J Am Coll Cardiol, 2024.
- Basir, M.B., et al., *Early Utilization of Mechanical Circulatory Support in Acute Myocardial Infarction Complicated by Cardiogenic Shock: The National Cardiogenic Shock Initiative*. J Am Heart Assoc, 2023. **12**(23): p. e031401.
- Moscucci, M., et al., *Association of a continuous quality improvement initiative with practice and outcome variations of contemporary percutaneous coronary interventions*. Circulation, 2006. **113**(6): p. 814-22.

## DISCLOSURE INFORMATION

MB has served as a consultant for Abiomed, Boston Scientific, Chiesi, Saranas and Zoll.

AK has received speaker honoraria from Abbott Vascular, Abiomed, CathWorks, Terumo; has served as consultant to Abiomed; has served on the advisory board of Medtronic.

RM has received speaker honoraria from Abbott Vascular, Boston Scientific, Corindus, and Infraredx; has served as a consultant to Abbott Vascular, Angiowave Imaging, Corindus, Infraredx, Nanoflex Robotics, RapidAI, and Spectrawave; has received research support from Angiowave Imaging, Corindus, Infraredx, Microbot Medical, and Nanoflex Robotics; and serves on the advisory boards of Gentuity, Medtronic, and Spectrawave.

Support for BMC2 is provided by Blue Cross and Blue Shield of Michigan (BCBSM) and Blue Care Network as part of the BCBSM Value Partnerships program. Although BCBSM and BMC2 work collaboratively, the opinions, beliefs and viewpoints expressed by the authors do not necessarily reflect the opinions, beliefs, and viewpoints of BCBSM or any of its employees. Further, BCBSM does not have access to BMC2 data, and all patient episodes occurring at engaged hospitals are included in the data registries, regardless of payer.