

Cardiogenic Shock

VHAC STATEWIDE MEETING
2024

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Introduction

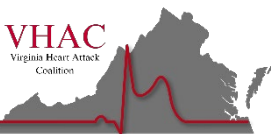
- Project developed in 2021 under the direction of Behnam Tehrani, MD (Inova)
- Relaunched in 2024 under the direction of Chalak Berzingi, MD, and Mark Joseph, MD (Carilion) and Francesco Moroni, MD (UVA)

Purpose:

- Establish a unified approach to improving the care of patients with cardiogenic shock across the state.

Goal:

- Develop a unified statewide protocol for managing cardiogenic shock, with continuous improvement driven by data sharing and collaboration. The group intends to maintain momentum through regular meetings and consistent follow-up on action items.



Overview of Cardiogenic Shock

- Summary of Scientific Principles or Guidelines
- Current Best Practices
- Important to align care with these guidelines

Carilion Clinic CVI Acute Myocardial Infarction Cardiogenic Shock Algorithm

Goals of management:

- Rapid identification
- Early mechanical circulatory support
- Right heart catheterization (pressures, CPO, & PAPI)
- Identify shock phenotype (LV, RV, or both)
- De-escalate inotropes and vasopressors

Suspect Shock: STEMI/NSTEMI

- Hypotension SBP < 90 for 30 min or requirement for vasopressors/inotropes to keep SBP > 90
- Organ hypoperfusion:
 - Cool, clammy
 - Confusion, anxiety
 - Decreased urine output
 - Rapid shallow breathing

STEMI

NSTEMI

STAT Cardiology Consult:
Shock confirmed

Activate cardiac cath Lab

Initial Stabilization:

- Volume resuscitation
- Vasopressors/Inotropes
- Initial Labs (lactate, troponin, Pro-BNP, AST/ALT, creatinine, mVO₂, ABG)
- Bedside Echo

Cath lab:

- Assessment for vascular access
- Diagnostic Coronary Angiogram, LVDEP
- RHC: filling pressures, CO, CI, CPO & PAPI
- Consider MCS devices prior to PCI
- Culprit vessel only PCI

CPO < 0.6
PAPi < 1

Consider R & L-pVAD

CPO < 0.6
PAPi > 1

Consider L-pVAD

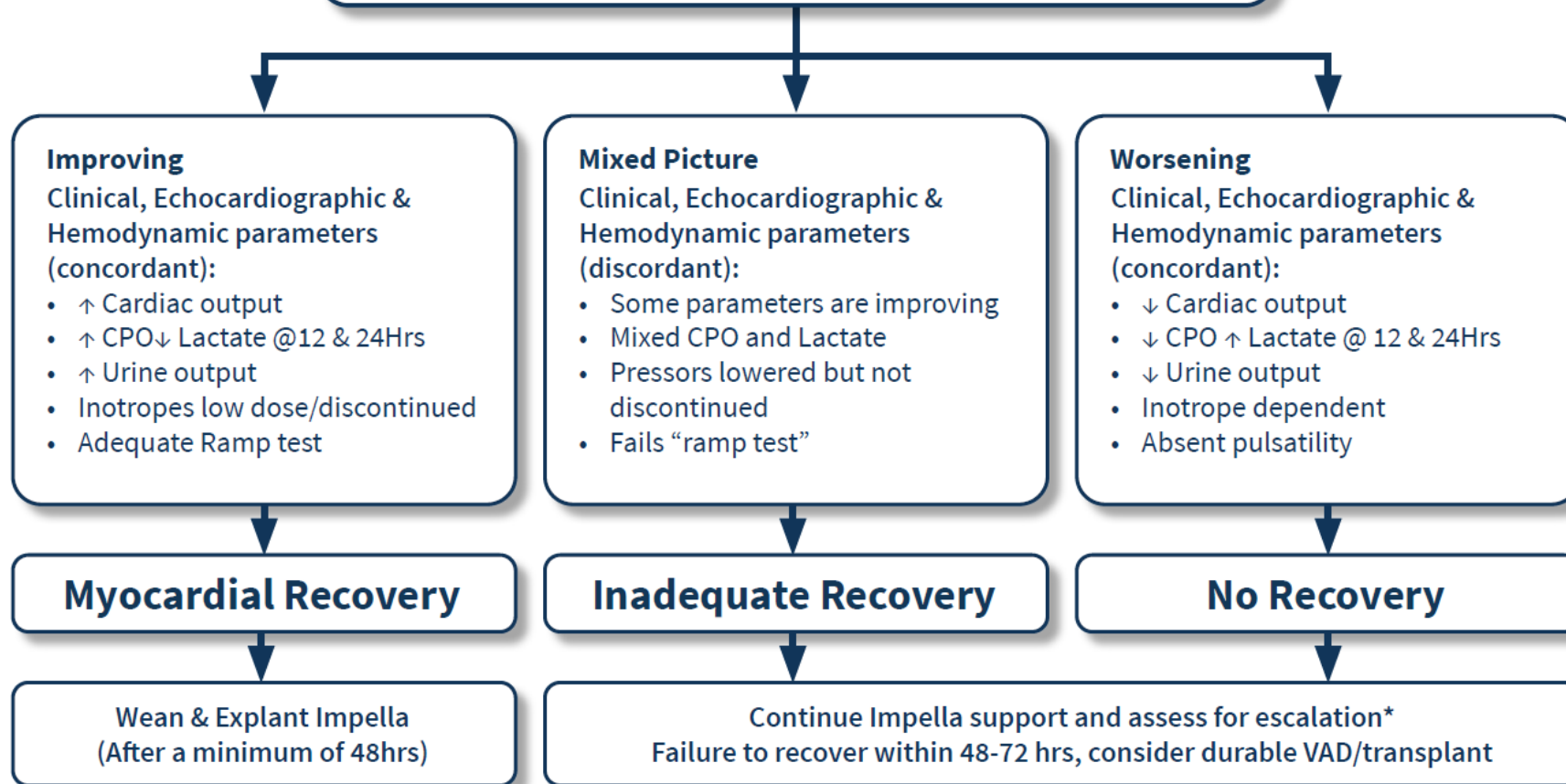
CPO > 0.6
PAPi < 1

Consider R -pVAD

- Reassess hemodynamics after MCS in cath lab
- Consider weaning Vasopressors/inotropes
- Admit to CCU
- Access for myocardial recovery

Ongoing Monitoring, Timely Escalation and Weaning

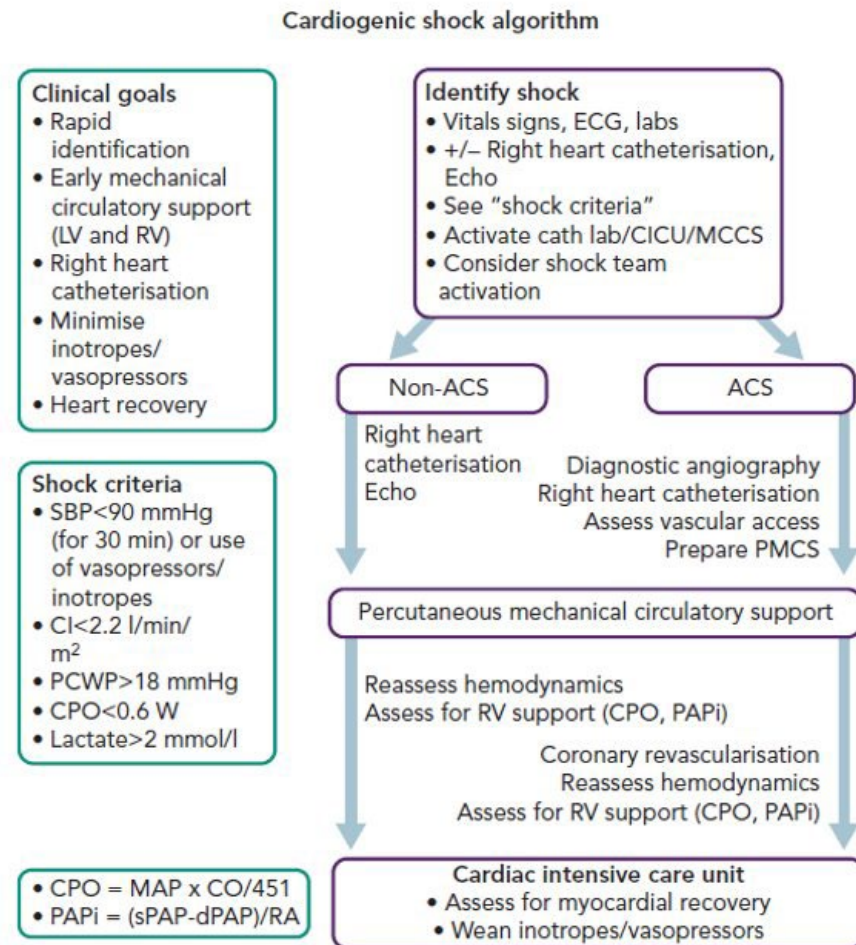
(Every 6 hours, or more frequently)



***If CPO ≤ 0.6 (or ≤ 0.8 with inotropes/pressors), consider escalation**

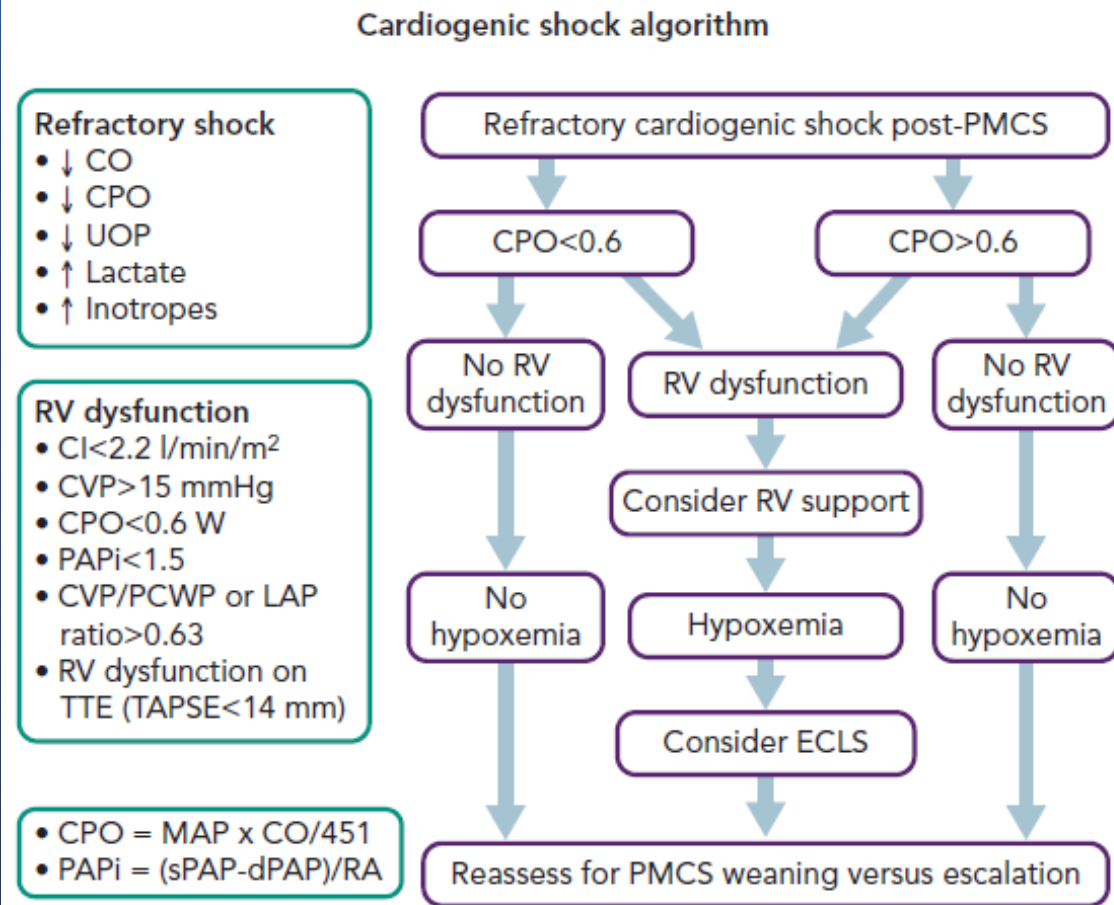
- PAPI ≤ 0.9 : Support right side with Impella RP
- PAPI > 0.9 : Escalate left side to Impella 5.0/Impella 5.5

Figure 2: INOVA Cardiogenic Shock Diagnosis, Team Activation and Treatment Algorithm/Protocol



ACS = acute coronary syndrome; CI = cardiac index; CICU = cardiac intensive care unit; CO = cardiac output; CPO = cardiac power output; dPAP = diastolic pulmonary artery pressure; ECG = electrocardiogram; LV = left ventricle; MAP = mean arterial pressure; MCCS = medical critical care service; PAPI = pulmonary artery pulsatility index; PCWP = pulmonary capillary wedge pressure; PMCS = percutaneous mechanical circulatory support; RA = right atrium; RV = right ventricle; SBP = systolic blood pressure; sPAP = systolic pulmonary artery pressure.

Figure 3: INOVA Mechanical Circulatory Support Escalation and Weaning Algorithm/Protocol



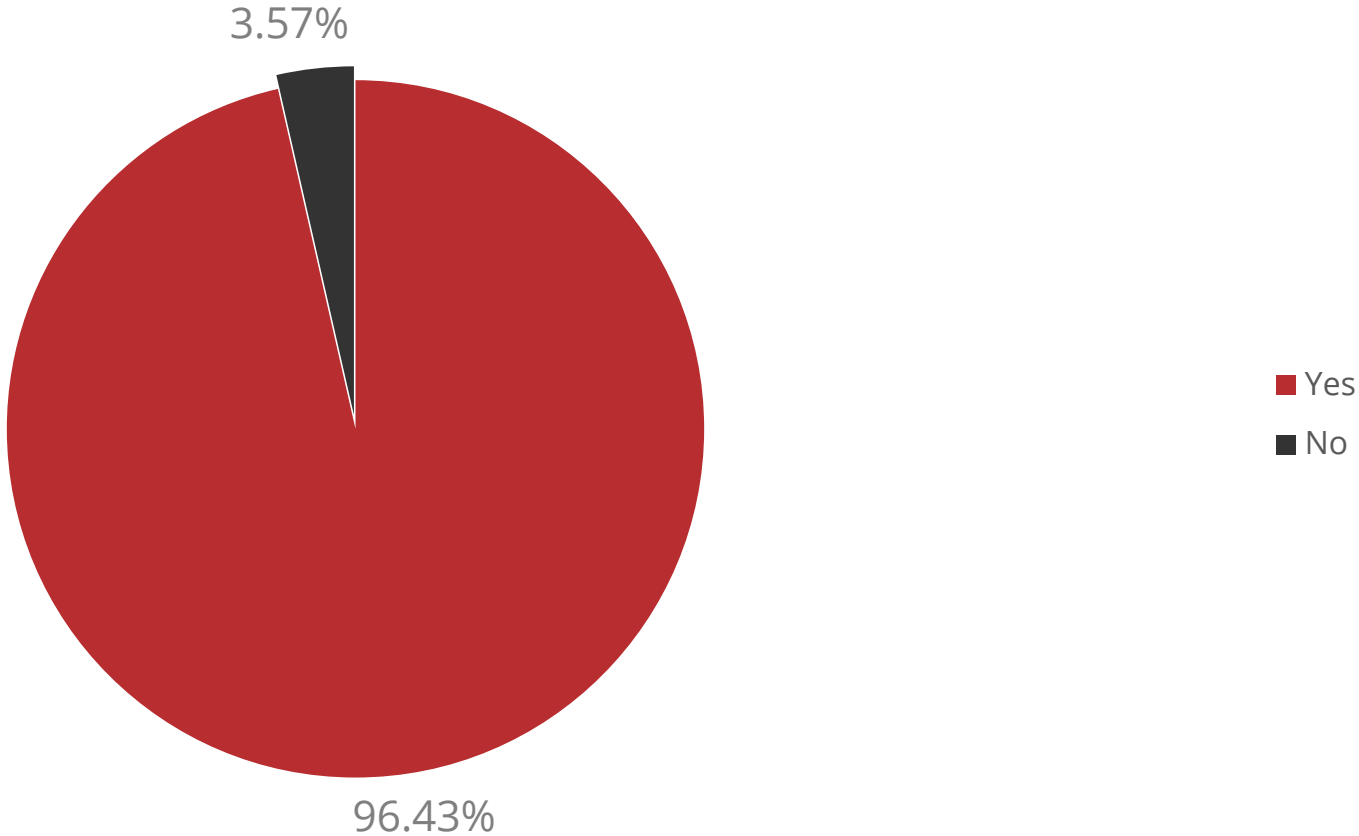
CI = cardiac index; CO = cardiac output; CPO = cardiac power output; CVP = central venous pressure; dPAP = diastolic pulmonary artery pressure; ECLS = extracorporeal life support; LAP = left atrial pressure; PAPI = pulmonary artery pulsatility index; PCWP = pulmonary capillary wedge pressure; PMCS = percutaneous mechanical circulatory support; RV = right ventricle; sPAP = systolic pulmonary artery pressure; TAPSE = tricuspid annular plane systolic excursion; TTE = transthoracic echocardiogram; UOP = urine output.

Survey Results

N=28

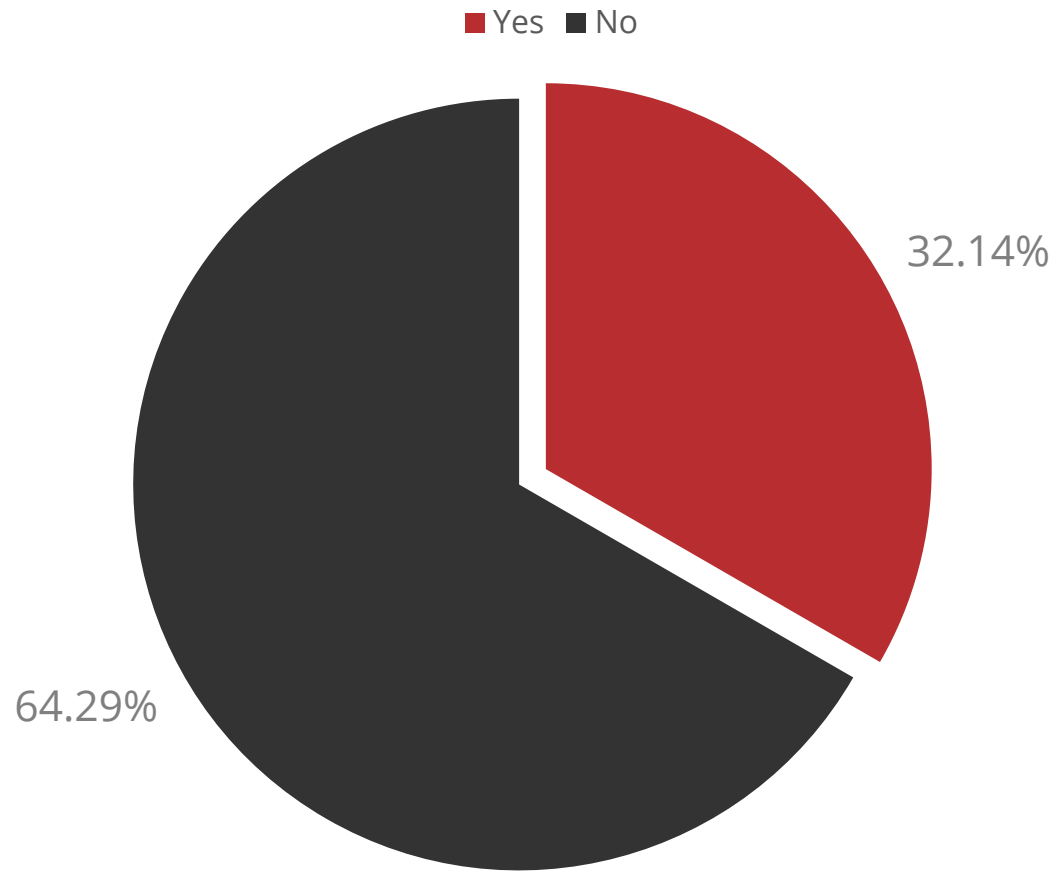
Initial Survey 2021/ Repeat Survey 2024

Does your institution have a 24-7 capable cardiac cath lab with primary PCI capability?

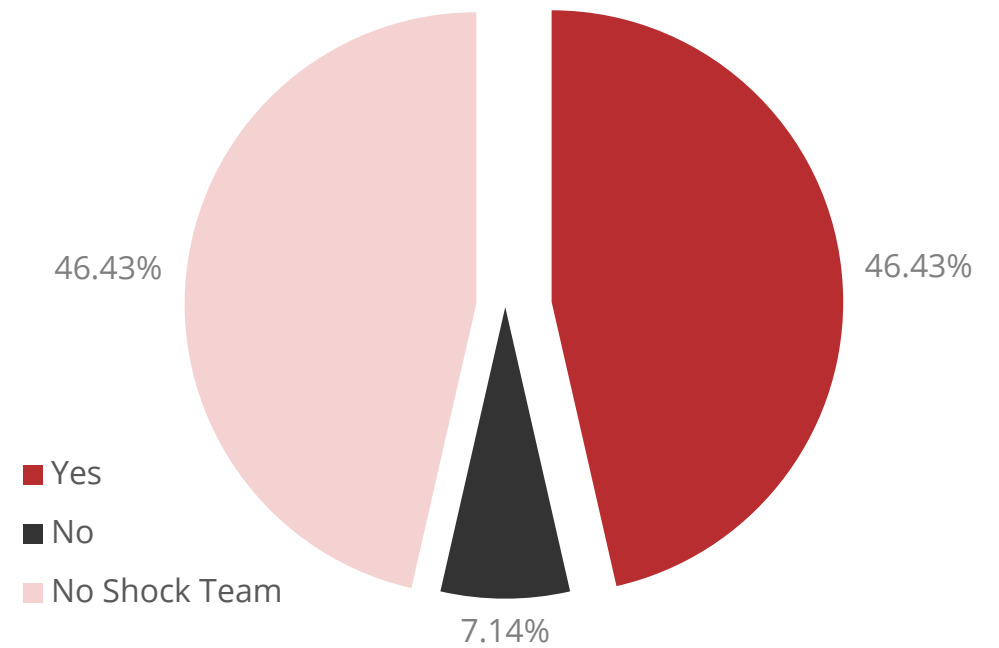


Does your institution have a dedicated shock team?

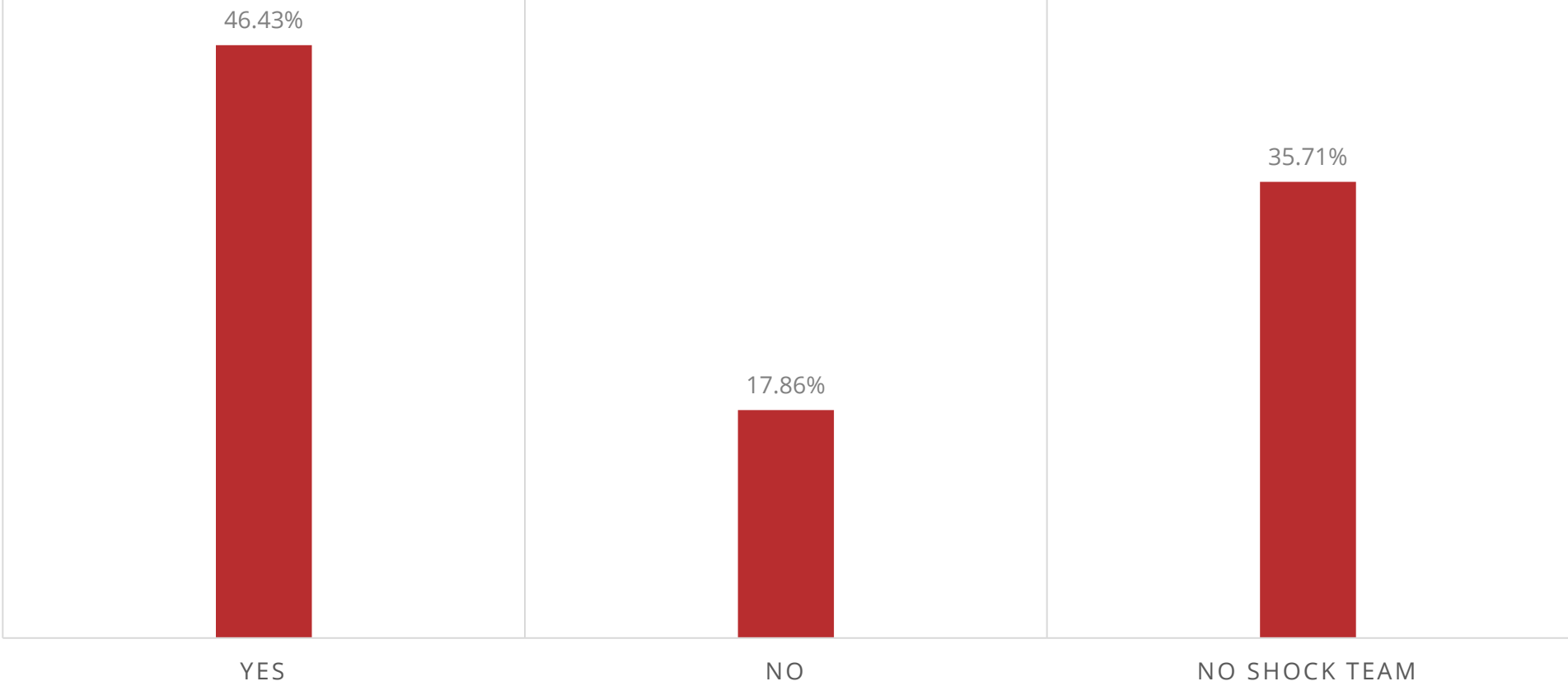
2024 N=12 / 2021 N=24



Is your shock team available on a 24-7 basis?



Does your institution have a call line for cardiogenic shock management?

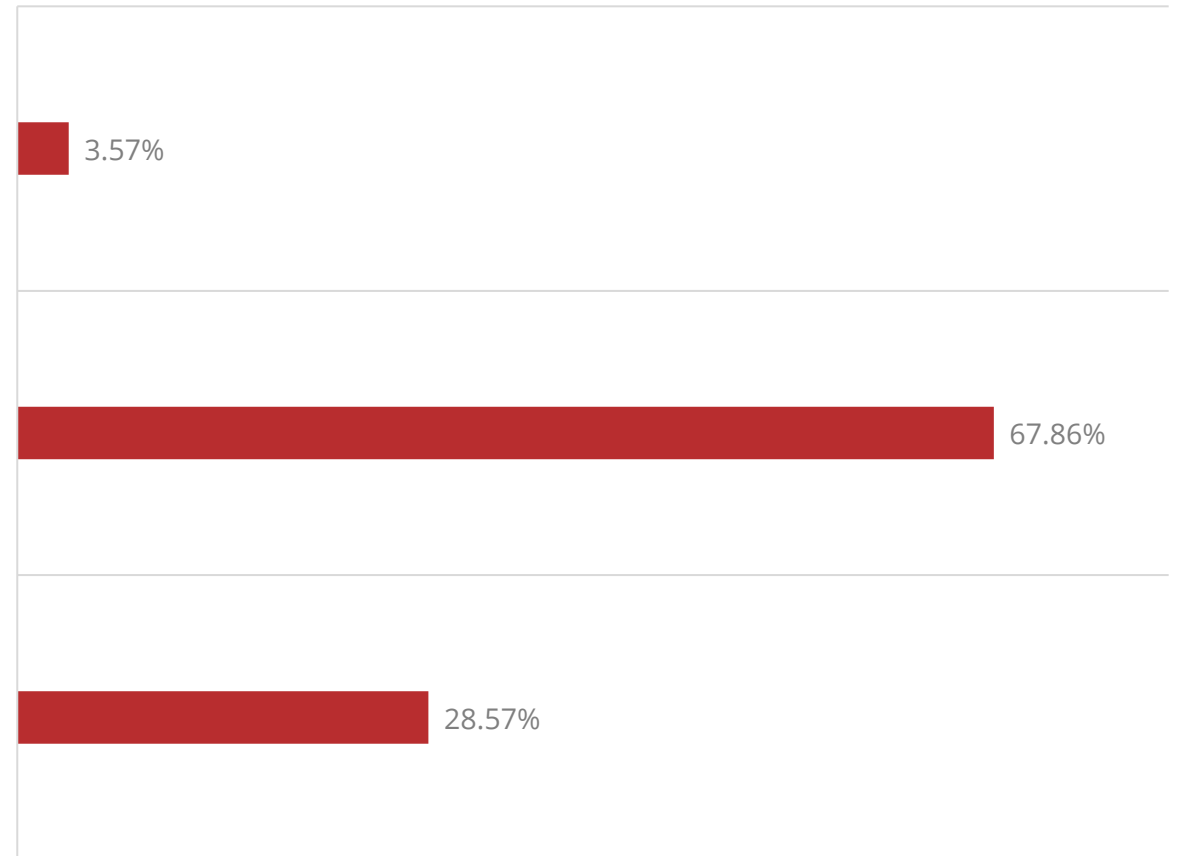


Please choose the category which would best describe your institution's shock classification in a regionalized shock network:

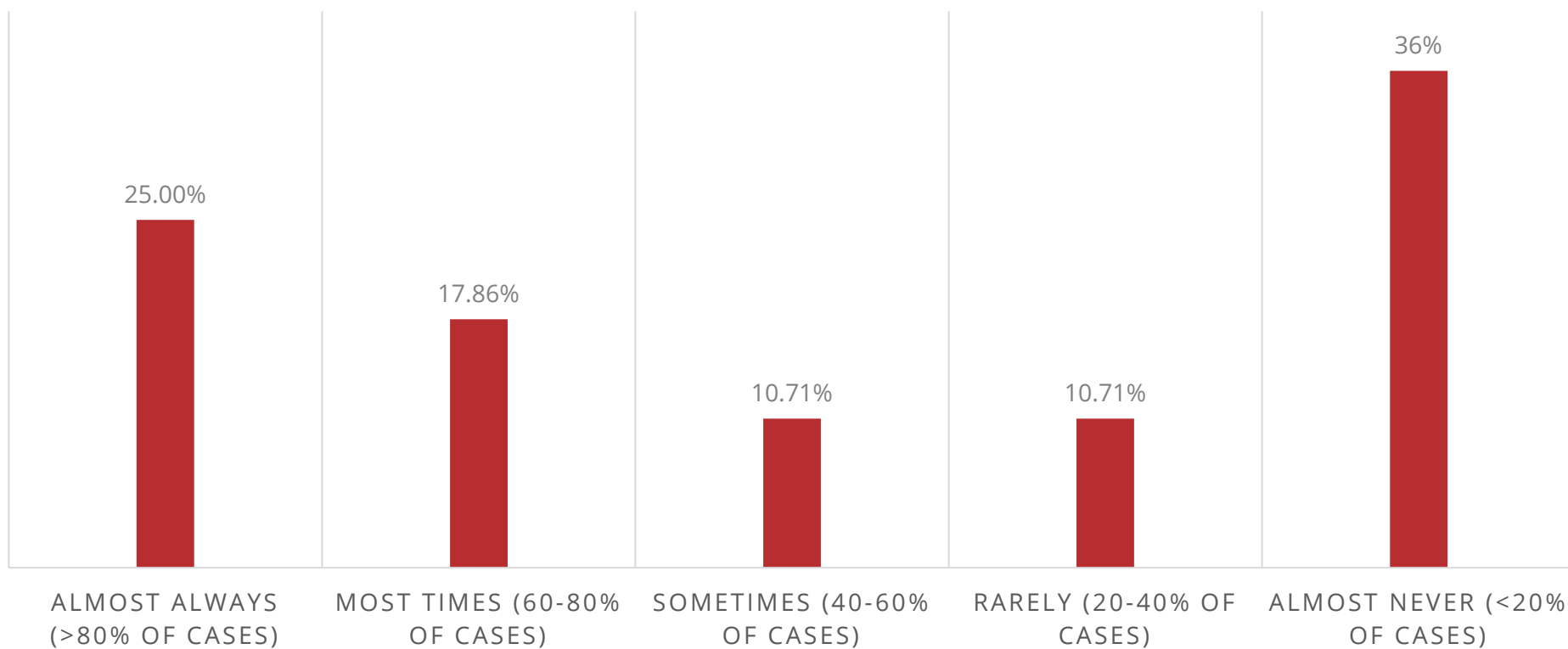
Level 3 Shock Center – Non-PCI capable with primary referrals to Level 1 and Level 2 centers.

Level 2 Shock Center – 24/7 cardiac cath lab with primary PCI and IABP capability. May be able to implant Impella and ECMO on site but would transfer to Level 1 center for LVAD and/or transplant evaluation if destination therapies needed.

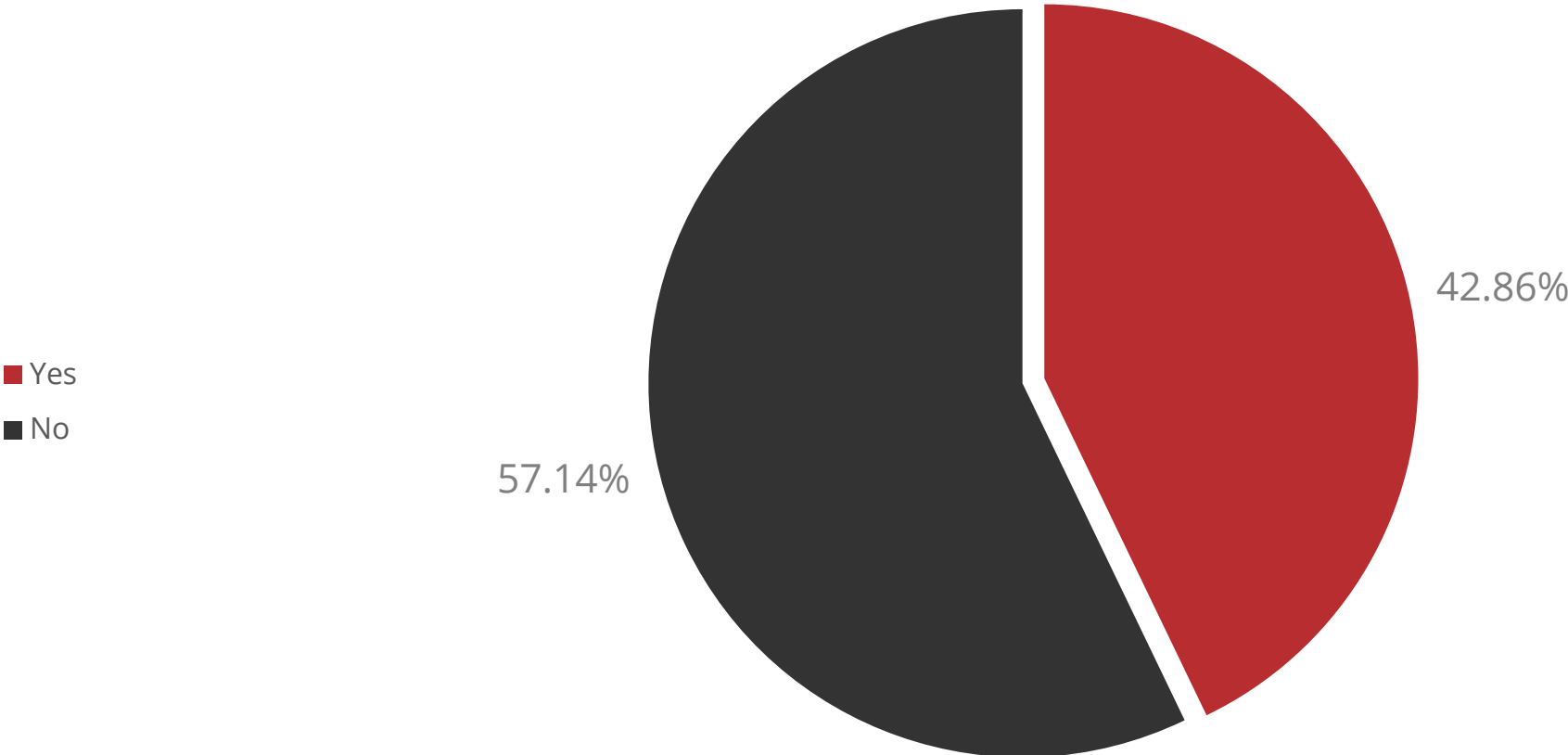
Level 1 Shock center: LVAD/transplant, High Risk PCI, ECMO and Impella capabilities.



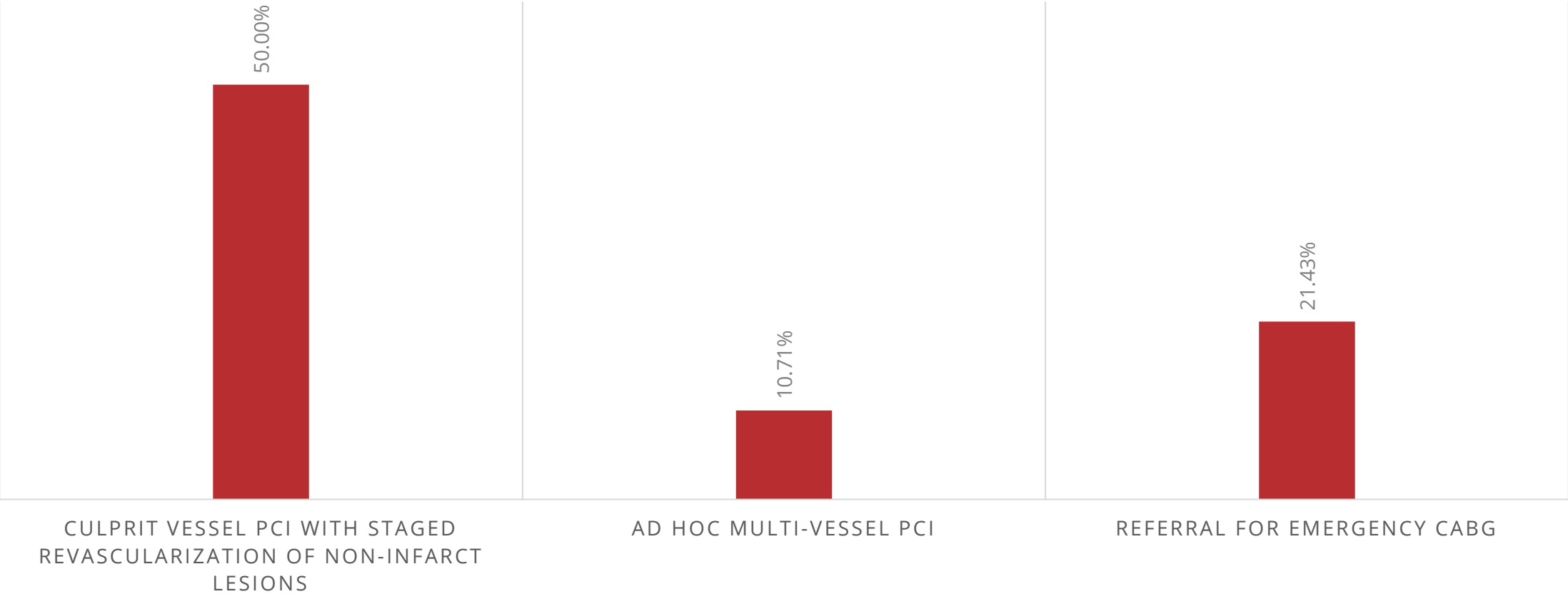
Which of the following best describes your practice with regards to utilizing pulmonary arterial catheters to diagnose cardiogenic shock?



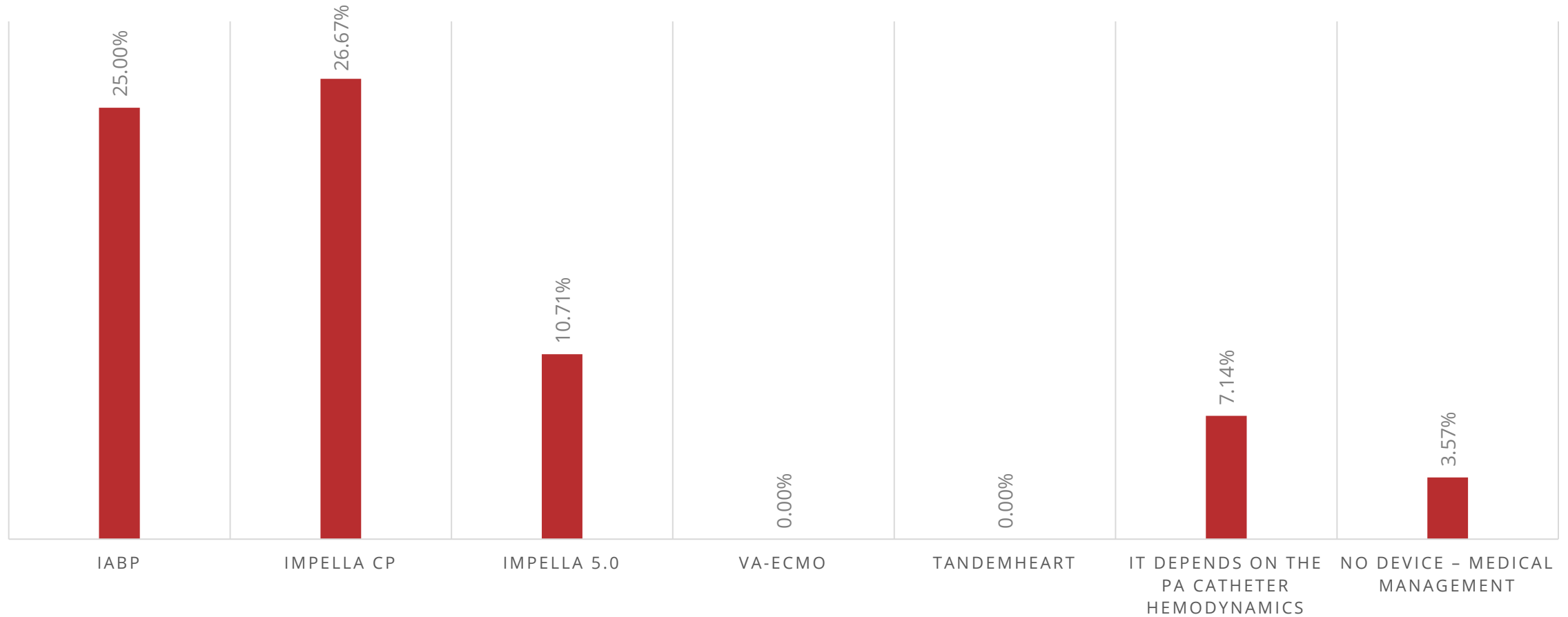
Does your institution use any risk scores or staging systems in the stratification of patients with cardiogenic shock?



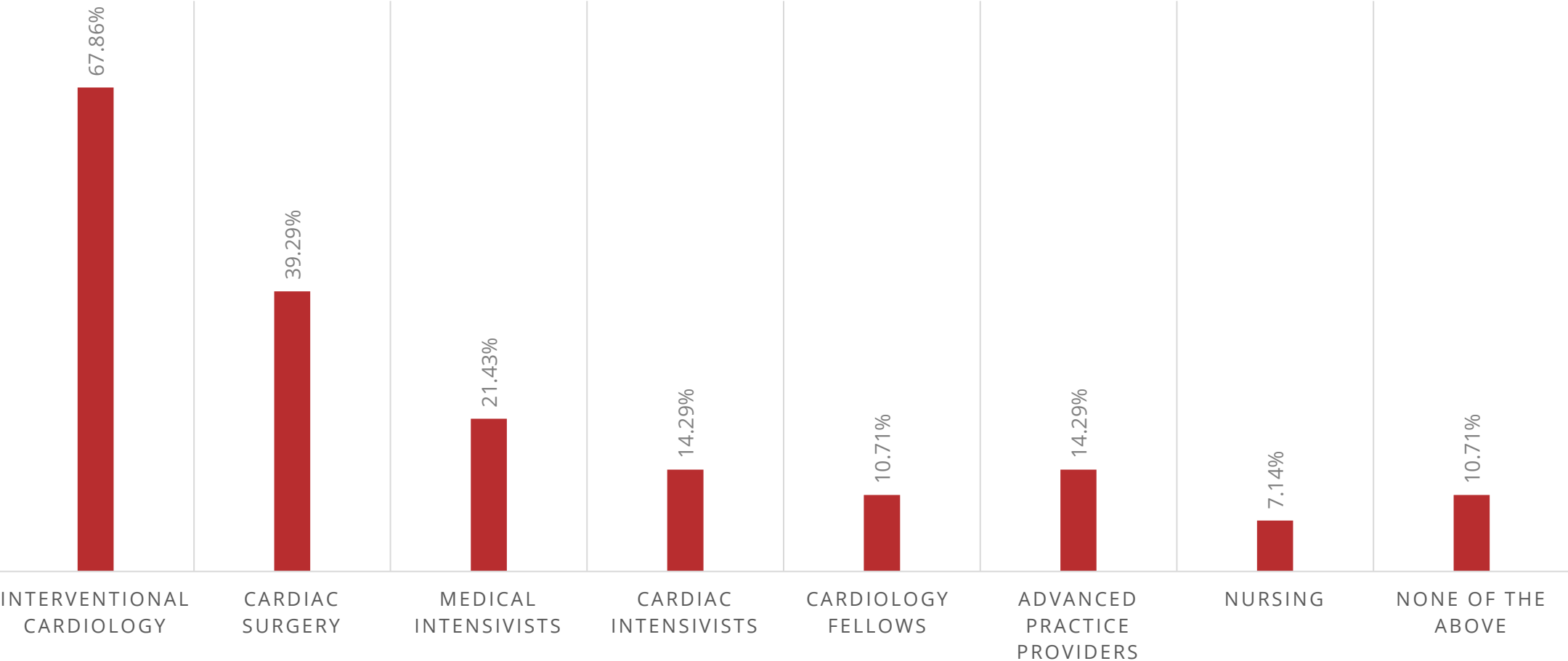
In patients presenting to your hospital with acute myocardial infarction complicated by cardiogenic shock and multi-vessel coronary artery disease, which of the following best describes your revascularization strategy?



In the management of refractory LV-dominant shock, what is your initial MCS device of choice?



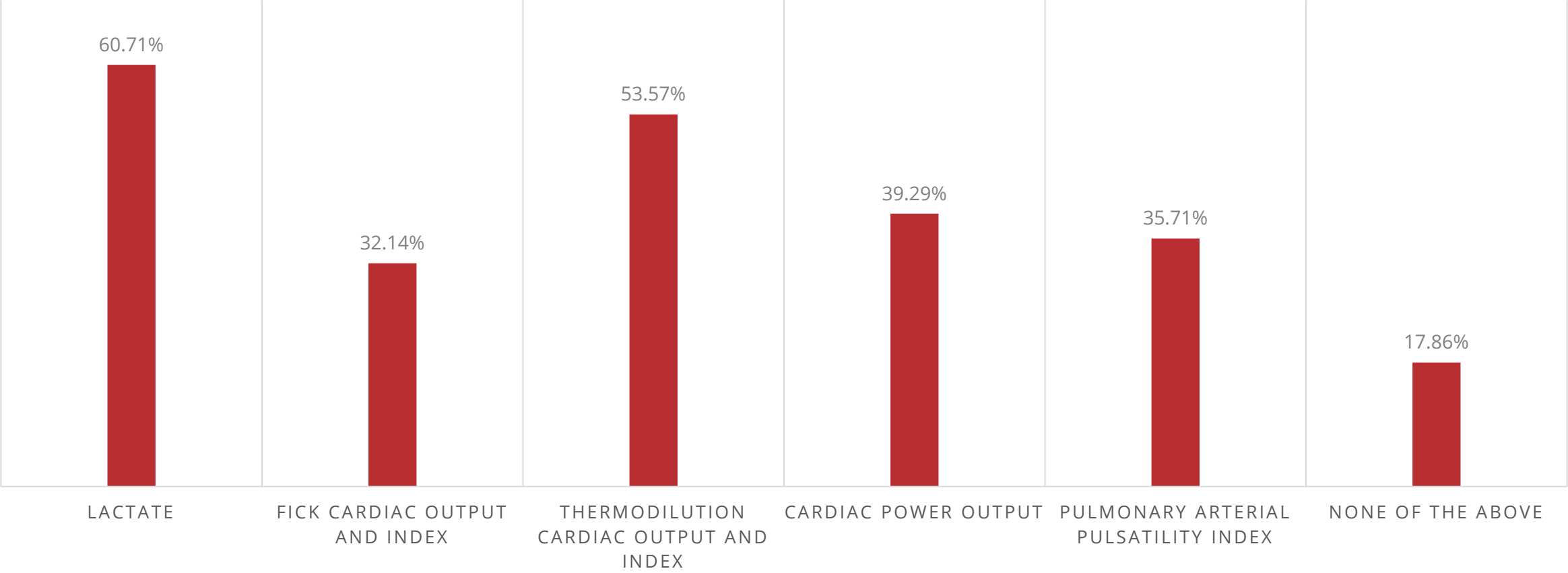
Who is primarily responsible for management of mechanical circulatory support devices at your institution? (Select all that apply)



Does your institution's ICU have dedicated weaning and escalation protocols for circulatory support device management?



Please choose one or more of the following options. Which of the following hemometabolic parameters do you usually follow in patients with cardiogenic shock in your ICU? (Check all that apply)



Draft Protocol

Opportunities	Long-term Goals
Inconsistent Diagnosis and Early Recognition	Implement standardized screening tools and protocols for early recognition of cardiogenic shock. Provide training programs for healthcare providers to enhance their ability to identify early signs of shock
Variability in Treatment Protocols	Develop and disseminate statewide standardized protocols for the management of cardiogenic shock. Encourage the formation of dedicated shock teams in hospitals to ensure consistent application of best practices.
Data Collection and Outcome Tracking	Establish an outcome metrics for analyzing data on cardiogenic shock cases, including patient outcomes and treatment methods.
Training and Education	Ensure all relevant healthcare providers are up-to-date with the latest treatment guidelines and technologies.
Disparities in Care	Expand access to advanced care by increasing the availability of specialized cardiac centers and mechanical support devices in underserved areas.
Coordination of Care	Develop clear communication protocols to ensure seamless transitions between different stages of care. "Spoke and Hub Model"
Patient and Family Education	Create comprehensive educational resources for patients and families, explaining the condition, treatment options, and what to expect during and after treatment.
Outcome Disparities	Conduct regular outcome reviews and quality improvement initiatives to reduce variability in care.
Resource Limitations	Advocate for increased funding and resources to ensure all institutions have access to necessary therapies. Explore partnerships and funding opportunities to alleviate financial burdens on patients and healthcare providers.



Vision



Next Steps

- Engage Stakeholders
 - At least one representative from each institution
- Meet to Review Literature, Case Studies, etc.
- Develop/Finalize Data Collection Framework & Outcome Metrics
 - Develop Preliminary Reports
- Develop Statewide Protocols and Shock Teams Framework

Thank You

A special thank you to the members of the VHAC Cardiogenic Shock Workgroup.

Contact Sherri@vcsqi.org for information for further inquiries

Website: VAHeartAttackCoalition.org

