VHAC
Virginia Heart Attack Coalition

VCSQI



VIRGINIA HEART ATTACK COALITION STATEWIDE MEETING

VHAC
Virginia Heart Attack Coalition

2026 Statewide Meeting

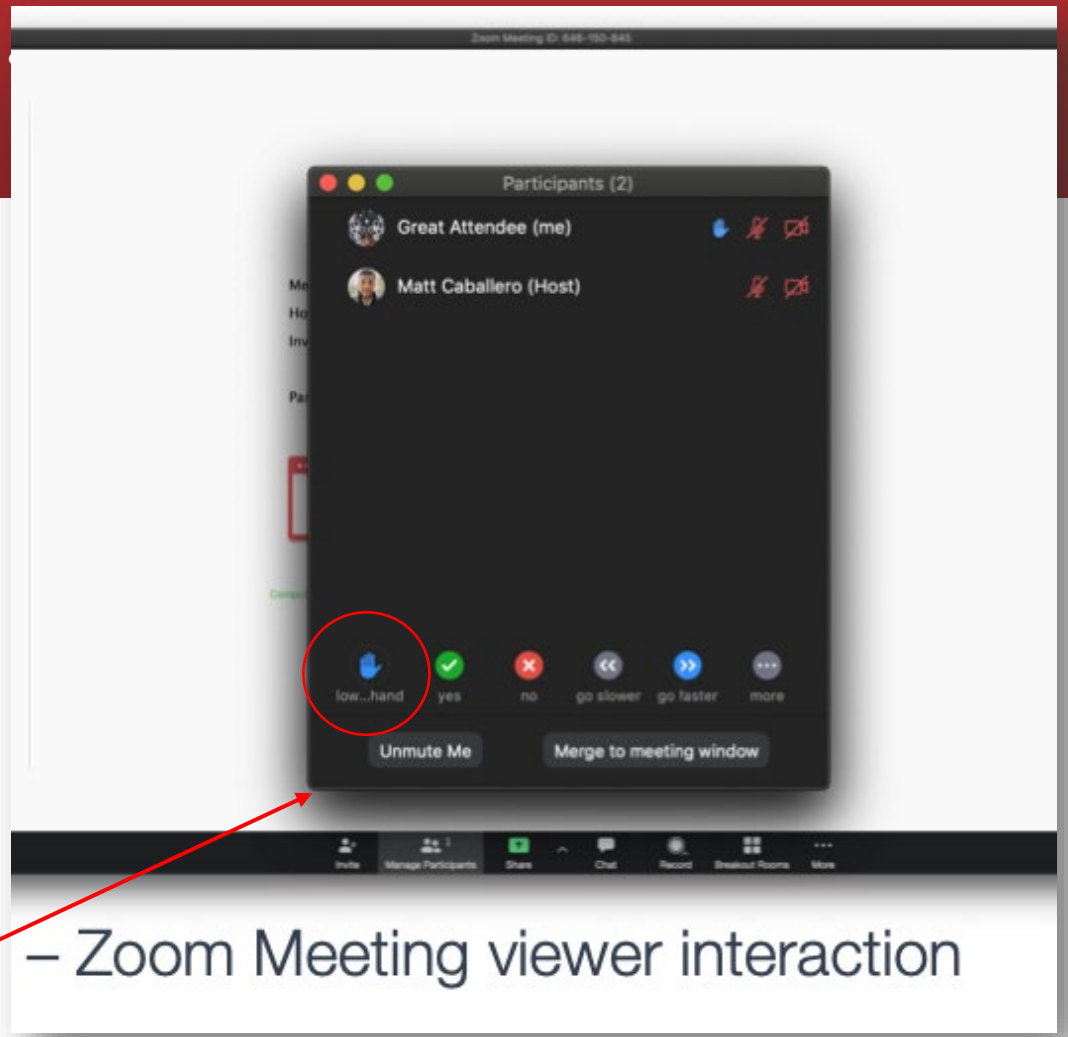
OCTOBER 21-22, 2026

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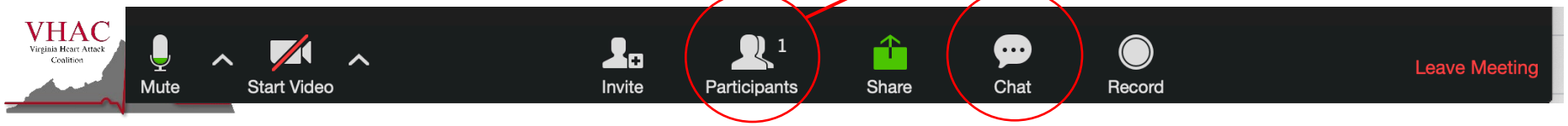


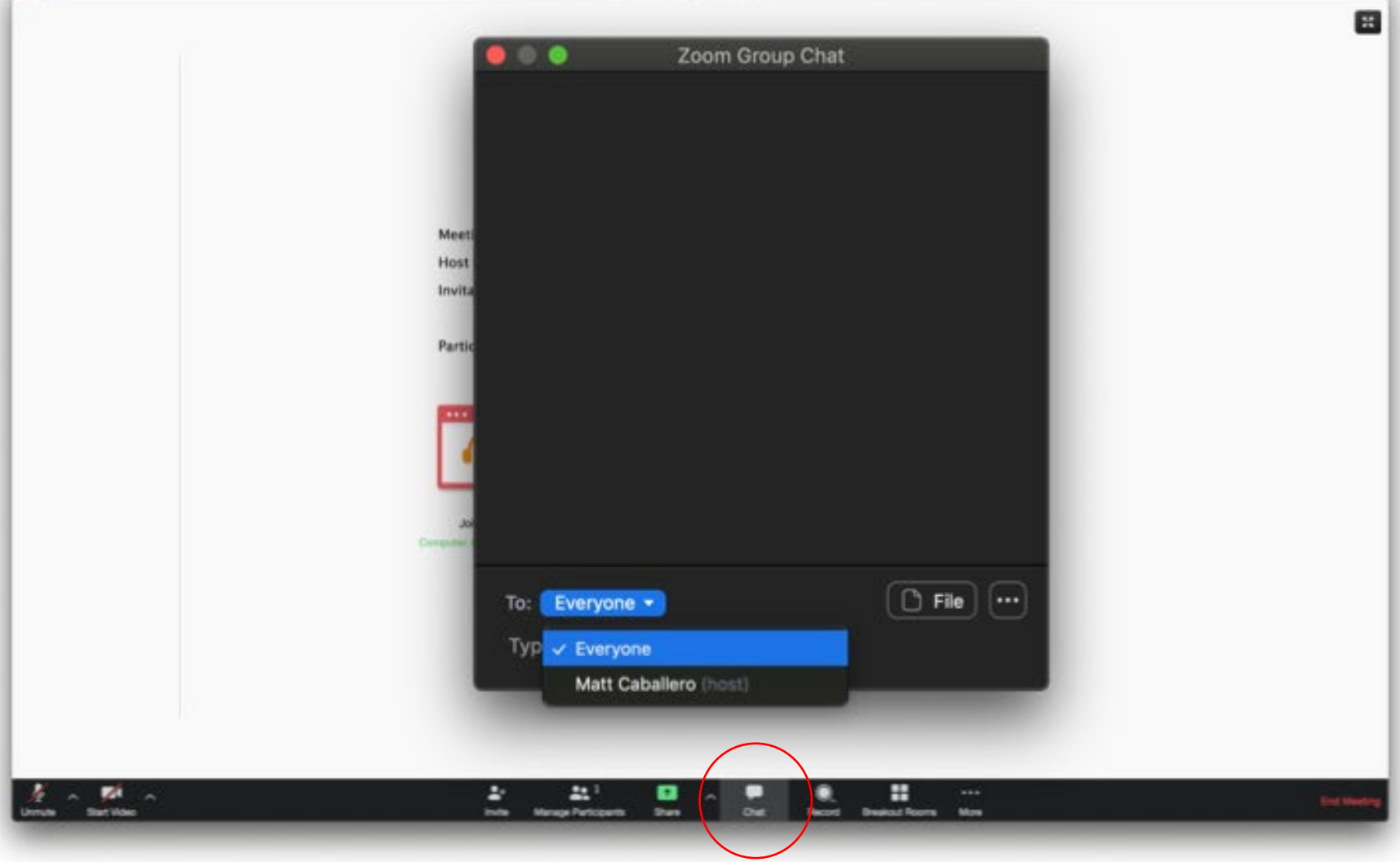
To ensure a smooth meeting..

- Connect your Audio and Video
  - See registration email for Zoom link and dial in number
  - If this is your first time using Zoom, it will automatically download the required software
  - **Call/text Sherri (216) 513-3141** if you need assistance
- Please mute your lines (phone or audio), until called upon
  - Interactive features available under **'participants'** window
- Hold questions until end of presentation
  - Use "Raise Hand" feature for questions or comments
  - The Chat Room can also be used to ask questions



– Zoom Meeting viewer interaction





Housekeeping – Zoom Meeting viewer interaction

zoom

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Virginia Heart Attack Coalition

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VIRGINIA CARDIAC SERVICES QUALITY INITIATIVE

VHAC Statewide Meeting - October 21-22, 2026 - 9:00-3:00 PM

Lewis Ginter Botanical Gardens

Course Description: *This series is tailored for VCSQI Quarterly Meetings, focusing on the evolving landscape of cardiac care, including diagnostic, therapeutic, and professional practices. The meetings serve as a platform to review, assess, and integrate new technologies and research in the realm of cardiac surgery and care. By employing a multidisciplinary approach, these gatherings ensure that cardiac patients receive prompt, guideline-aligned treatment, leading to an overall improvement in the quality of care. Participants will enhance their collaborative skills with peers and experts in the cardiac community, gain familiarity with the resources and programs available in their service areas, and benefit from the insights of leading subject matter experts in cardiac health.*

Target Audience: Physicians, Nurses, PAs

Desired Outcomes: *At the conclusion of these activities, participants will be able to:*

- Gain a deeper understanding of the latest research and data in cardiovascular care
- Integrate data-driven insights into clinical practice, leading to better patient outcomes.
- Increase consistency in applying value-based practices across different healthcare settings.
- Develop enhanced skills in interpreting and applying cardiovascular data, such as insights from STS and CathPCI registries, to improve clinical decision-making and patient care strategies.
- Learn knowledge and practical strategies for aligning their clinical practices with the latest evidence-based guidelines and best practices in cardiovascular care.
- Apply consistent, high-quality care techniques that positively impact patient outcomes, focusing on reducing variability in treatment and enhancing patient-centered approaches in cardiovascular care.

AGENDA

9:00 – 9:30 AM
State of the State
Peter K. O'Brien, MD, CPPS, FACC
Medical Director, Centra Stroobants Cardiac Catheterization Laboratory
Chief Quality Officer, Centra Heart and Vascular Institute
Co-founder and Steering Group, Virginia Heart Attack Coalition

9:30 – 10:15 AM
Regional Reporting
- Central – Megan Vaughan, MSN, RN, Bon Secours Richmond Heart & Vascular Institute
- Eastern – Anand Krishnan, MD, MD, Sentara Healthcare
- Northwestern – Patrick Stafford, MD, University of Virginia
- Southern –Maegan Sholes, Centra Lynchburg
- Western – Melanie Johnson, Carilion Clinic
- Northern – Laura Atwell, Manager of EMS Programs, NVERS

10:15 – 10:30 AM - Break

10:30-11:00 AM
Statewide Data Review — VHAC + EMS
Eddie Fonner, VCSQI Executive Director, Chief Data Analyst
Laura Atwell, Manager of EMS Programs, NVERS

11:00 -12:00 PM
Panel Discussion
Evidence to Action: Current Research in STEMI Systems of Care
Moderator: Lt. Yasmin Ahmady, Prince William County Department of Fire and Rescue (PWCDFR)

Evidence Review Presenter & Panelist: Michael Kontos, MD - Division of Cardiovascular Medicine, Virginia Commonwealth University

Panelists:
Aman A. Shah, MD, Emergency Medicine/EMS, Cooper University Health Care-Camden
Kayla Long, MD, Emergency Medicine, Centra Lynchburg General Hospital
Patrick Stafford, MD, Division of Cardiovascular Medicine, University of Virginia
Kimberly Pumphrey, Rivanna-Rappahannock EMS Council Region 5, NVERS Northern Virginia Emergency Response System

AGENDA

12:00 – 1:00 PM - Lunch

1:00 – 1:45 PM
KEYNOTE PRESENTATION
Moving the Decision Upstream: The Crashing Patient and the Future of Prehospital Cardiovascular Care
Aman Shah, MD FAEMS FAAEM
Operational Medical Director, Prince William County Fire & Rescue System and Public Safety Communications (911)
Associate EMS Medical Director, Cooper University Hospital
Assistant Professor of Emergency Medicine, Cooper Medical School of Rowan University

1:45 – 2:00 PM - Break

2:00 - 2:55 PM
Workgroup Updates (Rapid Fire)
- EMS Education – Lt. Yasmin Ahmady, Prince William County Department of Fire and Rescue (PWCDFR)
- Direct to Cath Lab – Peter K. O'Brien, MD, Centra Lynchburg
- Thrombolytics – Michael Kontos, MD, Virginia Commonwealth University
- Cardiogenic Shock – Chalak Berzingi, MD, Carilion Clinic
- PERT – Michael Kelley, MD, Carilion Clinic

2:55 – 3:00 PM
Closing Remarks
Peter K. O'Brien, MD, CPPS, FACC

3:00 – 4:00 PM
Educational Session
Cary Strosnider BSA, FPC
LifeEvac Flight Paramedic & Outreach Coordinator

Housekeeping

- Meals are served in the back of the room
- Soft Drinks (and coffee!) are available all day
- Restrooms are out the back to the left
- Please let us know if we can provide you anything that will make your meeting experience more enjoyable

UVA Health Continuing Education
Provided by the School of Medicine and School of Nursing

Accreditation and Designation Statement

In support of improving patient care, this activity has been planned and implemented by the UVA Health Continuing Education and VCSQI. UVA Health Continuing Education is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

Physicians

UVA Health Continuing Education designates this live activity for a maximum of **5.5** ***AMA PRA Category 1 Credits.™*** Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Nurses

UVA Health Continuing Education awards up to **5.5 contact hour(s)** for nurses who participate in this educational activity and complete the post activity evaluation.

Hours of Participation

UVA Health Continuing Education awards **5.5 hours of participation** (consistent with the designated number of *AMA PRA Category 1 Credit(s)™* or ANCC contact hours) to a participant who successfully completes this educational activity. UVA Health Continuing Education maintains a record of participation for six (6) years.

Physician Associates

UVA Health Continuing Education has been authorized by the American Academy of PAs (AAPA) to award AAPA Category 1 CME credit for activities planned in accordance with AAPA CME Criteria.

This activity is designated for **5.5** AAPA Category 1 CME credits. PAs should only claim credit commensurate with the extent of their participation.

Successful completion of this CME activity, which includes participation in the evaluation component, enables the participant to earn up to **5.5** MOC points in the American Board of Internal Medicine's (ABIM) Maintenance of Certification (MOC) program. It is the CME activity provider's responsibility to submit participant completion information to ACCME for the purpose of granting ABIM MOC credit.

Disclosures

The following faculty and planners have disclosed financial relationships as follows:

All financial relationships have been mitigated to ensure independence and integrity in the educational content.
No one in a position to control content has disclosed any financial relationships.

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No one else in a position to control content has disclosed any financial relationships.

Disclosure of Financial Relationships

UVA Health Continuing Education as a Joint Accreditation Provider adhere to the ***ACCME Standards for Integrity and Independence in Accredited Continuing Education,*** as well as Commonwealth of Virginia statutes, University of Virginia policies and procedures, and associated federal and private regulations and guidelines.

All individuals involved in the development and delivery of content for an accredited CE activity are required to disclose relevant financial relationships with ineligible companies occurring within the past 24 months (such as grants or research support, employee, consultant, stock holder, member of speakers bureau, etc.). UVA Health Continuing Education employs appropriate mechanisms to resolve potential conflicts of interest and ensure the educational design reflects content validity, scientific rigor and balance for participants. Questions about specific strategies can be directed to UVA Health Continuing Education at uvacme@uvahealth.org.

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How to Claim CE Credit

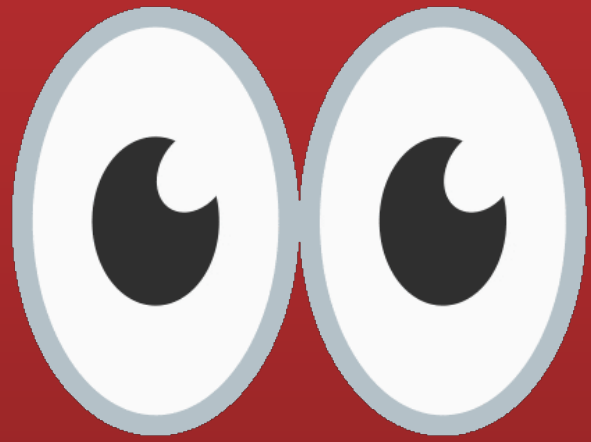
At the conclusion of this program

- Go to www.cmevillage.com
- Select "**Sign In**", ***Use your email and password***
- Click "**My CE, Claim Credit**"
- Enter Activity ID: 32212
- Complete **Evaluation and submit**.
- Return to **My CE, Transcript** to view and save your official documentation.
- If you have any problems or questions, please email the UVA CME office at uvacme@uvahealth.org
- **Participants need to complete within 7 days of this activity. After this date, credit cannot be awarded.**

Please be sure to sign in on the Official Class Roster at the registration desk.

1. Sign in for the meeting
2. Sign in for Credits

CAMERAS MUST BE ON!



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Promotional Support

We would like to thank the following companies for their promotional support of this program:

Viz AI

State of the State 2026

Peter K. O'Brien, MD, CPPS, FACC
Medical Director, Centra Stroobants Cardiac Catheterization Laboratory
Chief Quality Officer, Centra Heart And Vascular Institute
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2026

VHAC…New Challenges and New Opportunities

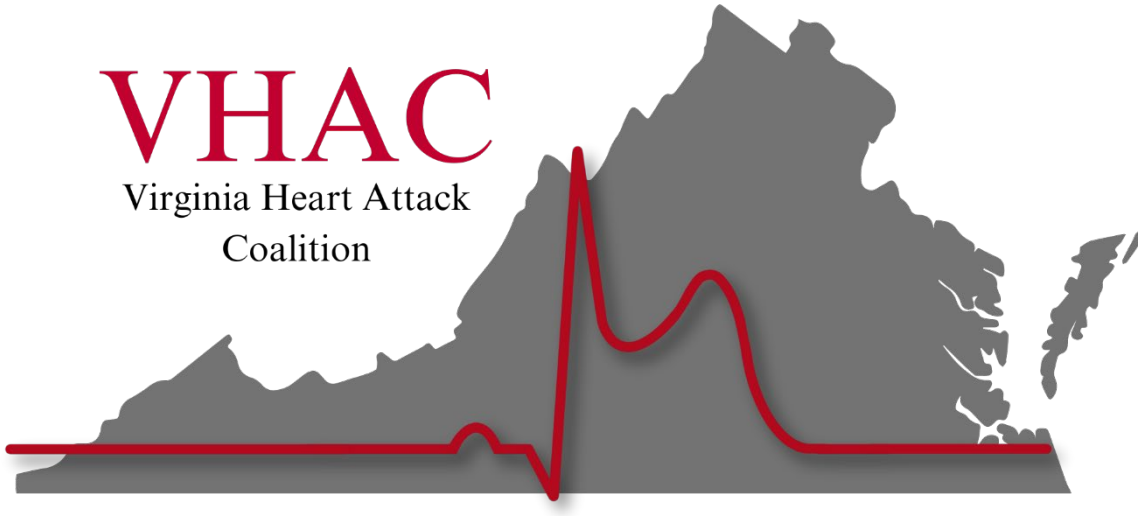
OCTOBER 22, 2026

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Virginia Heart Attack Coalition



Our Mission: To continuously improve cardiovascular systems of care in Virginia through education and data-driven collaboration with healthcare professionals and organizations, community partners, and patients.

Our Vision: All Virginians should have access to high-quality, patient-centered, equitable cardiovascular care.

It Is All About the Patients …Our Mission and Vision!

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Guideline Driven

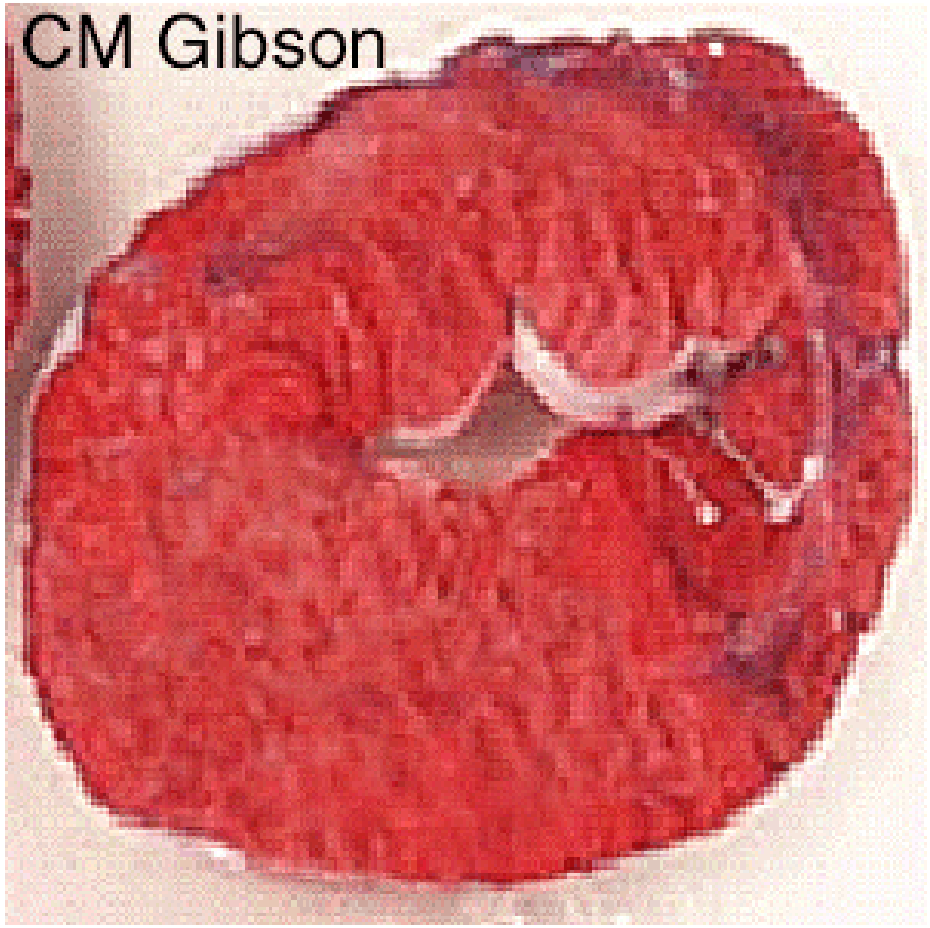


All communities should create and maintain a regional system of STEMI care that includes assessment and continuous quality improvement of EMS and hospital-based activities. Performance can be facilitated by participating in programs such as Mission: Lifeline and the D2B Alliance.

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Bottom Line: The old mantra rings true!



Courtesy of C Granger and Jollis.

Time is Muscle
Time is Life

System saves time!
System saves muscle!
Systems saves lives!

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JAMA Cardiology

Home | JAMA Cardiology | Vol. 10, No. 8

Original Investigation

Institutional Variability in Processes of Care and Outcomes Among Patients With STEMI in the US

Yasser M. Sammour, MD, MSc[1]; Safi U. Khan, MD, MS[1]; Haoyun Hong, BA[2]; et al

Author Affiliations | Article Information

JAMA Cardiol

Published Online: June 11, 2025

2025;10;(8):787-796.

doi:10.1001/jamacardio.2025.1411

FMC2B…*We are still not there!!!*



- Significant variability exists among centers in reaching target FMC2B times. High performing centers (HPC) consistently outperformed low performing centers (LPC).
- LPC's were characterized by prolonged emergency department stays and delays in reaching the cardiac Cath Lab
- This impacted outcome with higher risks of in-hospital mortality and longer length of stay
- Urban versus rural did not significantly impact this, nor did hospital volume.
- Disparities persist--with older, female, Black patient's less likely to receive rapid reperfusion.

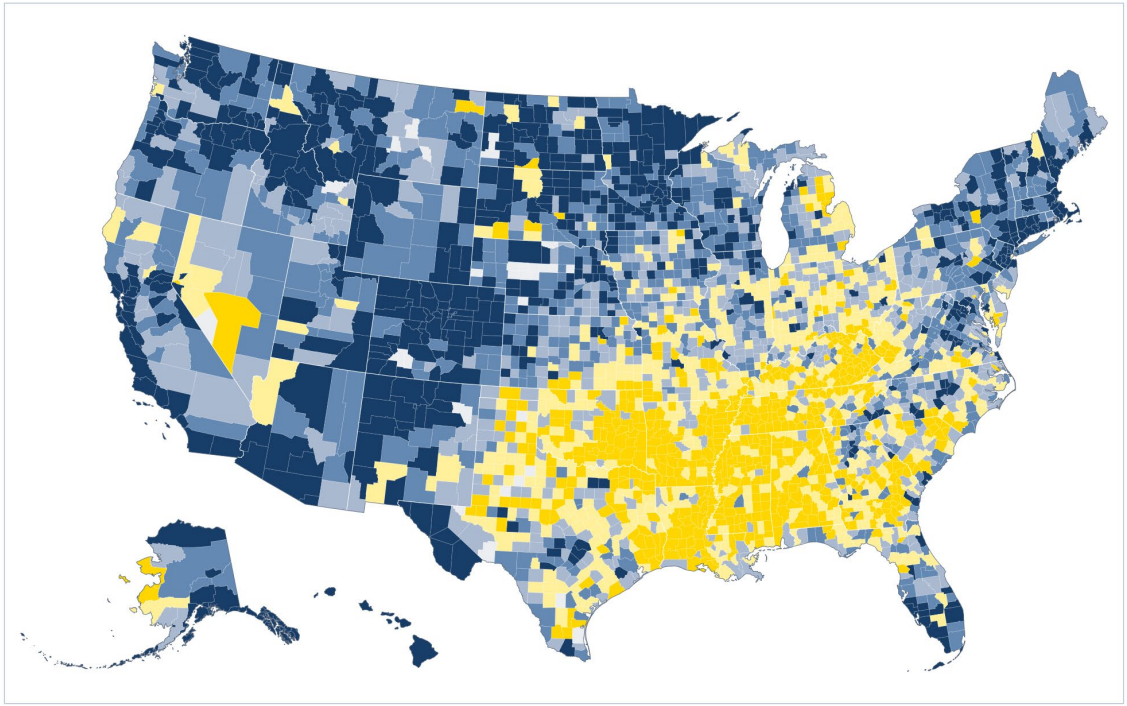
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Where you live determines whether you live…

Cardiovascular diseases (Total)
All populations · 2019

JACC JOURNALS



ASMR
deaths per 100,000 · dataset quantiles

< 216.3 | 216.3–244.5 | 244.5–272.4 | 272.4–308.6 | ≥ 308.6 | Unavailable

2019 county estimates; cells below the manuscript reporting threshold are unavailable.
Mensah et al. Cardiovascular Disease Mortality by County, Race, and/or Ethnicity, United States, 2000–2019.

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Treatment Delayed is Treatment Denied



Recognize the Signs

Chest pain, arm discomfort, shortness of breath—know the red flags.



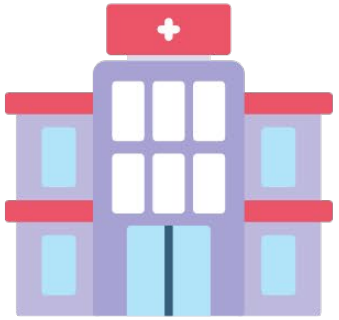
Alert Emergency Services

Call 911 right away—don't wait it out.



Care Starts with EMS

Paramedics begin life-saving interventions en route.



Enter the Emergency Department

Immediate assessment and triage begin.



Definitive Treatment in Cath Lab

Restoring blood flow saves heart muscle.



EVERY MINUTE COUNTS: BLOOD FLOW TREATMENT DELAYED

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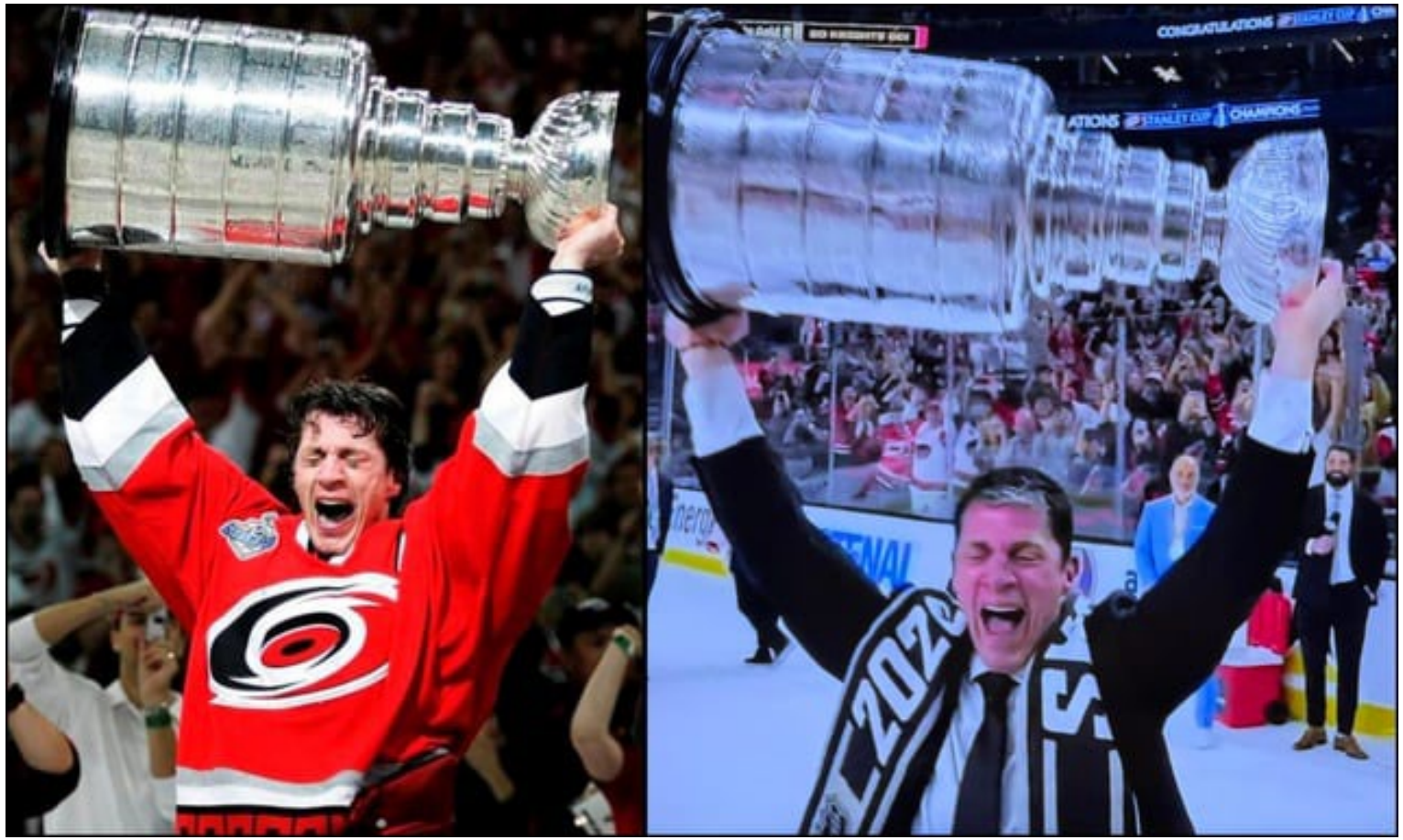
STEMI Care is a team sport with well defined rules…why is winning is still so hard?

Can we learn from others outside of medicine?

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What Can a Hockey Team Teach VHAC?
…Culture and Data



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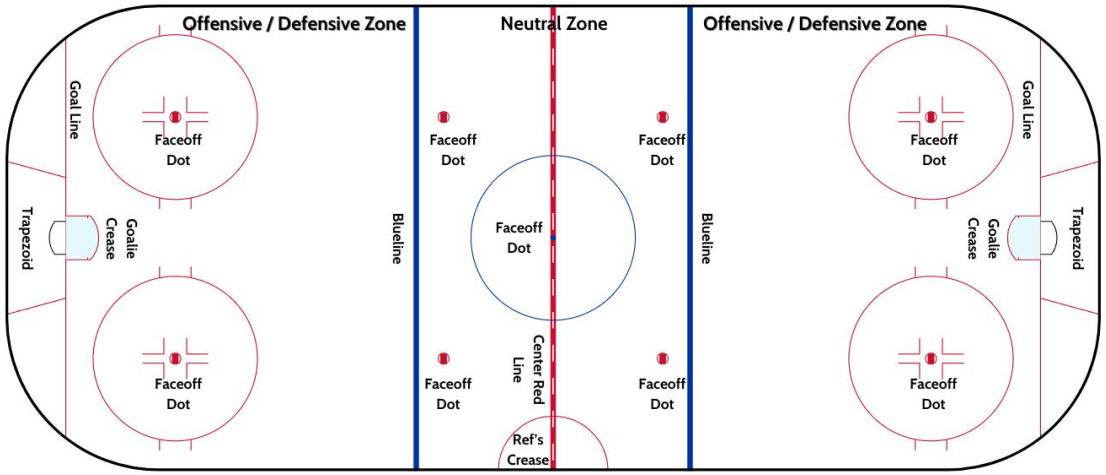
A new perspective…

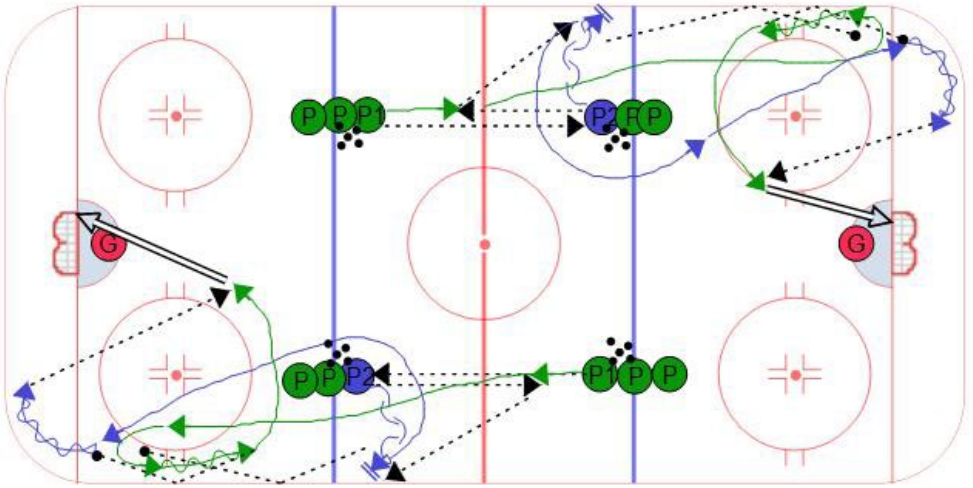


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Crunch the numbers…

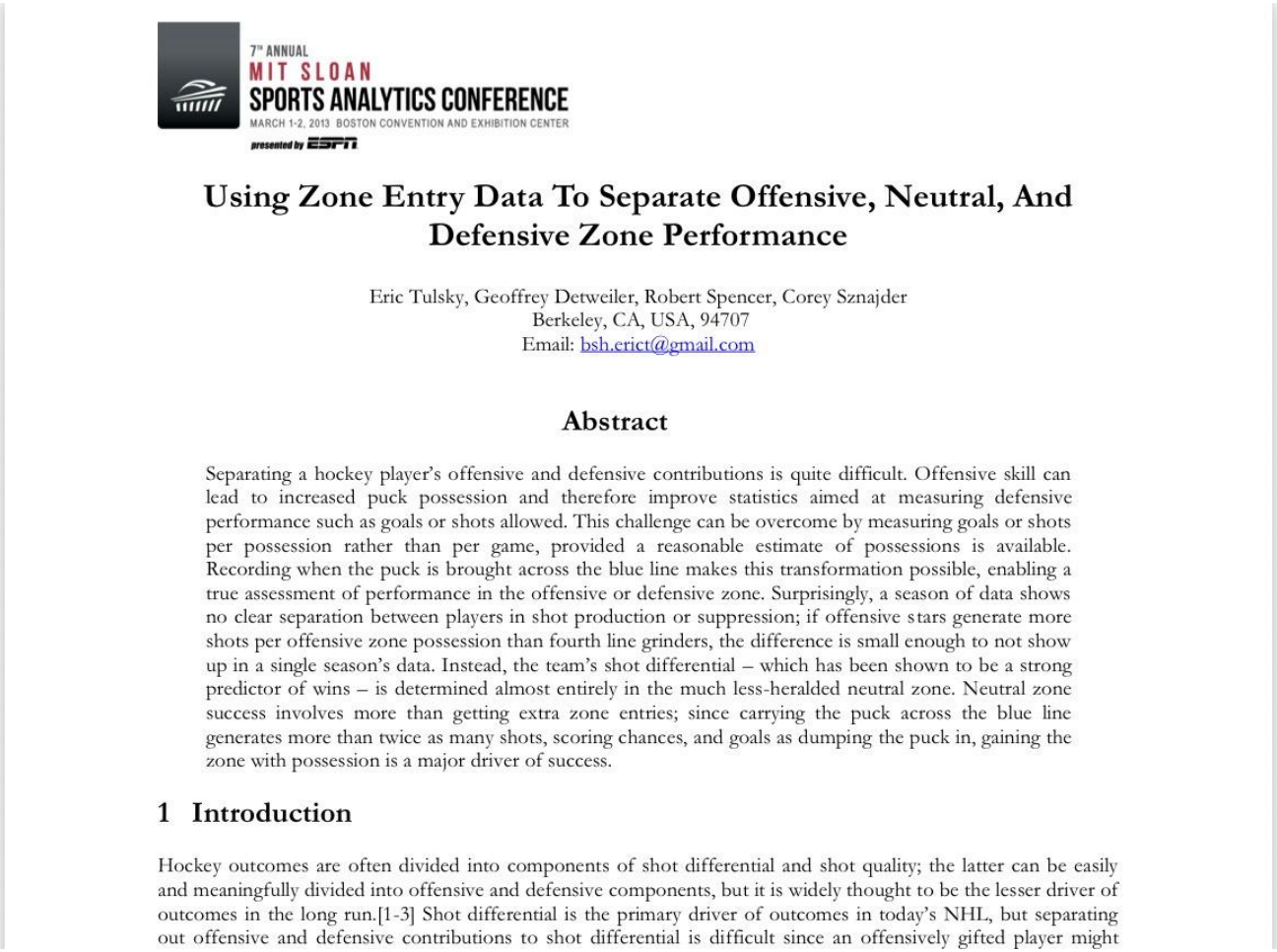




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An obscure paper that changed the NHL



7TH ANNUAL
MIT SLOAN
SPORTS ANALYTICS CONFERENCE
MARCH 1-2, 2013 BOSTON CONVENTION AND EXHIBITION CENTER
presented by ESPN

Using Zone Entry Data To Separate Offensive, Neutral, And Defensive Zone Performance

Eric Tulsky, Geoffrey Detweiler, Robert Spencer, Corey Sznajder
Berkeley, CA, USA, 94707
Email: bsh.erict@gmail.com

Abstract

Separating a hockey player's offensive and defensive contributions is quite difficult. Offensive skill can lead to increased puck possession and therefore improve statistics aimed at measuring defensive performance such as goals or shots allowed. This challenge can be overcome by measuring goals or shots per possession rather than per game, provided a reasonable estimate of possessions is available. Recording when the puck is brought across the blue line makes this transformation possible, enabling a true assessment of performance in the offensive or defensive zone. Surprisingly, a season of data shows no clear separation between players in shot production or suppression; if offensive stars generate more shots per offensive zone possession than fourth line grinders, the difference is small enough to not show up in a single season's data. Instead, the team's shot differential – which has been shown to be a strong predictor of wins – is determined almost entirely in the much less-heralded neutral zone. Neutral zone success involves more than getting extra zone entries; since carrying the puck across the blue line generates more than twice as many shots, scoring chances, and goals as dumping the puck in, gaining the zone with possession is a major driver of success.

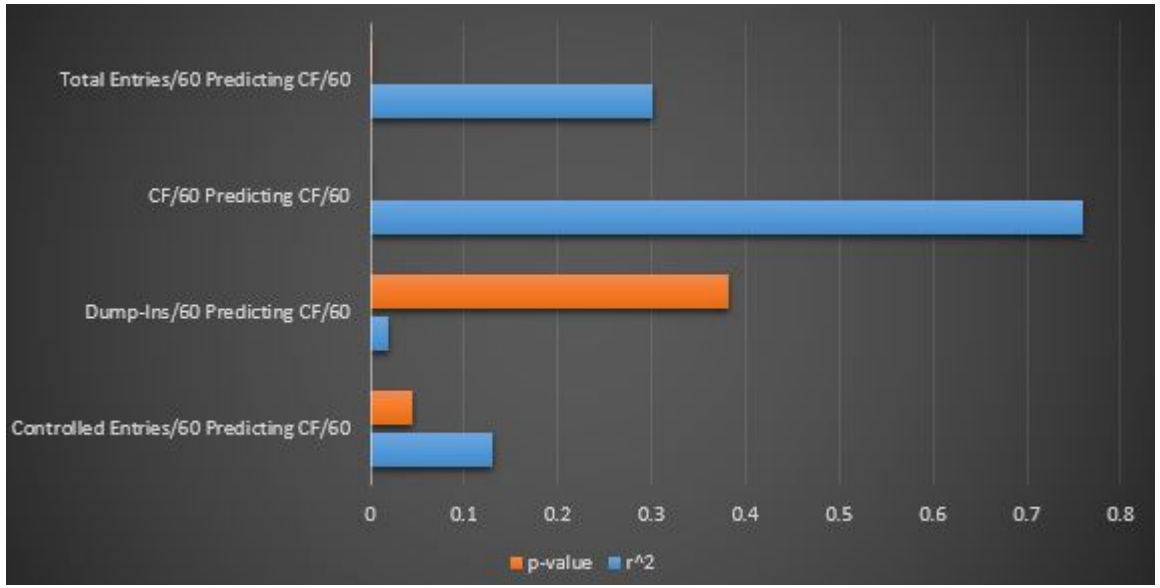
1 Introduction

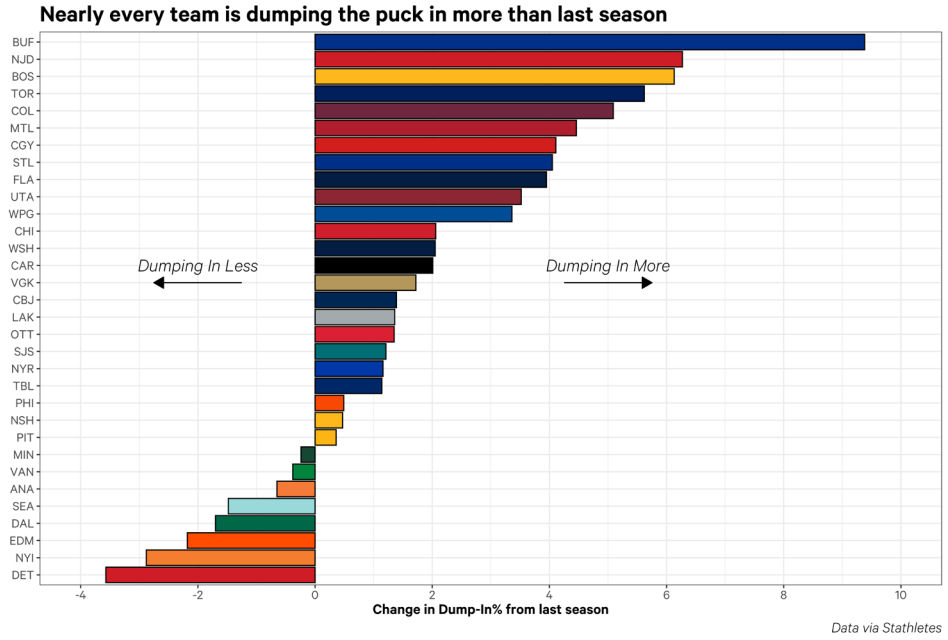
Hockey outcomes are often divided into components of shot differential and shot quality; the latter can be easily and meaningfully divided into offensive and defensive components, but it is widely thought to be the lesser driver of outcomes in the long run.[1-3] Shot differential is the primary driver of outcomes in today's NHL, but separating out offensive and defensive contributions to shot differential is difficult since an offensively gifted player might

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NHL goals…data driven???





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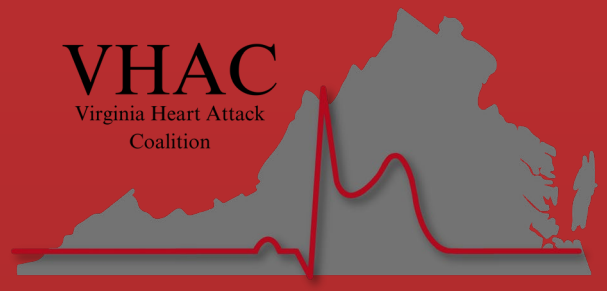
Relationships and Culture





What can a hockey team teach VHAC?

- Use data to drive change
- Take time to understand the perspective and challenges of your teammates, and focus on culture
- Put the needs of the team above that of the individual or health system
- Set a goal and drive relentlessly toward it—keep the patient at the center!!!



VCSQI/VHAC STEMI Registry State Data

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Virginia Heart Attack Coalition



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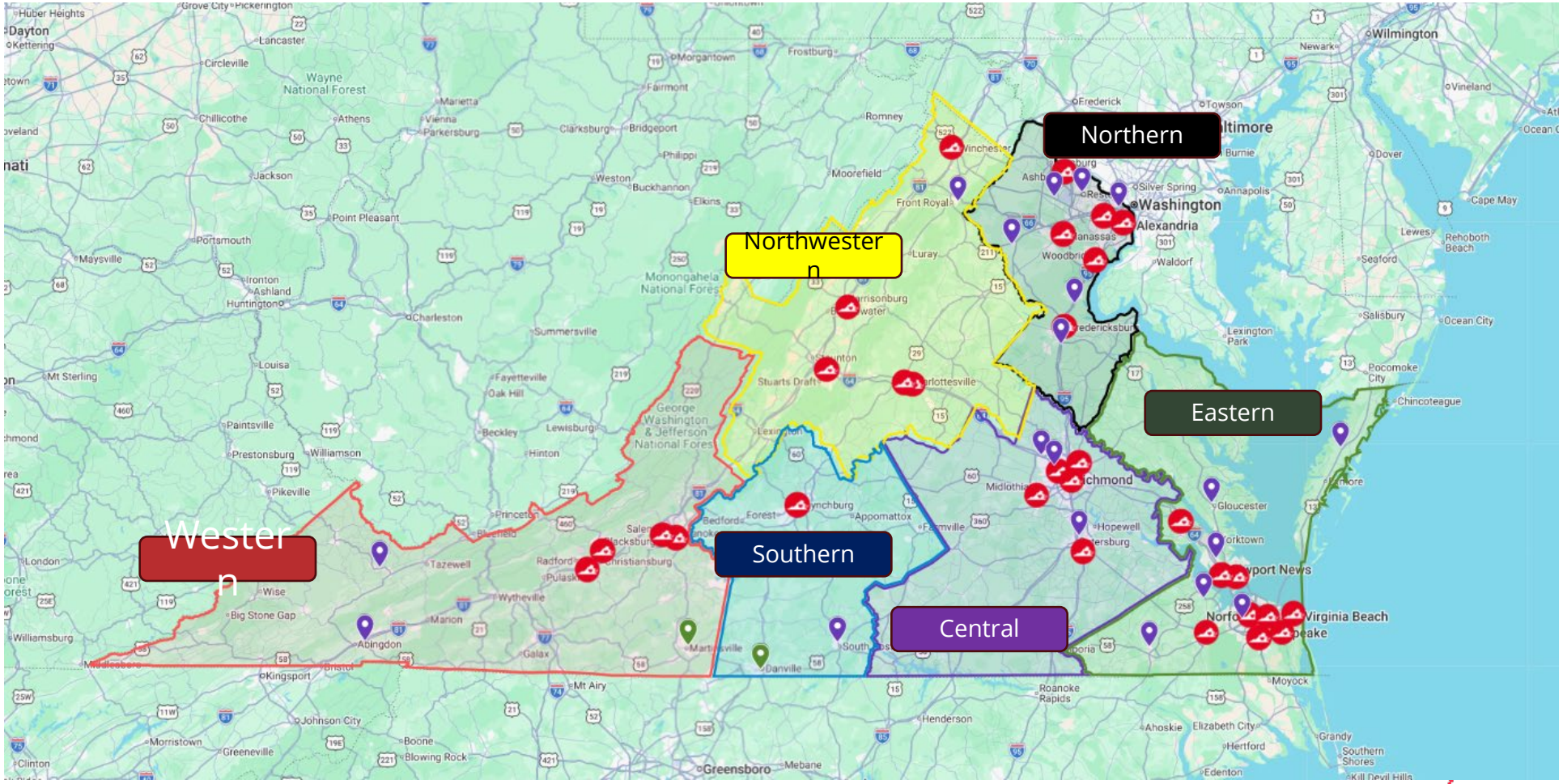
VHAC Strategic Plan…The Strategic Priority "Pillars"



VHAC Regional STEMI System Map

VHAC PARTICIPATION STATUS

- VHAC Participant — Data Submitting
- VHAC Participant — Not Submitting Data
- Not Currently Participating in VHAC



Levels of VHAC / VCSQI Participation

Current participation profile based on the 2026 VCSQI/VHAC membership workbook

5	**FULLY INTEGRATED** CathPCI + STEMI + VCSQI Cardiac Surgery	10 sites
4	**CARDIOLOGY INTEGRATED** CathPCI + STEMI	13 sites
3	**PARTIAL / TRANSITION** CathPCI only, preparing for STEMI, alternate MI registry, or agreement signed with no data yet	6 sites
2	**CARDIAC SURGERY ONLY** VCSQI Cardiac Surgery participation without CathPCI or STEMI	4 sites
1	**NO CURRENT VCSQI REGISTRY** No current CathPCI, STEMI, or VCSQI Cardiac Surgery participation	13 sites

The Dirty Dozen (well…17)

Bon Secours Maryview Medical Center
Carilion New River Valley Medical Center
Chippenham Hospital
Clinch Valley Medical Center
Fauquier Health
Henrico Doctors Hospital
Johnston Memorial Hospital
Lewis Gale Medical Center
Mary Immaculate Hospital
Reston Hospital Center
Sentara Halifax Regional Hospital
SOVAH Health - Danville
SOVAH Health - Martinsville
Spotsylvania Regional Medical Center (HCA)
Stonesprings Hospital Center
VHC Health
Warren Memorial Hospital

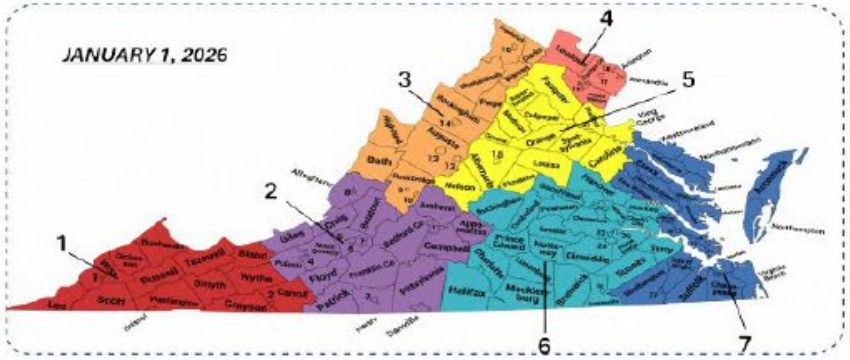
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Virginia EMS System Optimization: Statewide Connection. Regional Collaboration. Local Impact.

SYSTEM OPTIMIZATION SPECIALIST
Virginia Office of Emergency Medical Services

- Coordinates statewide EMS performance improvement
- Analyzes EMS data from the State Repository
- Develops statewide metrics and reports
- Provides education, tools, and feedback
- Interfaces directly with the 7 Regional Councils



DIRECTLY INTERFACES WITH THE 7 REGIONAL COUNCILS

REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7
Regional Council	Regional Council	Regional Council	Regional Council	Regional Council	Regional Council	Regional Council
Serves as the local connection to EMS agencies	Serves as the local connection to EMS agencies	Serves as the local connection to EMS agencies	Serves as the local connection to EMS agencies	Serves as the local connection to EMS agencies	Serves as the local connection to EMS agencies	Serves as the local connection to EMS agencies

REGIONAL COUNCILS CONNECT WITH LOCAL PARTNERS

EMS Agencies | Hospitals | Trauma Programs | Stroke Programs | Cardiac Partners (e.g., VHAC) | Public Health | Healthcare Coalitions | State Agencies | Other Partners

SHARED GOAL

Data Collection | Education & Training | Quality Improvement | Performance Metrics & Benchmarking | Feedback & Continuous Improvement

BETTER CARE. BETTER OUTCOMES. STRONGER VIRGINIA.

STATEWIDE DATA → REGIONAL COLLABORATION → LOCAL IMPROVEMENT → BETTER PATIENT OUTCOMES

VDH Virginia Department of Health
Office of Emergency Medical Services

Statewide Performance Improvement Metrics (NEW!)

Increase Administration of Oxygen to Hypoxic Patients

- By December 31, 2026, Virginia EMS providers will increase the proportion of hypoxic patients (SpO_2 < 90%) originating from a 911 request who receive documented oxygen therapy to 60% statewide, as measured through EMS patient care reports in the Virginia EMS Repository.

Increase Administration of Aspirin for Cardiac-Suspected Chest Pain

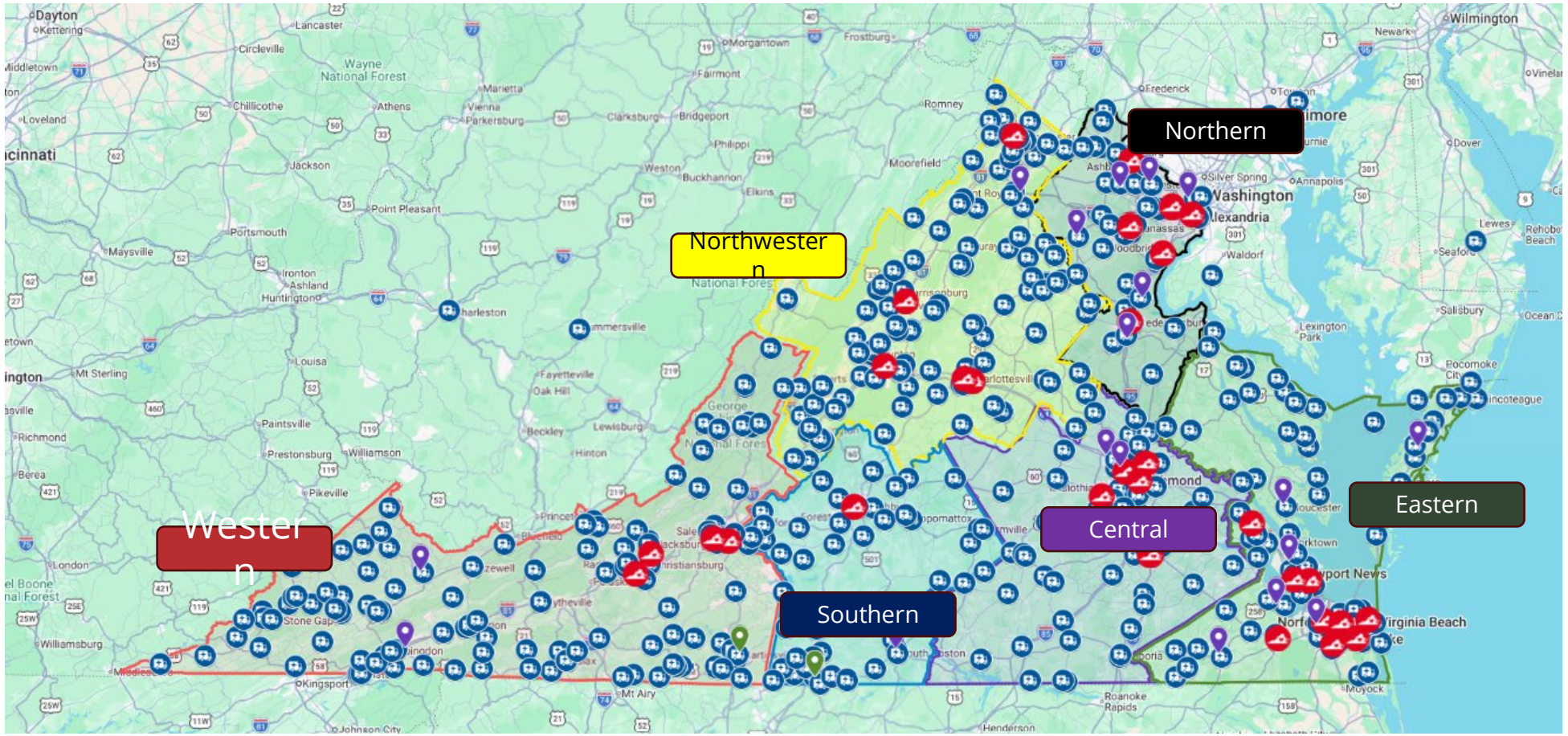
- By December 31, 2026, Virginia EMS agencies will increase the proportion of eligible patients experiencing chest pain of suspected cardiac origin originating from a 911 request who receive aspirin to 60% statewide, as measured through EMS patient care reports in the Virginia EMS Repository.

In 2025, 50% of non-traumatic chest pain EMS patients aged 35 or older were documented as receiving aspirin administration (Virginia MDC Key Indicator) and 35% of hypoxic EMS patients (SpO_2 < 90%) received documented oxygen therapy (NEMSQA Respiratory-02 Measure).

VHAC Regional STEMI System Map

VHAC PARTICIPATION STATUS

- VHAC Participant — Data Submitting
- VHAC Participant — Not Submitting Data
- Not Currently Participating in VHAC
- EMS Agency



Clinical Workgroups

Direct to Cath (formerly ED Bypass)

- Algorithm available

Cardiogenic Shock

- Protocol available

EMS Education

- ECG Fundamentals available

PE Response Team

- Protocol Available

Thrombolytics

- Lytic Algorithm Tool available

Data Managers FTE

- FTE Recommendations available

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2026…

Clinical Workgroups: EMS Lectures, Shock Case Presentations, Door to CCL Targets, PERT, etc.

Regional Development (New Leaders!)

Continued Growth of the STEMI Registry

Partnership with OEMS

VHAC Toolkit

VIRGINIA HEART ATTACK COALITION

Every Heart. Every Region. Every Virginian.

The Virginia Heart Attack Coalition brings together hospitals, EMS agencies, clinicians, and regional leaders to strengthen heart attack systems of care across the Commonwealth.



WHAT WE DO

SUPPORT REGIONAL COLLABORATION
Support regional collaboration between hospitals and EMS.

ADVANCE STEMI & HEART ATTACK SYSTEMS
Advance STEMI and heart attack systems of care.

PROMOTE EDUCATION & BEST PRACTICES
Promote education, quality improvement, and best practices.

USE DATA TO IMPROVE
Use data to identify opportunities and drive improvement.

CONNECT CLINICAL LEADERS
Connect clinical leaders across Virginia.

Join a regional meeti… workgroup, or co…

VHAC
COLLABORATIVE COUNCIL
STRONGER TOGETHER. BETTER OUTCOMES.

Your Patient, Your Community

Better STEMI Care for Every Patient, Every Time.

Join healthcare professionals, EMS leaders, and system partners across Virginia to improve STEMI systems of care through data, colla…



WHEN EMS, ED, AND … ARE … WE AL…

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…TOGETHER, W… …IMPROVE OUT…

VIRGINIA HEART ATTACK COALITION

A Part of the Virginia Cardiac Services Quality Initiative (VCSQI)

Advancing Systems of Care for Heart Attack Patients
www.vaheartattackcoalition.org
info@vaheartattackcoalition.org



PROUD MEMBER
VIRGINIA HEART ATTACK COALITION
DRIVING STATEWIDE CARDIOVASCULAR CARE STANDARDS
STATEWIDE COLLABORATIVE EXCELLENCE

SHARE YOUR EXPERIENCE.
DRIVE BETTER CARE ACROSS VIRGINIA.

Now accepting presentations for VHAC Workgroups!

Help strengthen cardiovascular systems of care by sharing case reviews, quality initiatives, workflow strategies, challenging cases, and best practices that benefit healthcare teams across the Commonwealth.

MULTIDISCIPLINARY PRESENTATION ARE ENCOURAGED.

WHY PRESENT?
- Share what works
- Help others learn and improve
- Strengthen systems of care
- Build connections across Virginia

Your experienc can make a difference for patients across our state!

PRESENTATION FORMAT
- 10–15 minutes Presentation
- 10–15 minutes Discussion / Q&A
- Approximately 20–30 minutes total

Interactive discussion is a key part of every session.

EXAMPLES INCLUDE
- Case reviews
- Workflow improvements
- Quality initiatives
- Difficult or educational cases
- Lesses learned
- Innovative practices
- System challenges & solutions

PRESENTATION OPPORTUNITIES INCLUDE:

VHAC COLLABORATIVE … SHOCK … PE RESPONSE TEAM

VHAC
VIRGINIA HEART ATTACK COALITION

TOGETHER, WE SAVE LIVES.

Your agency plays a critical role in Virginia's cardiovascular system of care. HVAC connects EMS, hospitals, clinicians, and partners to strengthen care from the first call to recovery and beyond.

EMS IS ESSENTIAL. YOUR VOICE MATTERS.

Your experience in the field provides valuable insight that helps improve systems, update protocols, enhance communication, and improve patient outcomes across Virginia.

WHEN YOU ENGAGE, YOU HELP TO:
- Strengthen collaboration between EMS agencies, hospitals, and partners
- Improve data, quality, and performance across the Commonwealth
- Shape initiatives that support prehospital and hospital care
- Enhance education, protocols, and resources for EMS professionals
- Ensure your agency is represented and recognized

PARTICIPATION EXPECTATIONS
- ≥ 75% STATEWIDE MEETING ATTENDANCE
- ≥ 75% REGIONAL MEETING ATTENDANCE
- ≥ 1 WORKGROUP OR INITIATIVE PARTICIPATION

A strong system starts with active participation.

MORE THAN AN EMAIL LIST. IT'S ABOUT ENGAGEMENT.

COMPLETE THE VHAC PARTICIPANT REGISTRATION & ENGAGEMENT FORM
Stay connected. Stay informed. Stay engaged.

COMPLETE THE FORM TODAY: vaheartattackcoalition.org/participate

Mission: Improve cardiovascular care across Virginia through education, data, and collaboration.



COLLABORATIVE …

MEETING DETAILS
…HAC Collaborative Council Meetings
Third Thursday of Every Month
6:30 - 7:30 PM
Microsoft Teams

THIS IS WHERE CHANGE HAPPENS
- Align statewide workgroups
- Contribute to protocols, tools, and strategies
- Collaborate with EMS, cardiology, and hospital leaders

JOIN NOW

VIRGINIA HEART ATTACK COALITION

Partnering with EMS to Strengthen Cardiac Systems of Care

The Virginia Heart Attack Coalition (VHAC) brings together EMS agencies, hospitals, and cardiovascular specialists to improve care for patients experiencing heart attack and other cardiac emergencies.

Through collaboration, shared data, and clinical leadership, VHAC works to strengthen coordination between prehospital providers and hospital teams across Virginia.

WHY EMS AGENCIES PARTICIPATE
Participation in VHAC helps EMS agencies strengthen clinical performance and engagement across the cardiac care system.

EMS PARTNERS GAIN OPPORTUNITIES FOR:
- Collaboration with cardiologists and hospital teams
- Access to cardiac-focused education and training
- Participation in statewide system-of-care initiatives
- Recognition of EMS contributions to patient outcomes



VHAC EMS STRATEGIC FOCUS

Training & Education
Cross-training opportunities where EMS providers engage with physicians and hospital teams through case discussions, ECG education, and regional learning sessions.

Closing the Outcome Loop
Connecting EMS providers with patient outcomes.
EMS providers often transport patients without ever learning the final outcome. VHAC is working to share cardiac intervention and outcome data so EMS providers can better understand the impact of their care.

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2026..A Pivotal Year

- Strengthened regional leadership
- Expanded EMS education and engagement
- Moved from workgroup discussion to implementation

Opportunities for 2027

- Reach more stakeholders—improve communication and engagement
- Transfer STEMI's and thrombolytics
- Educational Offerings—EMS lecture, Shock presentations, local conferences
- Collaboration with the OEMS
- Implementing new technologies—prearrival communication, AI for STEMI/OMI recognition
- STEMI Registry Participation.

Challenges for 2027 and Beyond!

- **Maintaining the Gains** Achieved and a **Steady Focus**
- **Broadening the Coalition** thru Recruitment, Retention, and Engagement—across all regions and healthcare systems
- Strengthening **Stakeholder and Systems Support** and Partnership during a Time of Financial and Operational Strain
- **Adapting and Redefining our Role** in a Changing Organizational and Scientific Landscape

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BOARD OF DIRECTORS



Peter O'Brien, MD
Centra Lynchburg General Hospital
Co-founder, and Chair, Virginia Heart Attack Coalition (VHAC)



Michael Kontos, MD -Co-Chair
Virginia Commonwealth University
Co-founder, and Chair, Virginia Heart Attack Coalition (VHAC)



Yasmin Ahmady, NRP, AAS
Prince William Department of Fire and Rescue



Melanie B. Johnson, MSN, RN-BC
Carilion Clinic



Kayla Long, DO
Centra Lynchburg General Hospital



Bob Page, M.Ed., NRP
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Rajan Patel, MD
UVA Health Heart and Vascular Center



Megan Vaughan, MSN, RN
Bon Secours Heart & Vascular Institute

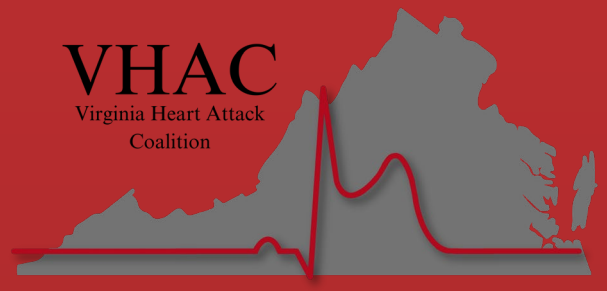
Celebrate the Progress, but Commit to the Future

- 18 Years and going strong
- Increased the number of Ambulances in the Commonwealth with 12 leads from 60% to 99%, and educated and trained hospitals and EMS in guideline driven care.
- Lowered the First Medical Contact to Balloon time from 95 to <70 minutes statewide
- Created our own STEMI Registry and recruited 28 PCI centers
- Enlisted experts from UVA, Sentara, Inova, Carilion, VCU, Bon Secours, and other members of VHAC to join us and create clinical workgroups on Shock, PE, EMS education, Thrombolytics, and ED Bypass
- Meet monthly and share best practices/data with hospitals and EMS agencies from across Virginia

VHAC won't stop until every patient in Virginia has access to optimal MI care…

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Regional Reporting

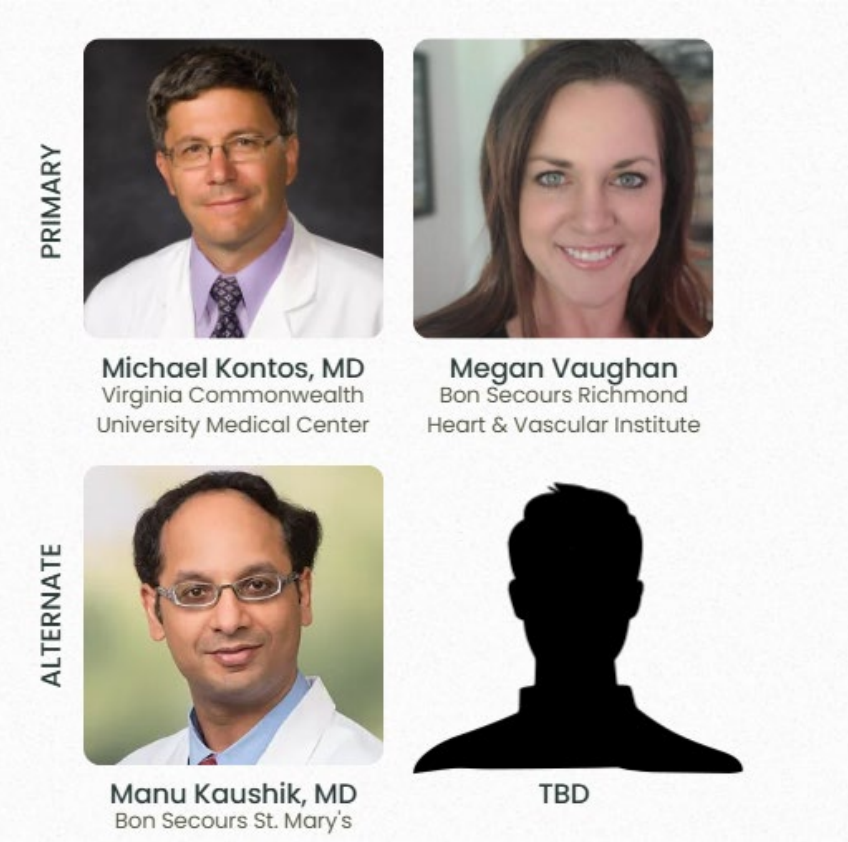
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Central Region



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Who We Are



Subsection: Health System and EMS

Overview of the health systems and EMS partners involved

PCI Centers:

1. VCU Medical Center
2. Bon Secours St. Mary's Hospital
3. Bon Secours Memorial Regional Medical Center
4. Bon Secours St. Francis Medical Center
5. Bon Secours Southside Medical Center
6. CJW Medical Center
7. Henrico Doctors' Hospital

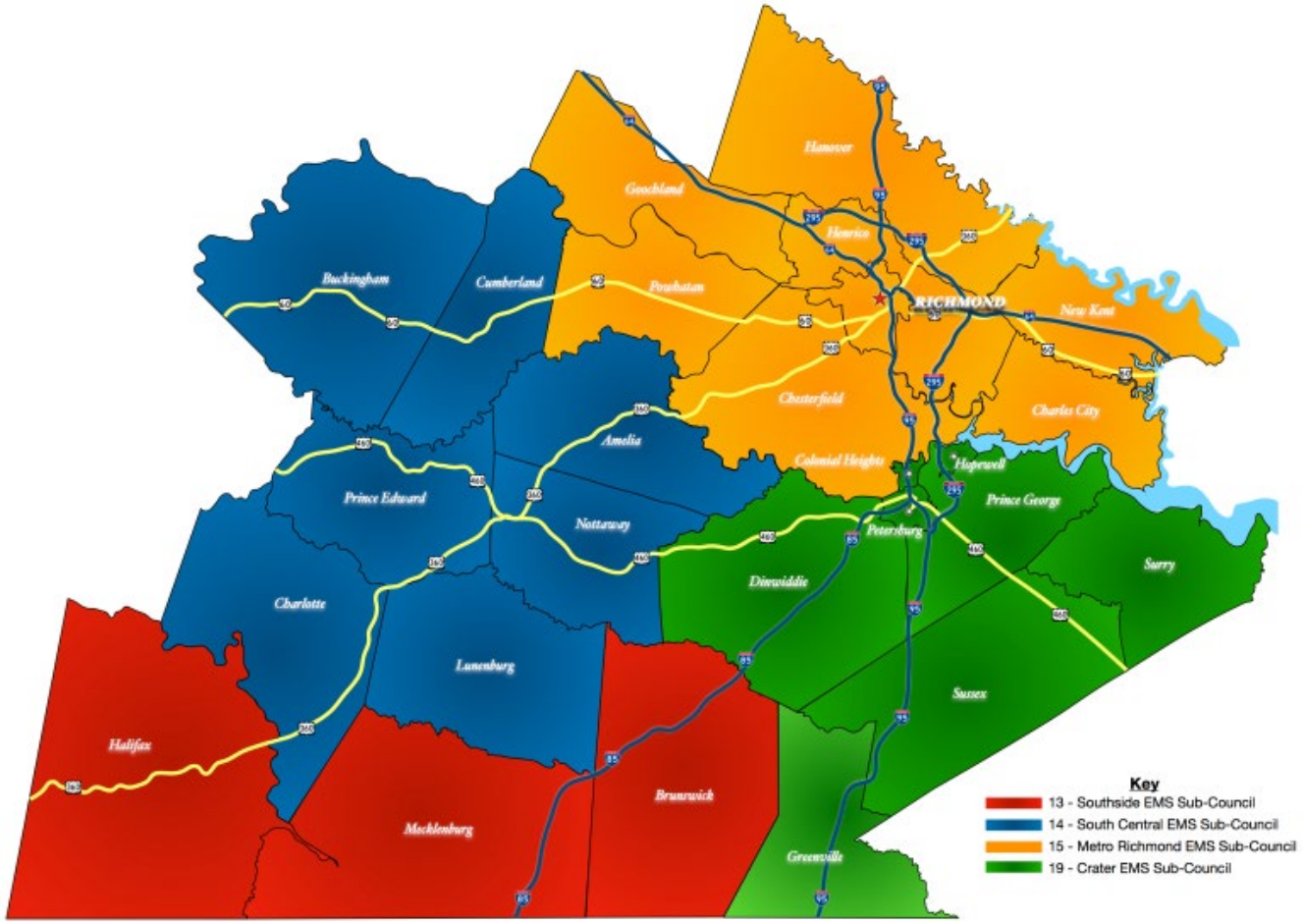
ODEMSA REGIONAL EMS AGENCIES

Central@vaheartattackcoalition.org

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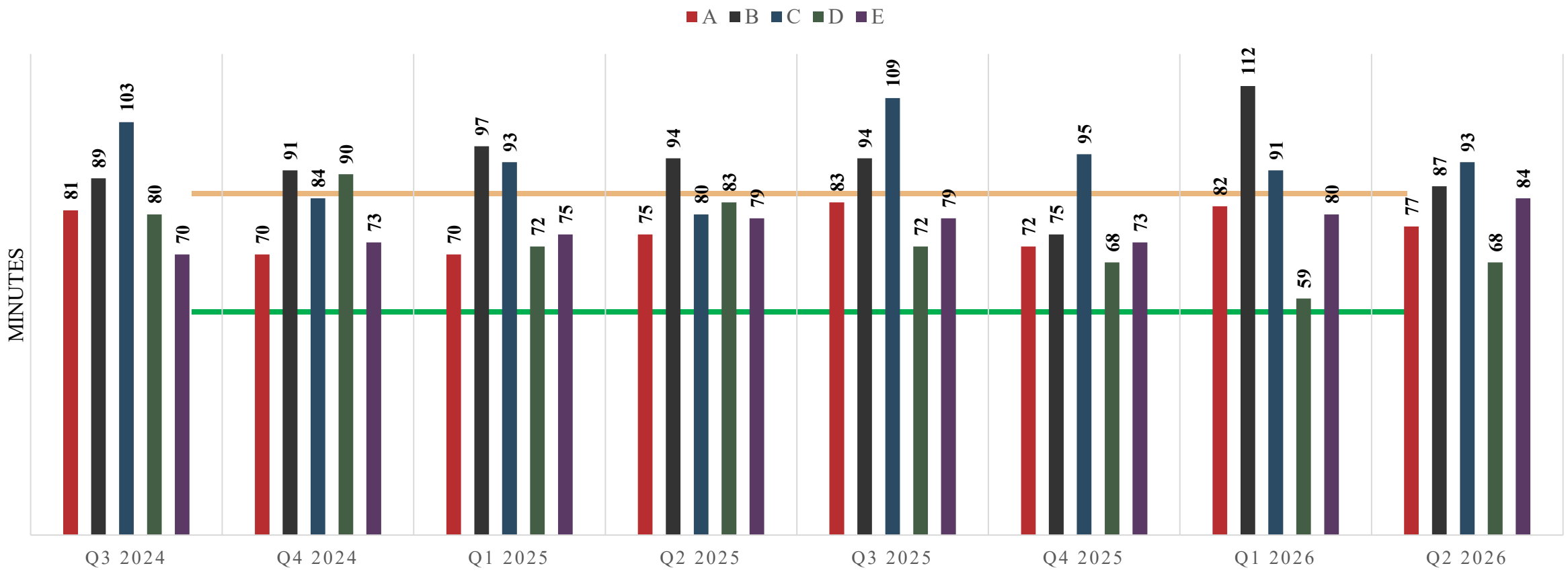
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REGION 6 EMS



https://odemsa.net/ems-agencies/

NCDR CPMI Metric #13443
Median First Medical Contact Time to Device (No Exceptions)



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2026: Regional Achievements

- **ODEMSA Region 6- Relaunched structure and has been building momentum since January 2026**
  - EMS Representation: Achieved Quorums
  - Improved Communication
  - Alignment of Central Region Initiatives
  - Standardized ESO Reporting Platform
- Direct to Cath Lab Processes Launched
- Increased Pre-Hospital EKG Transmissions
- Reducing False STEMI Team activation and reperfusion times

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2026: Educational Offerings

- VHAC 12-lead EKG & STEMI Care
  - 2026 Virginia Fire Rescue Conference
  - 2026 Bon Secours EMS Expo
  - Hanover Volunteer Fire Department (1 session)
  - Petersburg Fire & EMS (3 sessions)
  - Hopewell Fire & EMS (4 sessions)

2027 Focus & Goals

- Revise & Update all ODEMSA/Region 6 Cardiovascular Protocols
- Anonymized & Consolidated Hospital Data (VCSQI)
- Improved EMS Reporting Platform (ESO)
- Continued Outreach and Education
- Promote Direct to Cath Lab Initiatives
- Improve Transfer Processes, Reduce door-in-door-out times
- Standardize Thrombolytic Processes for Non-PCI Centers

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2026 Mission: Lifeline EMS Awards

- GOLD: Target Heart Attack
  - Chesterfield Fire EMS
  - Goochland County Department of Fire-Rescue & EMS
  - Henrico County Division of Fire



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2026 Hospital Recognitions

VCU

- ACC Chest Pain Accreditation Primary PCI + Resuscitation- Platinum Service Award (2008-2026)
- 2026 US Health & World News #1 Hospital
- 2026 ELSO Gold Level Recognition (3rd consecutive year)

HCA:

- **Chippenham Hospital**
  - STS 3-STAR ASCD (Jan 2022-December 2025)
  - 2026 US Health & World News #2 Hospital
  - Top 50 Cardiovascular Hospitals- Watson Health
- **Henrico Doctors' Hospital**
  - Modern Healthcare Presents the 50 Top Cardiovascular Hospital Programs
  - Healthgrades Excellence 2026: Cardiac Care, Coronary Intervention
  - 2026 US Health & World News Best Hospitals

Bon Secours:

- **St. Mary's Hospital**
  - ACC NCDR Chest Pain MI Silver
  - AHA GWTG Target Heart Failure GOLD +
  - STS 3 STARS ASCD (Jan 2022-Dec 2025)
  - US Health & World News #3 Hospital
- **St. Francis Medical Center**
  - ACC NCDR Chest Pain MI Silver
  - AHA GWG Target Heart Failure BRONZE
- **Southside Medical Center**
  - AHA GWTG Target Heart Failure BRONZE
- **Memorial Regional Medical Center**
  - STS 3 STARS ASCD (Jan 2022-Dec 2025)
  - AHA GWTG Target Heart Failure BRONZE
- **Southern Virginia Regional**
  - AHA GWTG Target Heart Failure SILVER

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Future Regional Meetings

2026-2027 Meetings

- Region 6 STEMI Council Meetings
  - *Pending final confirmation***
  - January 21, 2027 0800
  - April 15, 2027 0800
  - July 15, 2027 0800
  - October 21, 2027 0800

ODEMSA Leadership

- https://odemsa.net/stemi/
  - STEMI Council Chair: Dr. Alan Yee
  - ODEMSA Field Coordinator: Heather Nelson
  - ODEMSA Training Director: Chris Vernovai
  - ODEMSA Executive Director: Heidi Hooker
  - ODEMSA Deputy Director: Ryan Scarbrough

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Thank You

Central@vaheartattackcoalition.org

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Eastern Region

2026 Statewide Regional Report

Dr. Anand Krishnan

Proud partner of VCSQI



Eastern Region Overview

EASTERN REGION LEADERSHIP



Anand Krishnan, MD

Physician Chair



Wendy Freeman

Administrative Chair



Petra Lynch, MD

Physician Co-Chair



Jenn Woodard

Administrative Co-Chair

EMS Liaison

Jason Lovitz
Norfolk Fire & Rescue

17

9 PCI-capable hospitals

8+ transfer / referral hospitals and emergency sites

91+

Region 7 includes 8,800+ providers across 26 jurisdictions, with additional Peninsula and Eastern Shore partners.

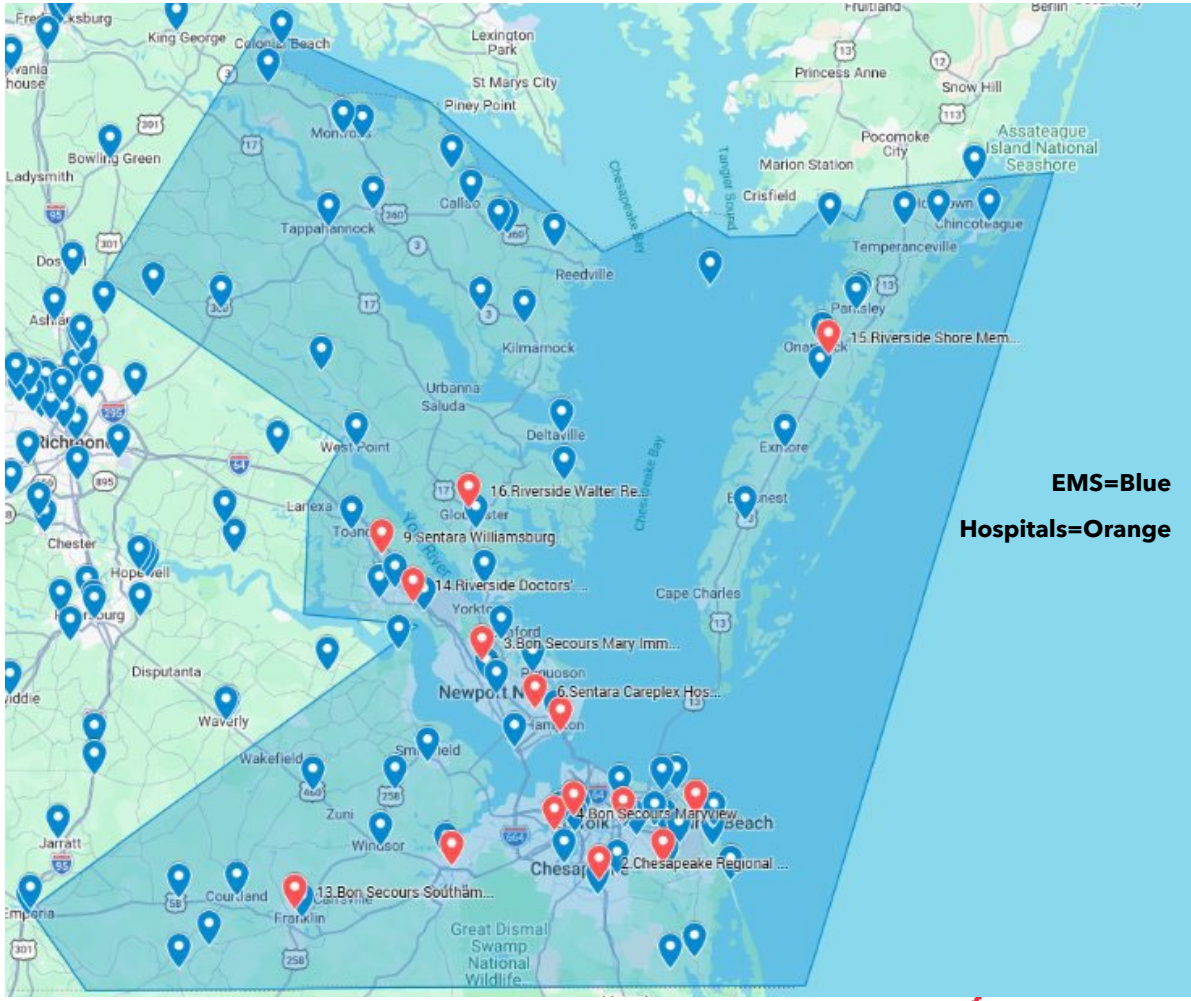
REGIONAL REACH

Hampton Roads • Peninsula • Western Tidewater • Eastern Shore

Eastern Hospitals

PCI & Non-PCI Centers

1. **Riverside Regional Medical Center - Newport News, VA**
2. Chesapeake Regional Medical Center - Chesapeake, VA
3. Bon Secours Mary Immaculate – Newport News, VA
4. Bon Secours Maryview Medical Center – Portsmouth, VA
5. **Sentara Norfolk General Hospital – Norfolk, VA**
6. **Sentara Careplex Hospital – Hampton, VA**
7. **Sentara Leigh Hospital – Norfolk, VA**
8. **Sentara Virginia Beach General Hospital – Virginia Beach,VA**
9. **Sentara Williamsburg Regional Medical Center –Williamsburg, VA**
10. **VA Medical Center – Hampton, VA**
11. **Sentara Princess Anne Hospital – Virginia Beach, VA**
12. **Sentara Obici Hospital – Suffolk, VA**
13. Bon Secours Southampton Medical Center – Franklin, VA
14. **Riverside Doctors' Hospital – Williamsburg, VA**
15. **Riverside Shore Memorial Hospital – Onancock, VA**
16. **Riverside Walter Reed Hospital – Gloucester, VA**
17. Riverside Smithfield Hospital – Smithfield, VA



Eastern EMS Agencies

- ABINGDON VOLUNTEER FIRE & RESCUE, INC.
- BLACKWATER VOLUNTEER RESCUE SQUAD
- BLOXOM VOLUNTEER FIRE COMPANY
- BUSCH GARDENS - WATER COUNTRY USA
- CALLAO RESCUE SQUAD INC
- CARDINAL AMBULANCE SERVICE, INC
- CARROLLTON VOLUNTEER FIRE DEPARTMENT
- CHESAPEAKE BEACH VOLUNTEER RESCUE SQUAD
- CHESAPEAKE FIRE DEPARTMENT
- CHINCOTEAGUE VOLUNTEER FIRE COMPANY
- COLONIAL BEACH VOLUNTEER FIRE DEPARTMENT INC
- COMMUNITY FIRE COMPANY INC
- COPLE DISTRICT VOLUNTEER FIRE DEPARTMENT
- CREEDS VOLUNTEER RESCUE SQUAD
- Chenega Global Protection, LLC / DBA NASA - Wallops Flight Facility
- DAVIS CORNER VOLUNTEER RESCUE SQUAD
- ESSEX COUNTY EMS
- **FRANKLIN FIRE & RESCUE**
- GLOUCESTER VOLUNTEER FIRE & RESCUE SQUAD, INC
- GREENBACKVILLE VOLUNTEER FIRE DEPARTMENT
- HAMPTON DIVISION OF FIRE/RESCUE
- ISLE OF WIGHT FIRE-RESCUE
- ISLE OF WIGHT VOLUNTEER RESCUE SQUAD, INC.
- IVOR VOLUNTEER RESCUE SQUAD
- JAMES CITY COUNTY FIRE DEPARTMENT
- JAMES CITY RESCUE SQUAD
- KEMPSVILLE VOLUNTEER RESCUE SQUAD
- KILMARNOCK-LANCASTER VOLUNTEER RESCUE SQUAD
- KING & QUEEN COUNTY DEPARTMENT OF EMERGENCY SERVICES
- KING WILLIAM COUNTY FIRE & EMERGENCY SERVICES
- LANCASTER COUNTY EMERGENCY SERVICES
- MANGOHICK VOLUNTEER FIRE DEPARTMENT, INC
- MATHEWS VOLUNTEER RESCUE SQUAD
- MELFA VOLUNTEER FIRE & RESCUE
- MID-COUNTY VOLUNTEER RESCUE SQUAD
- MIDDLESEX COUNTY VOLUNTEER RESCUE SQUAD, INC
- **NEWPORT NEWS FIRE DEPARTMENT**
- NEWPORT NEWS SHIPBUILDING FIRE DEPARTMENT
- NEWPORT VOLUNTEER RESCUE SQUAD
- NORFOLK AIRPORT AUTHORITY FIRE DEPARTMENT
- **NORFOLK FIRE-RESCUE**
- NORTHAMPTON COUNTY DEPARTMENT OF EMS
- NORTHUMBERLAND COUNTY RESCUE SQUAD
- NORTHUMBERLAND DEPARTMENT OF EMERGENCY SERVICES
- OAK GROVE VOLUNTEER FIRE DEPARTMENT
- OAK HALL RESCUE, INC.
- OCEAN PARK VOLUNTEER RESCUE SQUAD
- ONANCOCK VOLUNTEER FIRE DEPARTMENT
- PARKSLEY VOLUNTEER FIRE COMPANY, INC.
- PLAZA VOLUNTEER RESCUE SQUAD
- POQUOSON FIRE & RESCUE
- PORTSMOUTH FIRE, RESCUE & EMERGENCY SERVICES
- PRINCESS ANNE COURTHOUSE VOLUNTEER RESCUE SQUAD
- RICHMOND COUNTY EMERGENCY MEDICAL SERVICES
- SANDBRIDGE VOLUNTEER RESCUE SQUAD
- SAXIS VOLUNTEER FIRE AND RESCUE, INC
- SHORE TRANSPORT SERVICES, INC
- SUFFOLK FIRE & RESCUE
- SURRY NUCLEAR POWER STATION
- TANGIER VOLUNTEER FIRE DEPARTMENT
- UPPER LANCASTER VOLUNTEER RESCUE SQUAD
- **VIRGINIA BEACH DEPARTMENT OF EMS**
- VIRGINIA BEACH LIFESAVING
- **VIRGINIA BEACH VOLUNTEER RESCUE SQUAD**
- WEST POINT VOLUNTEER FIRE DEPARTMENT
- WESTMORELAND COUNTY DEPARTMENT OF EMERGENCY SERVICES
- WESTMORELAND VOLUNTEER FIRE DEPARTMENT
- WILLIAMSBURG FIRE DEPT – EMS
- WINDSOR VOLUNTEER RESCUE SQUAD
- YORK COUNTY FIRE AND LIFE SAFETY

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Source: VA OEMS Website

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Engagement & Outreach

Using education as the front door to stronger EMS, hospital and physician relationships.

ECG EDUCATION

12-Lead Placement & Interpretation

JUNE 11

Sentara Heart Hospital
Norfolk

3 attendees

ECG EDUCATION

12-Lead Placement & Interpretation

JUNE 22

Workforce Development Center
Franklin

10 attendees

ECG EDUCATION

12-Lead Placement & Interpretation

AUGUST 10

Newport News EMS Office

30 in person

ECG EDUCATION

12-Lead Placement & Interpretation

AUGUST 11

Eastern Shore Regional Fire Training Center

8 attendees

Four education sessions • approximately 50 attendees across the region

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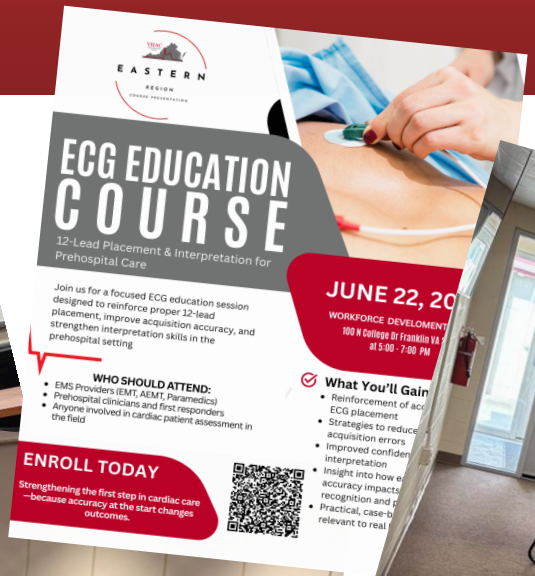
VCSQI

Engagement & Outreach

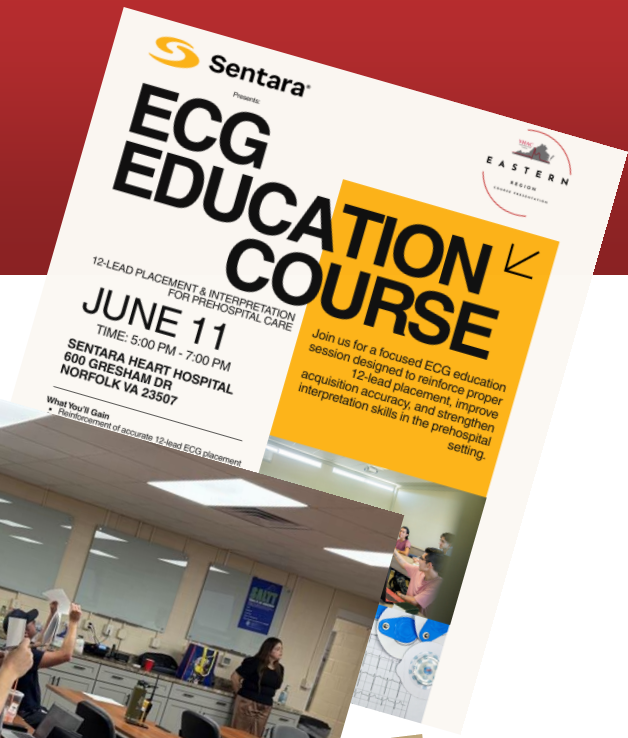














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Regional Focus Areas

1

Continue ECG Education

Maintain the physician-led regional education model and expand sessions into additional communities.

2

Strengthen Data Collection

Increase quarterly blinded submissions across PCI, transfer, referral and non-PCI hospitals.

3

Build Case-Based Learning

Include practical STEMI case review in regional meetings to identify shared lessons and opportunities.

Three practical priorities that can be advanced through the existing regional forum.

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Challenges & Barriers

ENGAGEMENT

Hospital representation remains incomplete, particularly among referral and non-PCI locations.

Sustaining participation across 91+ EMS agencies and multiple jurisdictions remains difficult.

DATA

Data is fragmented across health systems, PCI centers, transfer hospitals, referral emergency departments and EMS.

Incomplete submissions limit regional comparison and the ability to identify shared improvement opportunities.

GEOGRAPHY

The region spans Hampton Roads, the Peninsula, Western Tidewater, Northern Neck, and the Eastern Shore, requiring outreach approaches that work across urban, rural and geographically separated communities.

Primary regional challenge: building consistent reach, participation and data visibility across the full Eastern Region.

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Regional Plans & Timeline

NEXT Establish a quarterly blinded scorecard and make case review a recurring part of Eastern Region meetings.

TARGET By the Q3 2027 report, every hospital performs at or above the NCDR U.S. 50th percentile on all seven STEMI measures for two consecutive quarters.

A focused plan: create a dependable review rhythm and move the entire region toward a shared performance standard.

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Support Needed

WARM INTRODUCTIONS

Connections to hospitals, referral sites and EMS agencies that are missing or underrepresented.

CONSISTENT DATA SUBMISSION

Reliable quarterly participation from every hospital to create a complete regional view.

FLEXIBLE EMS VENUES

Connections to accessible locations and scheduling options that work for local EMS teams.

The support request is targeted: help us close representation gaps and strengthen the completeness of our shared data.

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Thank You!

Eastern@vaheartattackcoalition.org

Virginia Heart Attack Coalition

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Northwestern Region



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Who We Are



Health Systems and EMS Realignment

The Northwestern region includes PCI centers in Charlottesville, Fishersville, Harrisonburg, Front Royal, and Winchester.

It includes STEMI referring hospitals and centers in Culpeper, Lexington, Luray, and Woodstock, as well as some facilities in eastern West Virginia.

Recent realignment of EMS councils – Now part of OEMS Regions 3 and 5

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Who We Are

Regional Lead:

Dr. Patrick Stafford, MD
Interventional Cardiologist at UVA Health
(began leadership August 2024)

Regional Co-Lead: Noah Hillstrom
Program Manager, Rivanna-Rappahannock EMS Council Region 5
(began leadership June 2026)

PCI Centers:

1. Sentara Martha Jefferson Hospital
2. UVA Health
3. Augusta Health
4. Sentara RMH Medical Center
5. Winchester Medical Center
6. Warren Memorial Hospital

EMS Partners:

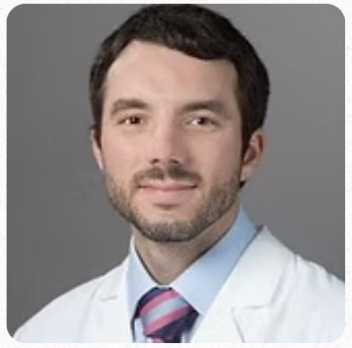
1. OEMS Region 3
2. OEMS Region 5

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Who We Are

PRIMARY

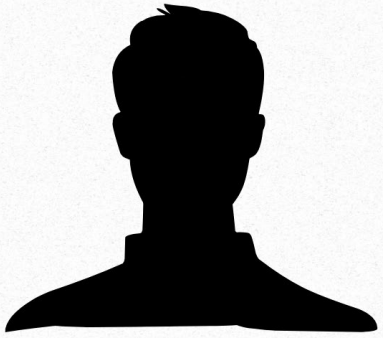


Patrick L. Stafford, MD
University of Virginia



Noah Hillstrom
Rivanna-Rappahannock EMS Council, NVERS Northern Virginia Emergency Response System

ALTERNATE



TBD

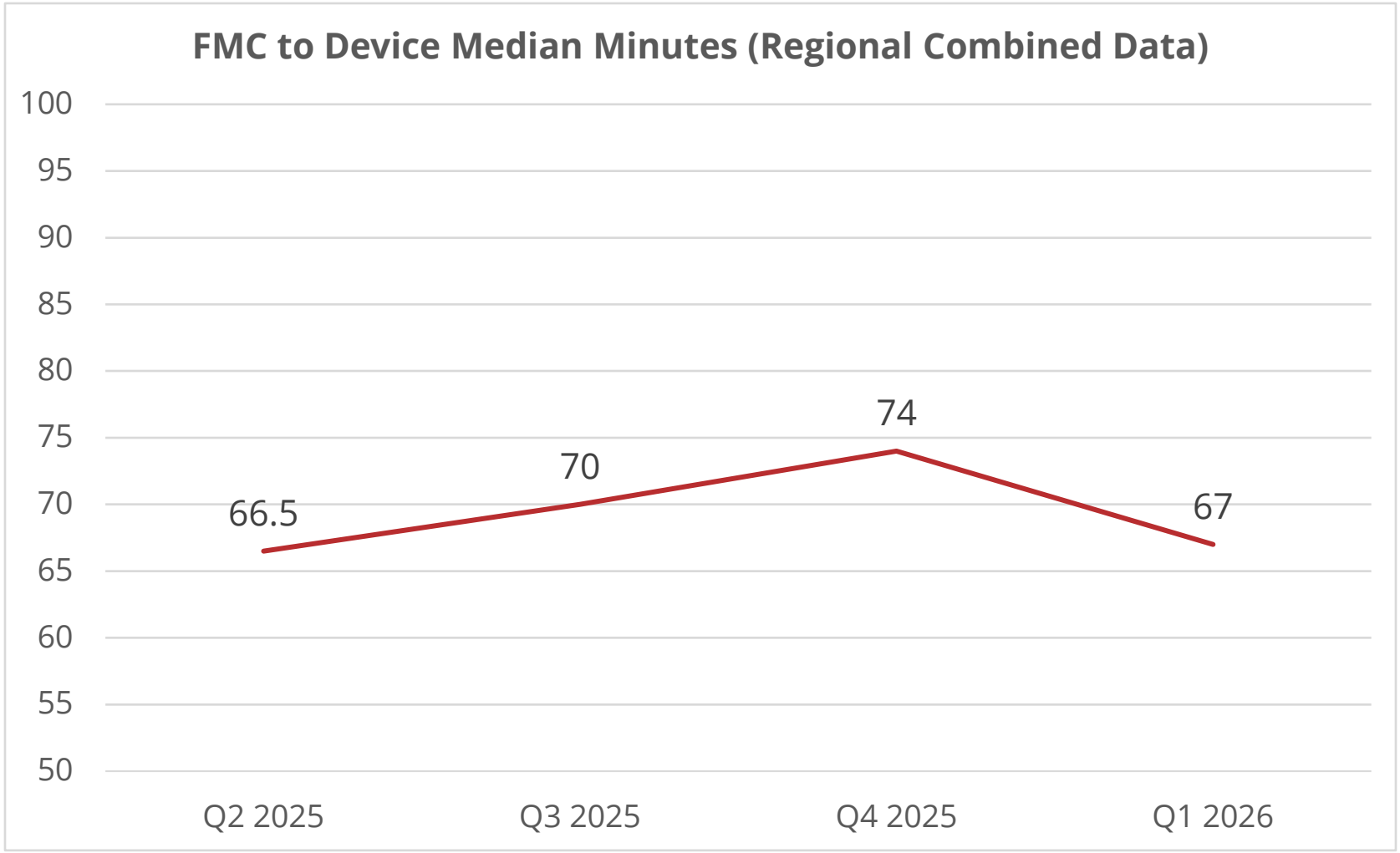


TBD

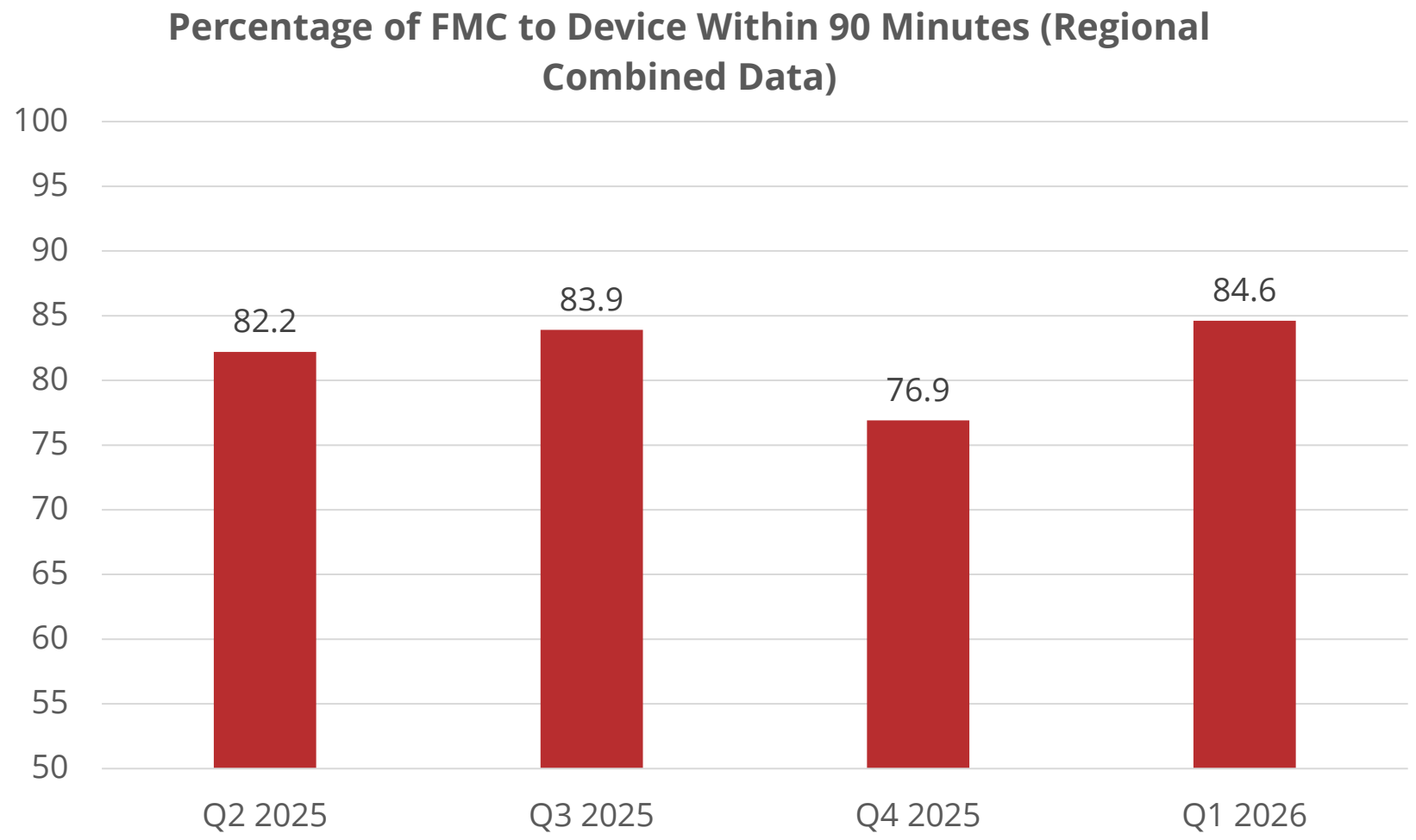
Regional Meetings

- Restarted regular scheduled meetings after a period of inactivity
- Networking: sharing of current processes, best practice
- Challenges:
  - Engaging and growing physician and EMS leadership within the region, especially at hospitals that have not demonstrated interest
  - Inconsistent sharing of data between sites

Regional Data



Regional Data



Our Regional Focus & Goals

Improvement Initiatives – Continued "building" for our region

1) Recruit EMS participation in meetings

- Reach out to EMS councils to gain understanding of how we can best engage EMS representatives from various locales
- Query EMS on topics of interest
- Recruit physicians and other practitioners to provide educational presentations to EMS

2) Develop local hospital leadership within our region.

- Find a physician champion or other leader at each site (PCI &/or STEMI referring center) and request participation at meetings.
- Advertise meetings to ED teams, Cath Lab teams, ACS quality committees, and Cardiology units
- Invite EMS to be involved in leadership opportunities.

Our Regional Focus & Goals

3) Analyze data and formulate plans to improve performance

- Promote regular data sharing data between sites and to better compare the NW region to other VHAC regions for chosen metrics
- When outliers are found, network to share successful practices/processes at other centers
- Include data driven by EMS and collaborate with EMS to learn how STEMI centers can partner better to improve processes/outcomes

4) Encourage active participation of regional members in VHAC

- Steering group
- Workgroups
- Statewide meeting

Open Discussion

Anything anyone would like to address regarding statewide or regional questions, concerns, comments, or thoughts?

Thank You

We would like to express our gratitude to all those actively involved in the Northwestern region and to the leaders of VHAC who offer assistance and challenge us to become better.

- Contact information for further inquiries:

Patrick Stafford, MD pls2b@uvahealth.org

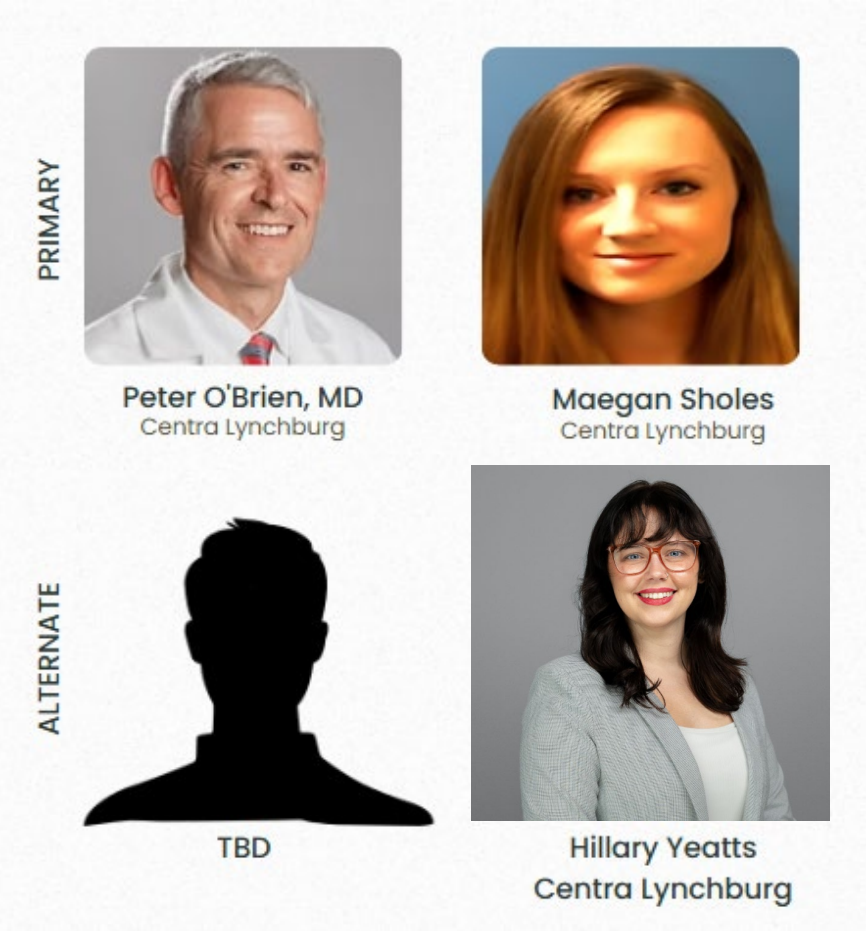
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Southern Region

Proud partner of VCSQI



Who we are



Centra Health

- Centra Lynchburg General Hospital
- Centra Bedford Memorial Hospital
- Centra Southside Community Hospital
- Centra Gretna Medical Center

Sentara

- Halifax Regional Hospital

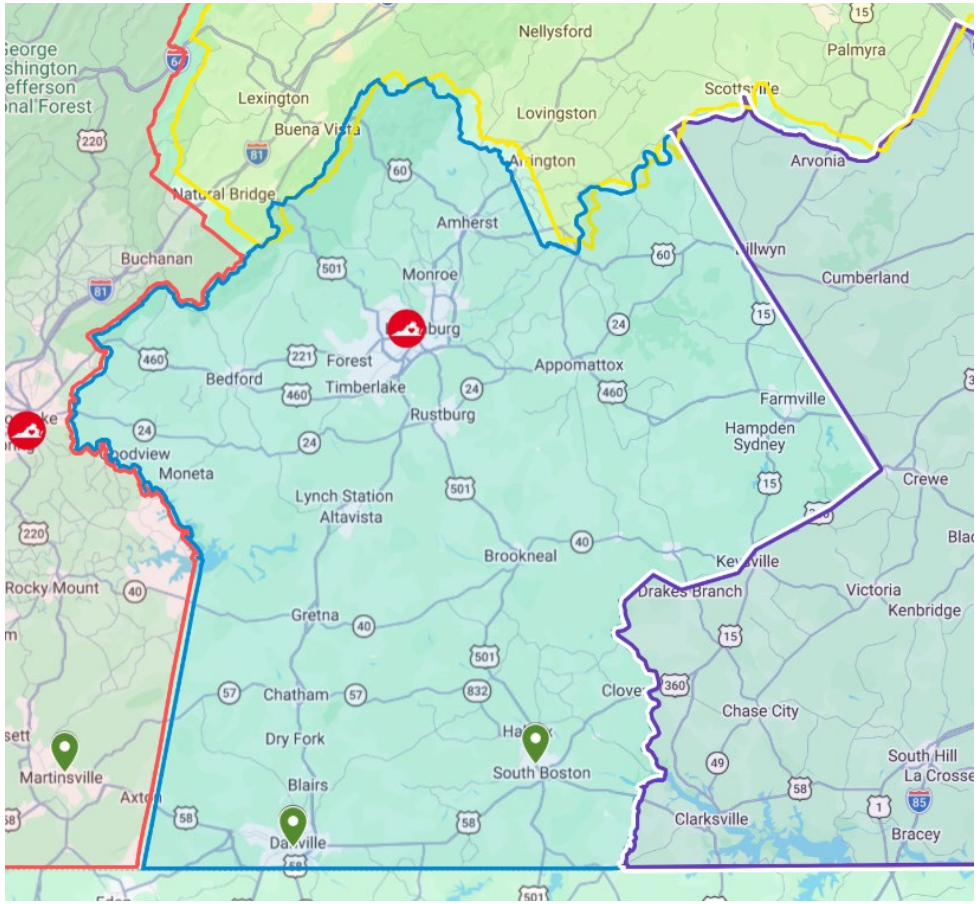
Region 2 EMS Council

Southern@vaheartattackcoalition.org

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Regional PCI Centers



VHAC participant-Data submitting:

- Centra Health Lynchburg General Hospital

VHAC participant-Data submission opportunity:

- Sovah Health Danville
- Sentara Halifax

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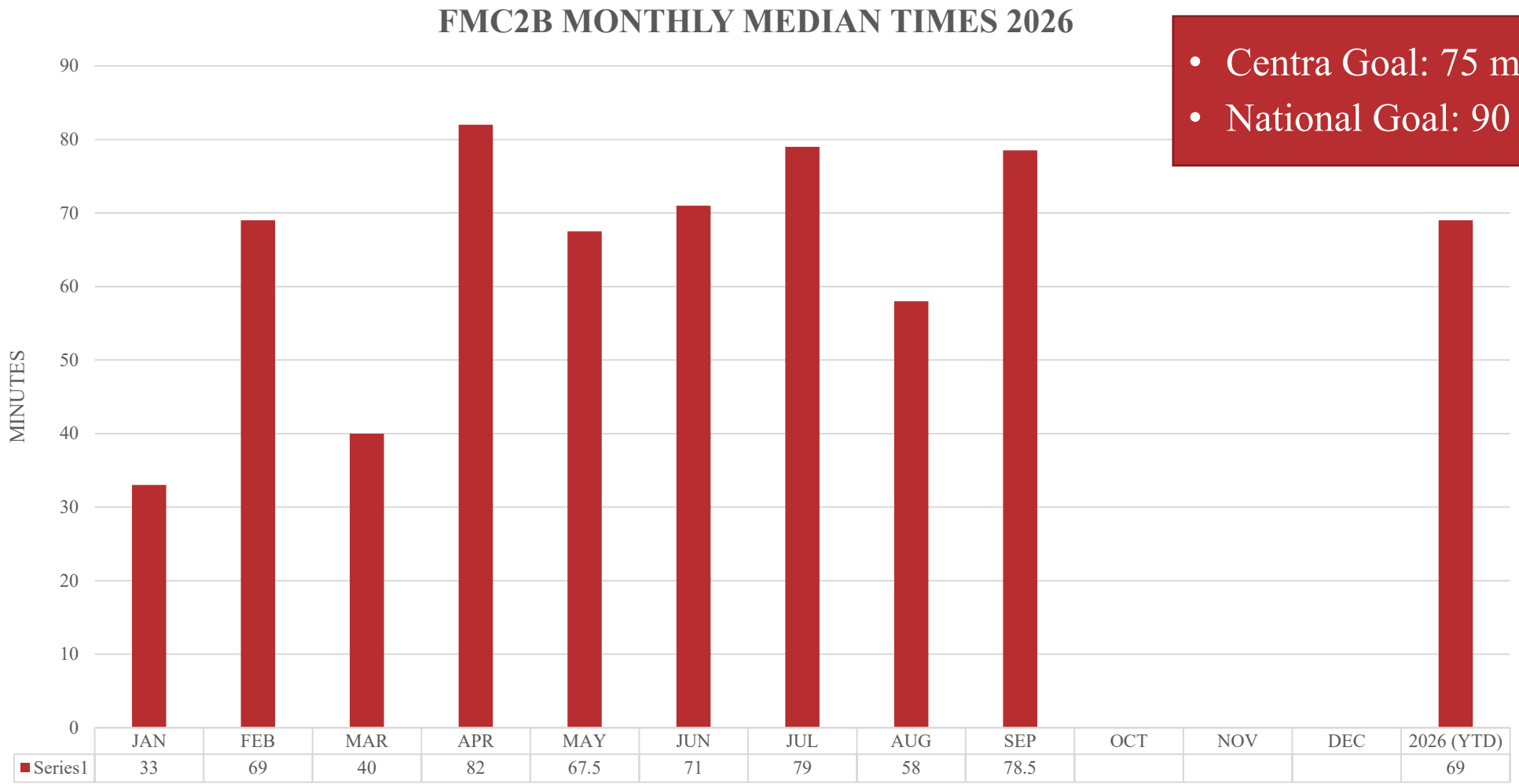
Pulsara

- Go-live date was May 2026
- Pulsara training sessions for Cardiology, MedComm and EMS
- Bedford County, Amherst, Wintergreen, and Campbell County have started to use
- Transfer facilities also utilizing for STEMI activation
- Physicians using for in-house STEMI
- Prior to Pulsara, the average STEMI activation took ***10-15 separate messages*** (calls, texts, pages, call backs, etc.)—Slow, prone to error, not always secure, etc.
- Will expand to other service lines

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Lynchburg General Hospital - FMC2B

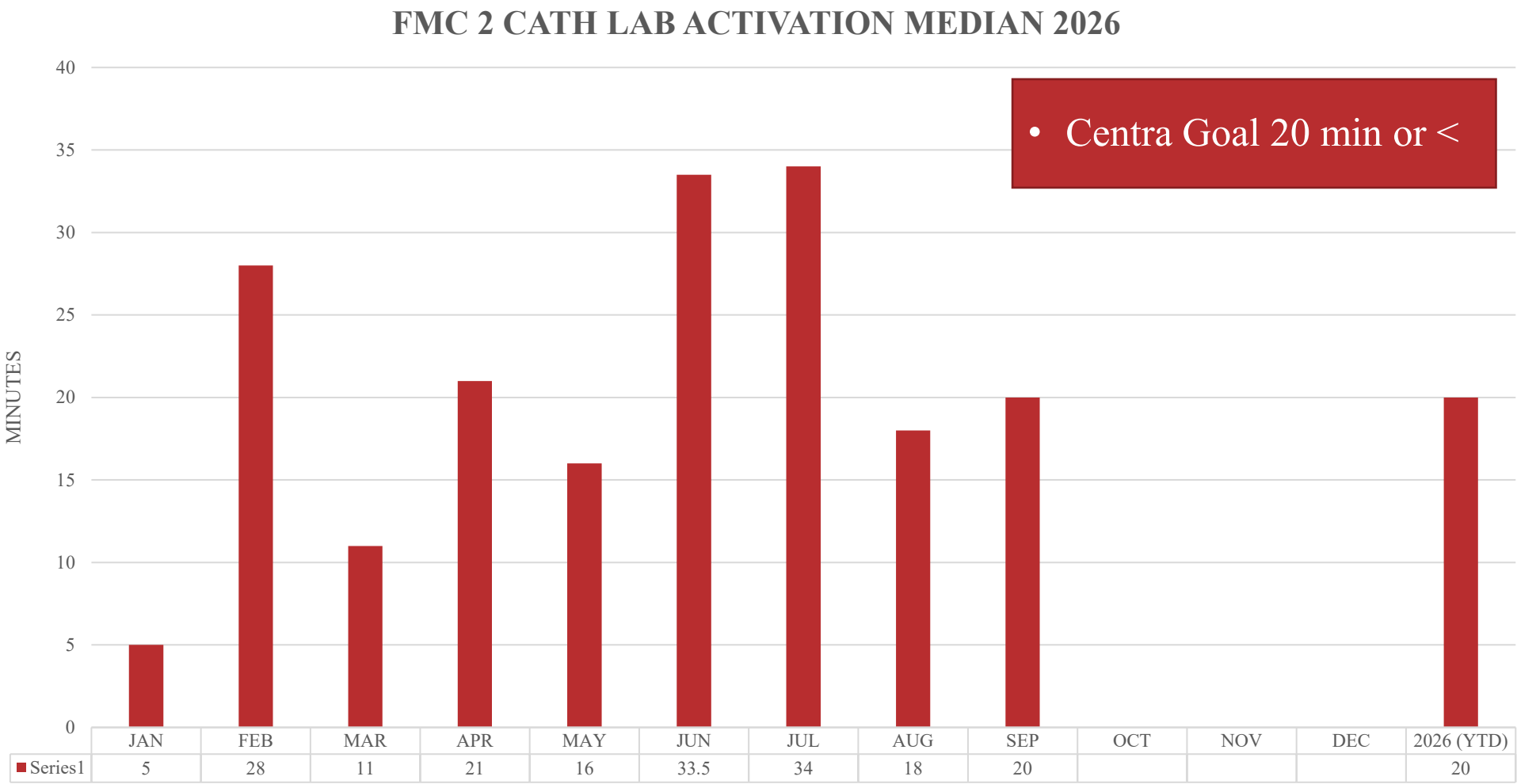


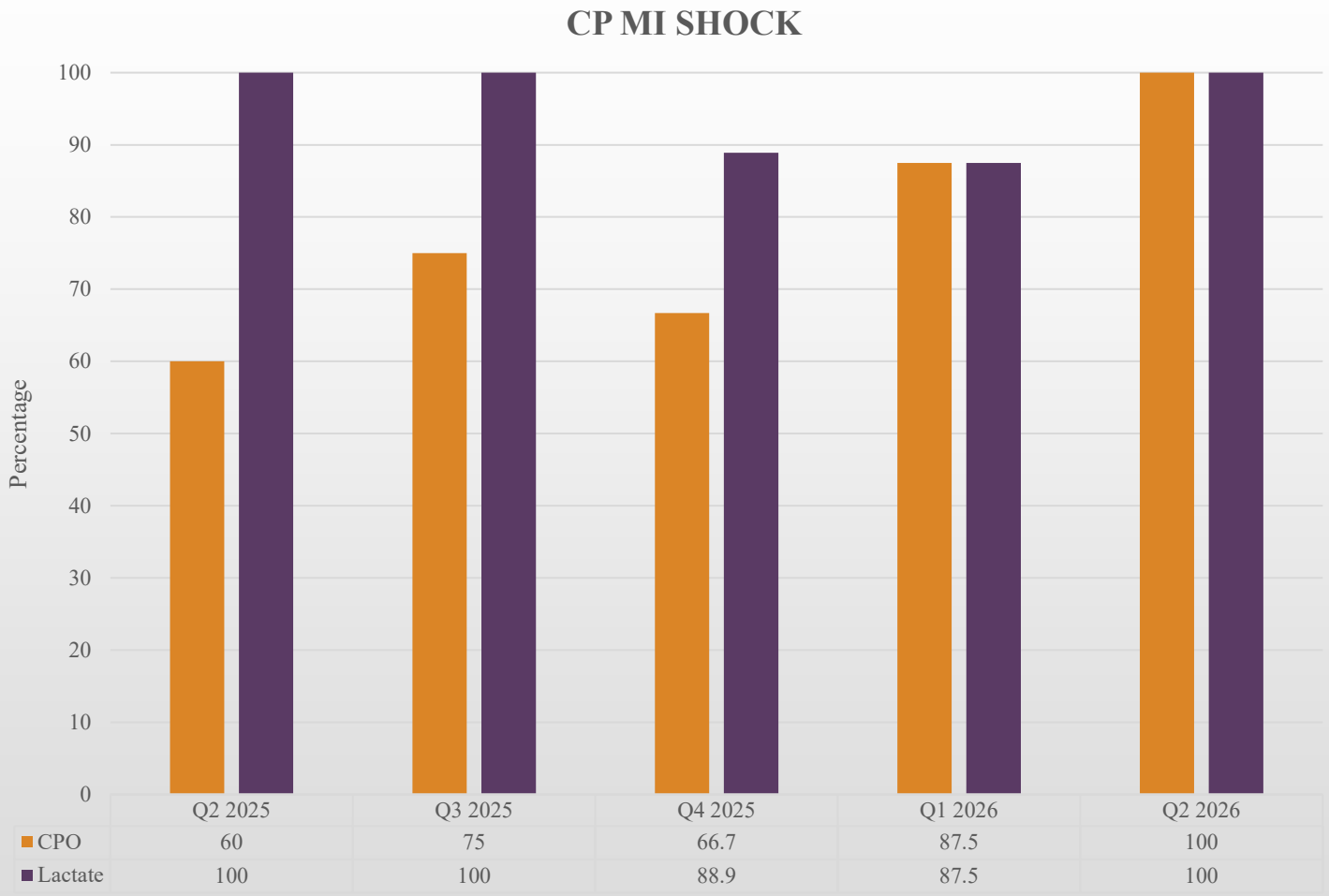
- Centra Goal: 75 min or <
- National Goal: 90 min or <

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First Medical Contact to Cath Lab Activation





Cardiogenic Shock:

- LGH Shock team implemented reporting CPO and PAPi on patients with Swan-Ganz catheter

ACS Cardiogenic Shock

Criteria: SBP <90mmHg or MAP <60 mmHg **OR** Use of any Ino-pressor **OR** Lactic Acid >2.0

Calculations:

CPO = MAP * CO /451

PAPi = (PAs-PAd)/RA

- **Cath Lab Interventions:**
  - Place Swan-Ganz Catheter
  - Cardiac Output and Filling Pressures
  - Calculate CPO and PAPi
  - Lactic Acid

CPO < 0.6 PAPi >1.5 CVP <15

CPO < 0.6 PAPi <1.5 CVP>15

LV predominant shock: MCS consideration

RV // Bi-Ventricular Shock: MCS consideration

MCS Options: IABP Impella CP Impella 5.0 ECMO

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Regional Meetings

- Teams Meeting
  - First Thursday of every other month (even months)
  - Next meeting: 12/3/26 @ 7:00
- Leaders provide updates on quality metrics from transferring facilities

Facility	D2B (YTD)	Di/Do (YTD)	D2N (YTD)
GMC	108	46	43.5
SCH	N/A	N/A	41
BMH	95	48	68
HRH	N/A	N/A	23

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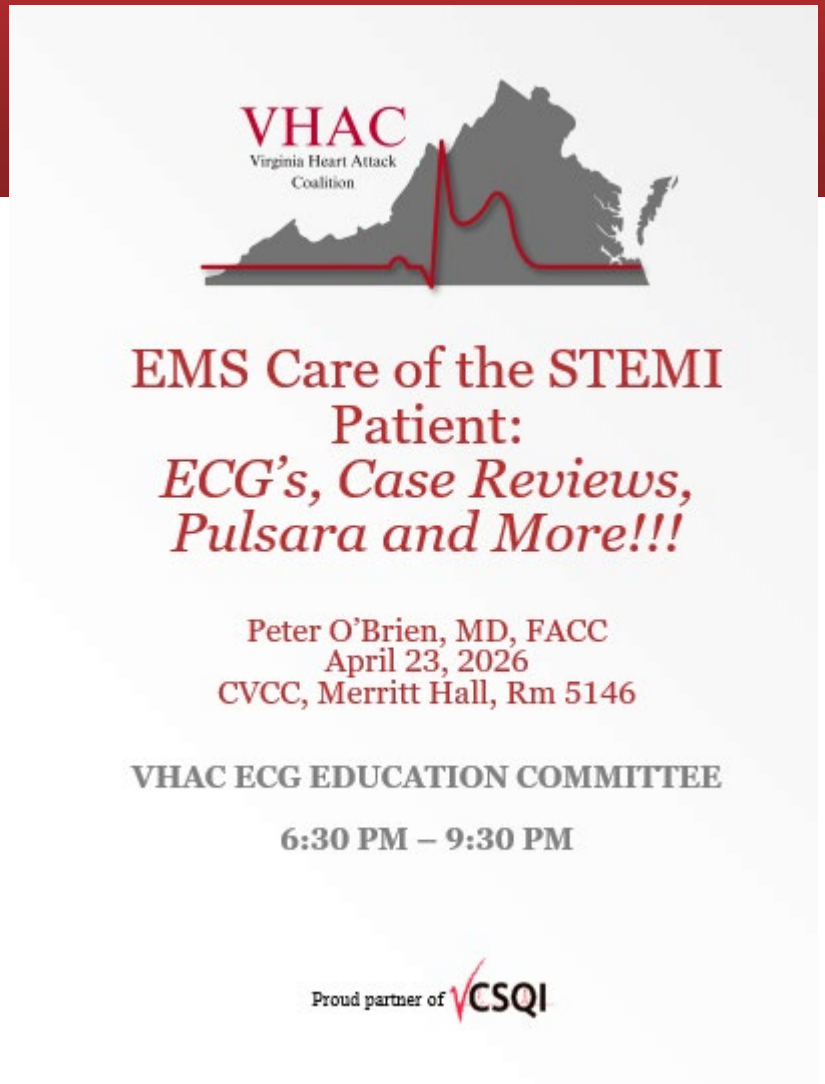
Tracking Prehospital EKG Transmission Rates:

September					
EMS Agency	EMS Chief Complaint of Chest pain	Transmitted EKG w/ Chest Pain	STEMI	STEMI w/ no transmit	% of Chest Pain w/ Transmitted EKG
Amelia					
Appomattox					
Buckingham	6	1			17%
Burkeville	2	1			50%
Centra					
Charlotte	3	2			67%
Cumberland					#DIV/0!
DRT					
Meherrin	2	2			100%
Nottoway	4	2			50%
Prince Edward	21	11			52%
Victoria	1	1			100%
TOTAL	39	20			

Focus & Goals

Process Improvement Initiatives

- Consistent Pulsara Use
- Queen of Hearts – OMI AI. Submitted requests for system wide use implementation
- Engaging with EMS
  - EMS education nights (April 2026, with the next one November 30, 2026)



Thank You

Southern@vaheartattackcoalition.org

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Western Region

Proud partner of VCSQI



Who we are:
Western Region

PRIMARY



Chalak Berzingi, MD
Carilion Clinic



Melanie Johnson
Carilion Clinic

ALTERNATE

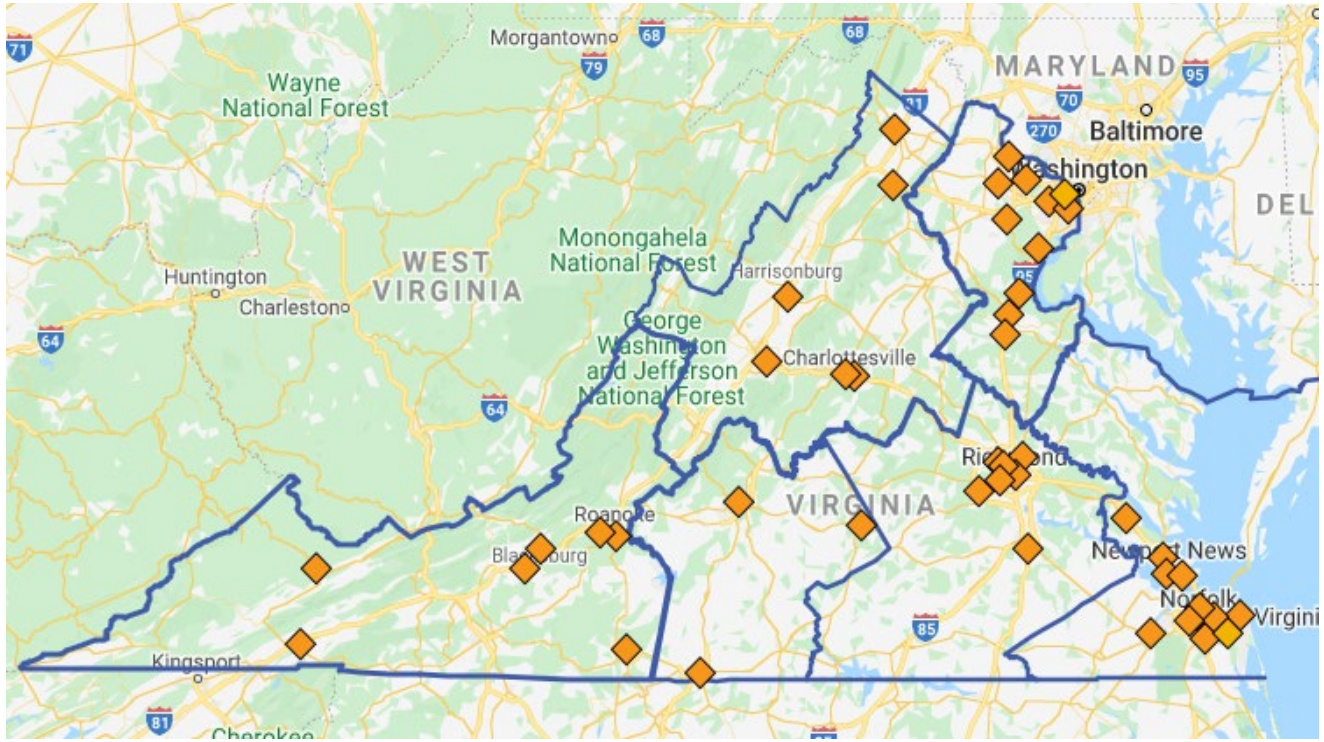


Richard Konstance, MD
LewisGale Medical Center



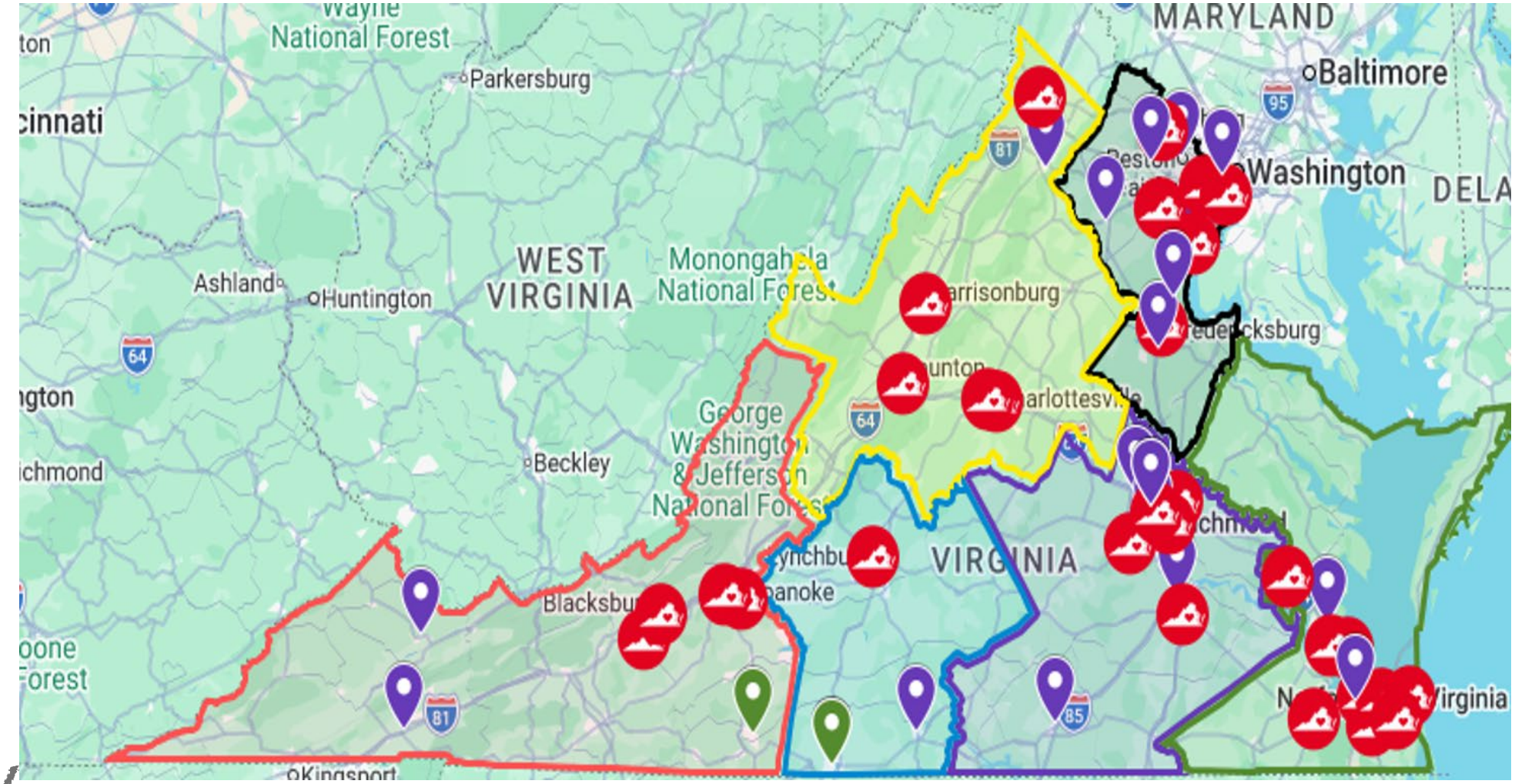
Jean Moreland
LewisGale Medical Center

PCI Centers:



Western@vaheartattackcoalition.org

VHAC Regions and PCI Centers



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Region 2



Counties (16)

- Alleghany
- Amherst
- Appomattox
- Bedford
- Botetourt
- Campbell
- Craig
- Floyd
- Franklin
- Giles
- Henry
- Montgomery
- Patrick
- Pittsylvania
- Pulaski
- Roanoke

Independent Cities (7)

- Covington
- Danville
- Lynchburg
- Martinsville
- Radford
- Roanoke
- Salem

16
Counties Served

80+
EMS Agencies

3,200+
Certified Providers

Western Region PCI Centers

PCI Centers:

1. Carilion New River Valley Medical Center – Christiansburg, Virginia
2. Carilion Medical Center – Roanoke, Virginia
3. Clinch Valley Medical Center – Richlands, Virginia
4. Johnston Memorial Hospital – Abingdon, Virginia
5. LewisGale Medical Center – Salem, Virginia
6. LewisGale Hospital Montgomery – Blacksburg, Virginia
7. Sovah Health-Martinsville – Martinsville, Virginia

Western@vaheartattackcoalition.org

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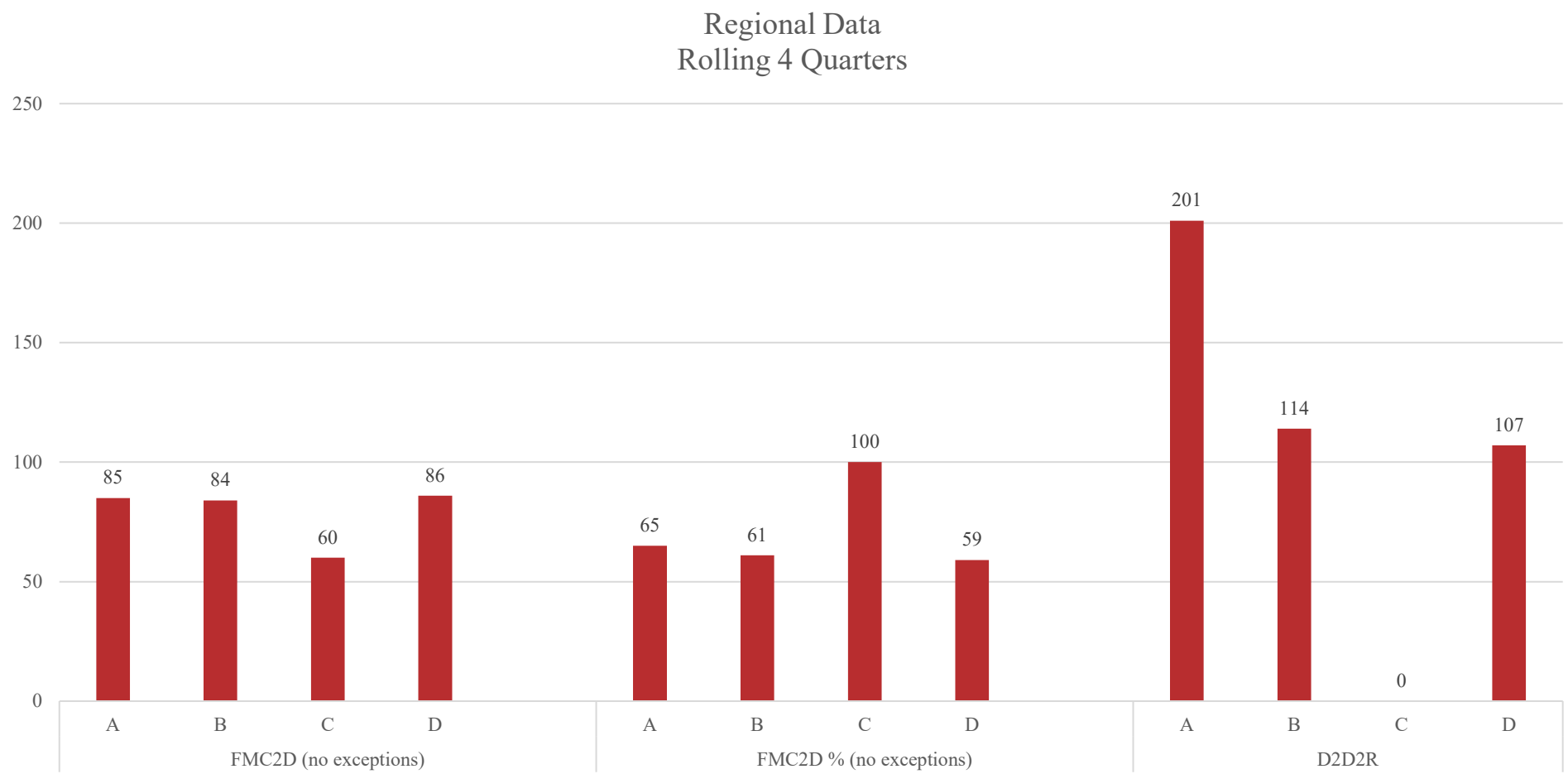
Regional Meetings

- Regional meetings are held quarterly
- Hybrid option available and in-person locations alternate between LewisGale Medical Center and Carilion Roanoke Memorial Hospital
- Agenda items include regional data reporting, roundtable discussion and updates from each facility and EMS agency in attendance
- Next meeting will be held in December at Lewis Gale Medical Center – Salem

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Data Review


Regional Data
Rolling 4 Quarters
250
200
150
100
50
0
85
84
60
86
65
61
100
59
201
114
0
107
A
B
C
D
FMC2D (no exceptions)
FMC2D % (no exceptions)
D2D2R

Our Focus & Goals

1. Reduction in the Door in Door Out (DIDO) times across the region

<u>Opportunities for improvement identified</u>

- Early STEMI identification
- Access to timely transportation is key
- Protocols
- Education provided to regional referring facilities regarding the use of thrombolytics will continue this year

The reduction in door in door out time will ultimately reduce the Door to Door to Reperfusion times which can improve patient outcomes with the reduction in total ischemic time

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Our Focus & Goals

2. Increase EMS involvement at Regional and State Meetings

<u>Explore ideas that will encourage EMS participation</u>

- Review and update contact list quarterly prior to meetings
- Each meeting to include EMS presentation
- Variation of times of meetings at 7am currently – most attendance
- Virtual option available
- With OEMS restructuring of regions – Region 2 leadership – Debbie Akers, Brandan Arthur

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Our Focus & Goals

3. Reduction in overall FMC2D across the region

<u>Opportunities for improvement identified</u>

- Encourage early activation of Field STEMI Alert
- Direct to Cath Lab Opportunities

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CARILION CLINIC
LIFE-GUARD

STEMI? GET THEM DIRECT TO THE CATH LAB

Earlier activation → faster definitive care

NEW PROCESS

When ground EMS requests helicopter transport to Carilion and STEMI criteria are confirmed,

Carilion Flight Ops activates the Cath Lab Team immediately upon PILOT ACCEPTANCE.

ED BYPASS RATE

14% → 90%

with this process

+74 percentage points

STEMI ACTIVATION CRITERIA

✓ BOTH REQUIRED

12-lead EKG confirms STEMI
Active chest pain

✕ EXCLUSIONS

- Trauma
- Sepsis
- Stroke
- Intubation
- GI bleed
- Unstable vital signs

WHAT THIS ENABLES

ED BYPASS → DIRECT TO CATH LAB → FASTER TREATMENT

EMS PROVIDERS: Provide the STEMI criteria to your 911 dispatcher when requesting a helicopter for a confirmed STEMI.

CALL CARILION FLIGHT OPS to activate the Cath Lab Team **1-888-377-7628**

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Chest Pain – MI Registry
2026 Performance Achievement Awards
Platinum

- Carilion Roanoke Memorial Hospital



- Johnston Memorial Hospital



- Lewis Gale Medical Center



- Lewis Gale Montgomery



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Smile

“If you see someone without a smile, give ‘em yours”

Dolly Parton

Thank You

Many thanks to all our team members throughout the Western region that work diligently to care for our communities.

EMS agencies, ED teams, Cardiologists, Interventional Cardiologists, Cath Lab teams, Cardiac Surgeons, Inpatient Staff, outpatient services, Cardiac Rehab, Heart Failure clinics, and all teams that care for cardiac patients!

Western@vaheartattackcoalition.org

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Virginia Heart Attack Coalition

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Thank You

Contact information:

Chalak Berzingi, MD – coberzingi@carilionclinic.org

Richard Konstance, MD – Richard.Konstance@hcahealthcare.com

Melanie Johnson, MSN, RN-BC – mbjohnson@carilionclinic.org

Jean Moreland, BSN, RN C – jean.moreland@hcahealthcare.com

Western@vaheartattackcoalition.org

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Virginia Heart Attack Coalition

Northern Region

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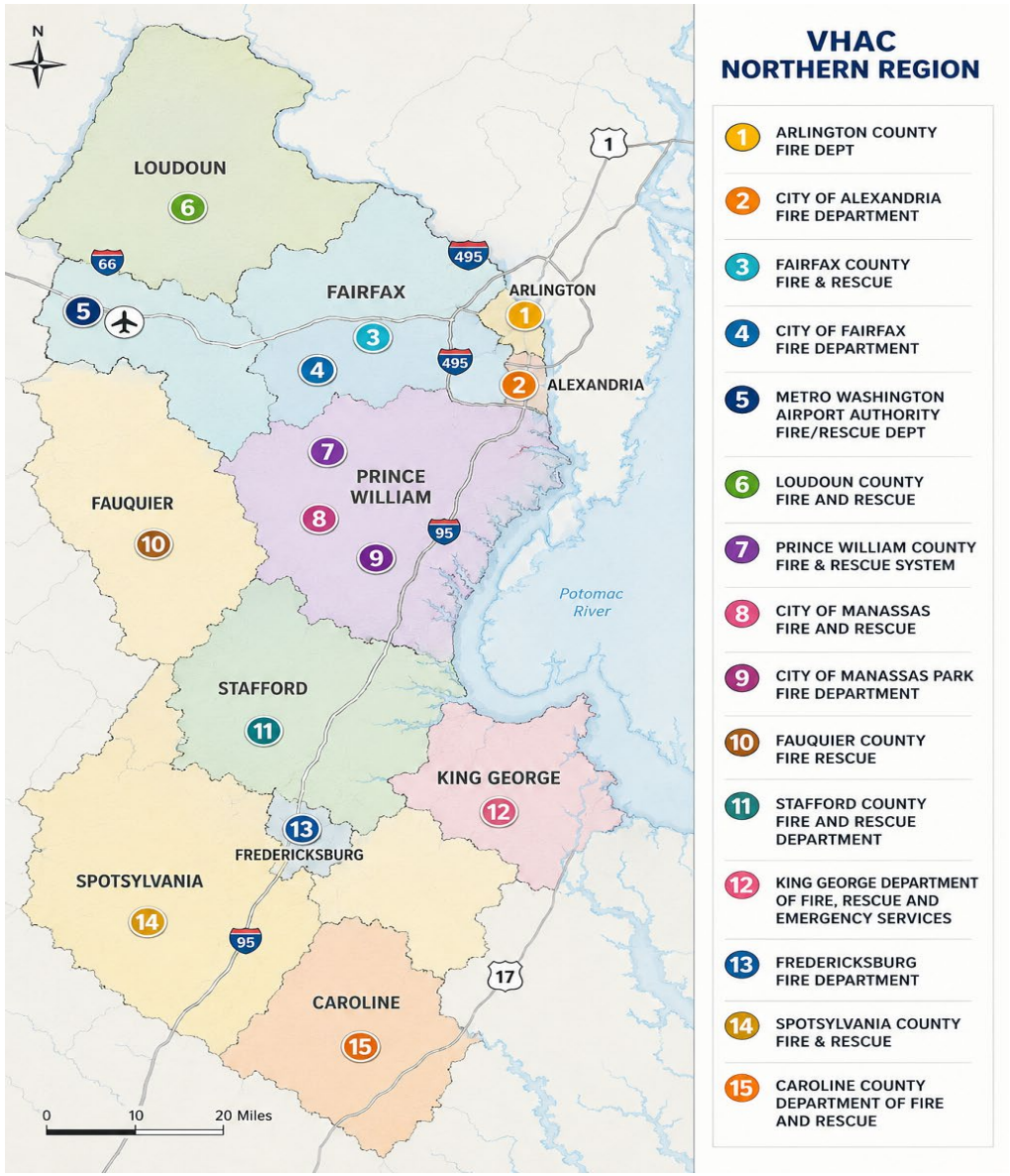


VHAC Northern Region

Regional Leads
Behnam Tehrani, MD, FSCAI
Sachin Kumar, MD, FACC, FSCAI (former)
Laura Atwell
Ali Harned BSN, RN, CCRN
J'nay Harshbarger BS., RCIS



VHAC Northern Region - EMS



VHAC NORTHERN REGION

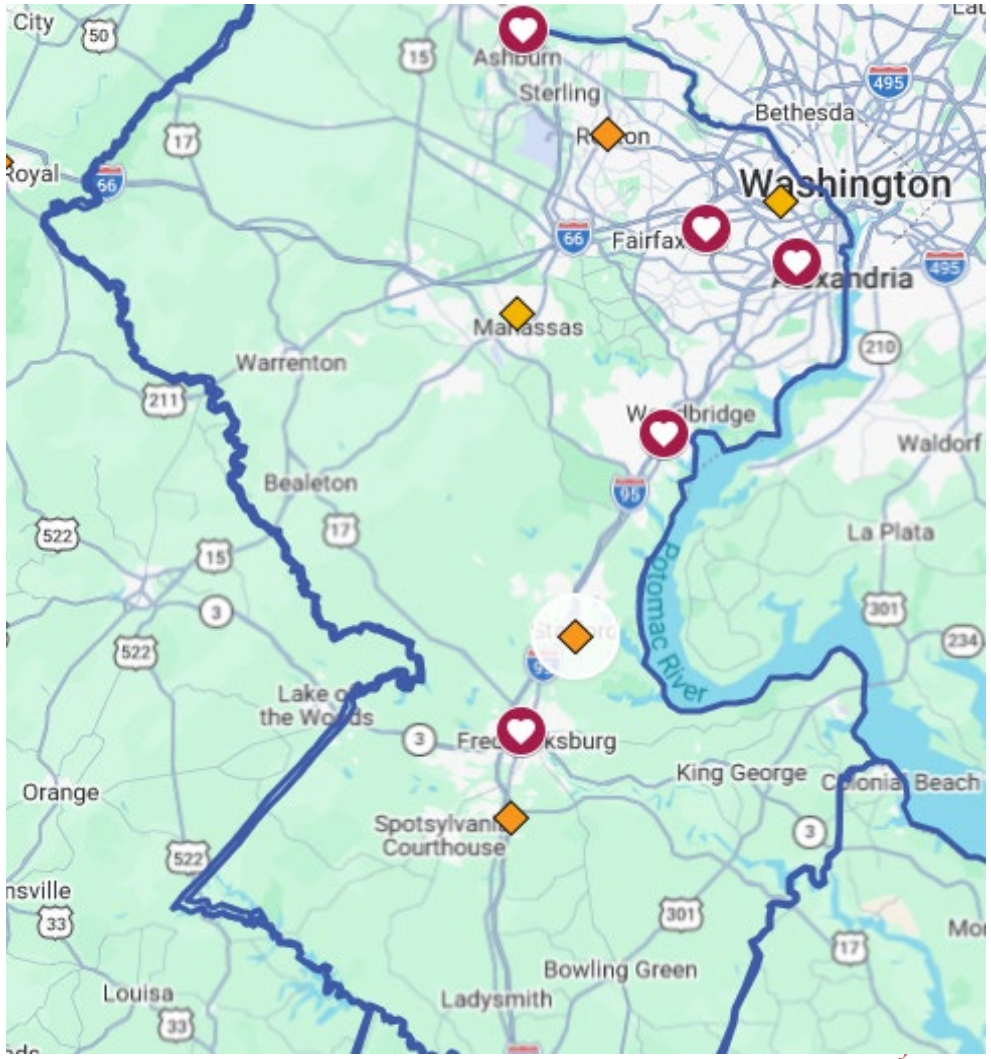
1. ARLINGTON COUNTY FIRE DEPT
2. CITY OF ALEXANDRIA FIRE DEPARTMENT
3. FAIRFAX COUNTY FIRE & RESCUE
4. CITY OF FAIRFAX FIRE DEPARTMENT
5. METRO WASHINGTON AIRPORT AUTHORITY FIRE/RESCUE DEPT
6. LOUDOUN COUNTY FIRE AND RESCUE
7. PRINCE WILLIAM COUNTY FIRE & RESCUE SYSTEM
8. CITY OF MANASSAS FIRE AND RESCUE
9. CITY OF MANASSAS PARK FIRE DEPARTMENT
10. FAUQUIER COUNTY FIRE RESCUE
11. STAFFORD COUNTY FIRE AND RESCUE DEPARTMENT
12. KING GEORGE DEPARTMENT OF FIRE, RESCUE AND EMERGENCY SERVICES
13. FREDERICKSBURG FIRE DEPARTMENT
14. SPOTSYLVANIA COUNTY FIRE & RESCUE
15. CAROLINE COUNTY DEPARTMENT OF FIRE AND RESCUE

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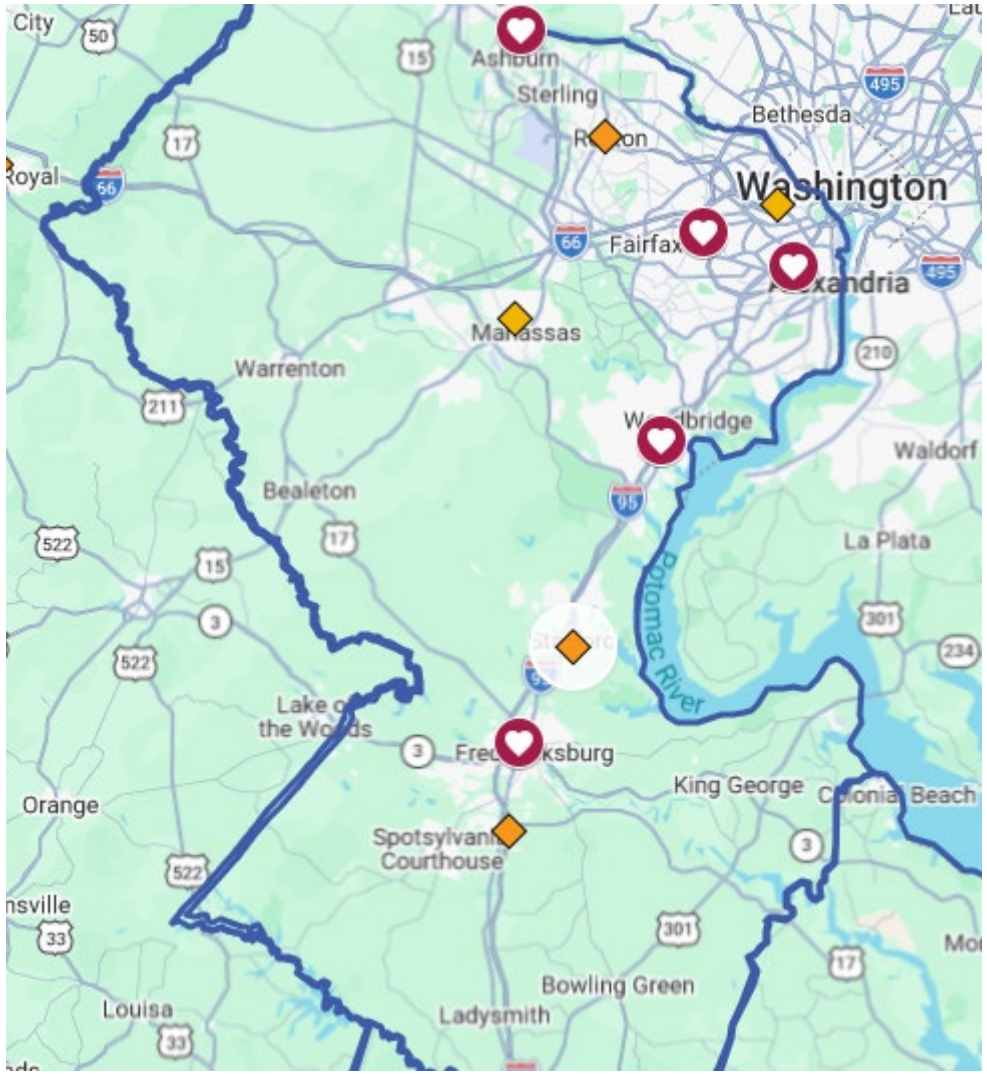
VHAC Northern Region – PCI Facilities

- Inova Fairfax
- Inova Loudoun
- Inova Alexandria
- Sentara Northern Va Medical Center
- Mary Washington Hospital
- Reston Hospital Center
- Virginia Hospital Center
- UVA Prince William Medical Center
- Stafford Hospital
- Spotsylvania Regional Medical Center

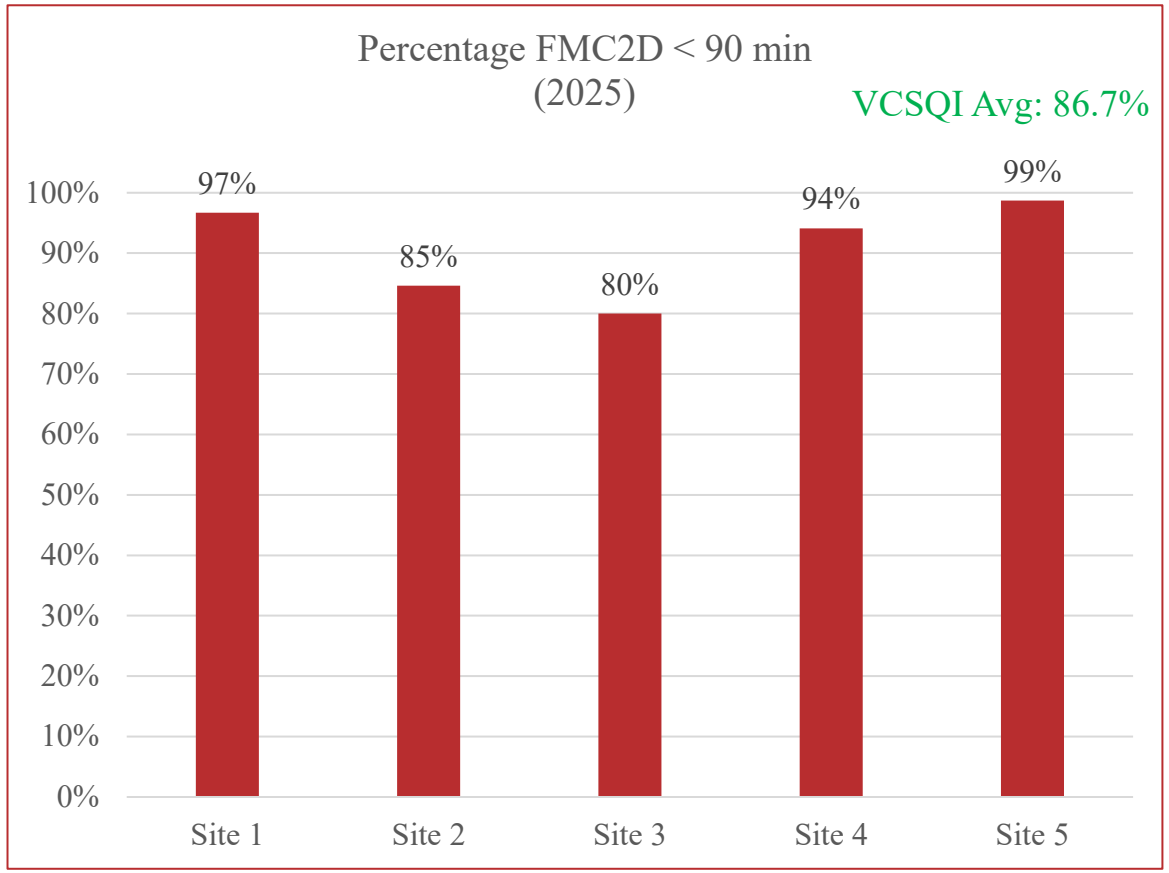


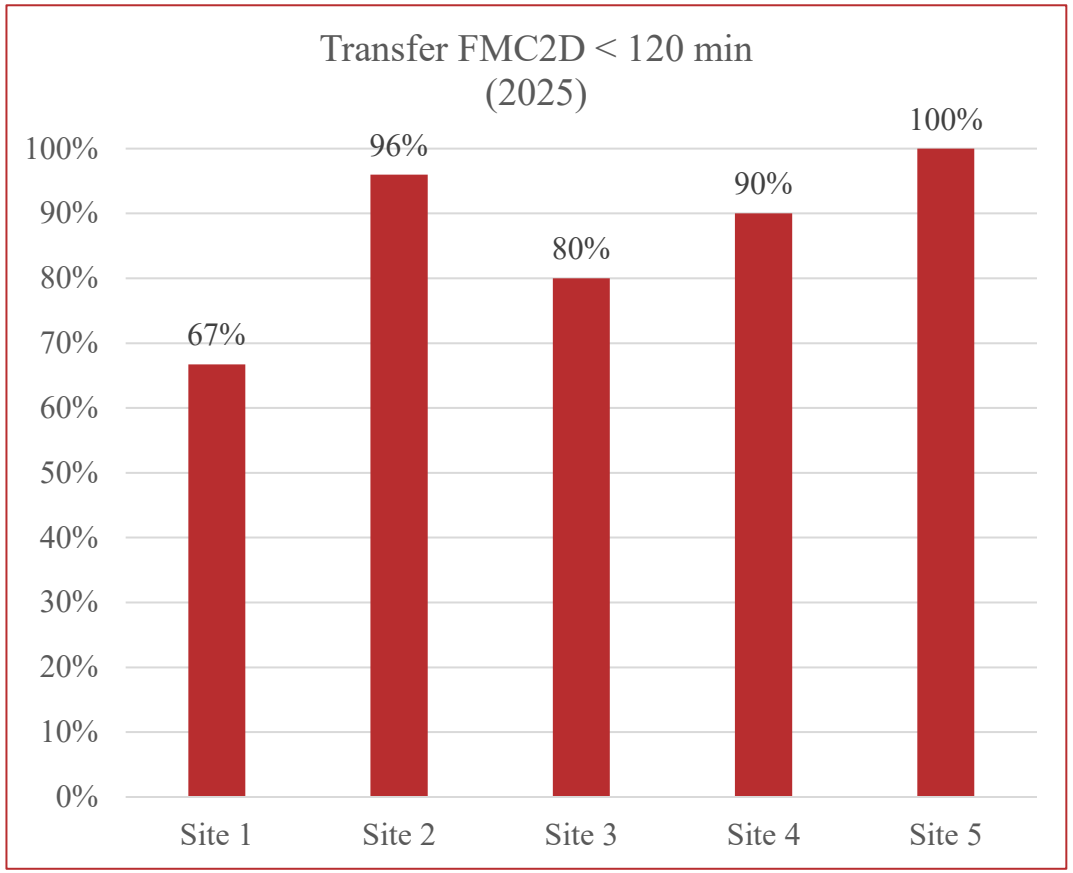
VHAC Northern Region Fall Meeting

- Data sharing – 5 de-identified sites (baseline)
- Goal- Regional transparency
- Drive collaboration in the following performance measures
- Hospital
  - FMC2D (non-transfers and transfers)
  - ED to first ECG
  - CCL to device
  - Direct to Cath Efforts
- EMS Metrics
  - ASA Administration in Chest Pain
  - Oxygen administration in Hypoxia



VHAC Northern Region – PCI Facilities

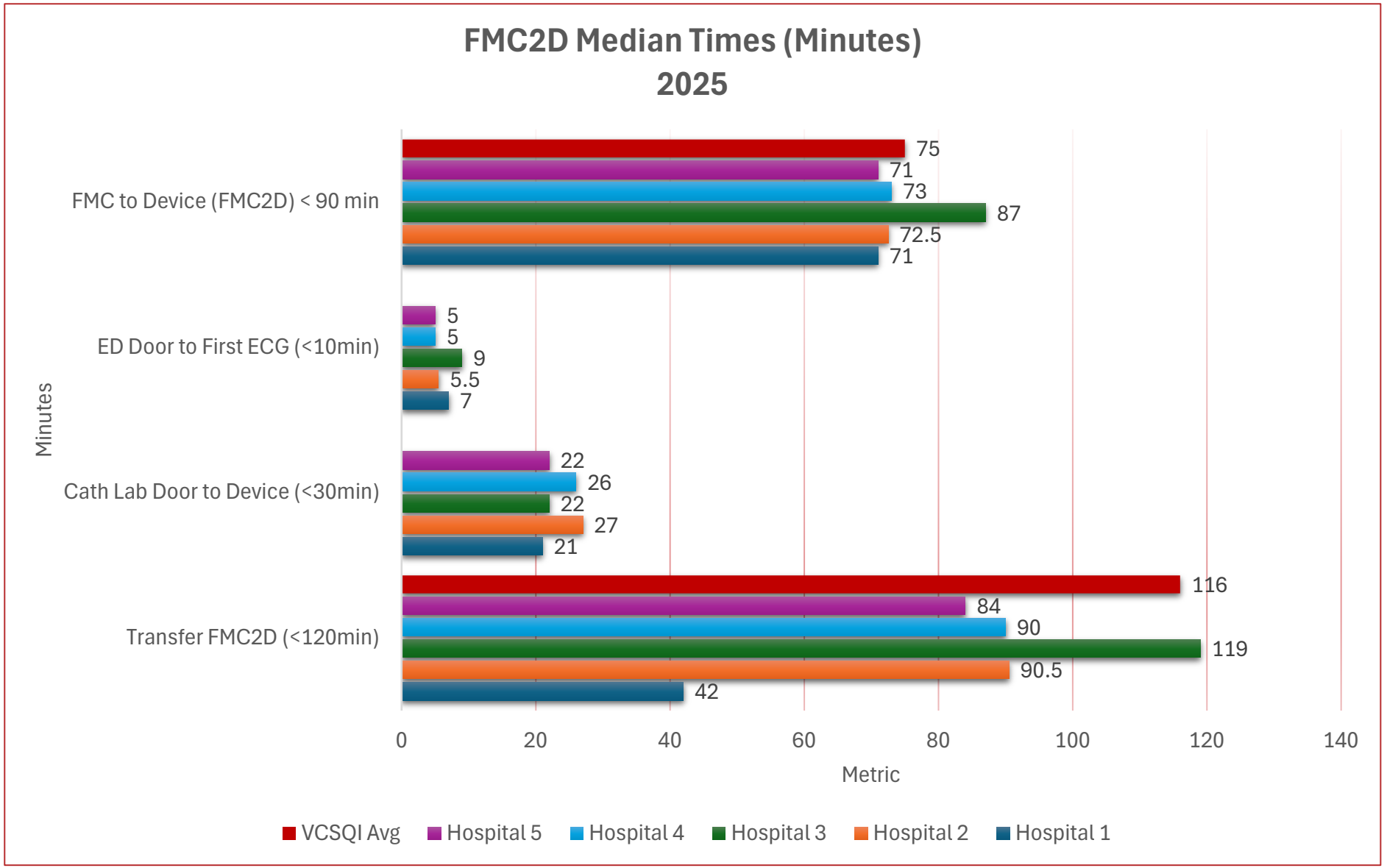




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VHAC Northern Region – PCI Facilities



VDH Virginia Department of Health
Office of Emergency Medical Services

Statewide Performance Improvement Metrics (NEW!)

Increase Administration of Oxygen to Hypoxic Patients

- By December 31, 2026, Virginia EMS providers will increase the proportion of hypoxic patients (SpO_2 < 90%) originating from a 911 request who receive documented oxygen therapy to 60% statewide, as measured through EMS patient care reports in the Virginia EMS Repository.

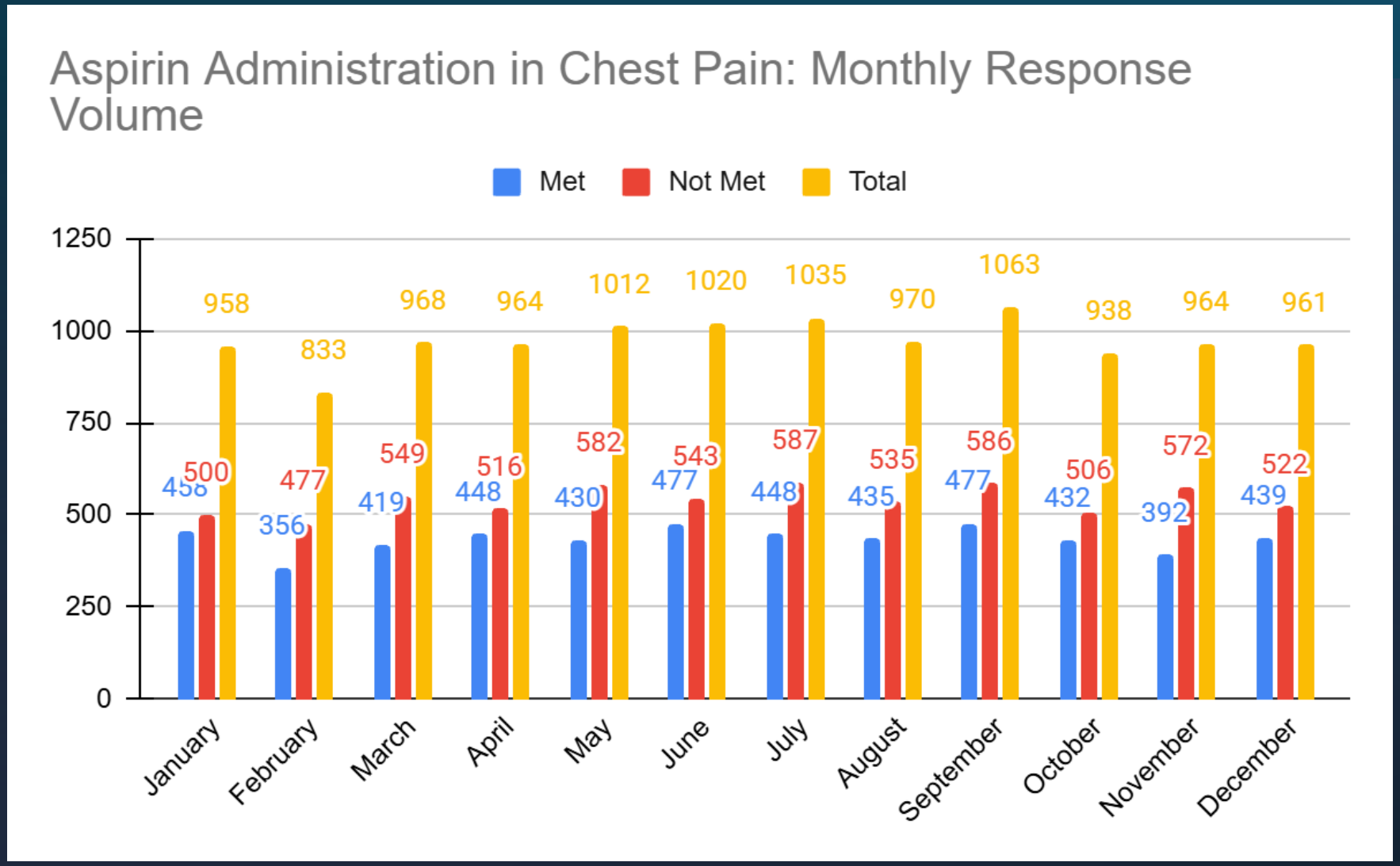
Increase Administration of Aspirin for Cardiac-Suspected Chest Pain

- By December 31, 2026, Virginia EMS agencies will increase the proportion of eligible patients experiencing chest pain of suspected cardiac origin originating from a 911 request who receive aspirin to 60% statewide, as measured through EMS patient care reports in the Virginia EMS Repository.

In 2025, 50% of non-traumatic chest pain EMS patients aged 35 or older were documented as receiving aspirin administration (Virginia MDC Key Indicator) and 35% of hypoxic EMS patients (SpO_2 < 90%) received documented oxygen therapy (NEMSQA Respiratory-02 Measure).

VHAC Northern Region Data

Aspirin Administration in Chest Pain: EMS responses to 911 requests for patients aged ≥ 35 to whom aspirin was administered for suspected STEMI, NSTEMI, angina, acute MI, or non-traumatic chest pain.

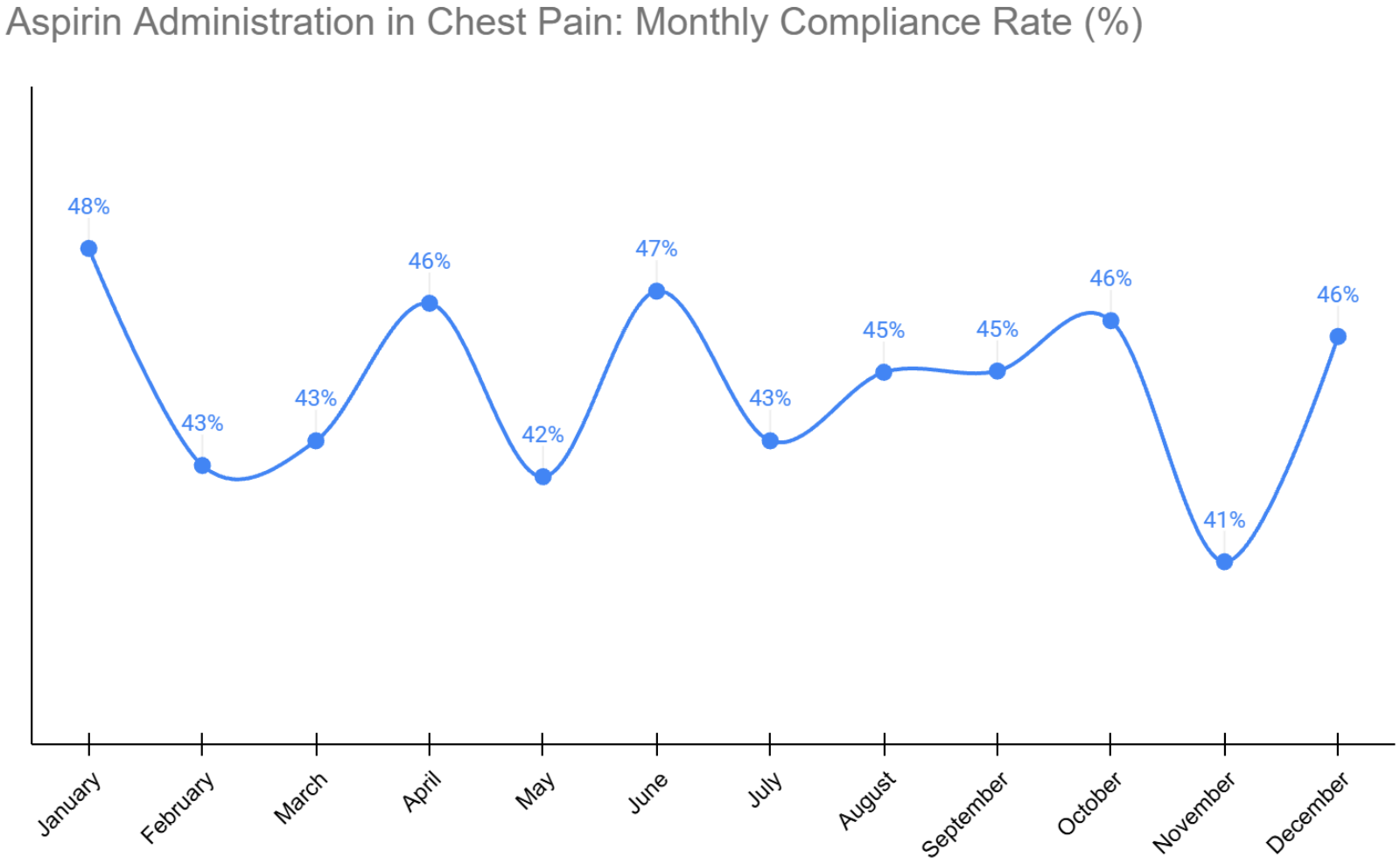


Calendar year 2025

Agencies:
Alexandria, Arlington, Fairfax City, Fairfax County, Loudoun, Manassas, Manassas Park, Prince William, Caroline, Fauquier, Fredericksburg, King George, Spotsylvania, Stafford

VHAC Northern Region Data

Aspirin Administration in Chest Pain: EMS responses to 911 requests for patients aged ≥ 35 to whom aspirin was administered for suspected STEMI, NSTEMI, angina, acute MI, or non-traumatic chest pain.

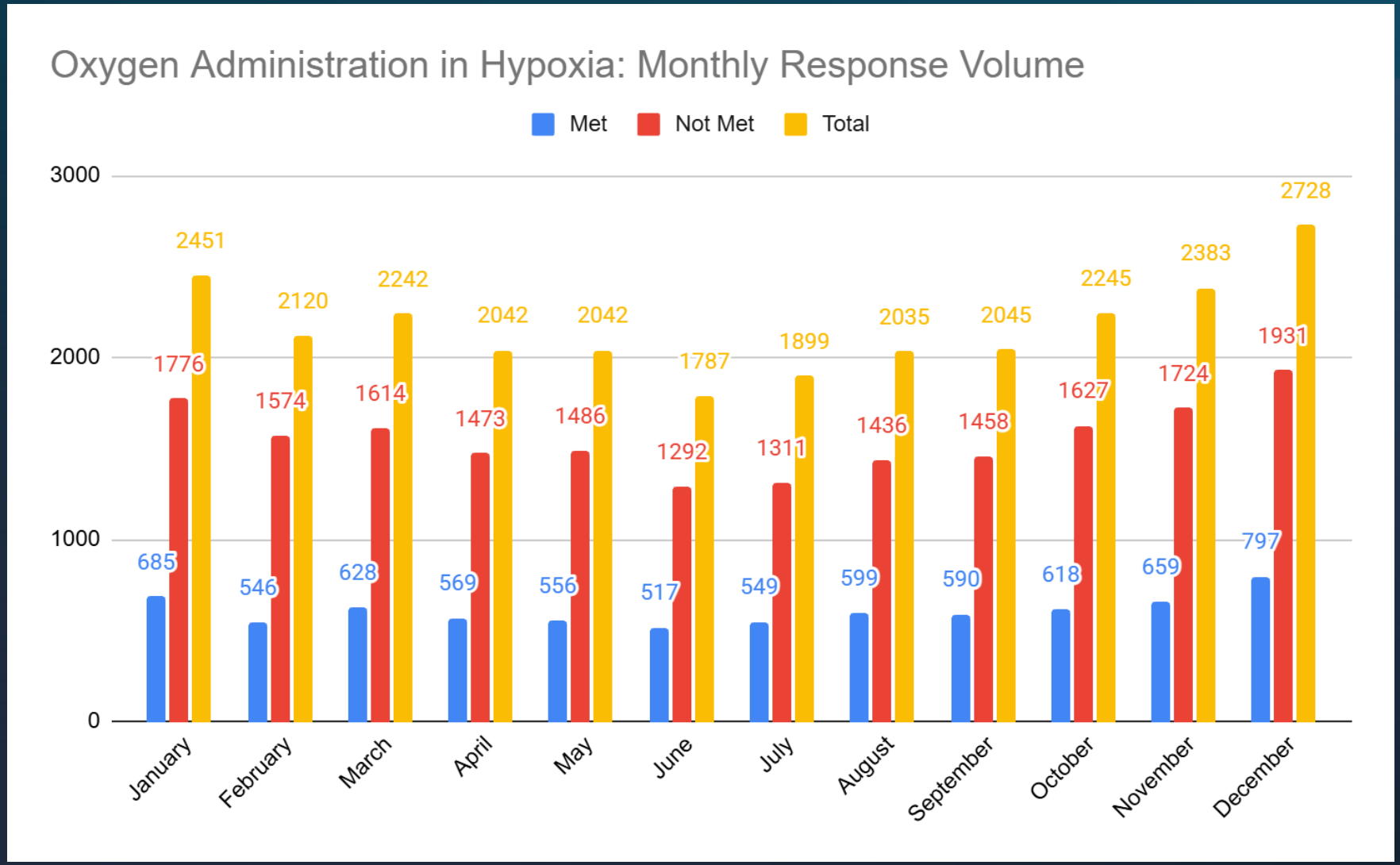


Calendar year 2025

Agencies:
Alexandria, Arlington, Fairfax City, Fairfax County, Loudoun, Manassas, Manassas Park, Prince William, Caroline, Fauquier, Fredericksburg, King George, Spotsylvania, Stafford

VHAC Northern Region Data

Oxygen Administration in Hypoxia: EMS responses to 911 requests for patients with hypoxia (defined as SpO2 <90) during which oxygen is administered, with age ≥ 1 day.

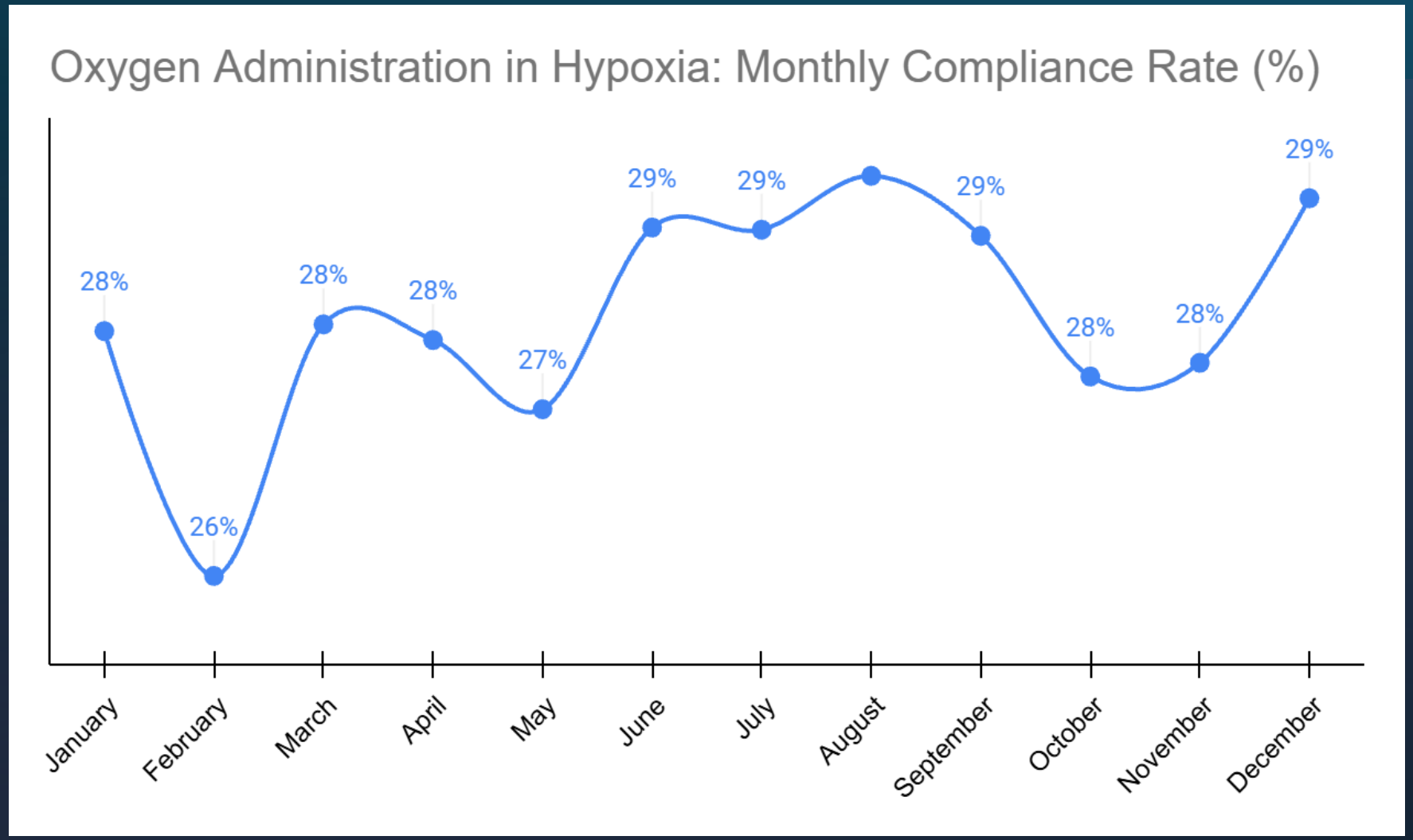


Calendar year 2025

Agencies:
Alexandria, Arlington, Fairfax City, Fairfax County, Loudoun, Manassas, Manassas Park, Prince William, Caroline, Fauquier, Fredericksburg, King George, Spotsylvania, Stafford

VHAC Northern Region Data

Oxygen Administration in Hypoxia: EMS responses to 911 requests for patients with hypoxia (defined as SpO2 <90) during which oxygen is administered, with age ≥ 1 day.

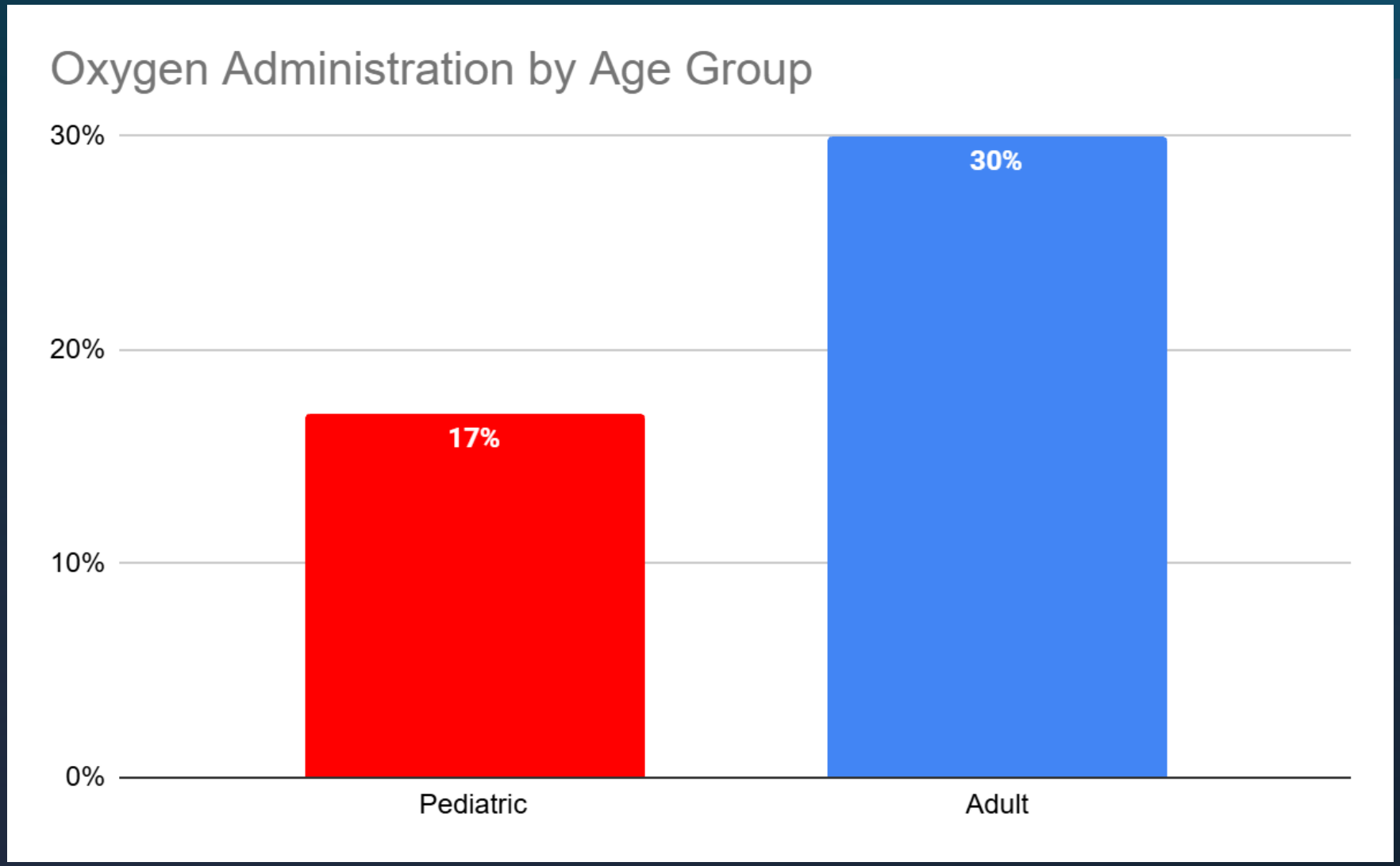


Calendar year 2025

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Alexandria, Arlington, Fairfax City, Fairfax County, Loudoun, Manassas, Manassas Park, Prince William, Caroline, Fauquier, Fredericksburg, King George, Spotsylvania, Stafford

VHAC Northern Region Data

Oxygen Administration in Hypoxia: EMS responses to 911 requests for patients with hypoxia (defined as SpO2 <90) during which oxygen is administered, with age ≥ 1 day.



Calendar year 2025

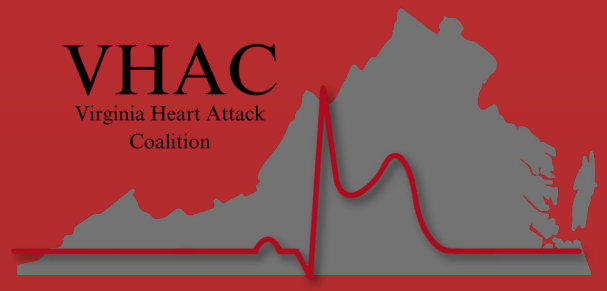
Agencies:
Alexandria, Arlington, Fairfax City, Fairfax County, Loudoun, Manassas, Manassas Park, Prince William, Caroline, Fauquier, Fredericksburg, King George, Spotsylvania, Stafford

Thank you!



VHAC
Virginia Heart Attack Coalition

VCSQI



Break

PLEASE RETURN AT 10:30 AM

SAY HELLO TO OUR SPONSOR

VHAC
Virginia Heart Attack Coalition

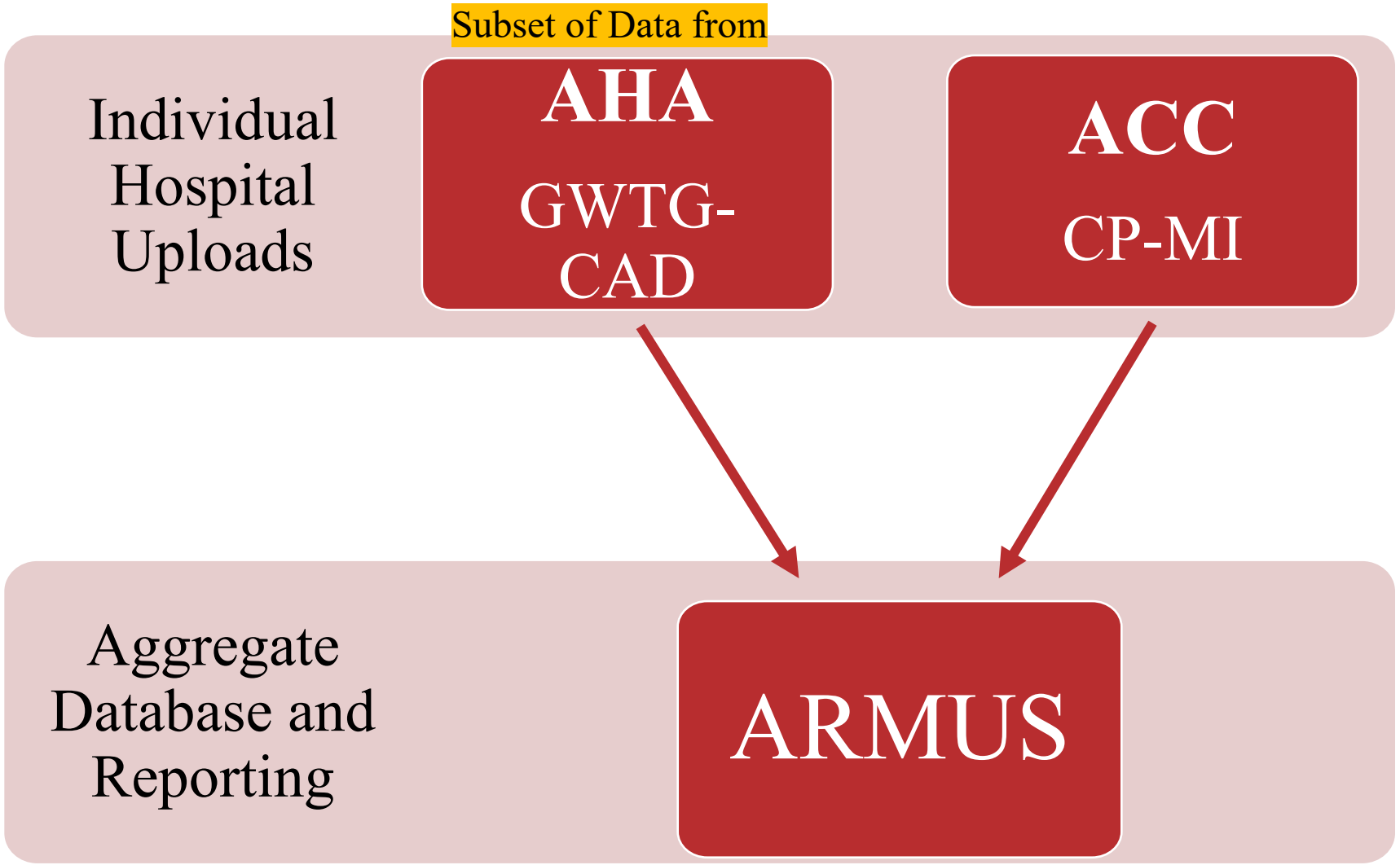
VHAC-VCSQI Statewide STEMI Database

Q4 2025 SUMMARY REPORTS

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Data Aggregation Model



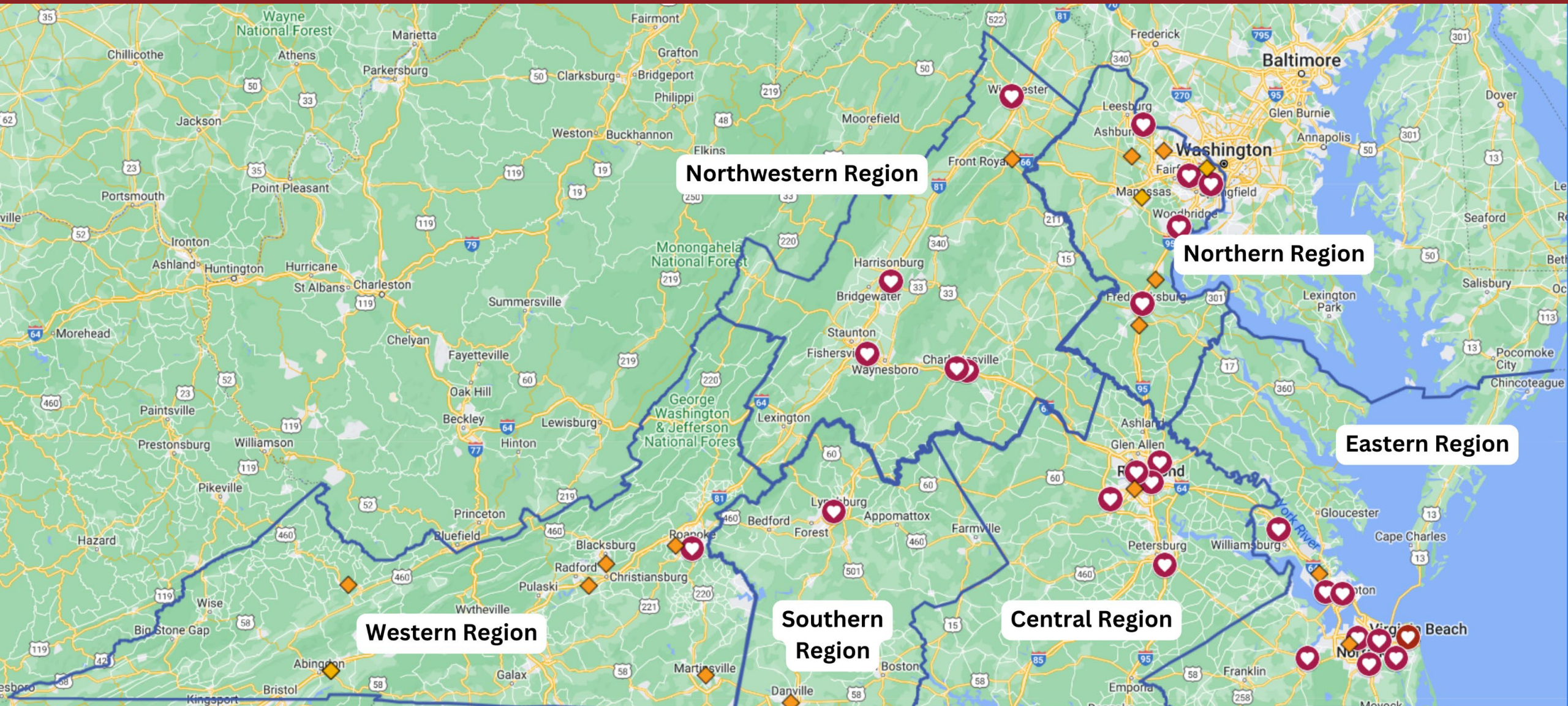
STEMI Database Participation

- 26 VCSQI Programs included in the database
  - 3 New members pending uploads
- 22 Programs currently sharing CP-MI data quarterly
- 1 Program from GWTG
  - Sharing a subset from GWTG-CAD

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VHAC Regions and VCSQI Database Participation



STEMI Reports by Region: Q1 2024 – Q4 2025

Population: All STEMI Patients, Q1 2024 – Q4 2025 (N=4,216)	VCSQI	Central	East	North	Northwest	South	West
Median Door In - Door Out (Minutes): Transfer Patients	**61.0**	58.0	68.0	53.5	67.0	59.0	56.0
Median Transfer Time between Hospitals	**29.0**	29.0	27.0	21.0	39.5	34.0	40.0
FMC to Primary PCI <= 90 Minutes: Non-Transfer Patients	**88.1%**	**81.8%**	88.6%	90.3%	89.8%	91.2%	85.5%
Median FMC to Primary PCI: Non-Transfer Patients (with exceptions)	**71.0**	**74.0**	73.0	73.0	67.0	68.0	75.0
Median FMC to Primary PCI: Non-Transfer Patients (without exceptions)	**73.0**	**77.0**	74.0	75.0	69.0	69.0	77.0

= Exceeds VCSQI Average

= Equal to VCSQI Average

= Lower than VCSQI Average

VHAC
Virginia Heart Attack Coalition

VCSQI

STEMI Reports by Hospital: Q1 2024 – Q4 2025

Population: All STEMI Patients, Q1 2024 – Q4 2025 (N=4,216)	VCSQI	2OZJ3	3E3HC	3K26L	5BKOW	5ZUU4	AH661	B7R9X	F06GN	GYV6A	H5QSA	HVZZJ	J5DO3	KHOVI	MTS72	NGZGO	PUEGF	R2ENC	T4DUC	U6FDP	UHYL6	UWG46	V4231	XM49H
Median Door In - Door Out (Minutes): Transfer Patients	**61.0**	69.0	63.0	55.0	67.5	52.0	29.5	87.0	44.0		56.0	61.0	53.0	77.5	52.0		98.0	49.0	49.0	59.0			72.0	68.0
Median Transfer Time between Hospitals	**29.0**	15.0	13.0	38.0	42.0	25.0	29.5	34.5	8.5		40.0	26.0	15.5	27.0	19.5		55.0	20.0	20.0	34.0			47.5	30.0
FMC to Primary PCI <= 90 Minutes: Non-Transfer Patients	**88.1%**	95.6%	81.9%	90.2%	97.3%	93.9%	91.2%	71.4%	90.3%	90.8%	85.5%	89.6%	94.1%	80.6%	92.2%		92.3%	90.8%	85.0%	91.2%	93.7%	86.5%	70.9%	71.3%
Median FMC to Primary PCI: Non-Transfer Patients (with exceptions)	**71.0**	72.0	76.0	68.0	64.0	72.0	62.0	81.0	67.0	69.0	75.0	75.0	72.5	73.0	73.0		65.0	67.5	74.5	68.0	70.0	76.5	78.0	81.0
Median FMC to Primary PCI: Non-Transfer Patients (without exceptions)	**73.0**	73.0	80.0	70.0	64.5	74.0	65.0	85.0	67.5	72.5	77.0	76.5	74.0	76.0	73.0	96.0	67.0	69.5	78.0	69.0	71.0	79.5	82.0	82.0

= Exceeds VCSQI Average

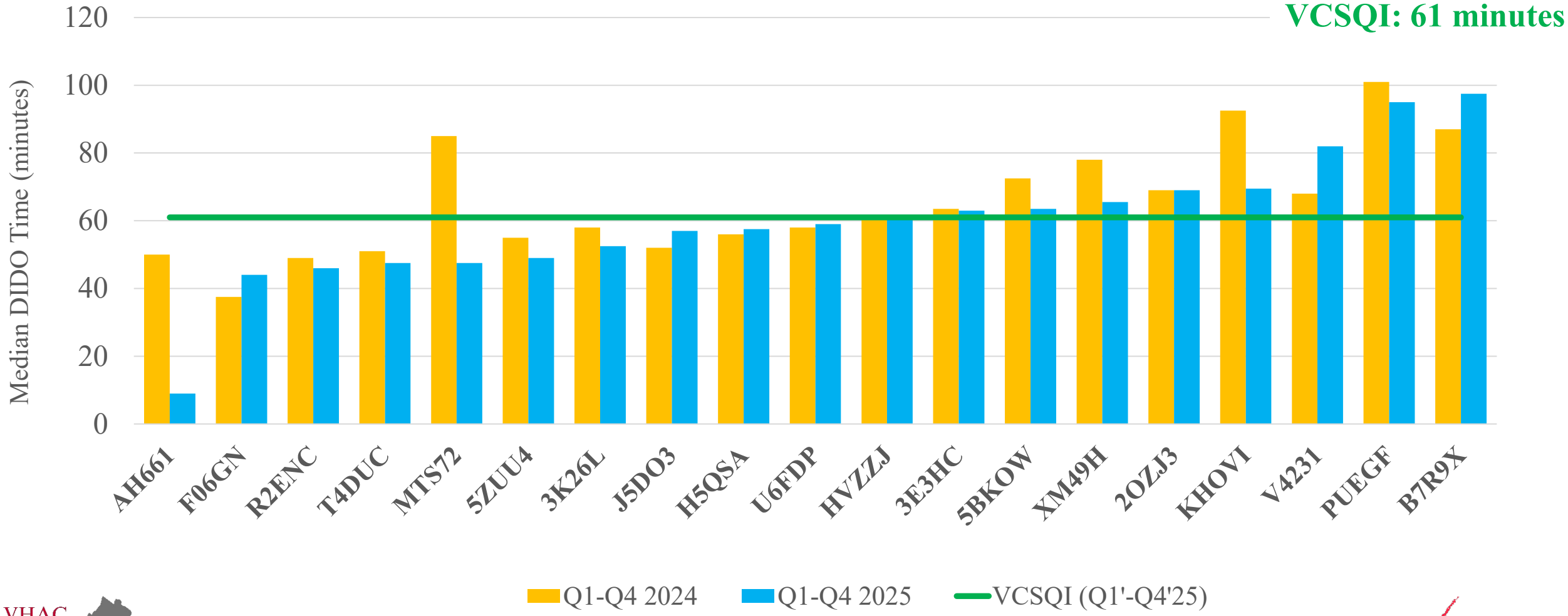
= Equal to VCSQI Average

= Lower than VCSQI Average

VHAC
Virginia Heart Attack Coalition

VCSQI

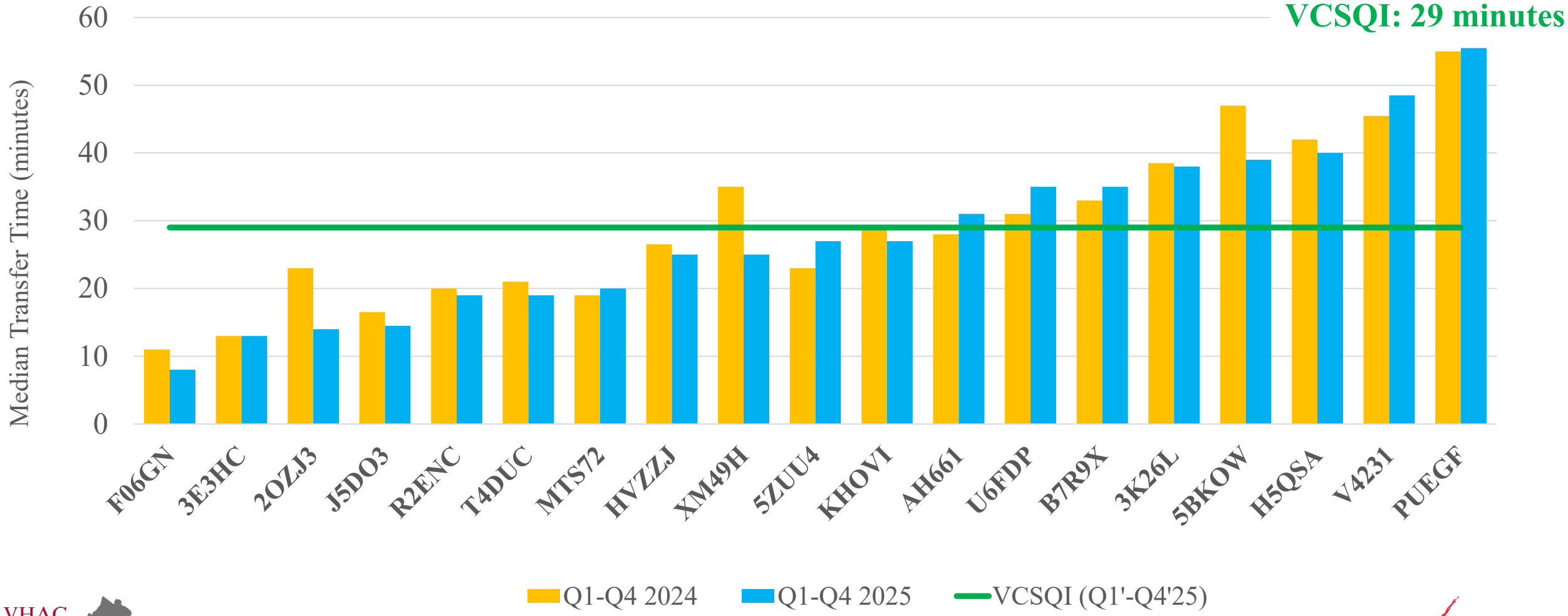
Median DIDO (en route to Receiving Facility): STEMI Procedures Q1 2024 – Q4 2025 (N=2,367)



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Virginia Heart Attack Coalition

VCSQI

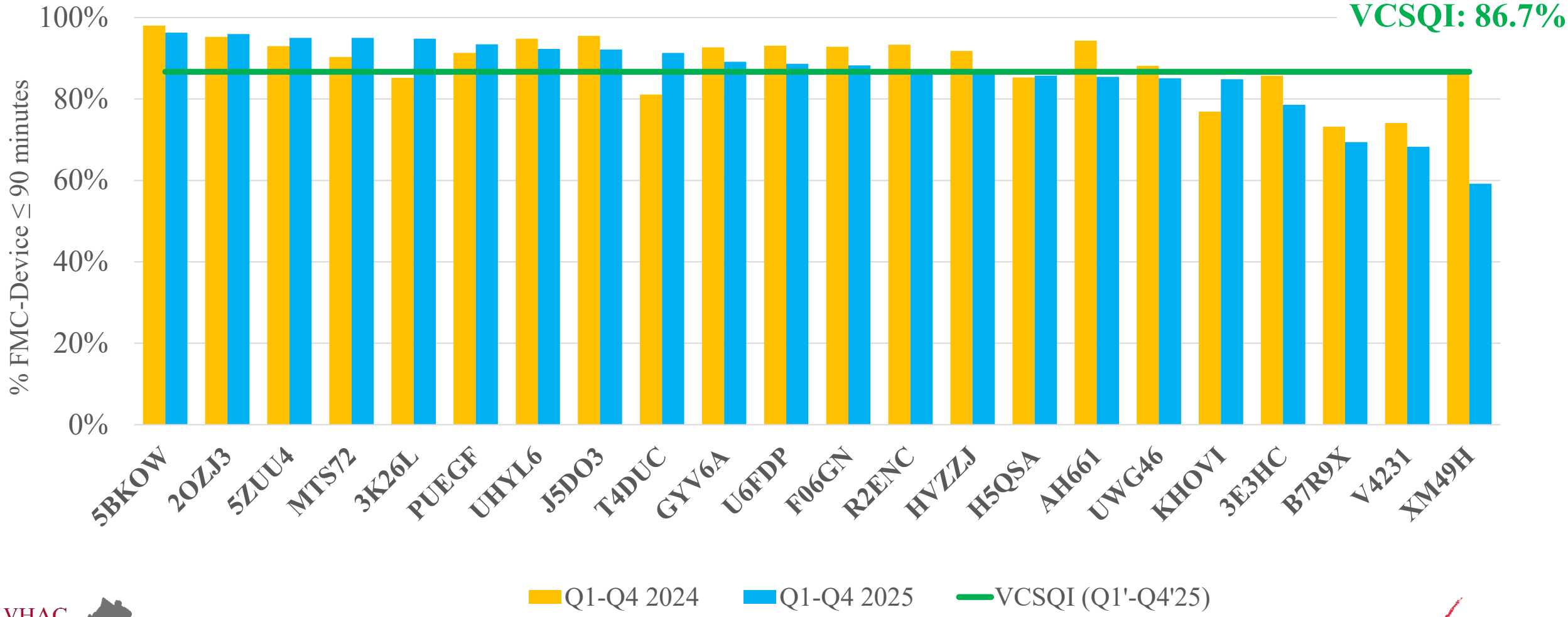
Median Transfer Time (en route to Receiving Facility): STEMI Procedures Q1 2024 – Q4 2025 (N=2,367)



VHAC
Virginia Heart Attack Coalition

VCSQI

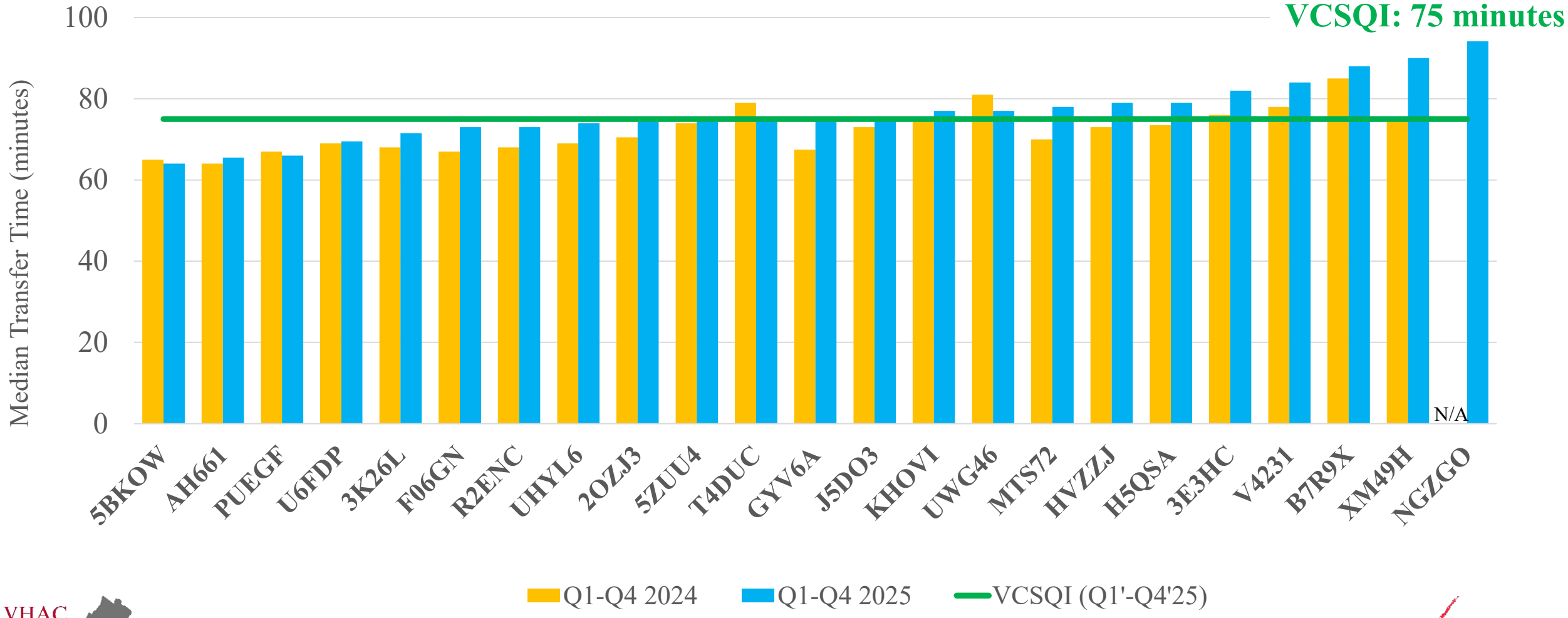
FMC-Device ≤ 90 Minutes: STEMI Procedures
Q1 2024 – Q4 2025 (N=2,367)



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Virginia Heart Attack Coalition

VCSQI

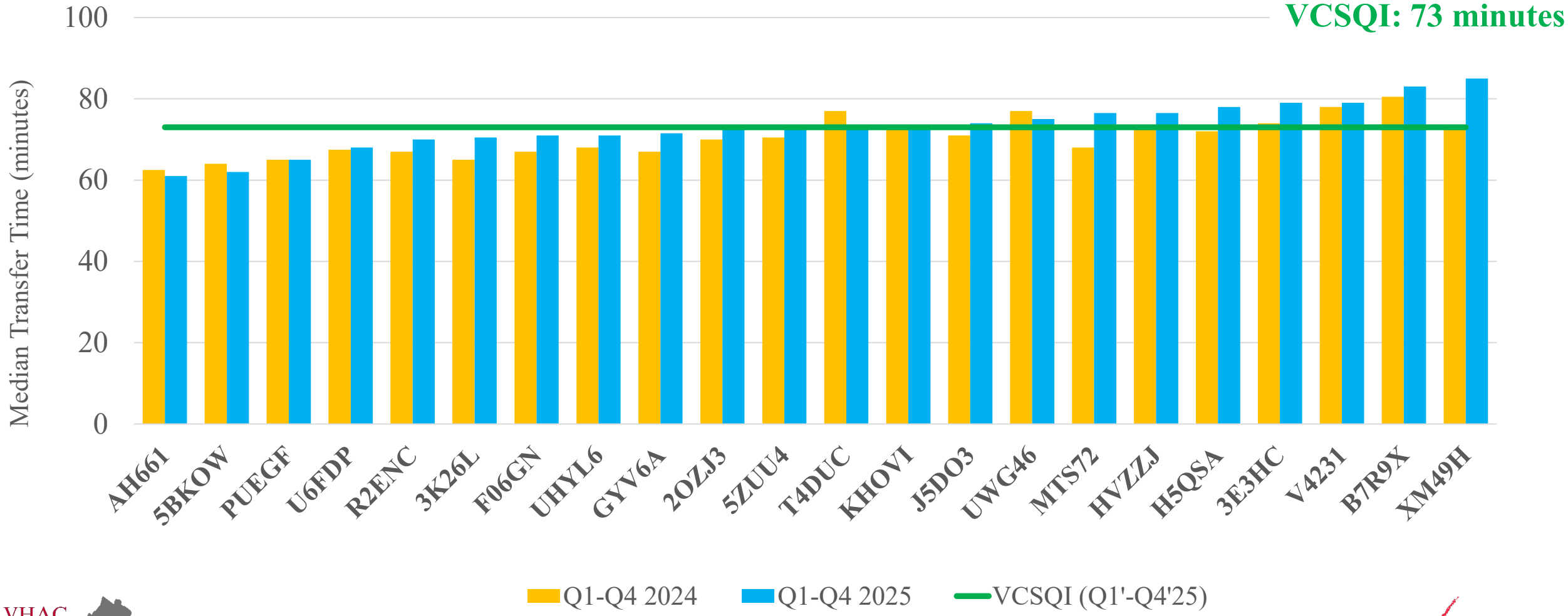
Median FMC-Balloon Time, No Exceptions: STEMI Procedures Q1 2024 – Q4 2025 (N=2,367)



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Virginia Heart Attack Coalition

VCSQI

Median FMC-Balloon Time, with Exceptions: STEMI Procedures Q1 2024 – Q4 2025 (N=2,367)



VHAC
Virginia Heart Attack Coalition

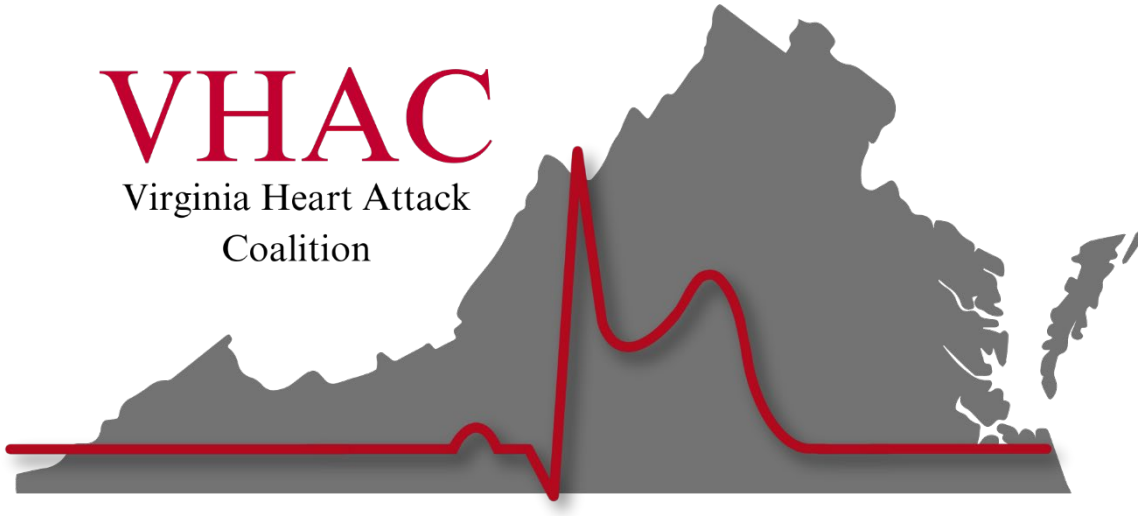
VCSQI

But this is just the beginning…



VHAC

Virginia Heart Attack Coalition



Our Mission: To continuously improve cardiovascular systems of care in Virginia through education and data-driven collaboration with healthcare professionals and organizations, community partners, and patients.

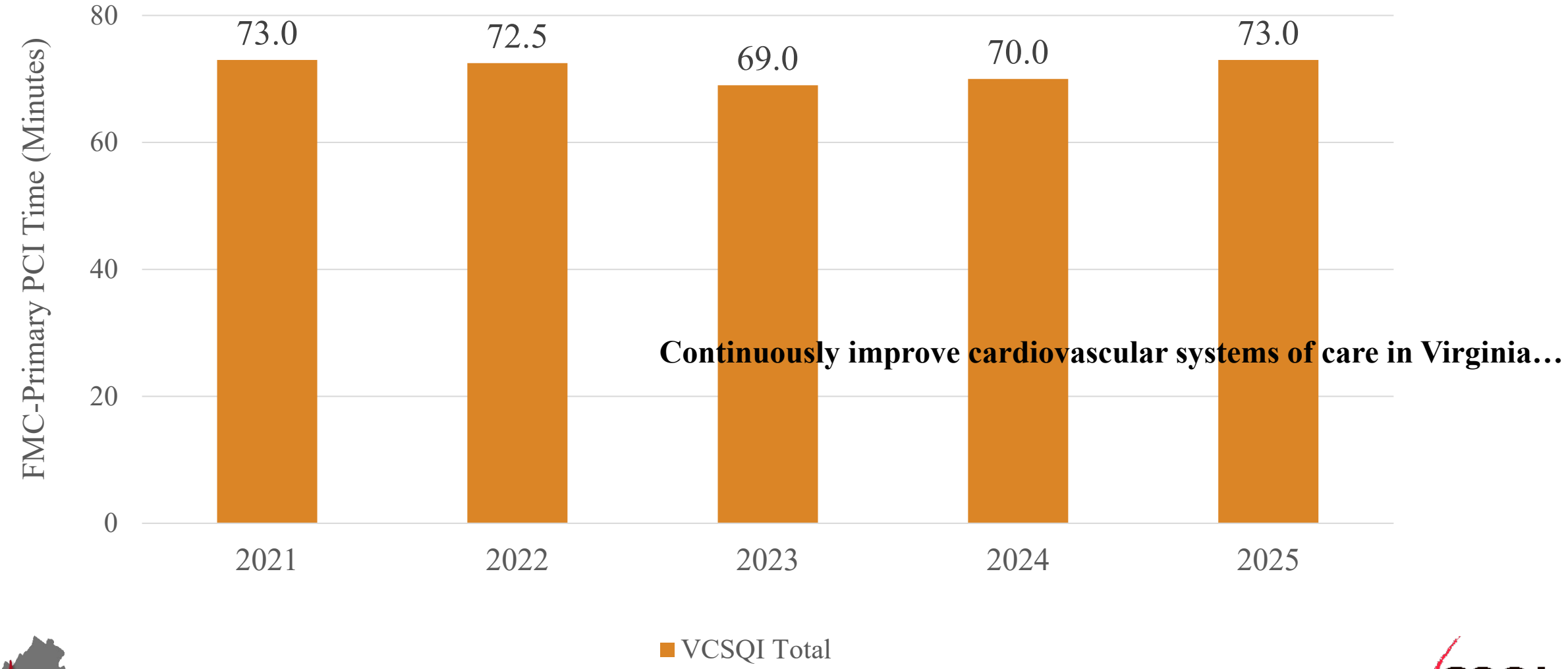
Our Vision: All Virginians should have access to high-quality, patient-centered, equitable cardiovascular care.

It Is All About the Patients …Our Mission and Vision!

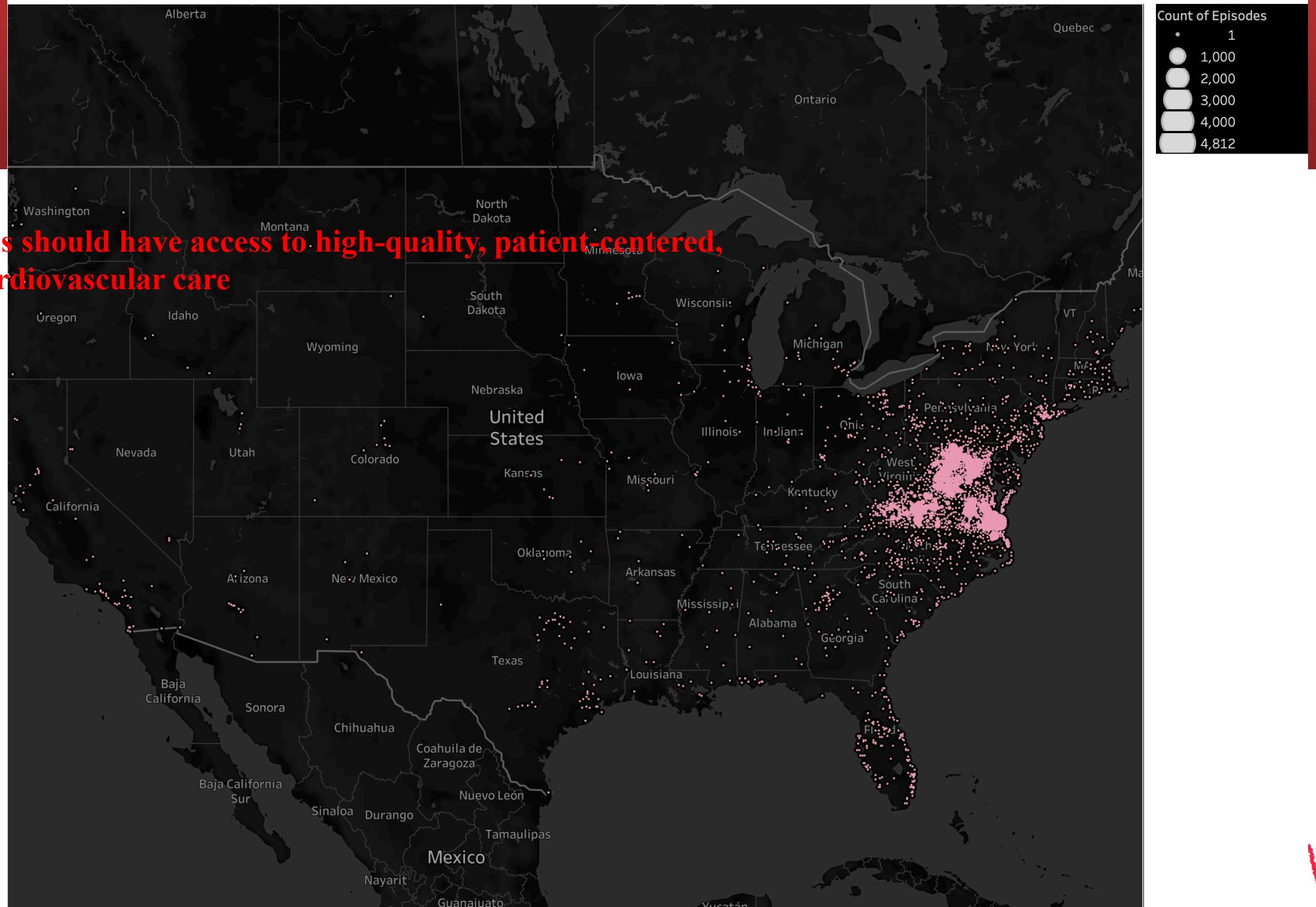
VHAC Virginia Heart Attack Coalition

VCSQI

Median FMC-Primary PCI (Non-Transfer) by Year: With Exceptions



Patient ZIP Codes in VHAC Registry: 2015-2025 (N=62,158 episodes, 2,608 ZIP Codes)

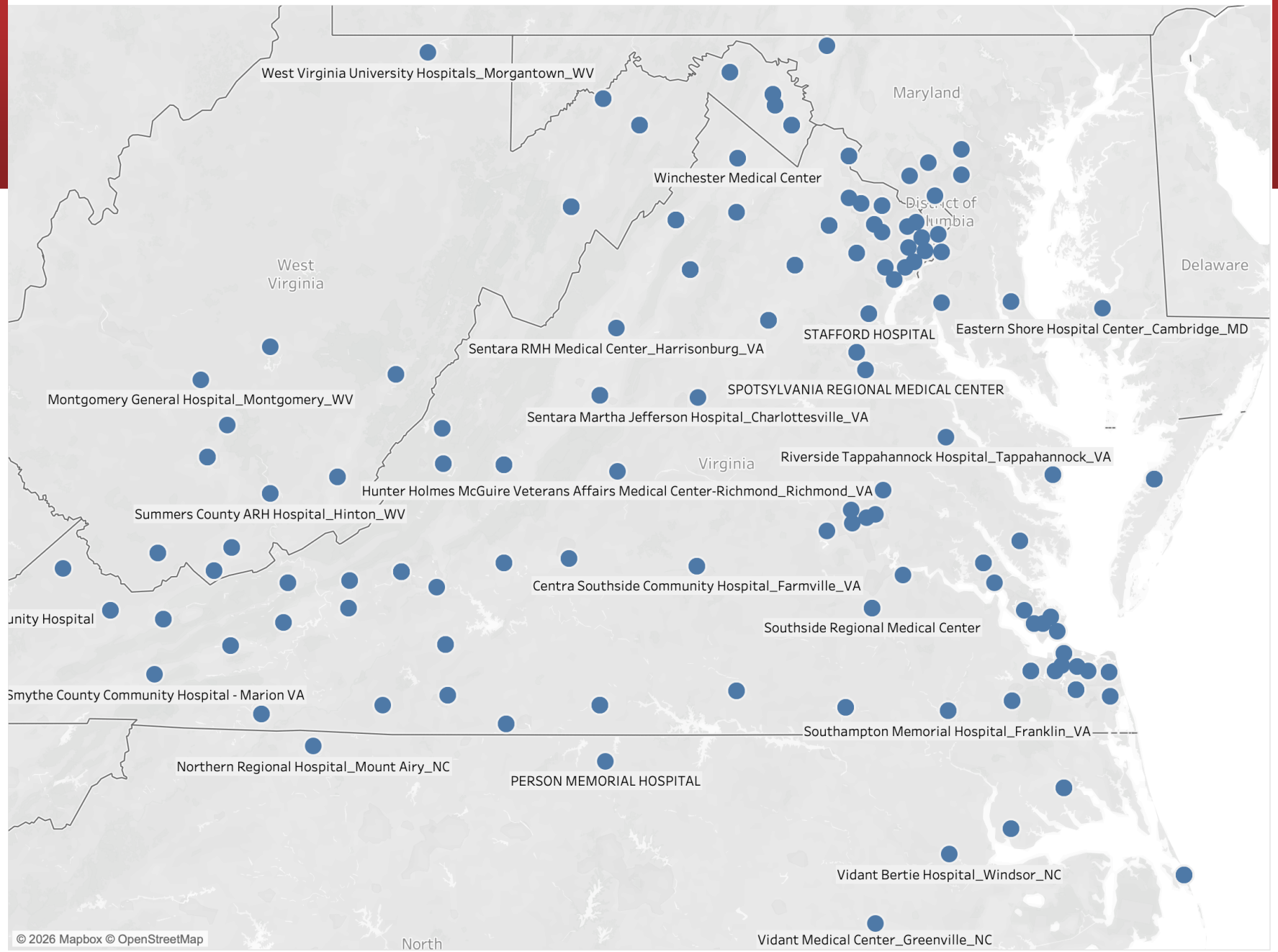


All Virginians should have access to high-quality, patient-centered, equitable cardiovascular care

VHAC
Virginia Heart Attack Coalition

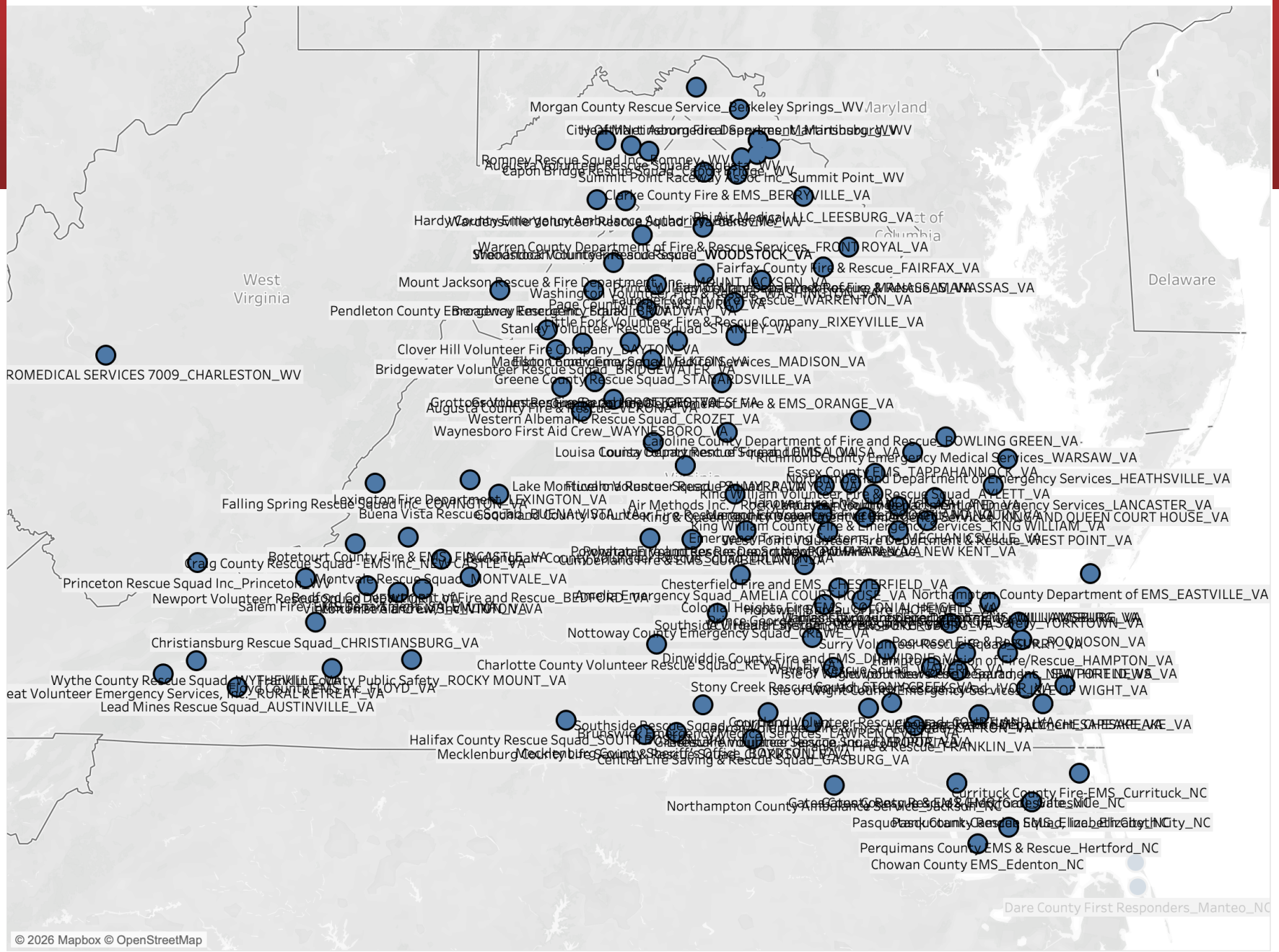
VCSQI

Transfer Hospitals in VHAC Registry: 2015-2025 (N=167)



Map based on Longitude (generated) and Latitude (generated). The marks are labeled by Hospital Name (original). Details are shown for Hospital ZIP. The data is filtered on Dcdate Year, which excludes 8 members.

EMS Agencies in VHAC Registry: 2015-2025 (N=167)



Map based on Longitude (generated) and Latitude (generated). The marks are labeled by Original EMS Name. Details are shown for ZIP Code. The data is filtered on Dcdate Year, which excludes 8 members.

Thank You!

Questions / Suggestions?

Sherri White, MSc, SSGBC
Quality Improvement Advisor
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Eddie Fonner
Exec. Director / Data Science
Eddie@vcsqi.org

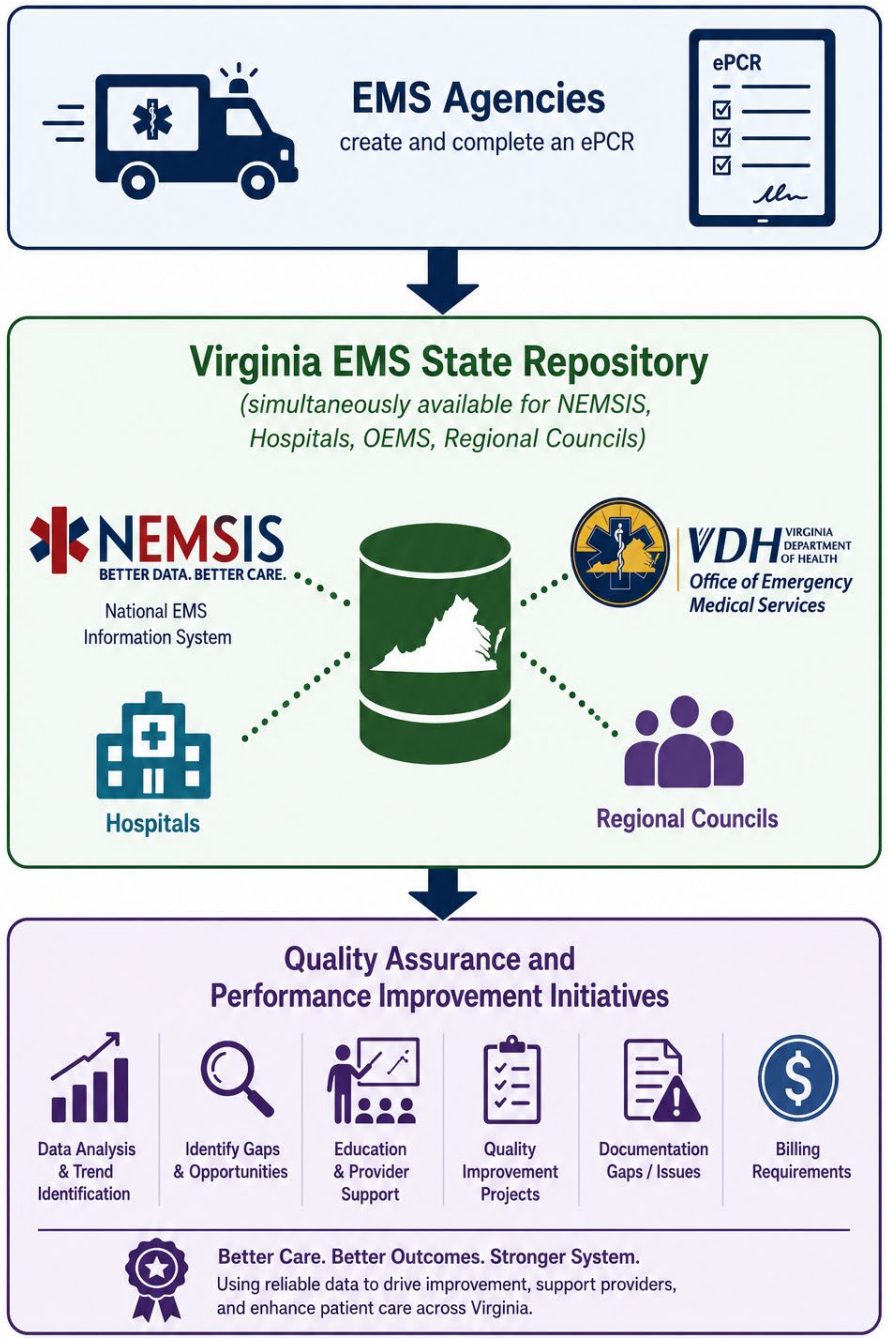
EMS Data and Performance Improvement (PI) Across Virginia

System Optimization Division
Presenter: Amanda Loreti, Office of EMS – System Optimization Specialist



Virginia's EMS Data Ecosystem

- Over 500 EMS agencies contribute data.
- Repository contains 1.7-1.8 million patient care records annually.
- Data supports local, regional, and statewide quality improvement efforts.



System Optimization Division's Role

- Coordinating data use across Virginia:
  - Aggregation of agency-level data
  - Quality assurance and methodology oversight
  - Supporting agencies with documentation, reporting, and performance improvement
- Supporting statewide committees, regional councils, and partner organizations

Building a Statewide PI Framework

Moving from Data Collection to Action

- Current priorities:
  - Standardized performance measures
  - Consistent reporting methodologies
  - Regional engagement
  - Data-informed education
  - Statewide quality improvement collaboration

Goal: **Create a sustainable framework where agencies can benchmark performance and improve patient outcomes.**

Statewide Performance Improvement Metrics (NEW!)

Increase Administration of Oxygen to Hypoxic Patients

- By December 31, 2026, Virginia EMS providers will increase the proportion of hypoxic patients (SpO_2 < 90%) originating from a 911 request who receive documented oxygen therapy to **60%** statewide, as measured through EMS patient care reports in the Virginia EMS Repository.
- Aligns with NEMSQA Respiratory-02 Measure
- 2025 Statewide Performance: **35%**

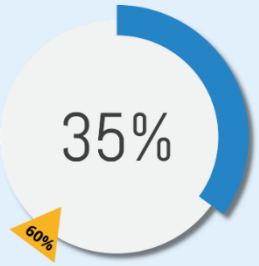
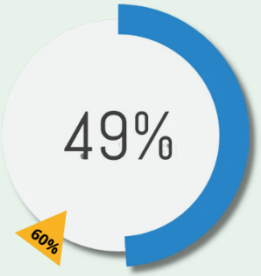
Increase Administration of Aspirin for Cardiac-Suspected Chest Pain Patients

- By December 31, 2026, Virginia EMS agencies will increase the proportion of eligible patients experiencing chest pain of suspected cardiac origin originating from a 911 request who receive aspirin to **60%** statewide, as measured through EMS patient care reports in the Virginia EMS Repository.
- Aligns with Virginia Medical Direction Committee Key Indicator
- 2025 Statewide Performance: **50%**

Virginia Office of EMS

STATEWIDE PERFORMANCE IMPROVEMENT INITIATIVES

Working together to improve patient care and outcomes across the Commonwealth.

WHAT IS THE INITIATIVE?	WHERE WE WERE IN 2025	WHY IT'S IMPORTANT
OXYGEN ADMINISTRATION By December 31, 2026, Virginia EMS providers will boost the percentage of hypoxic patients (SpO_2 < 90%) from 911 calls who get documented oxygen therapy to **60% statewide**. This will be tracked using EMS patient care reports in the Virginia EMS Repository.	STATEWIDE RATE IN 2025  **Our goal: 60% by 12/31/2026**	Oxygen therapy is key for keeping oxygen levels up. It supports vital organs and can save lives for those with hypoxia or breathing problems.
ASPIRIN ADMINISTRATION By December 31, 2026, Virginia EMS providers aim to give aspirin to **60% statewide** of eligible patients with chest pain from suspected cardiac issues. This will be tracked using EMS patient care reports in the Virginia EMS Repository.	STATEWIDE RATE IN 2025  **Our goal: 60% by 12/31/2026**	Aspirin stops platelet clumping. This helps prevent blood clots from forming and growing. For patients with suspected acute coronary syndrome, giving aspirin early can lower complications and improve outcomes.

HOW YOU DOCUMENT MATTERS

Accurate and complete documentation shows the care you provide. It helps us find ways to improve. Your documentation leads to better outcomes for our patients and our system. **Use the "discrete fields" or the drop-downs to record medications and procedures.** Don't rely only on the narrative section. This way, your care is captured accurately in the data.

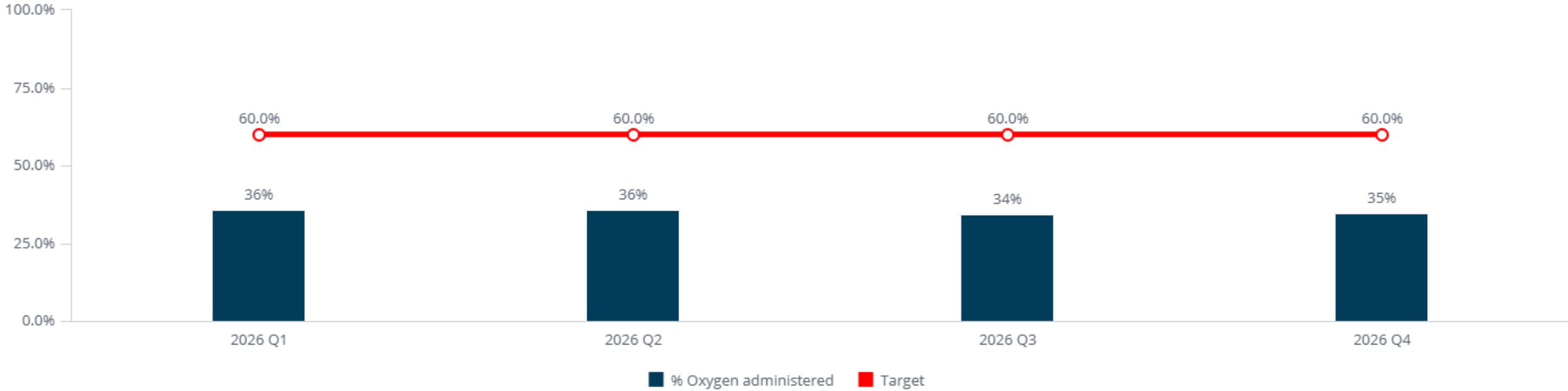
Administration of Oxygen to Hypoxic Patients

Oxygen Administered

% Oxygen administered
35%

Oxygen administered 27,409

Oxygen Administered

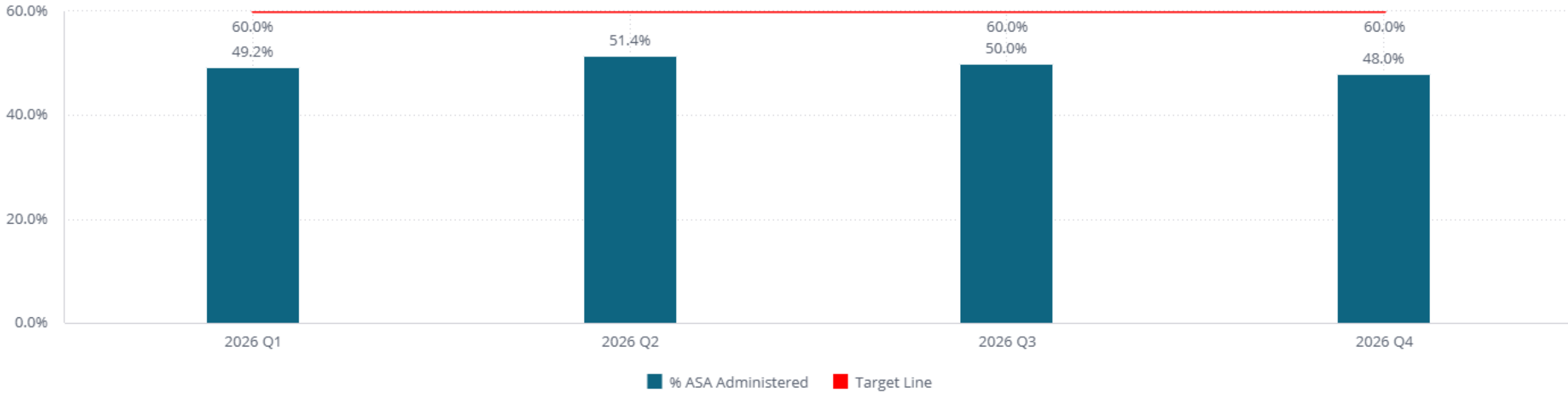


Administration of Aspirin for Cardiac-Suspected Chest Pain Patients

Overall Aspirin Administration

% Aspirin Administered
50%

Aspirin Administered **17,543**



Documentation Challenges

- Common issues include:
  - Medications/Procedures documented only in narrative or not mentioned at all.
  - Missing discrete fields
  - Inconsistent impressions
  - Variation between agencies

If aspirin is documented solely in the narrative and not in the discrete fields (medication section), it does not reflect.

- We are working on hosting Documentation Education across the state to improve this.

Quality reporting depends on quality documentation.

Looking Ahead: Long-Term PI Strategy

- These two initial metrics serve as an entry point into a broader, long-term PI strategy for Virginia's EMS system.
- Future statewide clinical initiatives may include:
  - Hypertension management in pregnant patients
  - Pain management for pediatric patients
  - Hypothermia management in trauma patients
- Regional EMS Councils will continue developing and implementing PI projects tailored to regional needs and priorities.
- This approach ensures local challenges are addressed while maintaining alignment with statewide goals.

Key Takeaways

Moving Forward Together

- Virginia already has a robust EMS data infrastructure.
- The System Optimization Division is working to standardize statewide performance improvement efforts and improve data quality.
- Aspirin administration and oxygen administration are early examples of meaningful statewide metrics.
- **Documentation remains foundational**.

Better Data → Better Decisions → Better Patient Outcomes

Discussion & Questions

Data Visualizations

2026 EMS Calls: 772,346* (↑ 2.1%)

*01/01/2026 - 05/31/2026; updated monthly
2025 EMS Calls (01/01/2025 - 05/31/2025): 756,227

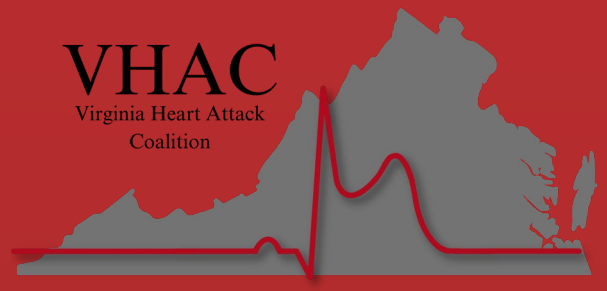


EMS Trauma Triage Dashboard



EMS Suspected Substance Use Incidents

VAOEMS System Optimization Support Request



PANEL DISCUSSION

EVIDENCE TO ACTION: CURRENT RESEARCH IN STEMI SYSTEMS OF CARE

Evidence to Action: Current Research in STEMI Systems of Care

Michael Kontos, MD
Professor, Cardiology
VCU Medical Center
Richmond, VA

Circulation Aug 11, 2026

ORIGINAL RESEARCH ARTICLE

Mechanical CPR Device Use and Cardiac Arrest Survival in EMS Agencies

Paul S. Chan, MD, MSc; Bryan F. McNally, MD, MPH; Zhuxuan Fu, PhD; Rabab Al-Araji, MPH; Saket Girotra, MD, SM

Background

- CPR is often suboptimal in routine practice
  - Is physically demanding
  - Difficult to sustain for long periods
- Mechanical CPR devices potentially can decrease CPR quality variability
  - Provides consistent chest compressions with a standardized rate and depth
  - minimal interruptions
  - Frees up EMS to focus on identifying and treating the OHCA
- Mechanical CPR device use has grown
  - Increasing from 1.9% in 2010 to 8.0% in 2016 of all OHCAs in 1 EMS registry
  - 44.7% of EMS-treated OHCAs in 2022 in the CARES registry
- Evidence supporting mechanical CPR devices for cardiac arrest is mixed
  - Review: only 2 of 7 randomized and quasi-randomized trials (N=8067) had higher rates of survival to discharge
  - None increased rates of survival with good neurological function

Study Purpose

- Prior studies limited by potential of “resuscitation time bias”; patients initially randomized to manual CPR but have ROSC with defibrillation
- Examined whether EMS agency rates of OHCA survival increased after the introduced mechanical CPR devices
- Conducted an interrupted time series analysis to assess the association between mechanical CPR use and OHCA survival outcomes at EMS agencies initiating device use
- End points:
    - Overall survival
    - Rates of favorable neurological survival

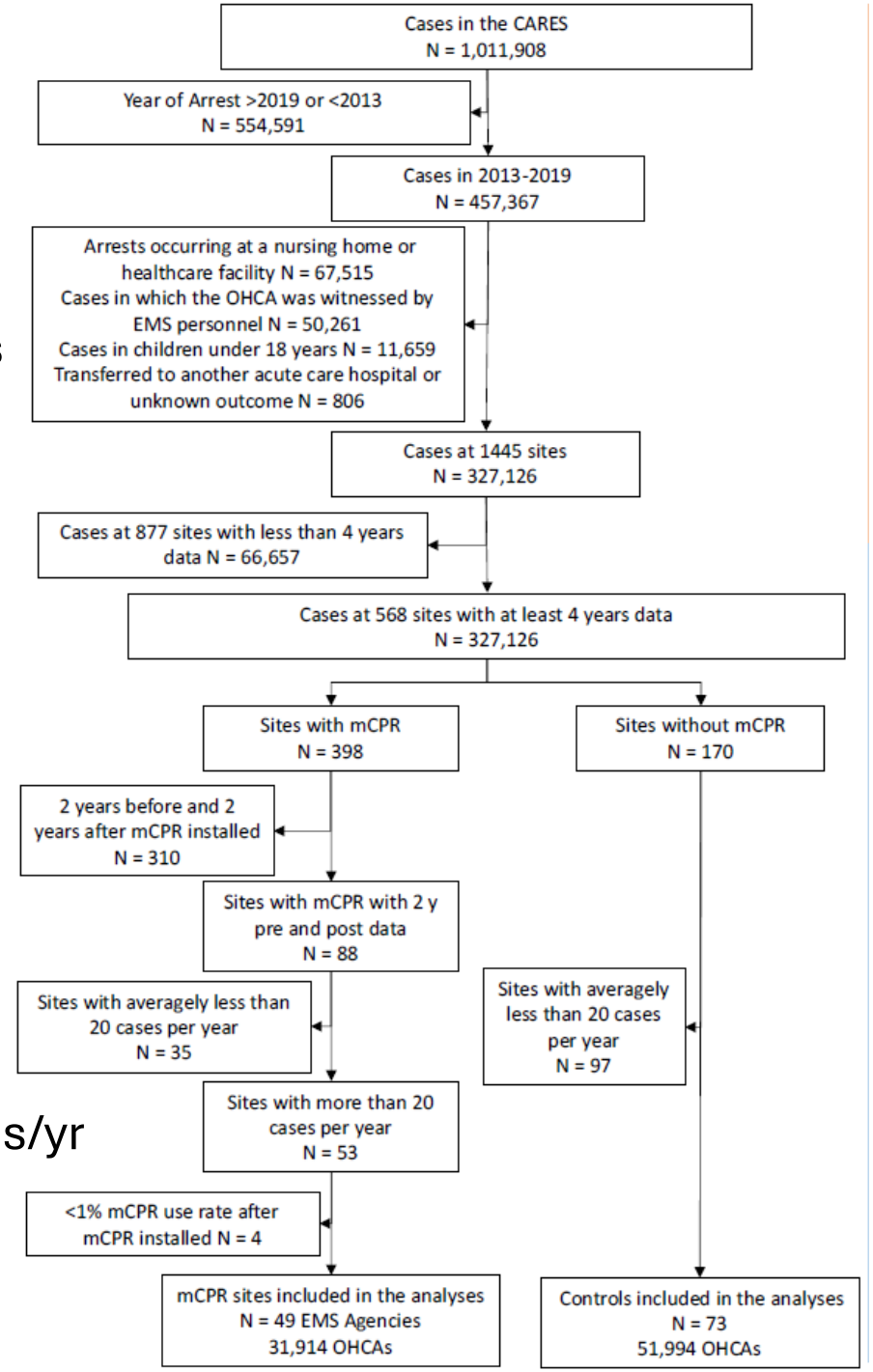
Inclusion Criteria

Standard exclusions

<4 years data

2 years before and
2 years after mCPR

>20 cases/yr

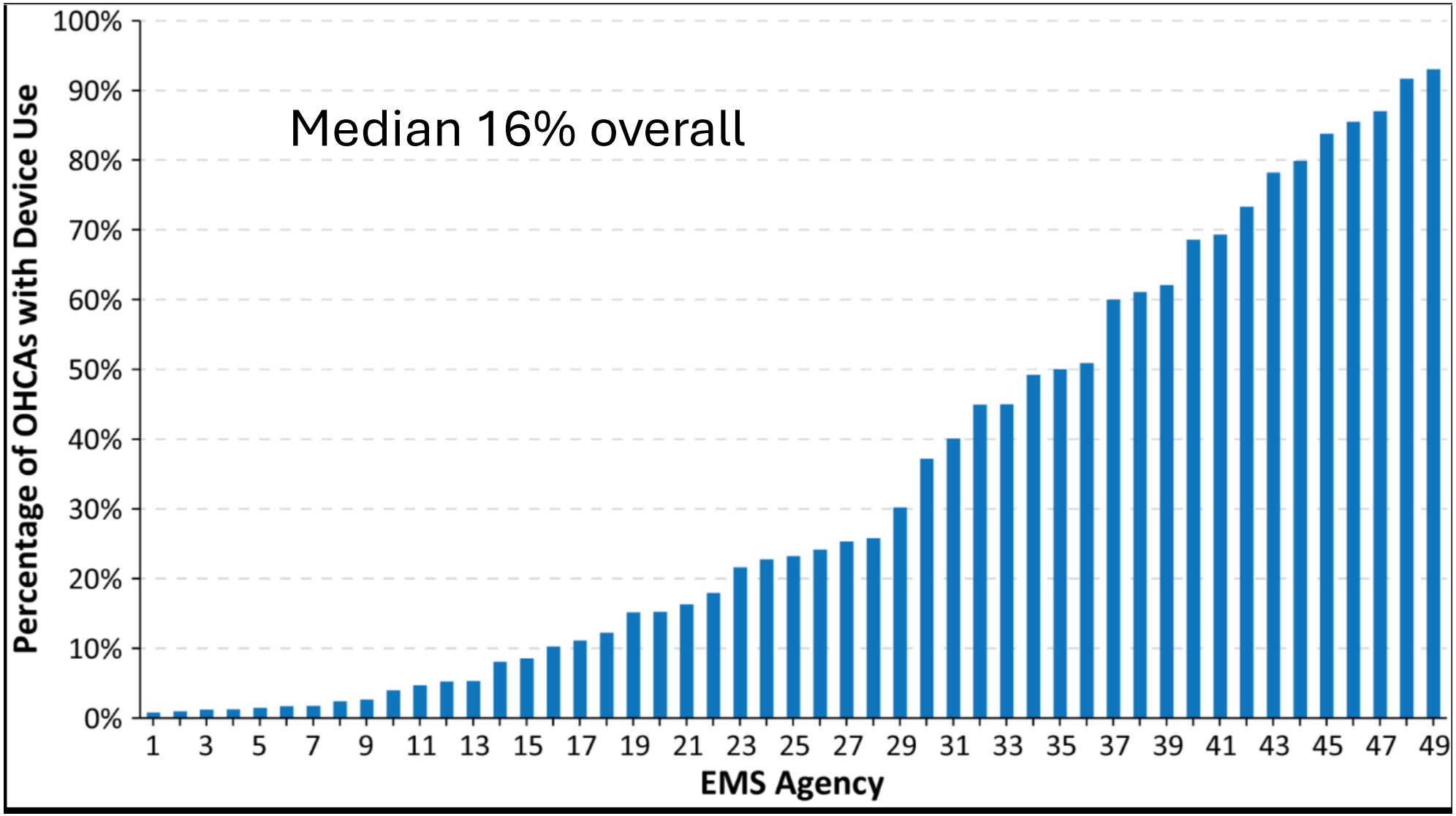


Final cohort: 83,908 OHCAs from 122 EMS agencies

49 that introduced mechanical CPR devices

73 that did not

Variation in mechanical CPR device use among the 49 EMS agencies



Baseline Characteristics

	Before mechanical CPR	After mechanical CPR	Standardized
	N=14 110	N=17 804	Difference*
Age, y			0.02
Mean±SD	62.2 (17.1)	61.8 (17.3)	
Median (interquartile range)	63.0 (52.0–75.0)	63.0 (51.0–74.0)	
Cardiac arrest pathogenesis, n (%)			0.34
Presumed cardiac pathogenesis	12 554 (89.0)	14 980 (84.1)	
Respiratory/asphyxia	948 (6.7)	1302 (7.3)	
Drug overdose	43 (0.3)	1048 (5.9)	
Other	565 (4.0)	474 (2.7)	
First detected rhythm, n (%)			0.04
Nonshockable			
Asystole	7077 (50.2)	9231 (51.9)	
Pulseless electrical activity	2423 (17.2)	2907 (16.3)	
Unknown unshockable rhythm	1398 (9.9)	1920 (10.8)	
Shockable			
Ventricular fibrillation	2247 (15.9)	2630 (14.8)	
Ventricular tachycardia	165 (1.2)	173 (1.0)	
Unknown shockable rhythm	800 (5.7)	936 (5.3)	

78% non-shockable

22% shockable

Trends in Survival Outcomes at Control Agencies

Varied from 9.6% to 10.6% without significant variation over time

Outcomes	2013 n=5625	2014 n=6638	2015 n=7359	2016 n=7515	2017 n=8393	2018 n=8217	2019 n=8247	*P* for trend Unadjusted	Adjusted*
Favorable neurological survival	555 (9.9%)	647 (9.7%)	719 (9.8%)	794 (10.6%)	853 (10.1%)	850 (10.3%)	789 (9.6%)	0.80	0.23
Survival to discharge	640 (11.4%)	781 (11.8%)	829 (11.3%)	908 (12.1%)	993 (11.8%)	985 (12.0%)	919 (11.1%)	0.97	0.31

Trends in Outcomes for Agencies using mCPR

Patient level: 8.7% before and 8.2% after mCPR introduction

EMS agency level: 8.9% before and 8.3% after mCPR introduction

	Adjusted OR (95% CI)*	*P* value
Favorable neurological survival		
Annual survival slope before mechanical CPR introduction†	0.96 (0.90–1.03)	0.25
Annual survival slope after mechanical CPR introduction‡	1.00 (0.94–1.05)	0.89
Change in survival slope after mechanical CPR introduction§	1.03 (0.96–1.12)	0.41
Change in model intercept after mechanical CPR introduction‖	0.94 (0.80–1.11)	0.48
Survival to discharge		
Annual survival slope before mechanical CPR introduction†	0.96 (0.90–1.01)	0.13
Annual survival slope after mechanical CPR introduction‡	1.01 (0.96–1.06)	0.81
Change in survival slope after mechanical CPR introduction§	1.05 (0.98–1.13)	0.17
Change in model intercept after mechanical CPR introduction‖	0.94 (0.80–1.08)	0.32

Conclusions

- Use of mechanical CPR devices varied across EMS agencies, with a median agency-level rate of 16.4% for all their OHCAs

- Introduction of mechanical CPR devices was not associated with higher EMS agency rates of:
  - Favorable neurological survival
  - Survival to discharge
  - No difference between EMS agencies not using mCPR

Discussion

Circulation May 19, 2026

ORIGINAL RESEARCH ARTICLE

Prehospital Heparin Administration in Patients With STEMI Undergoing Primary PCI: HEPARIN-STEMI Randomized Controlled Trial

Misa Fister, MD, PhD; Marko Noc, MD, PhD; Peter Radsel, MD, PhD; Matjaz Bunc, MD, PhD; Danilo Franco, MD; Tomaz Goslar, MD, PhD; for the HEPARIN-STEMI Trial

Background

- Pretreatment with UFH investigated in a number of studies
- DANAMI-2 10 000-IU bolus of UFH on the way to primary PCI had a 32% IRA patency rate at time of cath
- Other retrospective observational studies showed improved IRA patency and better outcomes
- In contrast, the HEAP randomized trial found no difference in a high UFH dose (300 IE/kg) vs low-dose or no UFH on IRA patency
- Had higher rates of need for transfusion (10% versus 6%; *P*=0.07)

Rationale and Inclusion Criteria

- Investigated UFH pretreatment at the FMC in a contemporary high-volume primary PCI network
- Inclusion criteria:
  - >18 years old
  - obvious STEMI on prehospital ECG (confirmed by MD)
  - symptom duration of ≤6 hours
- Exclusions
  - Cardiac arrest
  - Cardiogenic shock

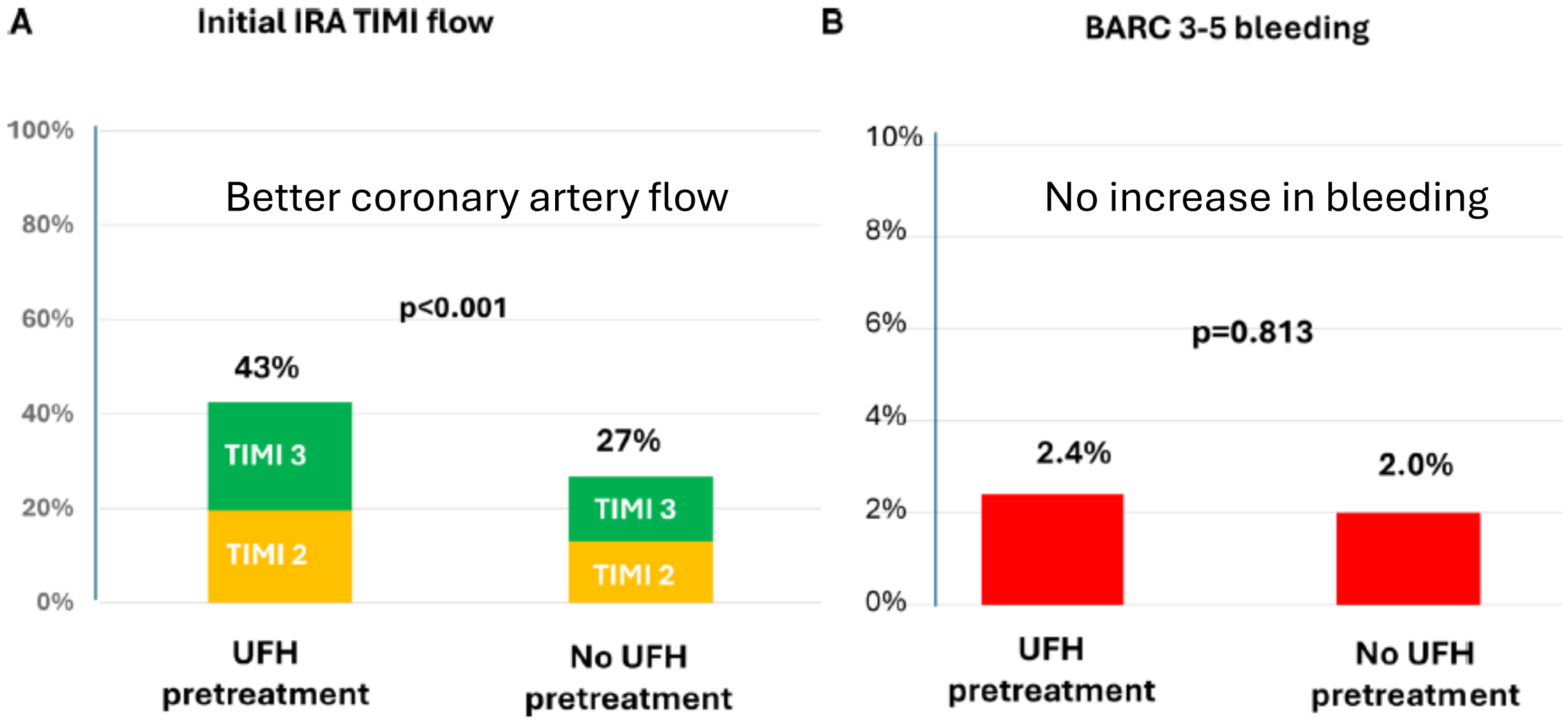
Procedure and End Points

- Pre-hospital treatment
  - ASA 250–500 mg
  - no P2Y12 inhibitor
  - UFH pretreatment with 70- to 100-IE/kg IV
  - Supplemental UFH given after initial coronary angiography and before primary PCI
- Primary end point
  - TIMI flow grade 2 or 3 (normal flow) in the IRA at initial coronary angiography
- Primary safety end point
  - In-hospital BARC type 3–5 bleeding
- Secondary end points:
  - post procedural TIMI flow grade 3
  - early ST-segment resolution
  - peak cardiac troponin I
  - Troponin I after 24 hours
  - 30-day all-cause mortality

Baseline Characteristics

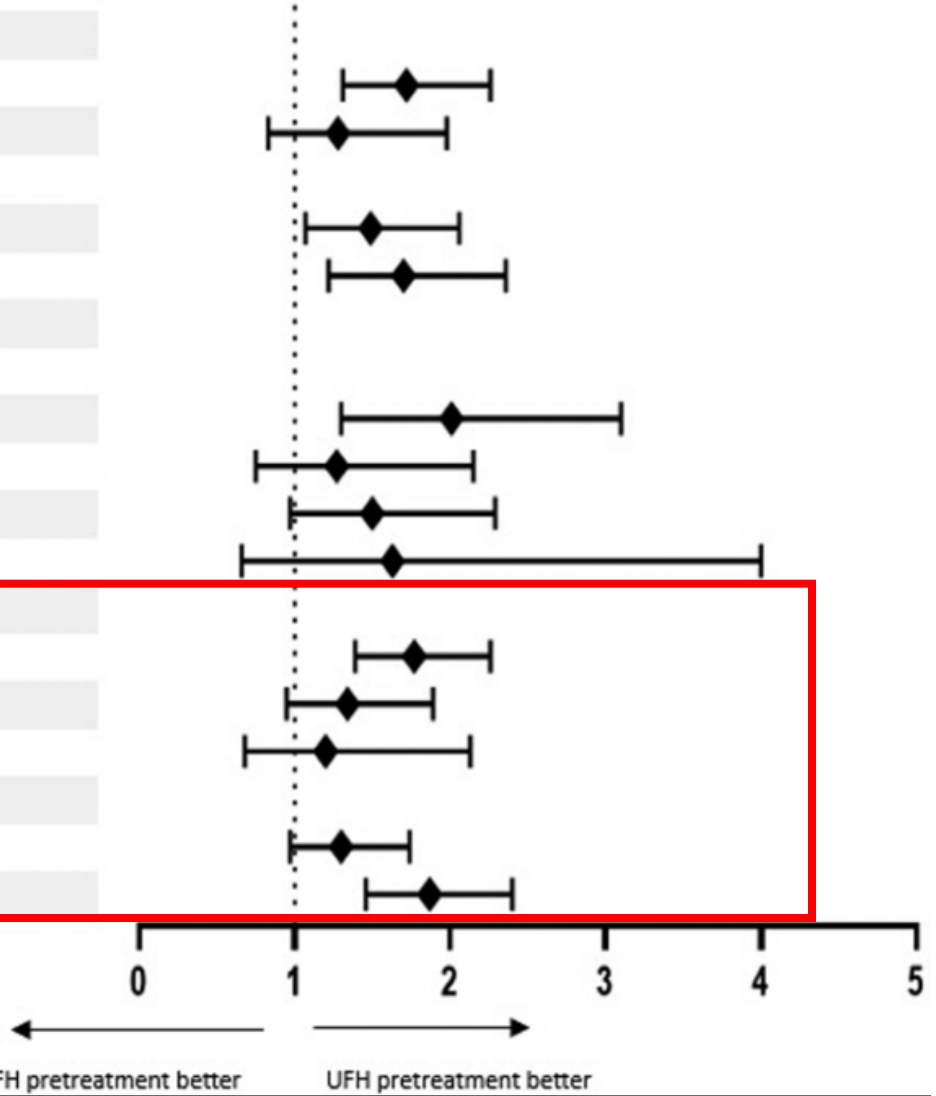
Characteristics	UFH pretreatment (n=298)	No UFH pretreatment (n=295)	*P* value
Age, y	64.2±11.7	63.0±11.6	0.186
Male sex	215 (72)	225 (76)	0.215
Body mass index	27.8±4.3	28.2±4.2	0.257
Hypertension	151/298 (51)	159/295 (54)	0.431
Diabetes	52/298 (17)	49/295 (17)	0.786
Hypercholesterolemia	98/298 (33)	101/295 (34)	0.727
Current smoking	127/298 (43)	117/295 (41)	0.464
Previous MI	30/298 (10)	38/295 (13)	0.282
Previous stroke	15/298 (5)	11/295 (4)	0.438
PAD	11/298 (4)	13/295 (4)	0.658
Previous PCI	36/298 (12)	45/295 (15)	0.260
Previous CABG	2/298 (0.7)	2/295 (0.7)	1.000
Prehospital treatment			
Symptoms to FMC, min	70 (35–135)	66 (35–120)	0.986
FMC to catheterization laboratory, min	69 (50–95)	66 (49–100)	0.853
Symptoms to catheterization laboratory, min	145 (107–210)	150 (104–220)	0.814
Acetylsalicylic acid at FMC	296/298 (99.3)	294/295 (99.7)	0.569
UFH pretreatment at FMC	291/298 (97.7)	5/295 (1.7)	<0.001

Outcomes


A
Initial IRA TIMI flow
100%
80%
60%
40%
20%
0%
Better coronary artery flow
p<0.001
43%
TIMI 3
TIMI 2
27%
TIMI 3
TIMI 2
UFH pretreatment
No UFH pretreatment
B
BARC 3-5 bleeding
10%
8%
6%
4%
2%
0%
No increase in bleeding
p=0.813
2.4%
2.0%
UFH pretreatment
No UFH pretreatment

Subgroup Analysis

Subgroup	Early heparin	Control	RR (95% CI)	p	P for interaction
Sex					0.273
Male	93/214 (43.5)	56/222 (25.2)	1.72 (1.31-2.26)	**<0.001**	
Female	33/82 (40.2)	22/70 (31.4)	1.28 (0.83-1.98)	0.260	
Age					0.468
<65 years	61/158 (38.6)	42/162 (25.9)	1.49 (1.07-2.06)	**0.015**	
≥65 years	65/138 (47.1)	36/130 (27.7)	1.70 (1.22-2.36)	**0.001**	
Culprit artery					0.745
LM	5/6 (83.3)	0/2 (0.0)		0.035	
LAD	39/97 (40.2)	24/120 (20.0)	2.01 (1.30-3.10)	**0.001**	
LCX	18/35 (51.4)	13/32 (40.6)	1.27 (0.75-2.15)	0.376	
RCA	40/121 (33.1)	25/113 (22.1)	1.50 (0.97-2.29)	0.062	
Side branch	13/26 (50.0)	4/13 (30.8)	1.63 (0.66-4.00)	0.254	
Symptoms to heparin (time - h)					1.000
<2	87/184 (47.3)		1.77 (1.39-2.26)	**<0.001**	
2-4	30/84 (35.7)	78/292 (26.7)	1.34 (0.95-1.89)	0.108	
>4	9/28 (32.1)		1.20 (0.68-2.13)	0.537	
Heparin to coronary angiography (time - h)					1.000
≤1	50/144 (34.7)	78/292 (26.7)	1.30 (0.97-1.74)	0.084	
>1	76/152 (50.0)		1.87 (1.46-2.40)	**<0.001**	



Conclusions

- Prehospital UFH administration in STEMI patients significantly improved IRA patency at initial coronary angiography
- No increased risk of significant bleeding
- Benefit appeared greater in patients with:
    - Shorter symptoms to UFH
    - Longer UFH to cath time
- No evidence of:
    - reduced infarct size (peak TnI 43 vs 49 ng/dl; p=03)
    - improved clinical outcomes (mortality 2.4 vs 2.5%)

Discussion

JAMA Aug 5, 2026

JAMA | Original Investigation

Duration of Therapeutic Hypothermia After Out-of-Hospital Cardiac Arrest
The ICECAP Randomized Clinical Trial

William J. Meurer, MD, MS; Sharon D. Yeatts, PhD; Romergryko G. Geocadin, MD; Akash Roy, PhD; Clifton W. Callaway, MD, PhD; Viswanathan Ramakrishnan, PhD; Scott M. Berry, PhD; Angela F. Caveney, PhD; Sara Meyer, BS; Nia Bozeman, BA; Deneil M. Harney, MPH, MSW; Mickie Speers, BSN; Valerie Lynn Willis Stevenson, BAS, LRT; Cemal B. Sozener, MD, MEng; Mohamud R. Daya, MD, MS; David G. Beiser, MD, MS; Jonathan Elmer, MD, MS; Imad R. Khan, MD; Karen G. Hirsch, MD; J. Hope Kilgannon, MD; Michelle Nassal, MD, PhD; Nicholas J. Johnson, MD; Rachel Beekman, MD; Teresa L. May, DO, MS; Jeremy Brown, MD; Robert Silbergleit, MD; for the SIREN Investigators

Background

- Therapeutic hypothermia widely used for neuroprotection following cardiac arrest
  - Small initial trials from 2002 →targeting 33 °C for either 12 hours or 24 hours
  - Two large trials→ no difference between of 33 °C vs 36 °C or a reactive fever control
  - Most patients had shockable initial rhythms and presumed cardiac cause
- Inconsistent findings likely multifactorial:
  - Patient selection
  - How the therapy is implemented
  - How quickly patients are cooled
  - Cooling duration

Rationale and Methods

- The Influence of Cooling Duration on Efficacy in Cardiac Arrest Patients (ICECAP) trial was designed to assess duration-response curve for rapidly initiated hypothermia
- Multicenter, randomized, adaptive-allocation clinical trial conducted at 71 hospitals in the US between June 2020 and June 2025
- Adults with out-of-hospital cardiac arrest who:
  - remained unconscious
  - achieved a target temperature less than 34 °C within 4 hours of cardiac arrest
  - had a definitive temperature control device started were eligible

Protocol

- Exclusions:
  - Hemodynamic instability (systolic BP < 80 mm Hg despite aggressive management)
  - Pre-existing neurological disability or condition confounding outcome determination
  - Pre-existing terminal illness
  - Sepsis
- Inclusion:
  - Had started therapeutic hypothermia as part of standard care prior to enrollment.
  - Time-to-target temperature <4 hours from the time of cardiac arrest
  - Time of cardiac arrest: initial 911 call or time of arrest if witnessed
  - Time to target temperature: cardiac arrest time to temperature <34 °C
- Hypothermia duration:
  - randomized to 6 hours to 72 hours
  - The first 200 patients were randomized to 12-, 24-, and 48-hour durations in a 1:1:1 ratio.
  - Later time allocation based on which likely to be optimal for each rhythm type
  - Rewarming duration equal to the cooling duration up to 24 hours
- Normothermia was maintained with a definitive device until liberation from mechanical ventilation or up to 120 hours.

End-Points

- The primary end point was the modified Rankin Scale score at 90 days.
- 7-point functional scale
- score 0 = independence
- Score 6 = death

- Changed to a weighted score 0-10
- Higher weights reflecting better outcomes
- Designed to balance relative contributions of both favorable outcome and degree of residual functional impairment
  - 10 =mRS score of 0
  - 9= mRS score of 1
  - 8 for an mRS score of 2

  Good outcomes
  - 6 for an mRS score of 3

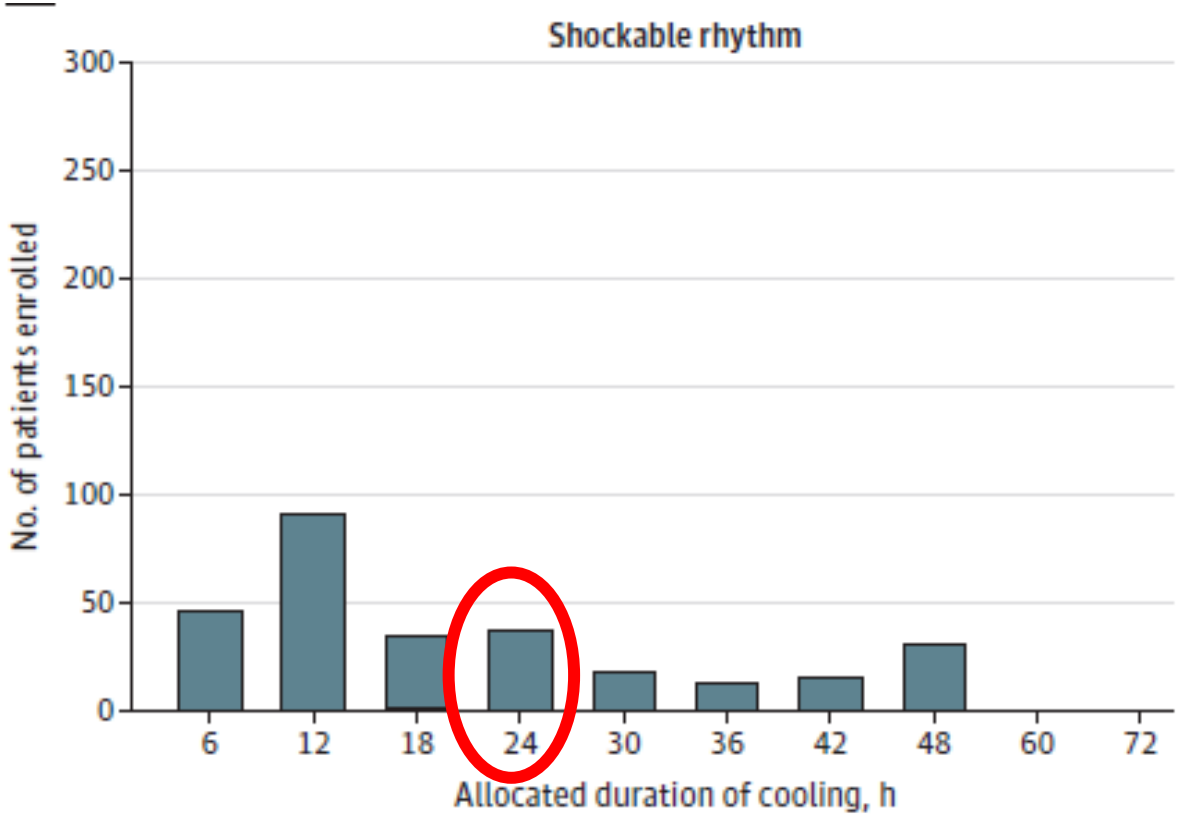
  Intermediate outcome
  - 0 for an mRS score of 4 to 6

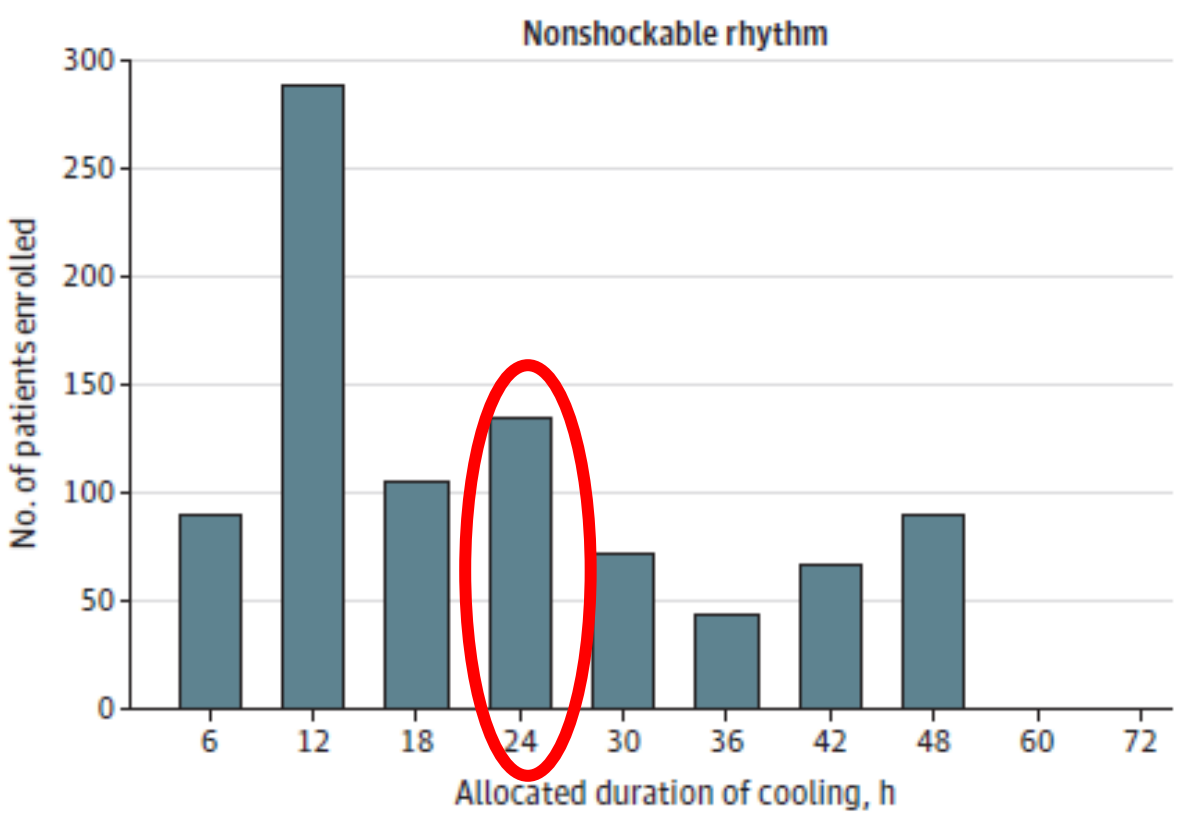
  Poor outcome
- High score good, low score badf
- Adverse events
  - Pneumonia and other infections
  - malignant cardiac arrhythmias
  - seizures, neurological worsening

Results

- Patients were enrolled at 71 sites between June 2020 and June 2025
- After 1158 patients randomized to 6-48 hours, met the prespecified stopping rule
- Presenting rhythms were non-shockable in 76% and shockable in 24%
- Median time from cardiac arrest to definitive temperature control device initiation was 2 hr 31 min
- Surface cooling device used in 55% of patients; endovascular device in 45%
- Overall, 90-day mortality was 74%
    - 81% in the non-shockable rhythm cohort
    - 52% in the shockable rhythm cohort

Cooling Distribution





Baseline characteristics

Characteristics	Rhythm type[a]	
	Nonshockable (n = 883)	Shockable (n = 275)
Age, median (IQR), y	61 (50-70)	62 (52-71)
Sex, No. (%)		
Female	365 (41.3)	93 (33.8)
Male	518 (58.7)	182 (66.2)
Most probable cause of initial arrest, No. (%)[c]		
Cardiac	199 (22.5)	212 (77.1)
Overdose/poisoning	248 (28.1)	35 (12.7)
Respiratory	260 (29.4)	15 (5.5)
Other medical	89 (10.1)	5 (1.8)
Neurological	22 (2.5)	6 (2.2)
Other	31 (3.5)	0
Unknown	34 (3.9)	2 (0.7)
Bystander performed cardiopulmonary resuscitation, No./total (%)	433/877 (49.4)	168/274 (61.3)
Bystander applied AED, No./total (%)	107/870 (12.3)	68/274 (24.8)
First cardiac arrest rhythm monitored per EMS or at ED arrival, No. (%)[d]		
Ventricular fibrillation	2 (0.2)	178 (64.7)
Ventricular tachycardia	3 (0.3)	25 (9.1)
Asystole	454 (51.4)	12 (4.4)
Pulseless electrical activity	363 (41.1)	17 (6.2)
Unknown or other	61 (6.9)	43 (15.6)
No. of shocks prior to hospital arrival, median (IQR)	0 (0-0) [n = 872]	2 (1-4) [n = 274]
Total prehospital epinephrine, median (IQR), mg	2 (1-4) [n = 874]	2 (1-4) [n = 273]
STEMI in the ED, No./total (%)	66/882 (7.5)	52/275 (18.9)
Arterial lactate, median (IQR), mmol/L[e]	6.9 (3.1-10.9) [n = 458]	5 (2.8-8.6) [n = 137]

22-29% Of each

¾ Cardiac

50-60% with Bystander CPR

74% VT/VF

92% PEA or asystole

Hospital Care

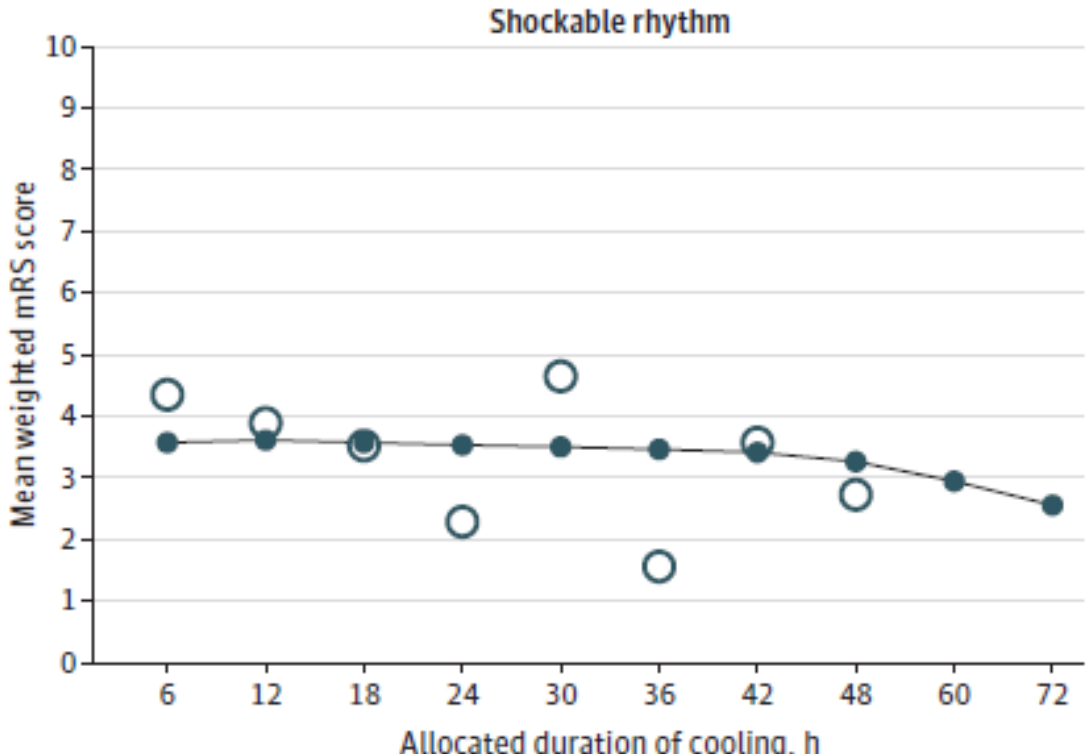
Variables	Rhythm type	
	Nonshockable (n = 883)	Shockable (n = 275)
Time from cardiac arrest to emergency department arrival, median (IQR), min	39 (30-51) [n = 865]	39 (30-50) [n = 271]
Time from cardiac arrest to device start, median (IQR), min	152.5 (113-196) [n = 874]	146 (112-188) [n = 274]
Type of definitive temperature control device, No. (%)		
Surface	477 (54)	159 (57.8)
Endovascular	406 (46)	116 (42.2)
Initial ICU to which patient was admitted, No./total (%)		
Medical ICU	547/882 (62.0)	97/274 (35.4)
Cardiology ICU	158/882 (17.9)	128/274 (46.7)
Neurological ICU	118/882 (13.4)	28/274 (10.2)
Combined or other ICU	59/882 (6.7)	21/274 (7.7)
Interventions performed during hospitalization, No. (%)		
Percutaneous coronary intervention	15 (1.7)	57 (20.7)
Coronary artery bypass graft surgery	1 (0.1)	6 (2.2)
AICD or pacemaker implanted	13 (1.5)	71 (25.8)
Continuous or intermittent hemodialysis	153 (17.3)	43 (15.6)

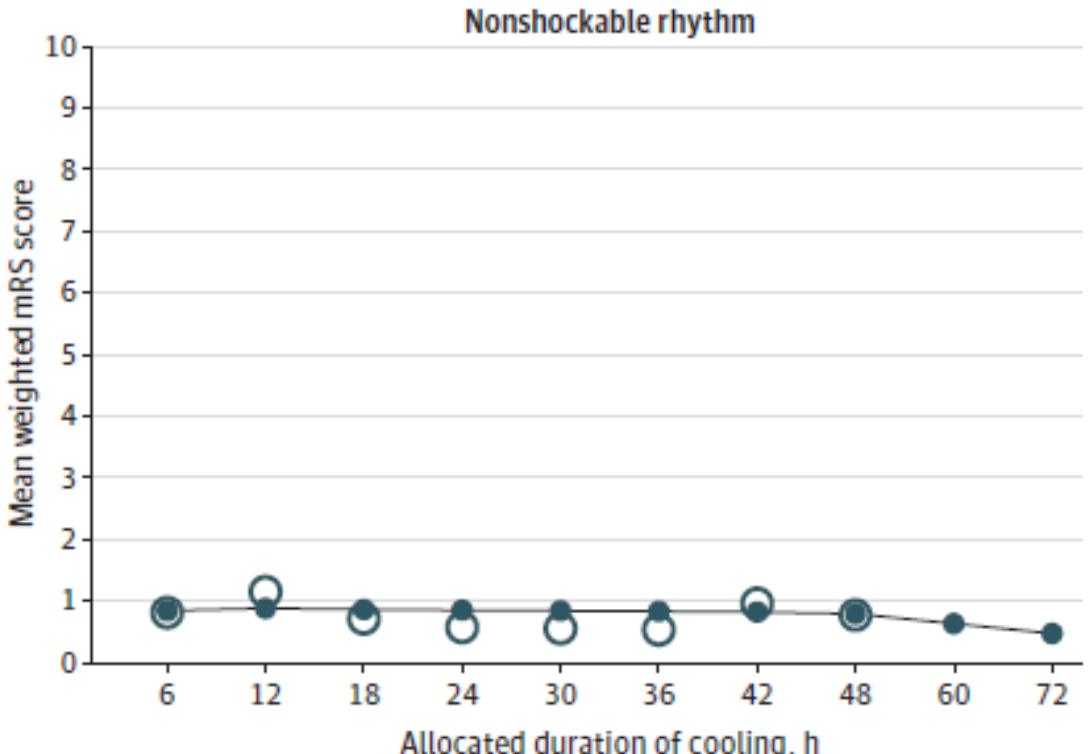
Outcomes

Outcomes	Cooling duration, h							
	6	12	18	24	30	36	42	48
Nonshockable rhythm								
Primary outcome	n = 89	n = 284	n = 104	n = 134	n = 70	n = 42	n = 64	n = 89
Weighted mRS score, model-based mean (SD)[a]	0.83 (0.13)	0.87 (0.11)	0.85 (0.1)	0.84 (0.1)	0.83 (0.11)	0.82 (0.11)	0.81 (0.12)	0.78 (0.15)
Probability of being the target duration	0.507	0.305	0.073	0.035	0.023	0.016	0.017	0.013
Mortality, No. (%)[b]								
All-cause mortality at 90 d	75 (84.3)	220 (77.5)	83 (79.8)	112 (83.6)	60 (85.7)	36 (85.7)	54 (84.4)	79 (88.8)
In-hospital mortality[c]	73 (82)	214 (75.4)	77 (74)	107 (79.9)	58 (82.9)	34 (81)	52 (81.3)	75 (84.3)
Mortality after WLST at 90 d	52 (58.4)	166 (58.5)	59 (56.7)	79 (59)	42 (60)	25 (59.5)	43 (67.2)	60 (67.4)
mRS score ≥4, No. (%)[b,d]	80 (89.9)	245 (86.3)	95 (91.3)	123 (91.8)	66 (94.3)	39 (92.9)	58 (90.6)	81 (91)
Shockable rhythm								
Primary outcome	n = 44	n = 89	n = 33	n = 36	n = 17	n = 11	n = 14	n = 28
Weighted mRS score, model-based mean (SD)[a]	3.57 (0.32)	3.61 (0.3)	3.57 (0.29)	3.53 (0.3)	3.5 (0.33)	3.46 (0.36)	3.4 (0.41)	3.26 (0.51)
Probability of being the target duration	0.49	0.301	0.08	0.041	0.028	0.018	0.017	0.013
Mortality, No. (%)[b]								
All-cause mortality at 90 d	18 (40.9)	46 (51.7)	19 (57.6)	20 (55.6)	5 (29.4)	8 (72.7)	8 (57.1)	19 (67.9)
In-hospital mortality[c]	17 (38.6)	45 (50.6)	17 (51.5)	16 (44.4)	5 (29.4)	8 (72.7)	8 (57.1)	18 (64.3)
Mortality after WLST at 90 d	14 (31.8)	37 (41.6)	15 (45.5)	9 (25)	4 (23.5)	6 (54.5)	5 (35.7)	14 (50)
mRS score ≥4, No. (%)[b,d]	22 (50)	49 (55.1)	19 (57.6)	26 (72.2)	7 (41.2)	9 (81.8)	8 (57.1)	19 (67.9)

Graphs of Duration-Response Model by Presenting Rhythm Type

8-10 =mRS score Good outcomes
6 =mRS score Intermediate outcome
0 =n mRS score Poor outcome
Higher score good, lower score bad

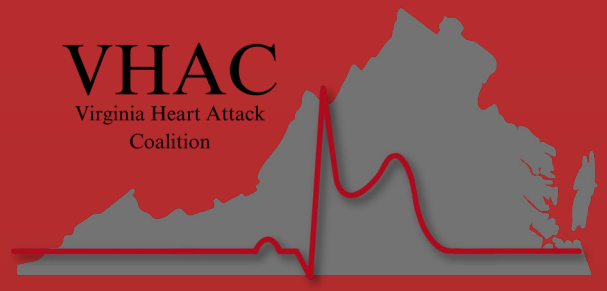




Conclusions

- Increasing cooling duration in this trial in broadly representative and inclusive cohorts of patients after OHCA, does not improve outcomes
- Why do the current data add to the body of neutral trials that do not sufficiently inform guidelines?
  - Large trials with broad inclusion criteria limited due to:
  - heterogeneous injury phenotypes
  - clinical practice variability
  - underlying social and genetic determinants of health
- Better question may be:
  - in whom is it important to control temperature
  - how to do so
  - when is the best to deliver it
- Sub-studies exploring the use of EEG, MRI, and other biomarkers may help to identify injury phenotypes

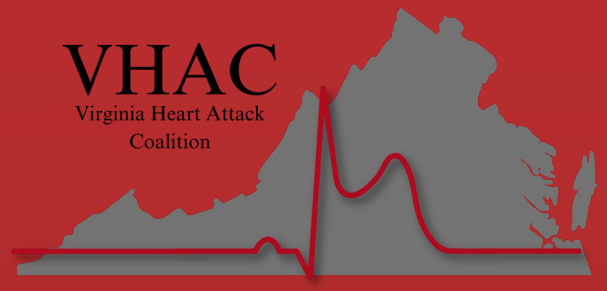
Discussion



LUNCH TIME

PLEASE RETURN AT 1:00 PM

SAY HELLO TO OUR SPONSOR



KEYNOTE PRESENTATION

Moving the Decision Upstream

The Crashing Patient and the Future of Prehospital Cardiovascular Care



Aman A. Shah, MD, FAEMS, FAAEM

October 22nd, 2026

VHAC Statewide Meeting

Disclosures

- I have no relevant financial relationships with ineligible companies to disclose.
- I have no financial relationship with any ultrasound, artificial intelligence, ECG, or medical-device company discussed in this presentation.
- Discussion of emerging technologies is for educational purposes and does not represent endorsement of any specific product or platform.

Objectives

1. Describe how serial clinical assessment and focused prehospital ultrasound can support earlier recognition and characterization of evolving cardiovascular shock.

2. Evaluate how artificial intelligence may support earlier recognition and decision-making in prehospital cardiovascular emergencies.

3. Identify the clinical, operational, and quality-improvement requirements needed to safely integrate emerging prehospital diagnostic capabilities into EMS and hospital systems of care.

The patient was fine…until they weren’t

Sudden Ambulance Death Syndrome (SADS)

The event may have been sudden.
The trajectory usually wasn’t.



The Crashing Patient

A framework for when physiology is failing.

Recognize the patient in extremis.
Identify the failing physiology.
Use the tools you already have.
Act before collapse.

Developed in New Jersey

Implementing in PWC

Patient in extremis

64-year-old male

Chest pressure
Shortness of breath
Diaphoresis

”I just don’t feel right.”

VITALS	
HR	96
BP	118/78
RR	24
SpO_2	93%

Awake. Talking. GRAY. SWEATY.

What happens next?

Do we stay, or do we go?



Stay

Assess. Treat. Reassess.

Go

Definitive care is at the hospital.

What does this patient need before we move?

Stabilize before you move

RECOGNIZE

Patient in extremis

INTERVENE

Airway • Breathing • Monitoring

REASSESS

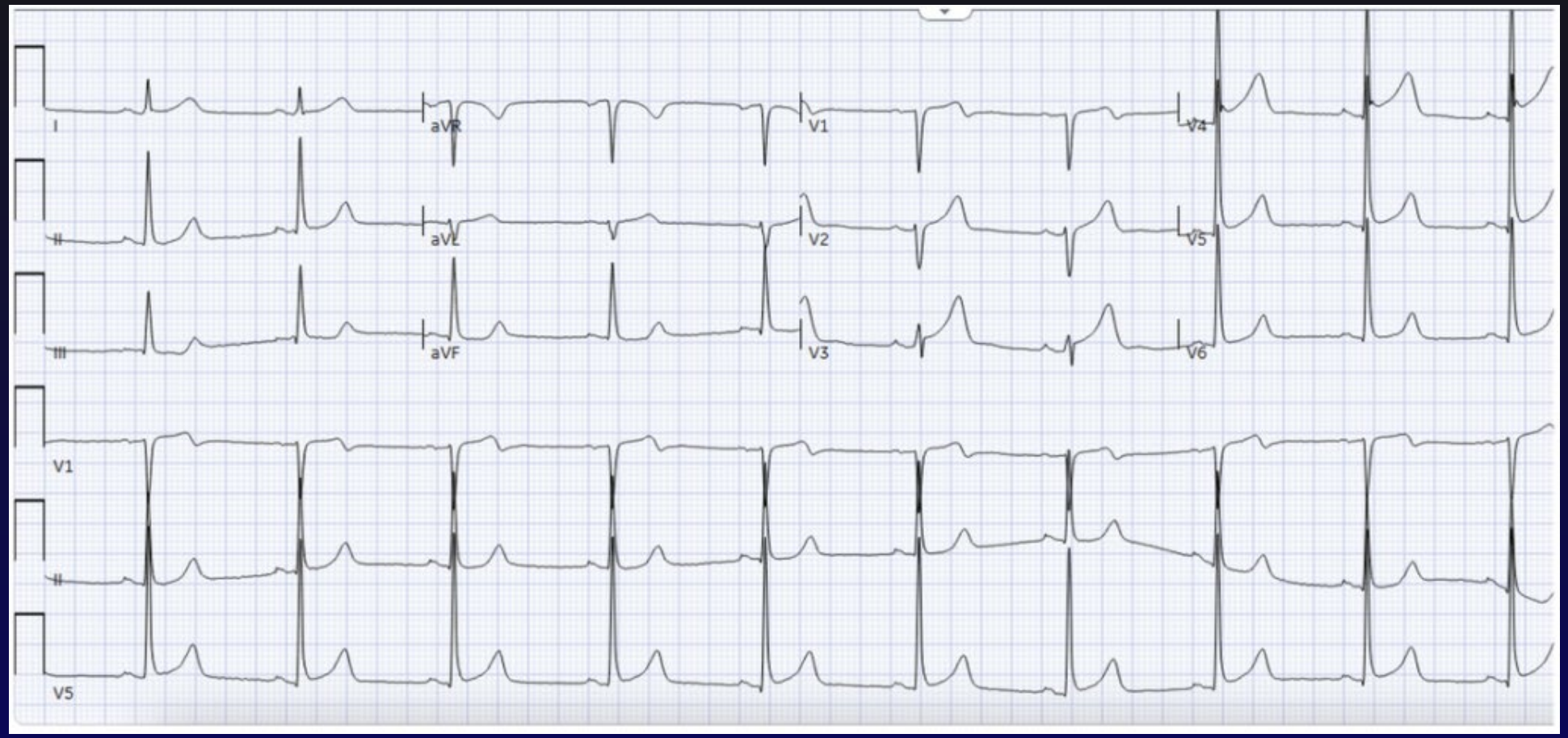
Respiratory Status • Circulatory Status

MOVE

Once critical actions are complete

Stabilize what cannot wait. Then move.

What would you do with this ECG?



Illustrative ECG from a published case.

Would you activate?

Three Minutes Later

Chest pressure worsening

More short of breath

Increasingly restless

VITALS	
HR	112
BP	98/74
RR	30
SpO_2	90%

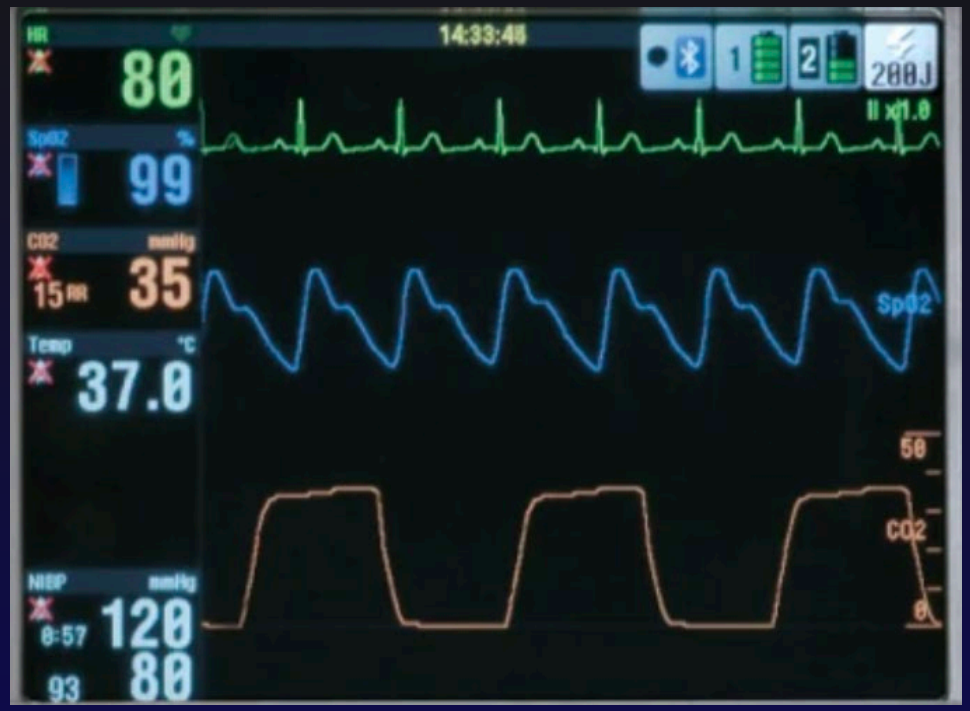
Cool. Pale. More dyspneic. Still talking.

No single number has declared shock. The trajectory has.

What are we missing?

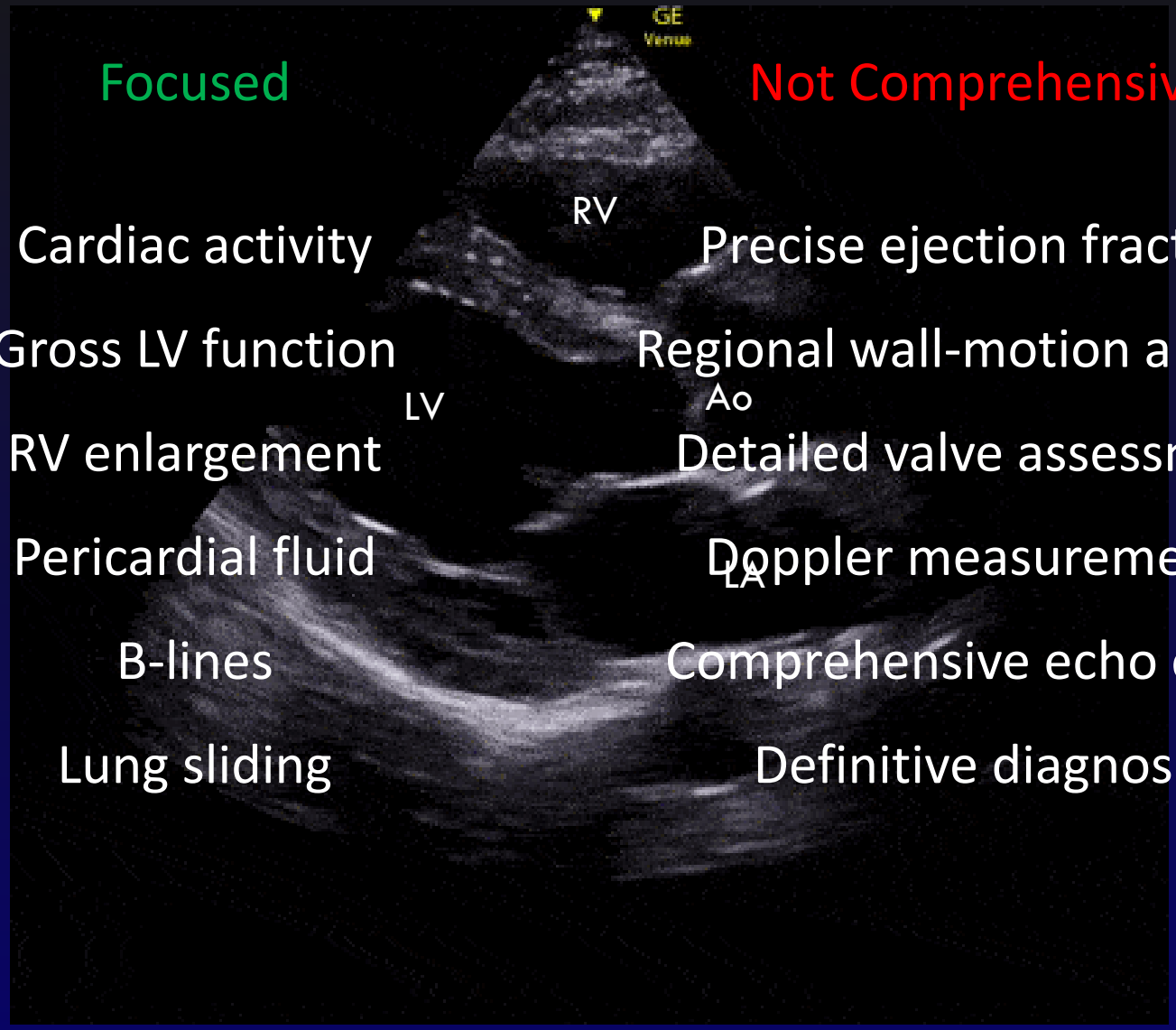
We can see:

The patient
The vital signs
The trajectory
The ECG



But what is the heart actually doing?

Now, we can look



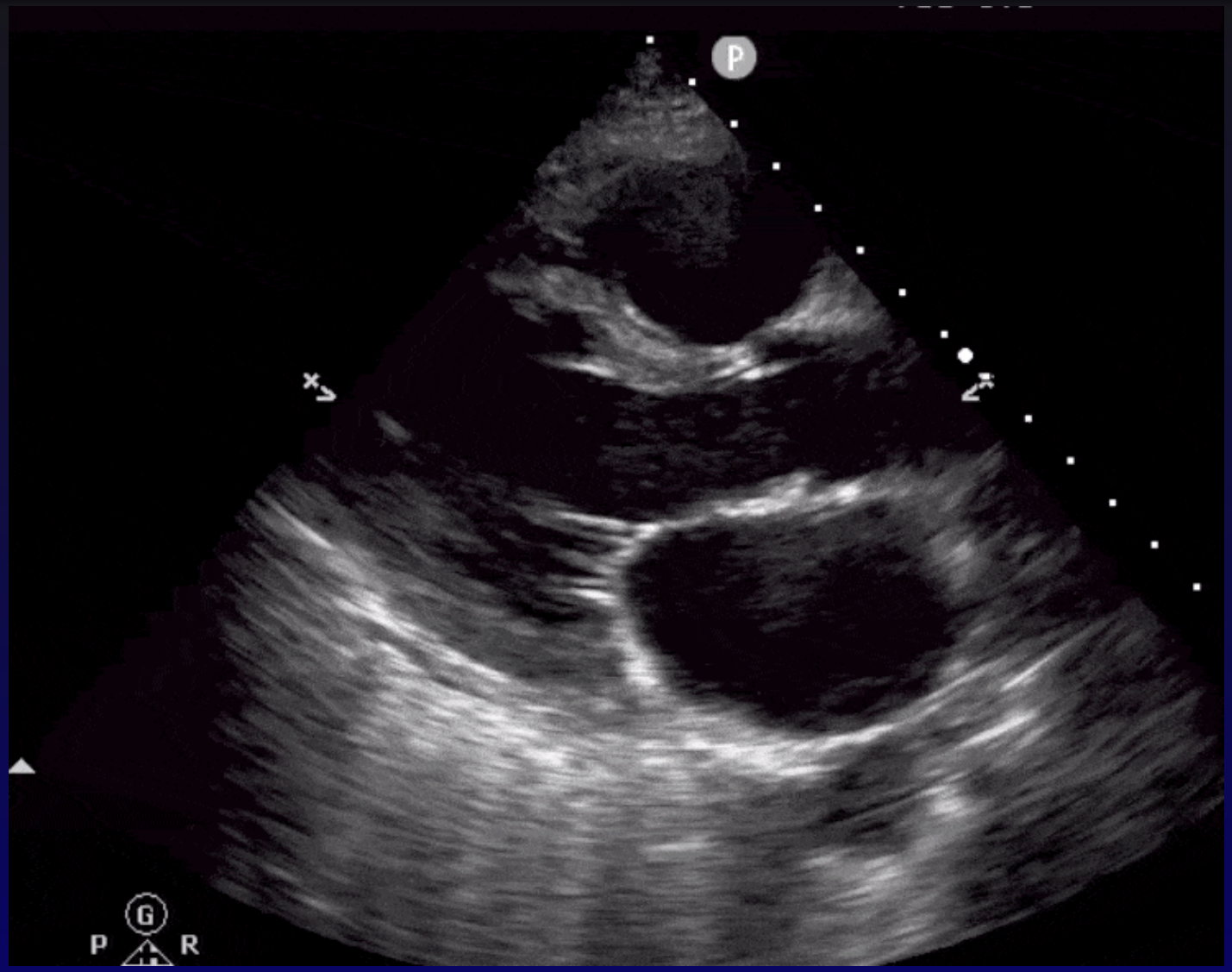
Focused

- Cardiac activity
- Gross LV function
- RV enlargement
- Pericardial fluid
- B-lines
- Lung sliding

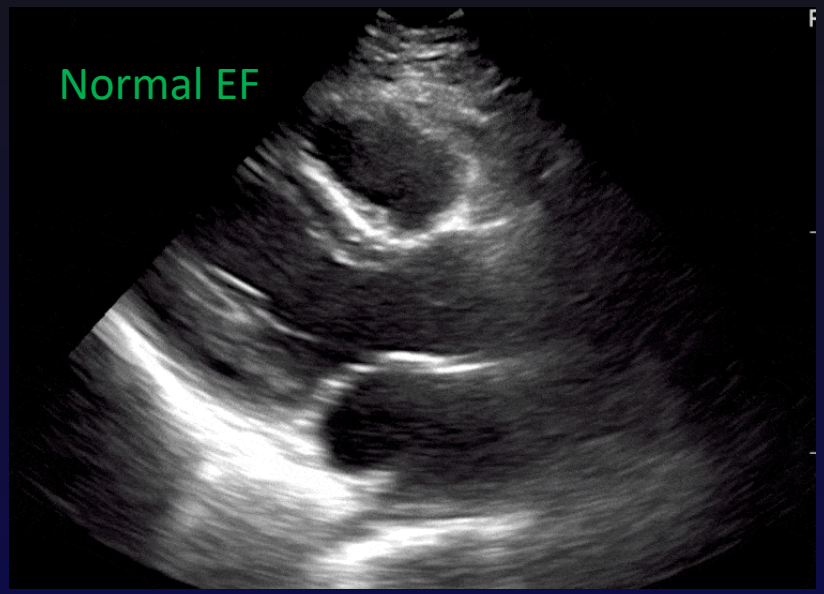
Not Comprehensive

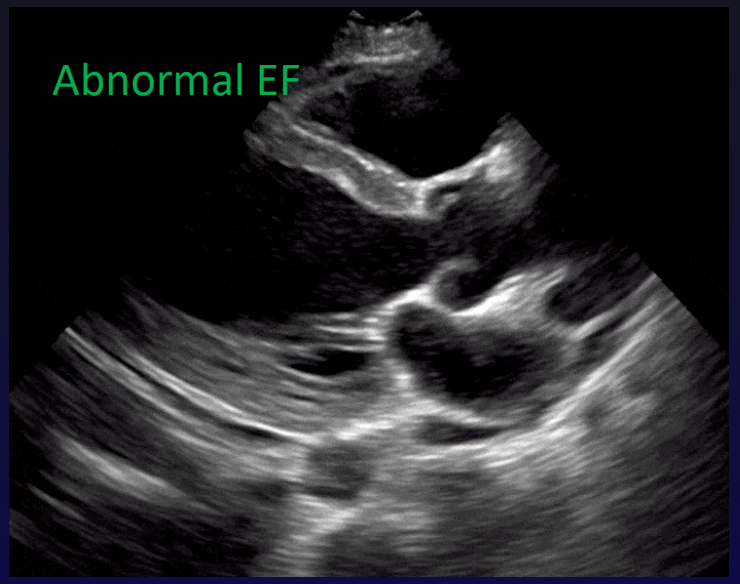
- Precise ejection fraction
- Regional wall-motion analysis
- Detailed valve assessment
- Doppler measurements
- Comprehensive echo exam
- Definitive diagnosis

What do you see?



Can we teach this?





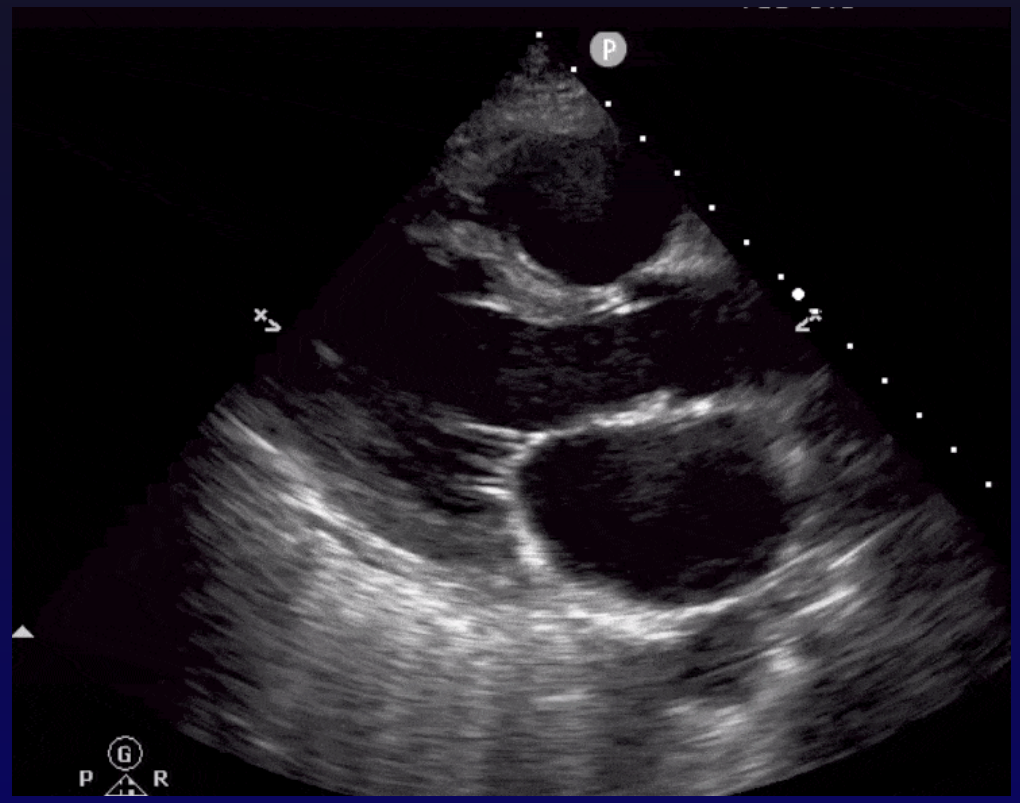
Do these hearts look the same?

The goal is not a precise EF.
The goal is recognizing grossly abnormal physiology.

Back to our patient

VITALS	
HR	112
BP	98/74
RR	30
SpO_2	90%

Cool • Pale • Dyspneic • Restless



Information Must Change Action

The ultrasound image is not the intervention.

The intervention is what the system does differently because it knows sooner.

Shock is a Trajectory…

Our opportunity

COMPENSATED

↓

DETERIORATING

↓

HYPOTENSIVE

↓

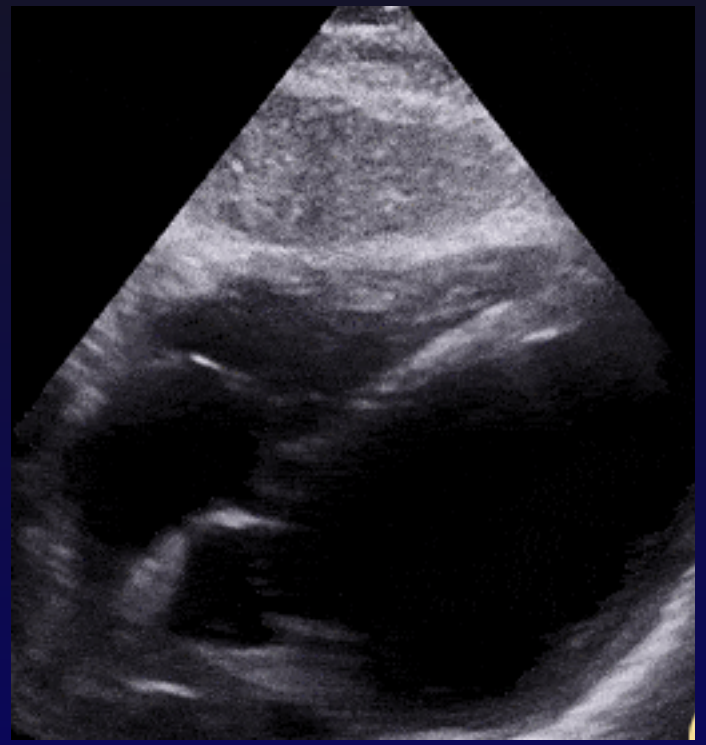
COLLAPSE

not a blood pressure.

Same Blood Pressure. Different Physiology

Patient A

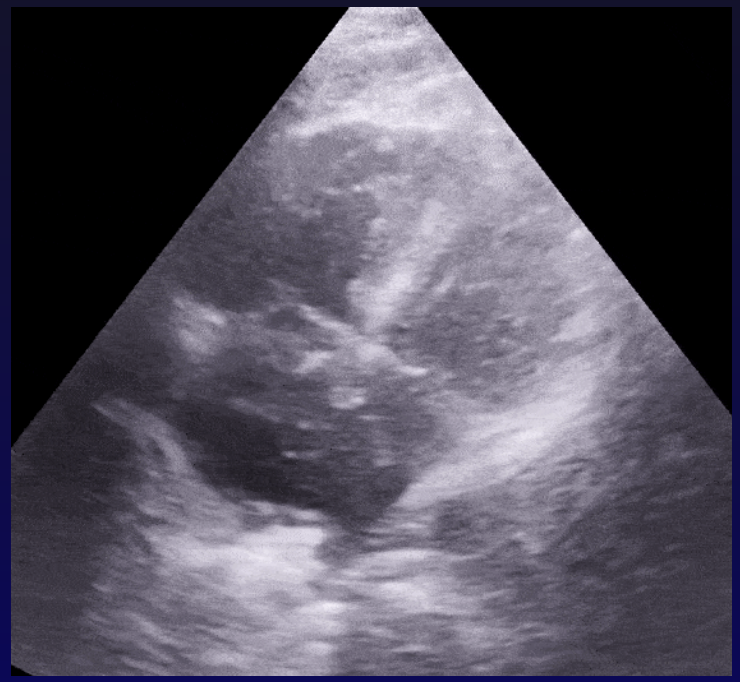
BP: 86/60



PUMP FAILURE

Patient B

BP: 86/60



OBSTRUCTIVE PHYSIOLOGY

Does the diagnosis have to be final?

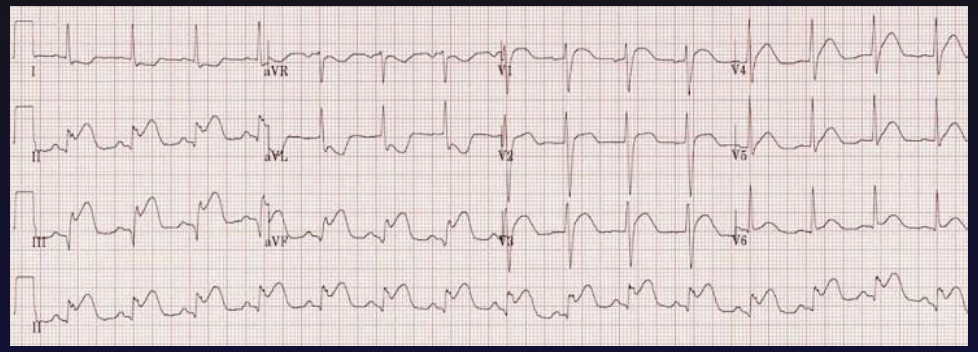
High-risk PE?

Clinical Trajectory • Obstructive Physiology • Hemodynamic Instability

Early PERT notification?

Recognition can move upstream before diagnostic certainty does.

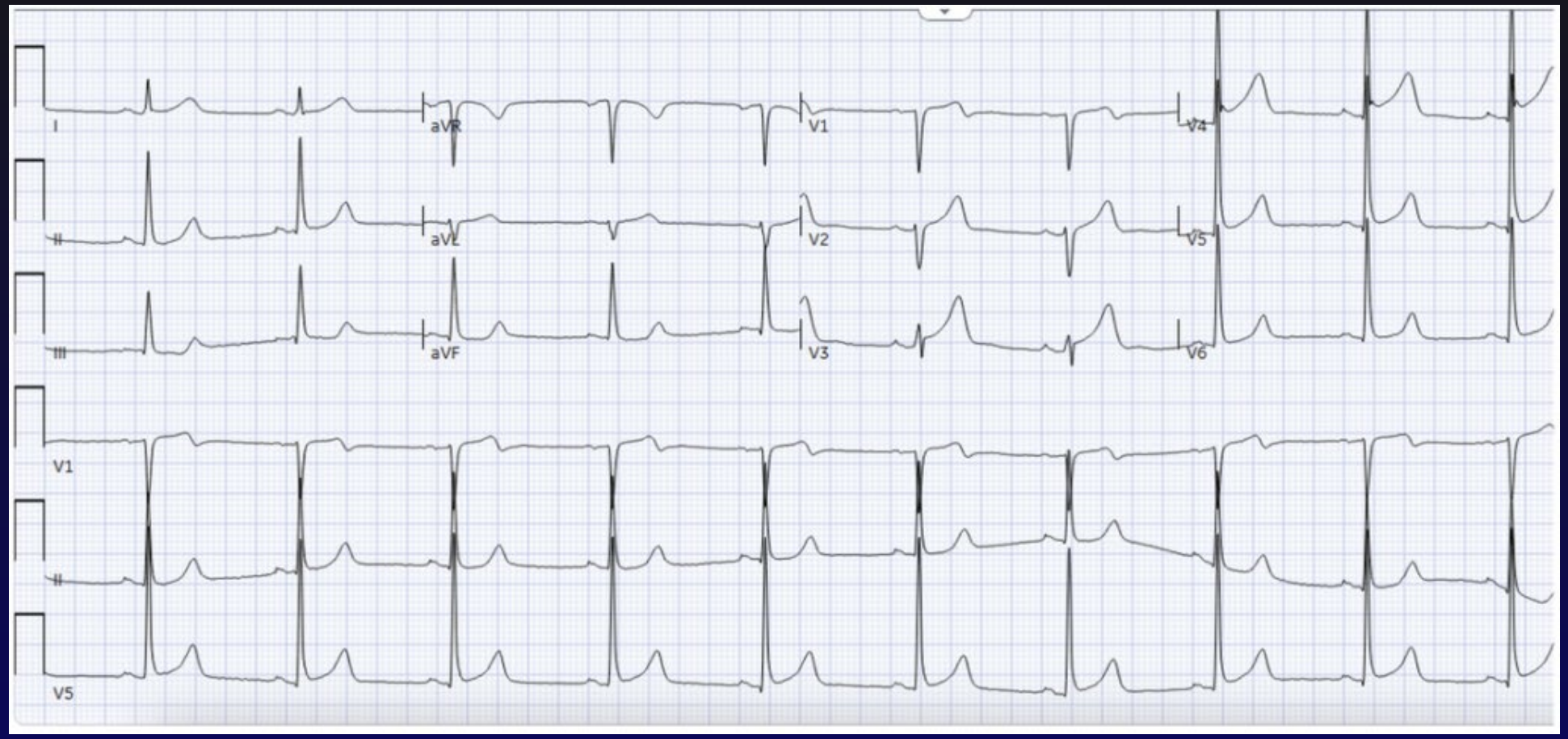
We’ve done this before



STEMI moved the decision upstream.

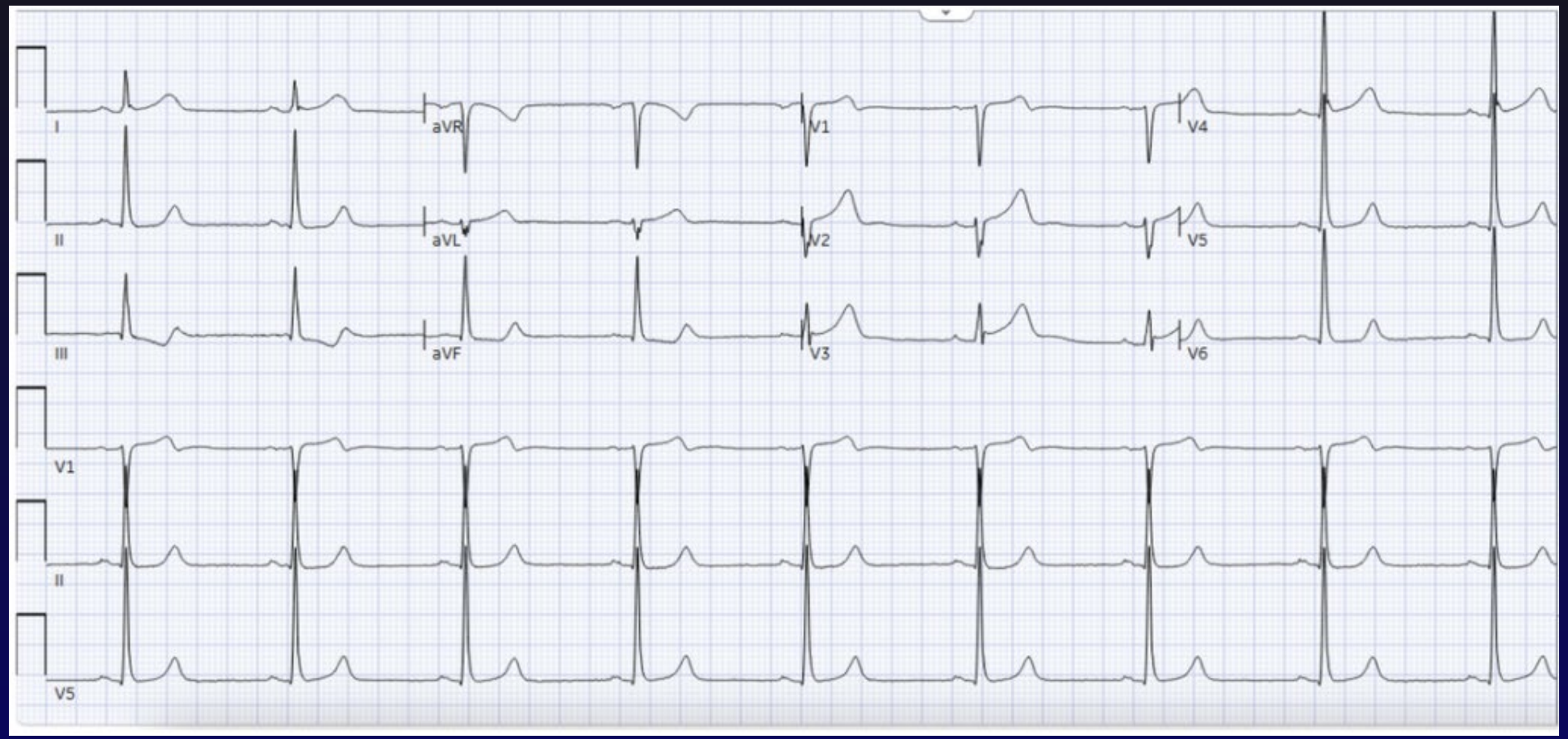


Remember this ECG?



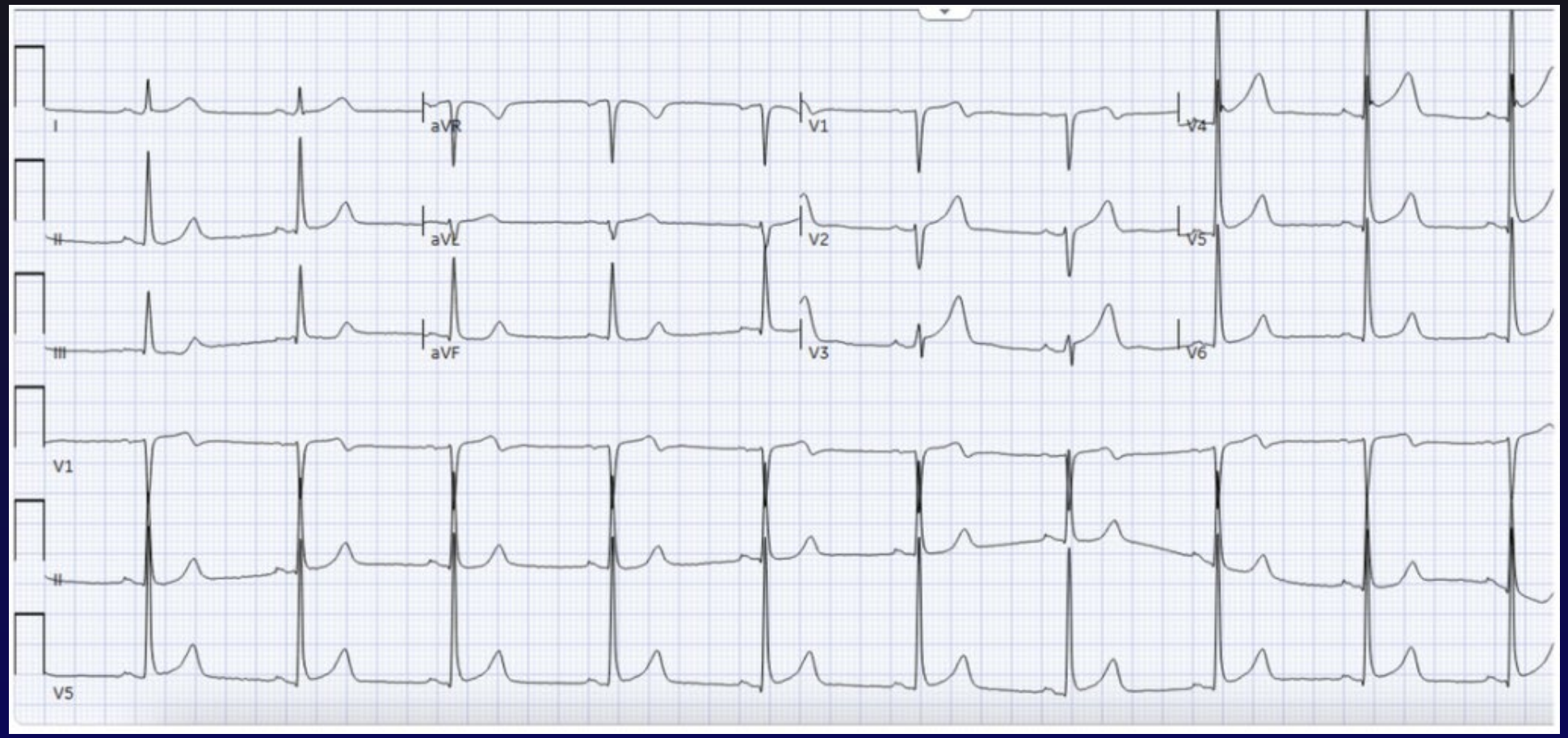
Would you activate now?

The ECG evolves



The patient is a movie, not a snapshot.

What if you had another reader?



Not a replacement.

A second reader.

A chance to recognize the pattern sooner

This is already here.

Queen of Hearts™
ACS AI ECG Model

FDA De Novo Authorized September 3, 2026



AI-assisted identification of ECG findings associated with urgent ACS

Can it find what we miss?

SENSITIVITY FOR OMI

STEMI CRITERIA	AI-ECG
23%	52%

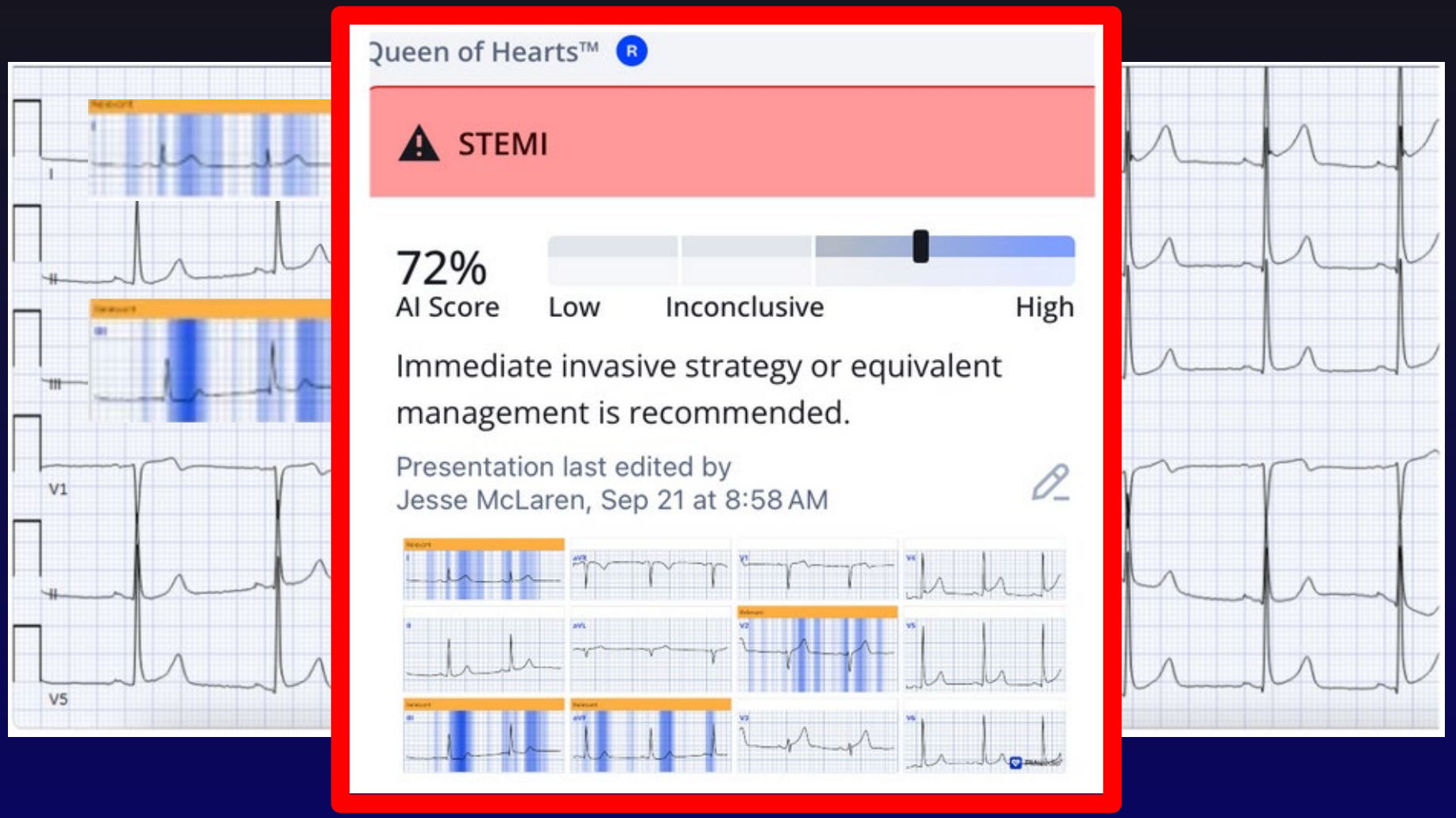
Improved Detection of Acute Coronary Occlusion Myocardial Infarction by an Artificial Intelligence Electrocardiogram Model in Swedish Emergency Departments

24,511 patients • 467 OMI • 5 Swedish EDs

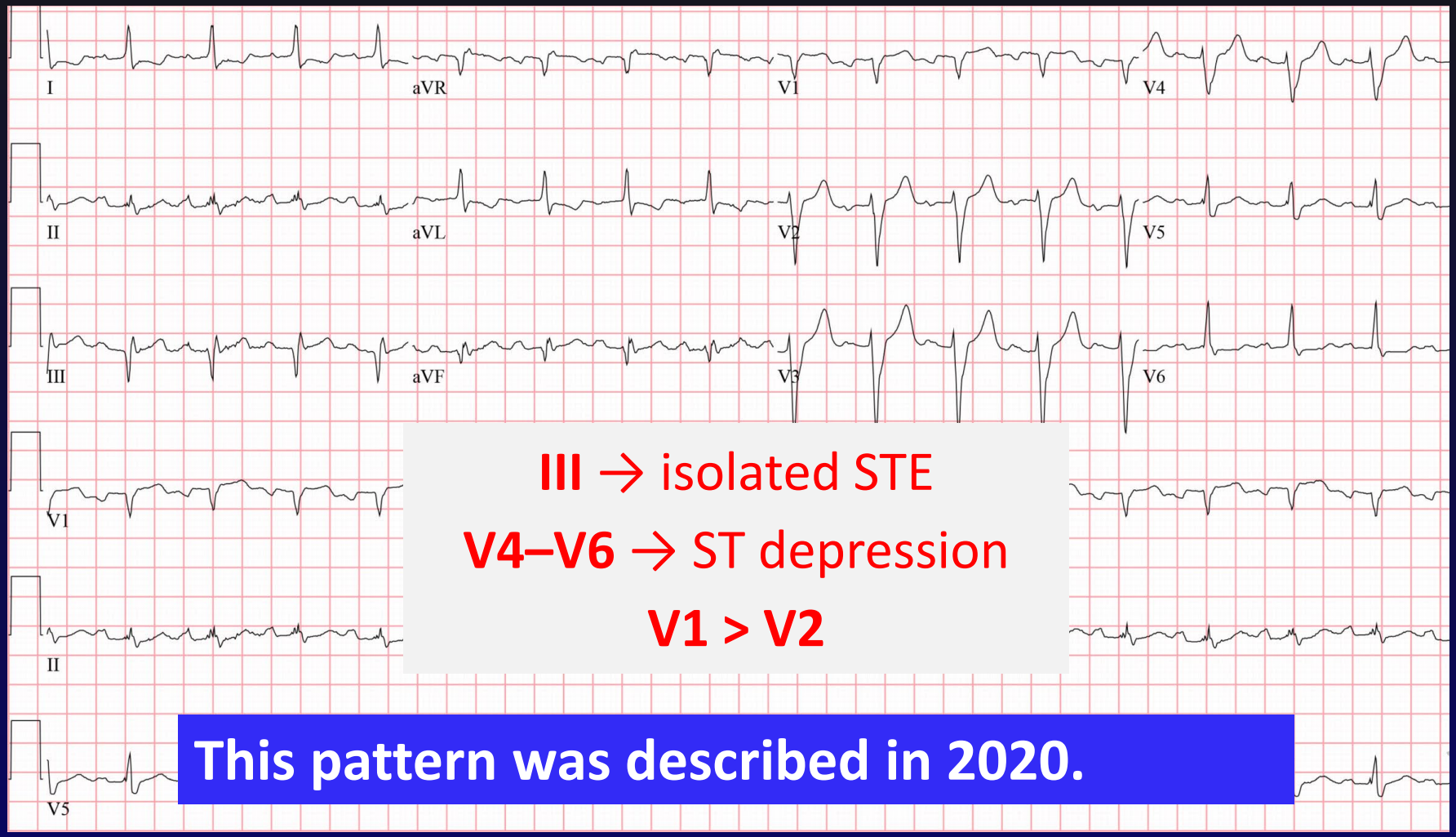
SPECIFICITY FOR OMI

STEMI CRITERIA	AI-ECG
98%	99%

What did the second reader see?



Medicine is Pattern Recognition



III → isolated STE

V4–V6 → ST depression

V1 > V2

This pattern was described in 2020.

Aslanger

AI Doesn’t Get the Final Word

PATIENT

TRAJECTORY

SERIAL ECGs

POCUS

AI

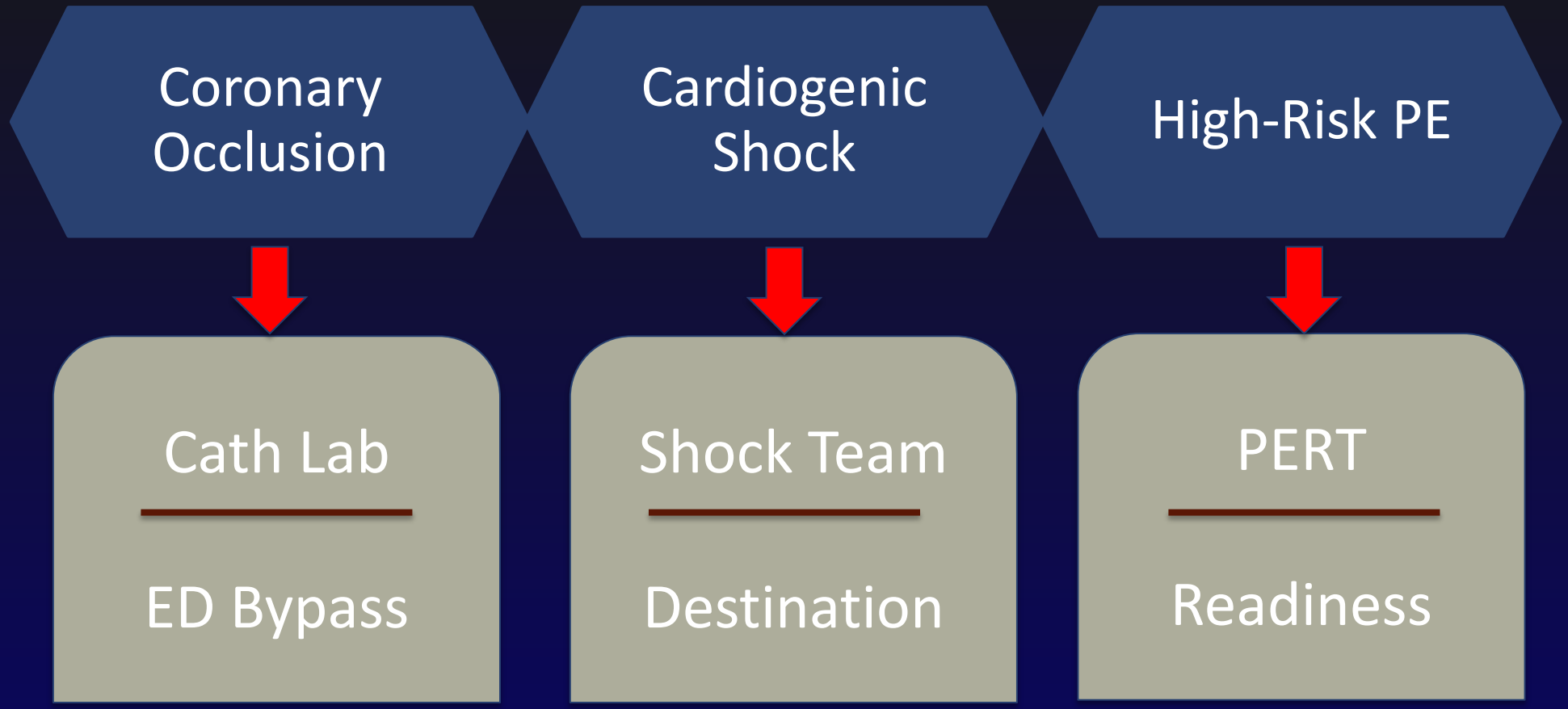


One ECG ≠ one picture.

One ECG ≠ one answer.
One algorithm ≠ one diagnosis.

NOW WHAT?

Knowing sooner should change what happens next



Knowing sooner → Acting sooner

Build the system before buying the technology

CLINICAL	OPERATIONAL	QUALITY
What are we asking?	Who gets the information?	Was it right?
What changes care?	What happens next?	Did it matter?

Technology without a pathway is just more data.

Trust Is Not a Feeling.

It Is a System Property.

Build the Trust

TRAIN → REVIEW → FEEDBACK → IMPROVE



TRAIN
Defined competency

REVIEW
Images + Decision

FEEDBACK
Diagnostic Closure

IMPROVE
Clinician + system

Trust is built through a closed loop.

One Cardiovascular System



The hospital door should not be where cardiovascular decision-making begins.

What do we need to build?

FROM THE FIELD

- Focused questions
- Reliable acquisition
- Serial assessment
- Clear communication

FROM THE HOSPITAL

- Define response
- Actionable pathways
- Diagnostic closure
- Feedback

Shared expectations

The technology only works if the pathway does

So what should we do now?

RECOGNIZE DETERIORATION EARLIER

Trajectory before thresholds.

INTERROGATE THE PHYSIOLOGY

Ask focused questions.

AUGMENT CLINICAL JUDGMENT

Use technology to see what we may miss.

CONNECT INFORMATION TO ACTION

Knowing sooner should change what happens next.

CLOSE THE LOOP

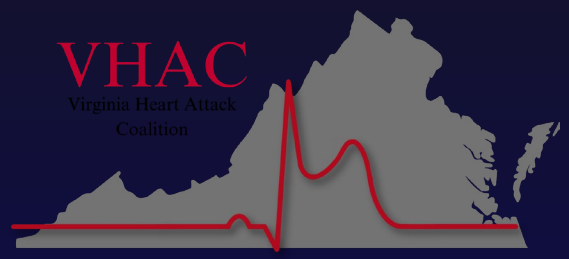
Review. Feedback. Improvement.

This is why rooms like this matter

EMS

Nursing

ED



System
Leadership

Cardiology

None of us can build this alone.

Back to your patient

RECOGNIZE – The trajectory

UNDERSTAND – The physiology

ACT – Before collapse

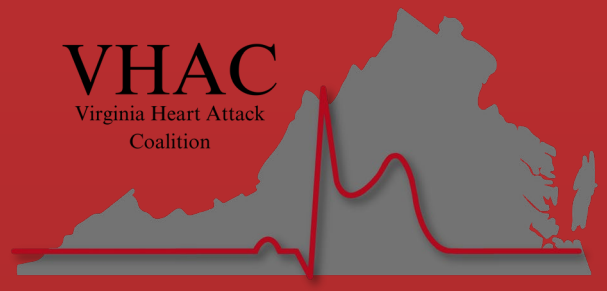
He was already sick.

Our opportunity was to recognize it sooner.

Move the right decision upstream

For the right patient.

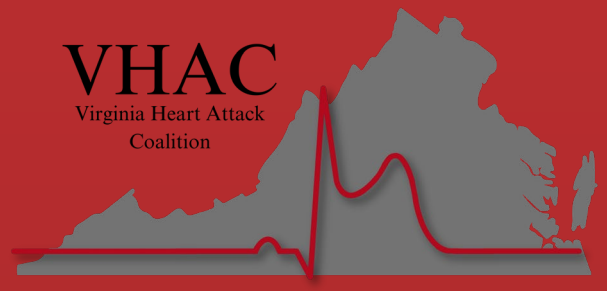
With the right system ready to act.



Break

PLEASE RETURN AT 2:00 PM

SAY HELLO TO OUR SPONSOR



Workgroup Updates

VHAC
Virginia Heart Attack Coalition

EMS Education



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From ECG Education to EMS Education

January 27, 2026

The ECG Education Workgroup was renamed to reflect a broader, statewide EMS cardiovascular education mission.

Expanded scope

Prehospital assessment, recognition, patient care, communication and interfacility transport.

Role clarified

Educational and advisory; develops learning resources, not statewide clinical mandates.

2026 accomplishments and decisions

12-lead education

Previously completed Train-the-Trainer educational series remains available through VHAC.

Two active workstreams

Separate teams formed for cardiogenic shock education and ECG/STEMI-mimic teaching resources.

ECG resource redesign

Agreed on case-based submissions, improved image quality, consistent formatting and clinical review.

Teaching approach updated

Stronger emphasis on clinical context, interactive cases and recognizing deterioration rather than memorization.

Workstream 1 | Cardiogenic shock course

IN DEVELOPMENT • TARGET: FEBRUARY 2027

Course focus

Early recognition and field assessment of cardiogenic shock; escalation, treatment considerations, communication and destination decisions.

2026 design decisions

Keep the focus on cardiogenic shock. Streamline the ~50-slide draft, use actual cases, strengthen visuals and connect EMS presentation to hospital care.

Project lead: Yasmin Ahmady • Contributors include Kimberly Pumphrey and Megan Vaughan

Workstream 2 | ECG education library

BUILDING A REUSABLE, QUALITY-REVIEWED TEACHING COLLECTION

Standard case format

Clinical presentation → readable ECG tracing → interpretation, teaching points and references.

Quality and clinical review

Collect → digitize/standardize → add teaching notes → workgroup review → physician review → publish.

Priority examples: STEMI mimics and challenging ECG patterns • Workstream lead: Bob Page

Initial library product anticipated near the beginning of 2027; scope and categories remain to be finalized.

Remainder of 2026 | Next steps

Cardiogenic shock

Revise the case-based presentation; identify additional de-identified EMS-to-hospital teaching cases.

ECG library

Finalize template, establish ECG categories, collect examples and organize the clinical review group.

Education dissemination

Continue sharing existing 12-lead content and solicit clinician and educator participation.

Meeting cadence

Bi-monthly workgroup meetings; November 24 meeting was tentative and requires confirmation.

What success looks like in early 2027

From shared educational content to practical, repeatable field learning

Complete

Finalize the cardiogenic shock course and pilot/evaluate its content.

Publish

Release an initial standardized, clinically reviewed ECG teaching collection.

Scale

Increase distribution of 12-lead materials and collect education feedback.

Status shown reflects the July 28 and September 22 workgroup minutes and January 2026 charter.

Thank You

Contact info@VCSQI.org with any question or concerns.

CLINICAL
WORKGROUP
RESOURCES

SCAN ME

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Direct to Cath Lab Workgroup

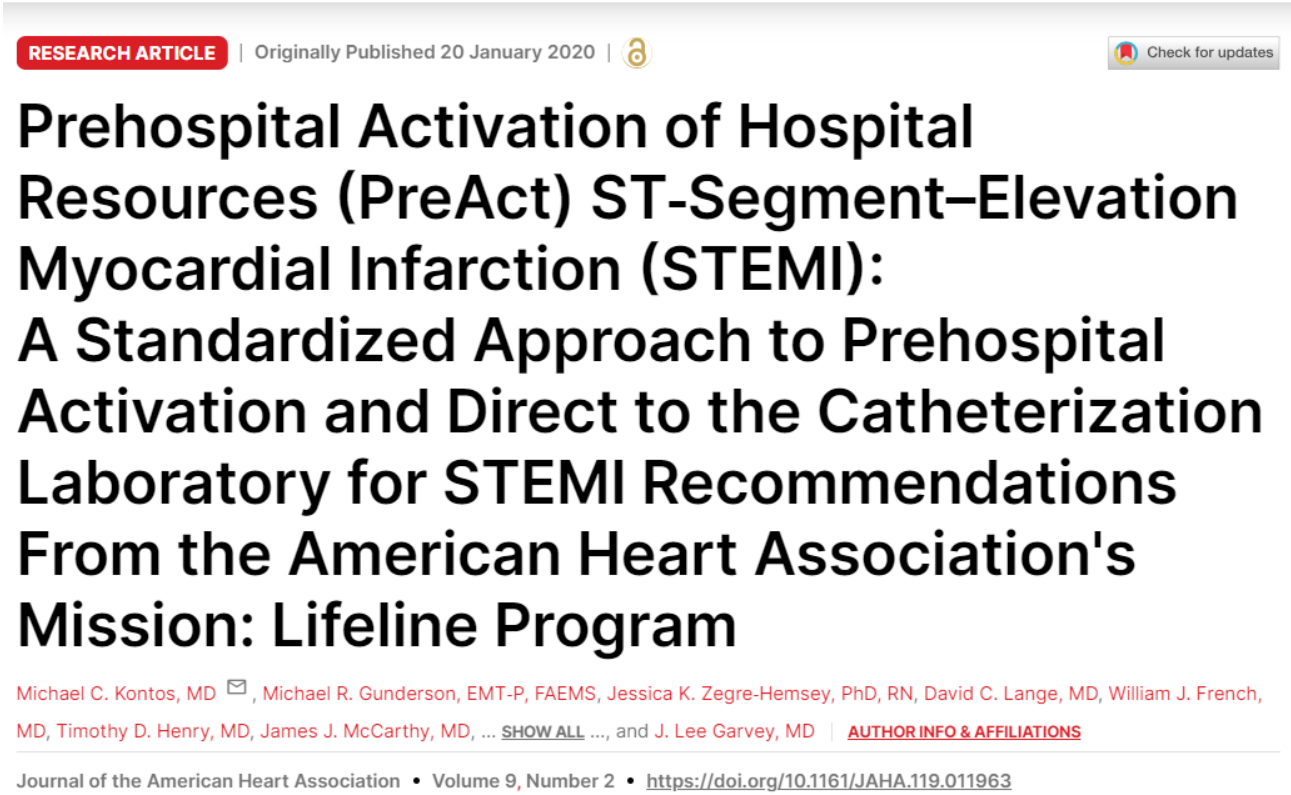
OCTOBER 2026

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Overview of the Science and/or Guidelines

- **Published Peer Reviewed Articles:**
  - Journal of American Heart Association (2020)[1]
  - Catheterization & Cardiac Interventions (2020)[2]
- ***Best EMS Practices***
  - 12-lead ECGs and Pre-Arrival Transmissions
- ***Goals:***
  - *Reduce STEMI activation overcalls*
  - *Promote Direct to Cath Lab Practices, decreasing time to PCI*



RESEARCH ARTICLE | Originally Published 20 January 2020 | Check for updates

Prehospital Activation of Hospital Resources (PreAct) ST-Segment–Elevation Myocardial Infarction (STEMI): A Standardized Approach to Prehospital Activation and Direct to the Catheterization Laboratory for STEMI Recommendations From the American Heart Association's Mission: Lifeline Program

Michael C. Kontos, MD, Michael R. Gunderson, EMT-P, FAEMS, Jessica K. Zegre-Hemsey, PhD, RN, David C. Lange, MD, William J. French, MD, Timothy D. Henry, MD, James J. McCarthy, MD, ... SHOW ALL ..., and J. Lee Garvey, MD | AUTHOR INFO & AFFILIATIONS

Journal of the American Heart Association • Volume 9, Number 2 • https://doi.org/10.1161/JAHA.119.011963

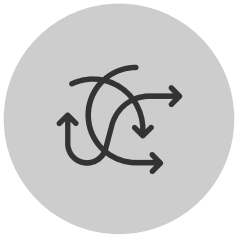
Barriers to Success



INCONSISTENT PRACTICES



TERMINOLOGY CONFUSION



COORDINATION CHALLENGES



RESOURCE LIMITATIONS



HIGH LEVELS OF INAPPROPRIATE CATH LAB ACTIVATIONS

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From 2024 Findings to 2026 Action

VHAC Direct-to-Cath Lab Workgroup • Founded February 2024

2024 | Identified major variation in STEMI activations, ED bypass and local protocols across Virginia

2025 | Established shared terminology, released definitions and developed a statewide Direct-to-Cath Lab guideline

2025–2026 | Built comparable registry measures, examined site-level variation and reviewed year-over-year performance

2026 | Advanced facility pilots, EMS collaboration, practical workflow improvements and a proposed statewide target

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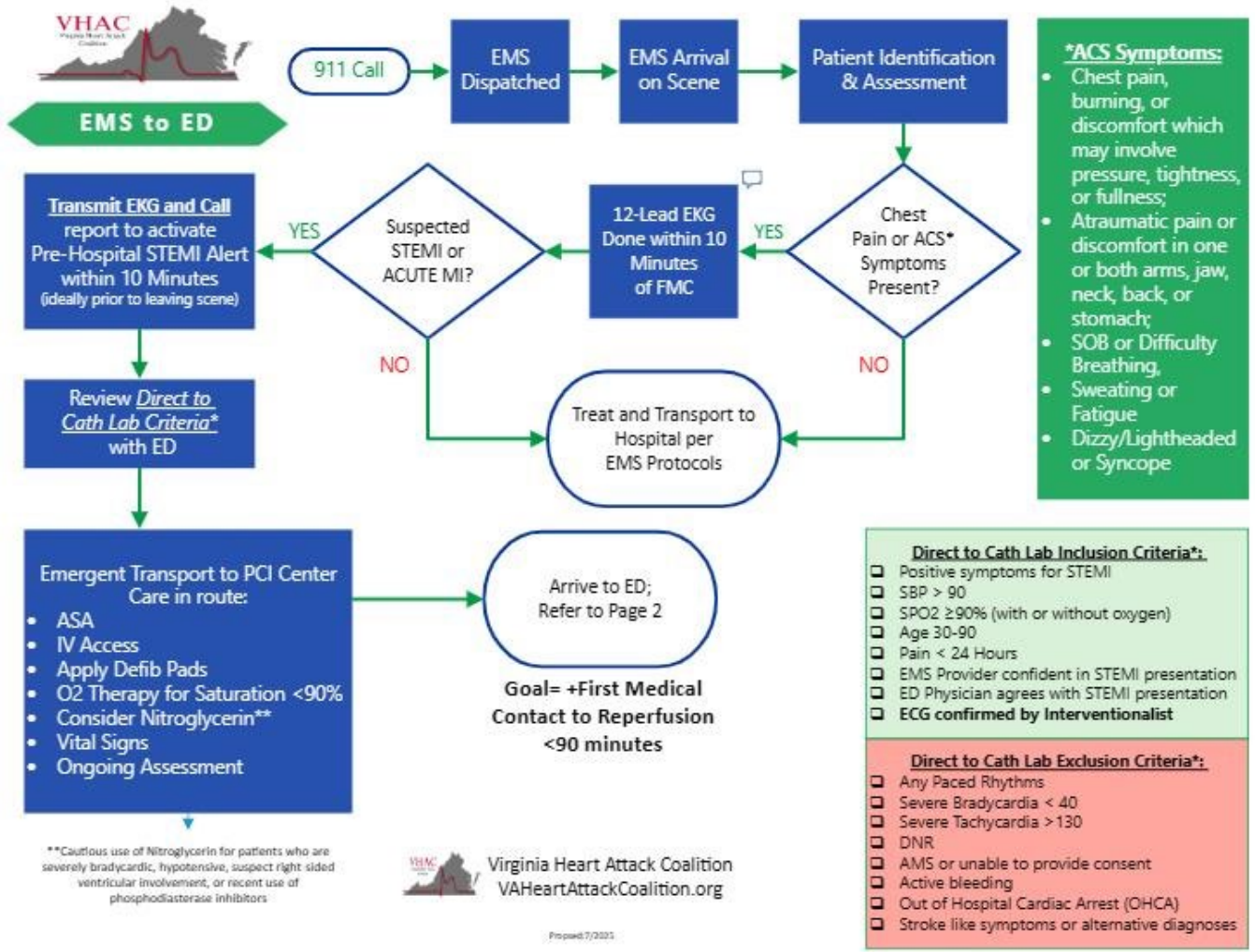
Definitions

- ED Bypass → Direct to Cath Lab from EMS (does not include Transfer STEMI's)
- STEMI Team Activations
  - Correct Call
  - Over Call
  - Under Call

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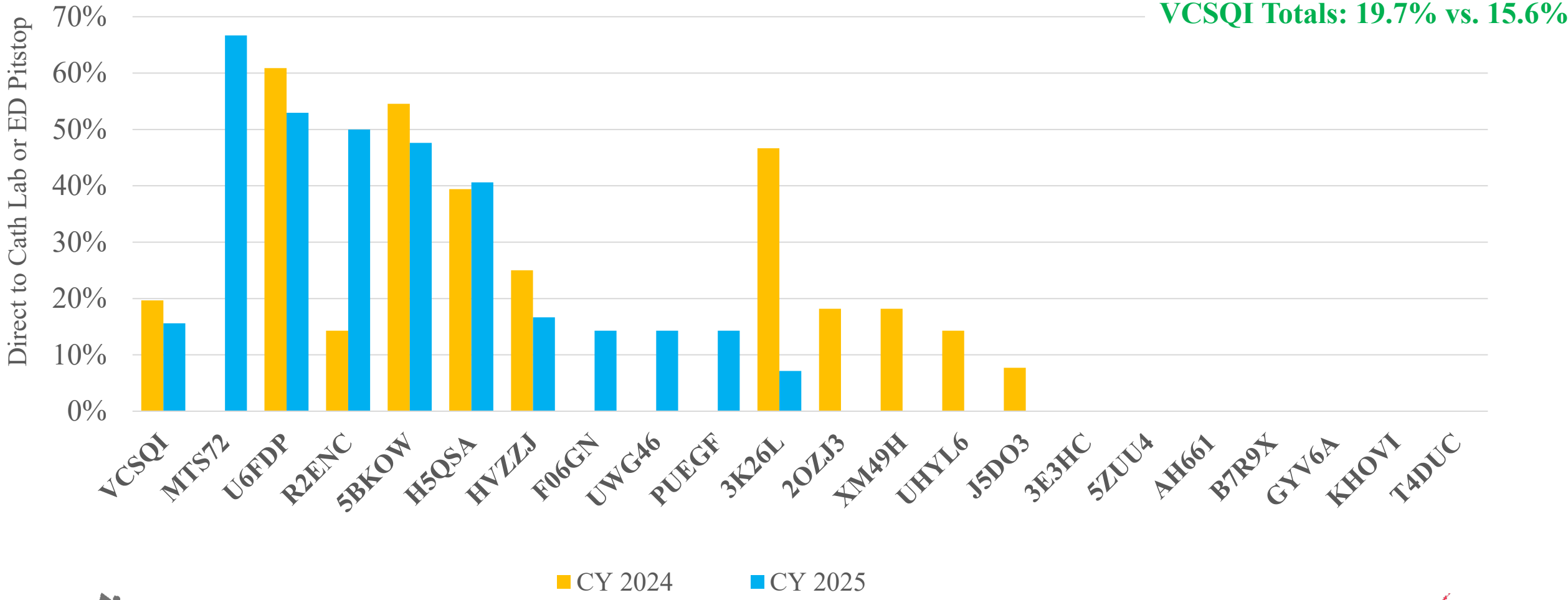
2025 Direct to Cath Lab STEMI Guideline



VHAC Virginia Heart Attack Coalition

VCSQI

Direct to Cath Lab or ED Pitstop <=5 Minutes by Hospital and Year: STEMI Procedures, Presenting by Ambulance Only* PREACT Patients, Arrival at Hospital between 7a-5p Mon-Fri (N=598)



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* Excludes Transfers, Arrival by Air and Personal Vehicle

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Goal for the State

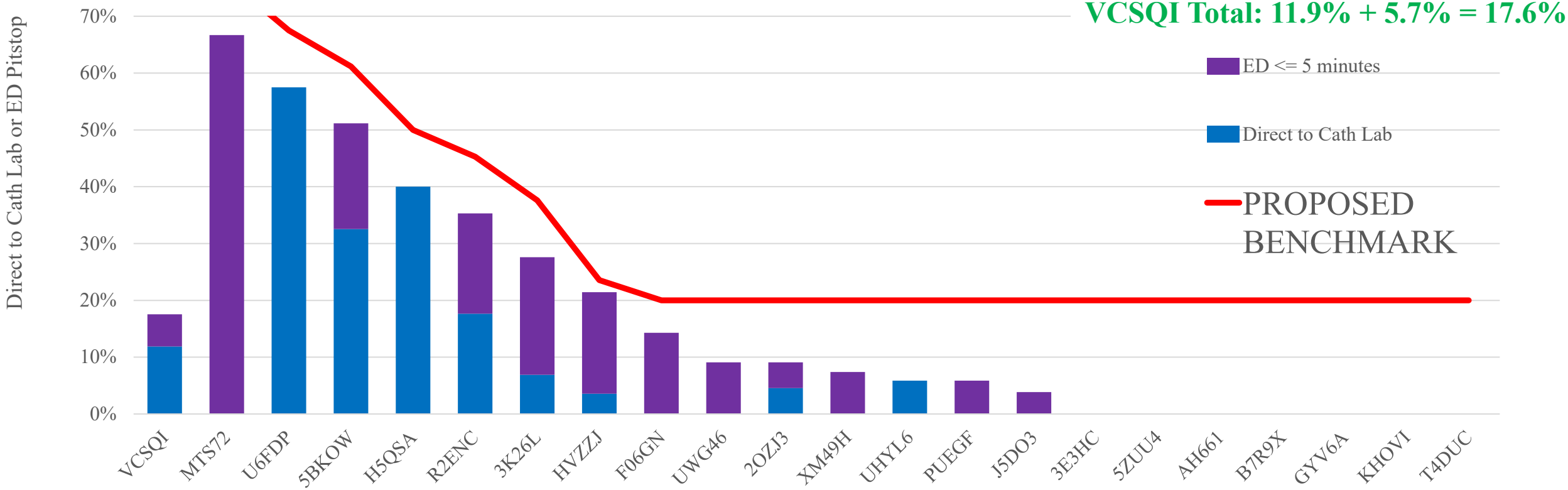
- Centers currently performing below 20%: use 20% as the initial benchmark

- Centers currently performing at or above 20%: use an improvement benchmark of 10 percentage points above current performance

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Virginia Heart Attack Coalition

VCSQI

Direct to Cath Lab or ED Pitstop by Hospital: Q1 2024 – Q4 2025
STEMI Procedures, Presenting by Ambulance Only*
PREACT Patients, Arrival at Hospital between 7a-5p Mon-Fri (N=598)



VHAC Virginia Heart Attack Coalition

* Excludes Transfers, Arrival by Air and Personal Vehicle

VCSQI

Next Steps

- [x] Continue workgroup meetings
- [x] Developed a standardized Direct to Cath Lab Protocol
- [x] Launching pilot program Quarter 1 2026
- [ ] Continue monitoring and review data for effectiveness/Proposed Benchmark of 20%
- [ ] Recommend unified STEMI Protocol for Virginia Hospitals and EMS Councils

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Thank You

Contact Sherri@vcsqi.org for information for further inquiries

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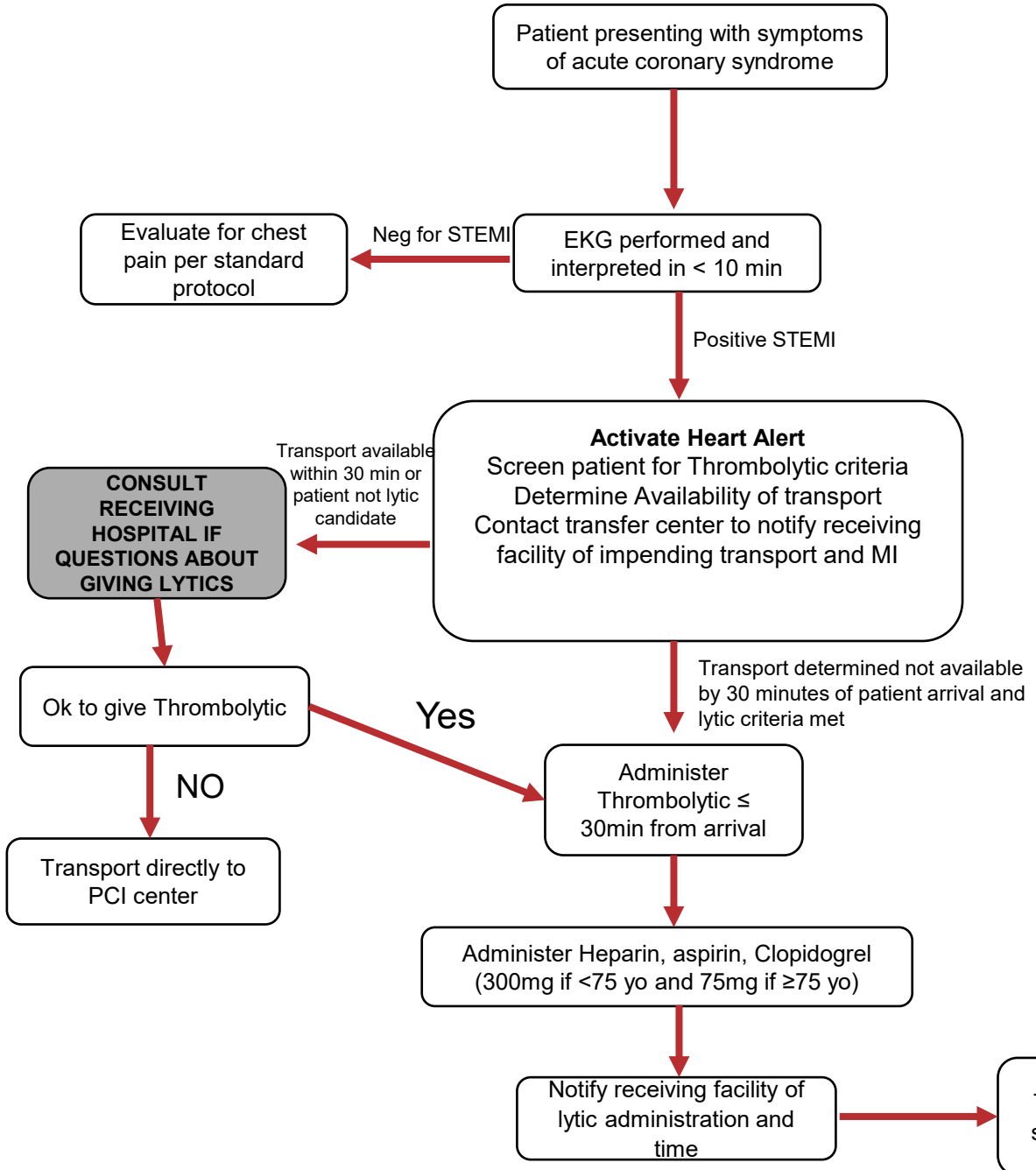
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Thrombolytic Workgroup Update

Proud partner of VCSQI



Lytic Algorithm



Absolute Contraindications

- Active internal bleeding
- Recent stroke (3 hrs to 3 months)
- Intracranial or intraspinal surgery or trauma within 2 months
- Intracranial neoplasm, arteriovenous malformation, or aneurysm
- Known bleeding diathesis
- Severe uncontrolled hypertension (SBP > 180 mmHg and/or DBP >110 mmHg)

Relative Contraindications

- Recent major surgery (CABG, OB delivery, organ biopsy, previous puncture of noncompressible vessels)
- Any other condition in which bleeding is a significant hazard or difficult to manage because of its location
- Recent trauma
- Currently receiving oral anticoagulants
- Recent gastrointestinal or genitourinary bleeding
- Subacute bacterial endocarditis
- Cerebrovascular disease
- Pregnancy

Developed by the VHAC Thrombolytics Workgroup

Thrombolytic Orders (Recommendations)
Adjunctive Medications:
Aspirin 324 mg po
Clopidogrel 300 mg po. For patients >75 yo give only 75 mg

Heparin bolus (60U/kg, but not to exceed 4000U).
Heparin infusion (12U/kg/hr, but not to exceed 1000U/hr).

TNK per protocol. For patients age>75 yo please give **½ dose TNK**

Calculations for Tenecteplase ** Different dosing compared to Acute Ischemic Stroke **

Age <75 years	**Age ≥ 75 years**
<60 kg: 30 mg (6 mL)	<60 kg: 15 mg (3 mL)
≥60 to <70 kg: 35 mg (7 mL)	≥60 to <70 kg: 17.5 mg (3.5 mL)
≥70 to <80 kg: 40 mg (8 mL)	≥70 to <80 kg: 20 mg (4 mL)
≥80 to <90 kg: 45 mg (9 mL)	≥80 to <90 kg: 22.5 mg (4.5 mL)
≥90 kg: 50 mg (10 mL)	≥90 kg: 25 mg (5 mL)

Initial Assessment:
1. Obtain 12 lead ECG
2. Confirm Acute MI:
   - Chest pain at rest greater than or equal to 20 minutes
   - ST Elevation of at least 0.1mV in:
     - At least 2 of 3 inferior leads (II, III, aVF) or
     - At least 2 adjacent of the 6 precordial leads (V1-V6) or
     - Leads I and a VL
3. Repeat ECG 60 minutes after TNK given

Nursing:
1. Bedrest
2. Vital Signs:
   a. Q 5 min X1 hour
   b. Q15 min X1 hour
   c. Q30 min X 1hour
   d. Q1 hour x 24 hours
3. Neurochecks:
   a. Q1 hour X 12 hours
4. Take Blood Pressure in both Arms

Labs:
Stat: CBC, PT, PTT, Platelet Count, BMP, Troponin, Sample to Blood Bank

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WWW.VAHEARTATTACKCOALITION.ORG/GROUPS

VHAC HANDBOOK *Now Available*

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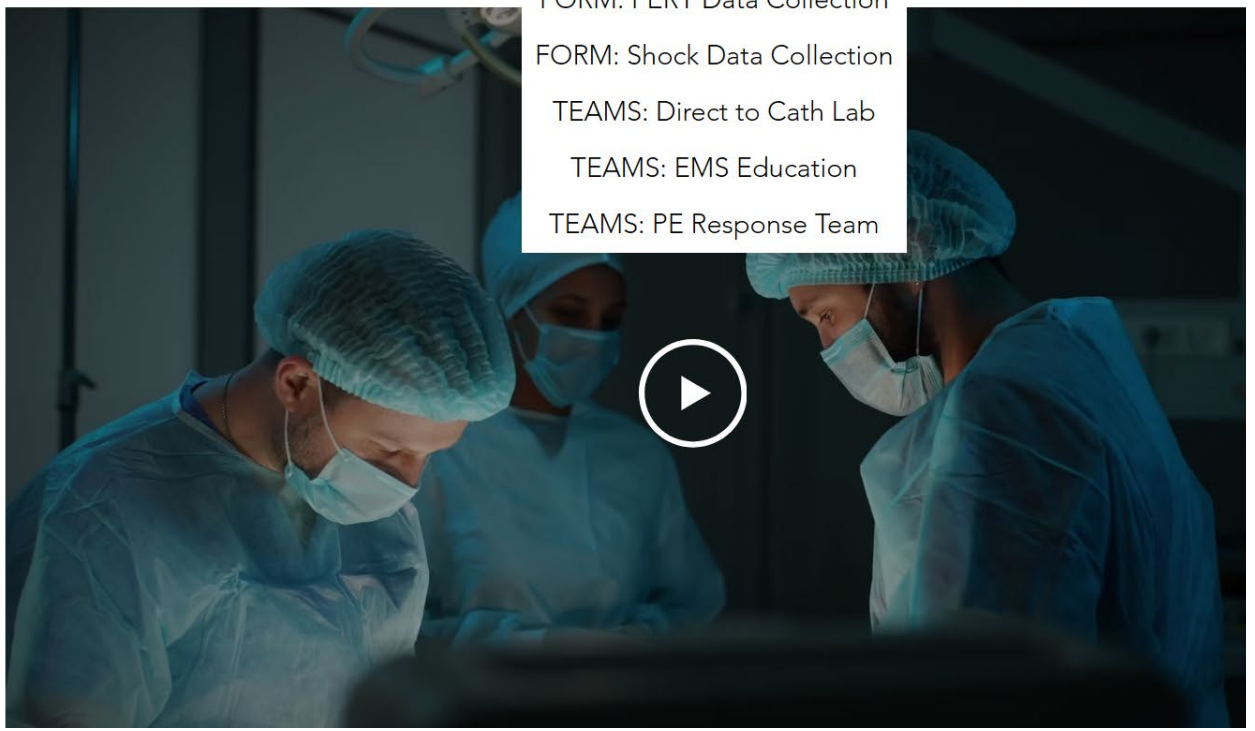
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- FORM: PERT Data Collection
- FORM: Shock Data Collection
- TEAMS: Direct to Cath Lab
- TEAMS: EMS Education
- TEAMS: PE Response Team

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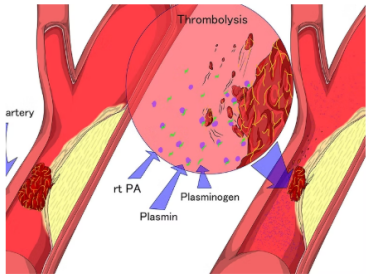
Welcome to the Virginia Heart Attack Coalition

Learn More



Clinical Workgroups | VHAC

https://www.vaheartattackcoalition.org/groups



Thrombolytics

The Thrombolytics Workgroup is dedicated to enhancing the use of thrombolytic therapy in treating heart attacks. This workgroup focuses on reviewing data, developing educational materials, and establishing standardized protocols to ensure the timely and effective administration of thrombolytics. The goal is to improve patient outcomes by promoting best practices and reducing delays in treatment.

2025 Statewide Meeting Material

PDF Presentation

Champions:

John Patterson, MD (HCA) and Michael Kontos, MD (VCU)

CLINICAL WORKGROUPS
VHAC
Virginia Heart Attack Coalition
THROMBOLYTICS

VHAC Lytic Algorithm Tool

—

View Details

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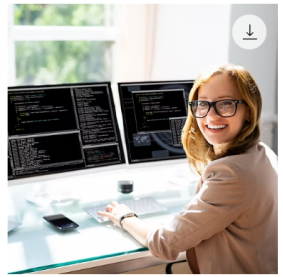
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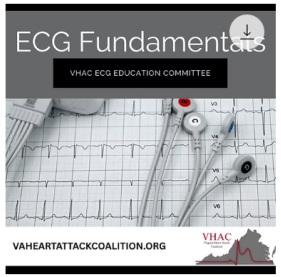


Data Managers FTE Recommendations

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VHAC Lytic Algorithm Tool

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ECG Education - 12 Lead Placement

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VHAC Pulmonary Embolism Response (PERT) Protocol

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VHAC Pre-Hospital STEMI Data Definitions

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SHOCK

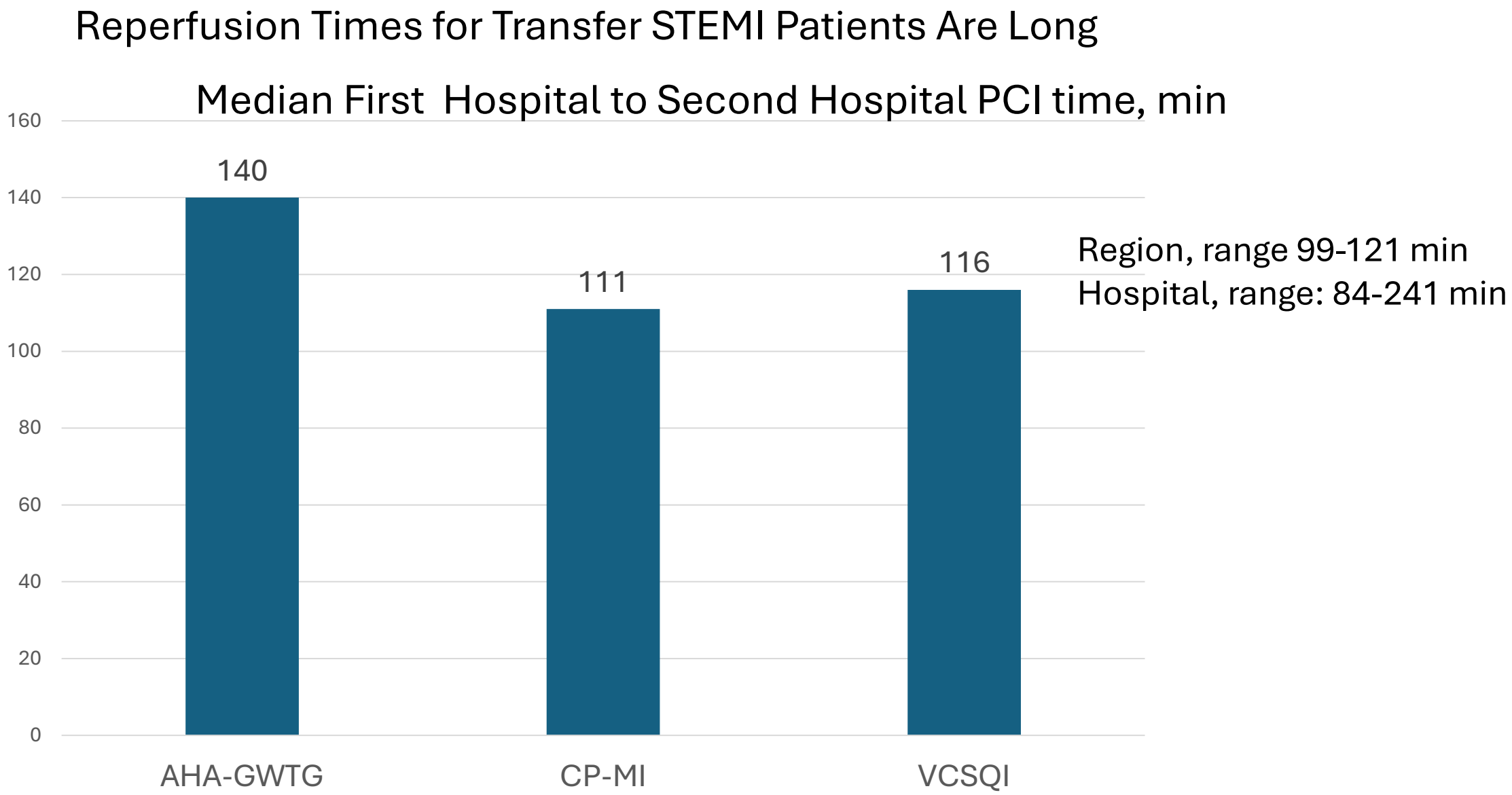
Project 1: Potential Prehospital Thrombolytics Pilot

- Projected Patient Volume (estimated 2-6 patients/month)
- Baseline data to be reviewed to estimate:
  - The anticipated number of eligible patients
  - The number of STEMI patients with prolonged transport times
  - The number of patients currently receiving thrombolytics
  - The number of patients who might benefit from prehospital treatment
- Medication Cost, Storage, and Replacement

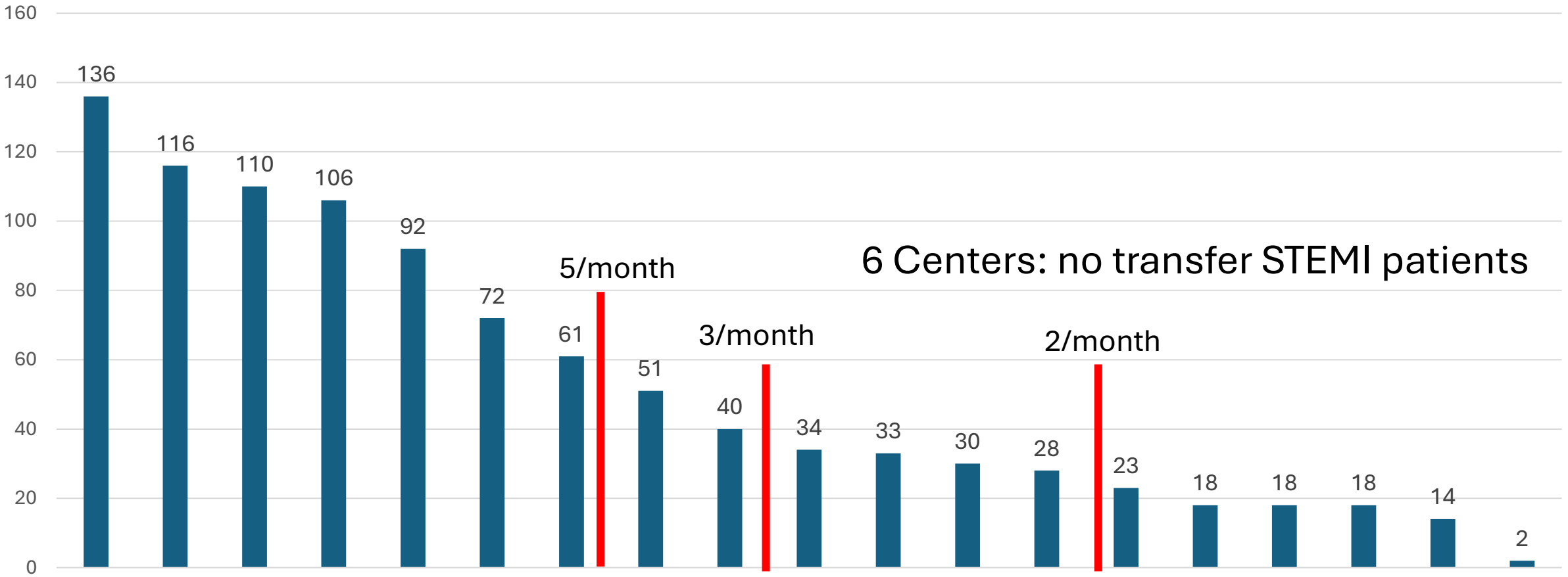
Project 1: Potential Prehospital Thrombolytics Pilot

- EMS Training and Low-Volume, High-Risk Procedures
- The proposed model would include:
  - A standardized patient screening checklist
  - Real-time physician review before medication administration
  - Communication through established clinical communication platform
  - Transport to an appropriate thrombolytic-accepting or PCI-capable facility
  - Clear protocols addressing contraindications and patient safety
  - Ongoing EMS education and competency review

Improving thrombolytic treatment for the appropriate patient



PCI For STEMI in VHAC – Transfer Volumes By Receiving Center



Primary PCI Times and Thrombolytic Use

7/19 hospitals (37%) with 1st door to PCI >120 min

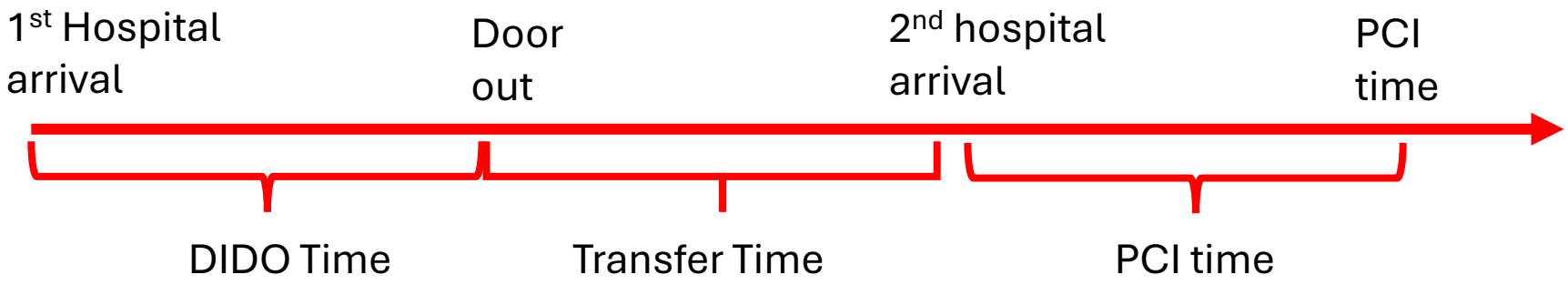
Exceed 120 min time 35-73% of time

Thrombolytic use 0-27% of time

	Median Arrival at OSH - Device Activation	Thrombolytics among Transfer Cases	FMC to Device > 120 Minutes
VCSQI Total	**117**	**22%**	**32%**
V4231	143	3%	73%
XM49H	129	9%	65%
B7R9X	182	21%	64%
2OZJ3	131	0%	56%
KHOVI	133	24%	40%
5BKOW	121	22%	35%
HVZZJ	124	27%	35%
5ZUU4	105	0%	34%
3E3HC	113	0%	33%
MTS72	114	0%	30%
R2ENC	86	0%	22%
U6FDP	107	42%	22%
T4DUC	95	0%	22%
H5QSA	108	40%	19%
J5DO3	93	0%	18%
F06GN	91	0%	17%
3K26L	117	52%	13%
PUEGF	183	83%	9%
AH661	88	0%	0%

Rationale and Goals

- Suboptimal thrombolytic use for transfer patients
  - Significant variation in thrombolytic use among hospitals
  - Prolonged transfer times but very low thrombolytic utilization
- Further refine data with four reportable metrics:
  - Arrival at the transferring hospital to departure (DIDO time)
  - Transfer duration time
  - Arrival at the receiving hospital to PCI
  - First-door-to-device time (total reperfusion time)



- Ongoing survey to centers to determine barriers to use
- Educational efforts to increase reperfusion strategies that meet guideline treatment standards
- If 1st door-device >120 min, promote thrombolytic use until able to demonstrate faster primary PCI times

Rationale and Goals

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Thank you!

For questions, please contact us at:

Info@VCSQI.org

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Cardiogenic Shock

CHALAK BERZINGI, MD, FACC, FSCAI

PROFESSOR OF MEDICINE

INTERVENTIONAL CARDIOLOGIST

CARILION CLINIC &VTC SCHOOL OF MEDICINE

Proud partner of VCSQI



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)
- In 2025 Drs Alex Treusdell from Innova and Raj Patel from UVA Joined.
- In 2026 continued as a bimonthly case presentations with review of cardiogenic shock data.

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.

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Cardiogenic Shock Team Activation

WHY is there a Shock Team?

Early identification and treatment improves survival in Cardiogenic Shock

WHAT is the Cardiogenic Shock Team?

A **multidisciplinary team** dedicated to optimizing the care of Cardiogenic Shock patients via:

- Rapid identification
- Coordinated consultation
- Early transfer/admission to Cardiac ICU, Cath Lab or Operating Room

WHO comprises the Shock Team?

- Interventional Cardiologist
- Cardiac Surgeon
- Advanced Heart Failure
- Cardiac Critical Care

HOW is the Shock Team activated?

Transfer Center:

WHO activates the Shock Team?

- Emergency Department
- Other units in the hospital (eg, Cath Lab or ICUs)
- Other hospitals

WHEN is the Team Activated?

Call the Shock Team as soon as Cardiogenic Shock is suspected

Clinical Criteria

- SBP < 90mmHg (for 30 min) or use of vasopressors/inotropes
- Lactate > 2 mmol/L
- Evidence of end-organ (eg, renal, hepatic, cerebral) hypoperfusion
- ACS or Heart Failure

Hemodynamic Criteria (if known)

- CI < 1.8 (or 2.2 L/min/m^2 with inotropes or vasopressors)
- CPO < 0.6
- PAPi < 1.0
- PCWP ≥ 15 mmHg

Contraindications*

- DNAR
- Terminal Illness

⟩⟩ Note: for STEMI, follow STEMI pathway

**If any questions, contact Shock Team*

AFTER the team has been activated

- Obtain ongoing Vital Signs, ECG, Labs (eg, BNP, Tn I, Lactate, CBC, CMP)
- Maintain 2 large bore IVs (consider central line as needed)
- Minimize vasopressors/inotropes to maintain MAP of ≥ 60 mmHg
- Preferential use of norepinephrine for vasopressor support
- ***Avoid*** use of phenylephrine
- Preferential use of amiodarone for control of VT or AF
- ***Avoid*** negative inotropes (eg, β-blockers, Ca^{++} channel blockers)
- Consider airway stabilization

AMI-Cardiogenic Shock Management

Call _____ to activate Cardiogenic Shock Team

CS Management Goals

- ***Serial reassessment (≤ q 6hr)*** of hemodynamics & end-organ perfusion
  - Lactate
  - Renal, hepatic function
  - Continuous hemodynamics
  - CPO & PAPi
- Optimize *Preload, Afterload* and *Contractility*
  - Volume or diuresis
  - Vasodilators or Vasopressors
  - Inotropes
- Timely, tailored treatment *escalation* for **Worsening Shock:**
  - Rising Lactate
  - Increasing pressor requirement
  - Worsening end-organ function
  - CPO < 0.6 and/or PAPi < 1
  - RA > 15 and/or PCWP > 15
- Assess for LV and RV recovery
  - Wean PMCS, vasopressors and inotropes

CS Hemodynamic Profile

	LV-dominant	RV-dominant	Bi-V
RA	< 15	> 15	> 15
PCWP	> 15	< 15	> 15
CPO	< 0.6	< 0.6	< 0.6
PAPi	> 1.0	< 1.0	< 1.0

CPO = MAP x CO/451
PAPi = (sPAP-dPAP)/RA

Treatment Considerations for *AMI-CS*

- ***Shock severity (SCAI stage)***
- ***Shock profile (LV, RV or Bi-V)***
- Revascularization status (mode and completeness)
- Presence of mechanical complications (eg, VSD, MR)
- Presence of hypoxia
- Presence of arrhythmias
- Contraindications to PMCS
- Use of IV antiplatelet agent

SCAI B CS *Beginning*

Hypoperfusion:
Lactate < 2 mmol/L
Minor renal & hepatic dysfunction
+/-
Hypotension:
SBP < 90 mmHg

Current Treatment:
No drugs or devices

→ **LV, RV or Bi-V:**
Consider
Impella CP
or
a trial of vasoactive agents

SCAI C CS *Classic*

Hypoperfusion:
Lactate ≥ 2 mmol/L
Alteration of renal & hepatic function
+
Hypotension:
SBP < 90 mmHg
OR
Current Treatment:
1 drug OR device

→ **LV-dominant:**
Impella CP

→ **RV-dominant or Bi-V:**
Right Sided MCS
+/-
Impella CP

SCAI D CS *Deteriorating*

Hypoperfusion:
Lactate ≥ 4 mmol/L
Worsening renal & hepatic function
+
Hypotension:
Escalating pressors
OR
Current Treatment:
2 drugs OR devices

→ **LV-dominant:**
Impella 5.5 or
VA-ECMO
+/- LV vent
or
Consider
Patient Transfer

→ **RV-dominant or Bi-V:**
VA-ECMO
+/-
LV vent
or
Right/Left Sided Impella

SCAI E CS *Extremis*

Hypoperfusion:
Lactate ≥ 8 mmol/L
Severe acidosis & end-organ failure
+
Hypotension:
Refractory
OR
Current Treatment:
≥ 3 drugs OR devices

→ **LV, RV or Bi-V:**
VA-ECMO
+/- LV vent
or
Consider
Patient Transfer

July 10, 2025

VHAC

Cardiogenic Shock Case Conference

A New Identity for Case-Based Learning

VHAC SHOCK WORKGROUP | 2026 SERIES UPDATE

WHY THE NEW IDENTITY

Makes the case-review portion easier to recognize and promote.

Creates a consistent forum for sharing real-world cases and learning across institutions.

FEEDBACK & EXPECTED BENEFITS

Members supported broader promotion and keeping case discussions connected to protocols, data, and quality improvement.

The group encouraged including EMS providers involved in presented cases.

OPEN TO EVERYONE

Participation is not limited to workgroup members.

Clinicians, EMS, nurses, cath lab teams, emergency medicine, critical care, trainees, healthcare leaders, and other interested participants are welcome.

One workgroup. A recognizable case conference. Broader shared learning across Virginia.

2026 Cardiogenic Shock Case Presentations

VHAC SHOCK WORKGROUP | FEBRUARY–OCTOBER 2026

FEB 12	Carilion Clinic
APR 09	Carilion Clinic
JUN 11	UVA Health
AUG 13	Carilion Clinic
OCT 08	UVA Health

VHAC

Cardiogenic Shock Case Conference

Second Thursday of every 2 months at 6PM

VAHEARTATTACKCOALITION.ORG

One Year of Collaboration, Learning & Quality Improvement

Annual Statewide Workgroup Update

Presented by the Physician Leads, Cardiogenic Shock Workgroup

Virginia statewide cardiovascular meeting | October 2026

Shared protocols • Multidisciplinary teams • Hemodynamic assessment • Better outcomes

Our Mission

- Build a collaborative statewide approach to the recognition and management of cardiogenic shock.
- Translate evidence and shared experience into practical institutional pathways.
- Promote early escalation, multidisciplinary decision-making, and measurement of outcomes.

Year in Review: A Consistent Forum

Every two months

Regular workgroup meetings throughout the past year.

Case-based learning

One cardiogenic shock case presentation and multidisciplinary discussion per meeting.

QI focus

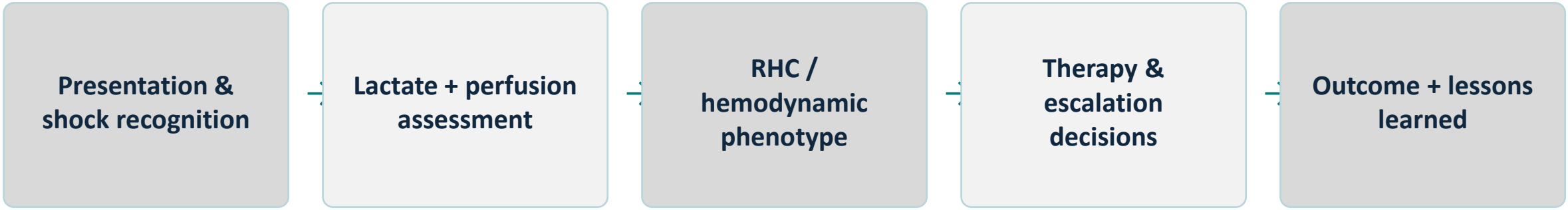
Review of care processes, hemodynamic data, clinical outcomes, and improvement opportunities.

Meeting cadence implies approximately six sessions annually; attendance and exact meeting counts should be verified.

What We Discussed

- Clinical presentations of cardiogenic shock, management decisions, and patient outcomes.
- Serial lactate and markers of tissue hypoperfusion.
- Right-heart catheterization: filling pressures, cardiac output/index, and shock phenotype.
- Escalation pathways, mechanical circulatory support considerations, and multidisciplinary coordination.

Case Review: From Presentation to Outcome



The purpose of case review is shared learning—not ranking institutions or attributing outcomes without risk adjustment.

Advancing the Virginia Shock Protocol

- Presentation of the current VHAC cardiogenic shock protocol with participating institutions.
- Encouraged hospitals to adapt a local protocol aligned with their capabilities and referral networks.
- Emphasized early identification, structured assessment, prompt activation, and timely transfer/escalation.
- Promoted consistent communication across emergency, catheterization laboratory, intensive care, and advanced heart-failure teams.

Building Multidisciplinary Shock Teams

Core team

Interventional cardiology, critical care/cardiac intensive care, advanced heart failure, cardiac surgery, and other relevant disciplines based on local resources.

Operational priorities

Defined activation criteria, 24/7 communication, transfer pathways, shared treatment decisions, and structured case review.

A Practical Statewide Measurement Framework

Domain	Illustrative measures
Recognition	Time to diagnosis, shock stage, activation timing
Perfusion	Initial/serial lactate, clearance, end-organ function
Hemodynamics	RHC use, cardiac index, filling pressures, cardiac power output
Treatment	Revascularization, vasoactive support, MCS use and escalation
Outcomes	Survival, complications, transfer, discharge disposition

Proposed common data elements; not a claim of completed statewide reporting.

National Registries: Complementary QI Opportunities

AHA cardiogenic shock initiatives

Broader shock systems-of-care, standardization, and collaborative data/quality improvement efforts. Confirm the exact AHA program and participation requirements before enrollment.

ACC cardiogenic shock registry

Newer registry emphasis on acute myocardial infarction–related cardiogenic shock, using standardized data to support quality improvement and benchmarking. Confirm current eligibility and scope with ACC.

Registry descriptions are high-level and should be checked against current program specifications.

What We Have Accomplished

- Maintained a reliable bimonthly statewide forum for multidisciplinary learning.
- Established a recurring case-based review of shock presentations, hemodynamics, management, and outcomes.
- Socialized the Virginia cardiogenic shock protocol and advocated for local institutional adoption.
- Encouraged formal shock-team development and raised awareness of national QI registries.

Priorities for the Next 12 Months

- Support local protocol adoption and identify shock-team contacts at participating hospitals.
- Agree on a small common dataset, including lactate, RHC parameters, treatment, and outcomes.
- Continue bimonthly case presentations with actionable learning points.
- Evaluate AHA and ACC registry participation against institutional needs and resources.
- Identify statewide improvement opportunities through collaborative, appropriately risk-adjusted review.

The Ask: Turn Collaboration into Implementation

Each institution

Identify a shock champion and review its local activation / escalation pathway.

Each meeting

Bring a representative case, key physiology, decisions, outcomes, and lessons learned.

Together

Move toward shared definitions, feasible data collection, and sustained statewide QI.

Thank you to participating clinicians and institutions across Virginia.

VHAC

Cardiogenic Shock Case Conference

MEET THE OCTOBER

CASE PRESENTER

Dr. Behnam Tehrani

Physician Lead

Thursday, December 10, 2026

6:00 PM

Zoom

Presenting Organization: Inova

Join us for case-based learning and discussion focused on cardiogenic shock care across Virginia.

Open to anyone interested in cardiogenic shock care.

Join Us

Register via VAHeartAttackCoalition,org

VHAC Virginia Heart Attack Coalition

VCSQI

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

VHAC
Virginia Heart Attack Coalition

PE Response Team

Moving From Protocol to Practice

Advancing coordinated, data-driven pulmonary embolism care across Virginia

MICHAEL KELLEY, MD
Interventional Cardiologist Carilion Clinic
NRV

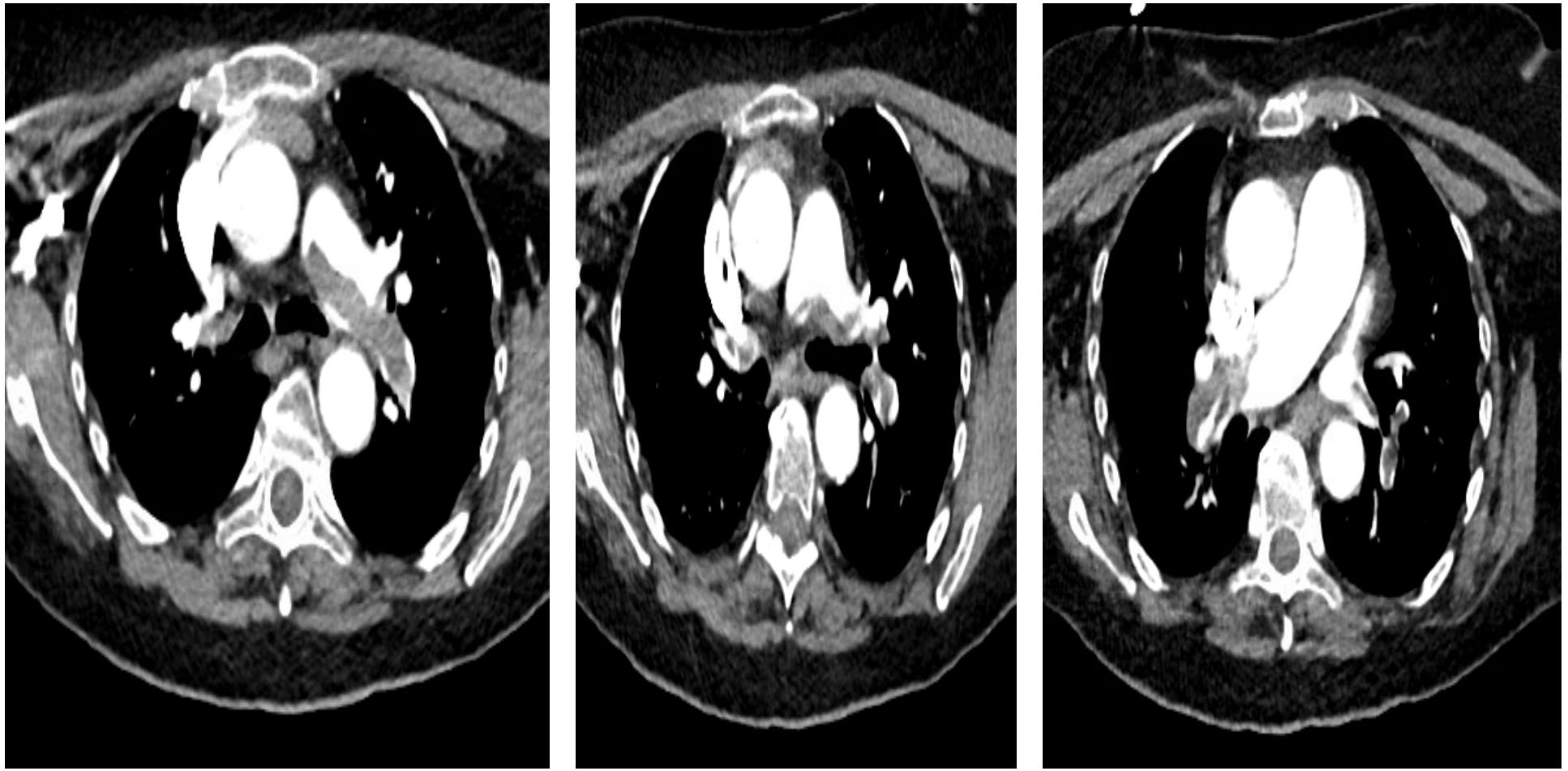
Proud partner of VCSQI



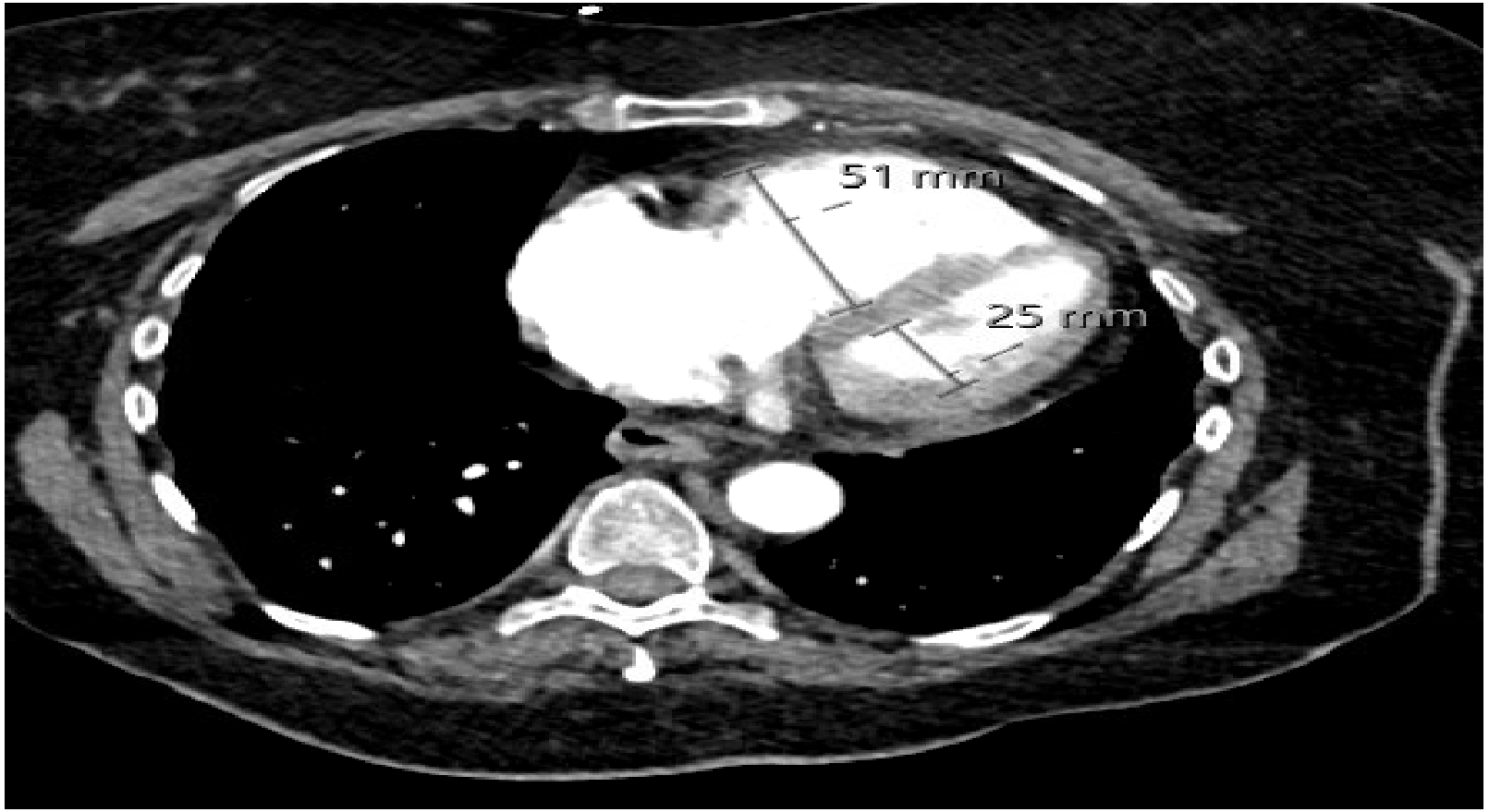
CASE

- 72-year-old female with acute, severe dyspnea. Left leg pain and swelling for the past week.
- Flu-like illness for the past week with decreased mobility.
- VS: BP 137/67, HR 86, O2 sat 97%.
- Chest CTA:
  - Acute saddle PE, large bilateral central clot burden.
  - Severe RV strain, RV/LV 2.0
- Labs: HS troponin 173, ProBNP 3878, Lactate 1.6.
- Venous Duplex: Acute, large DVT involving L CFV.
- ACC/AHA Class C3 risk.

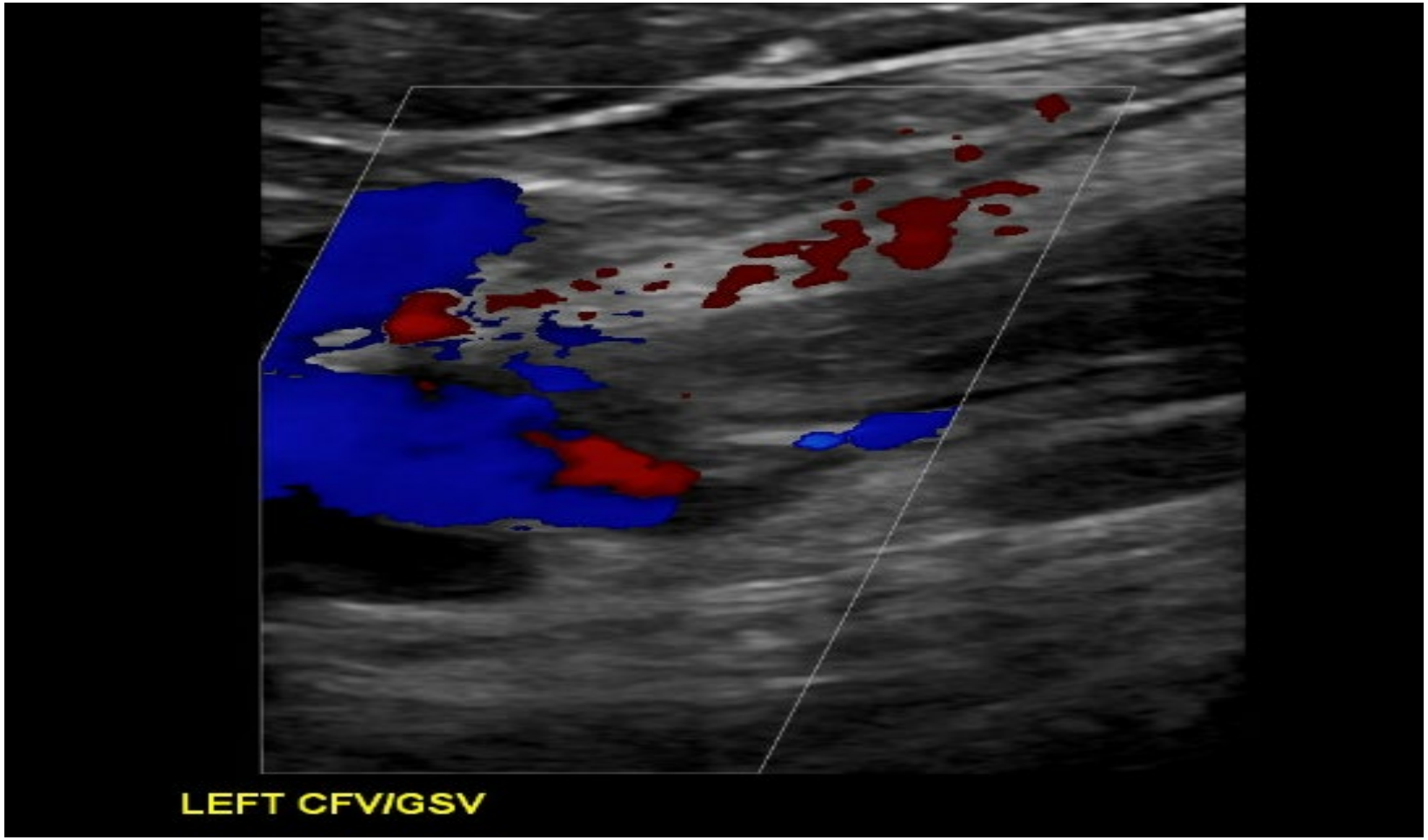
Chest CTA: Saddle PE



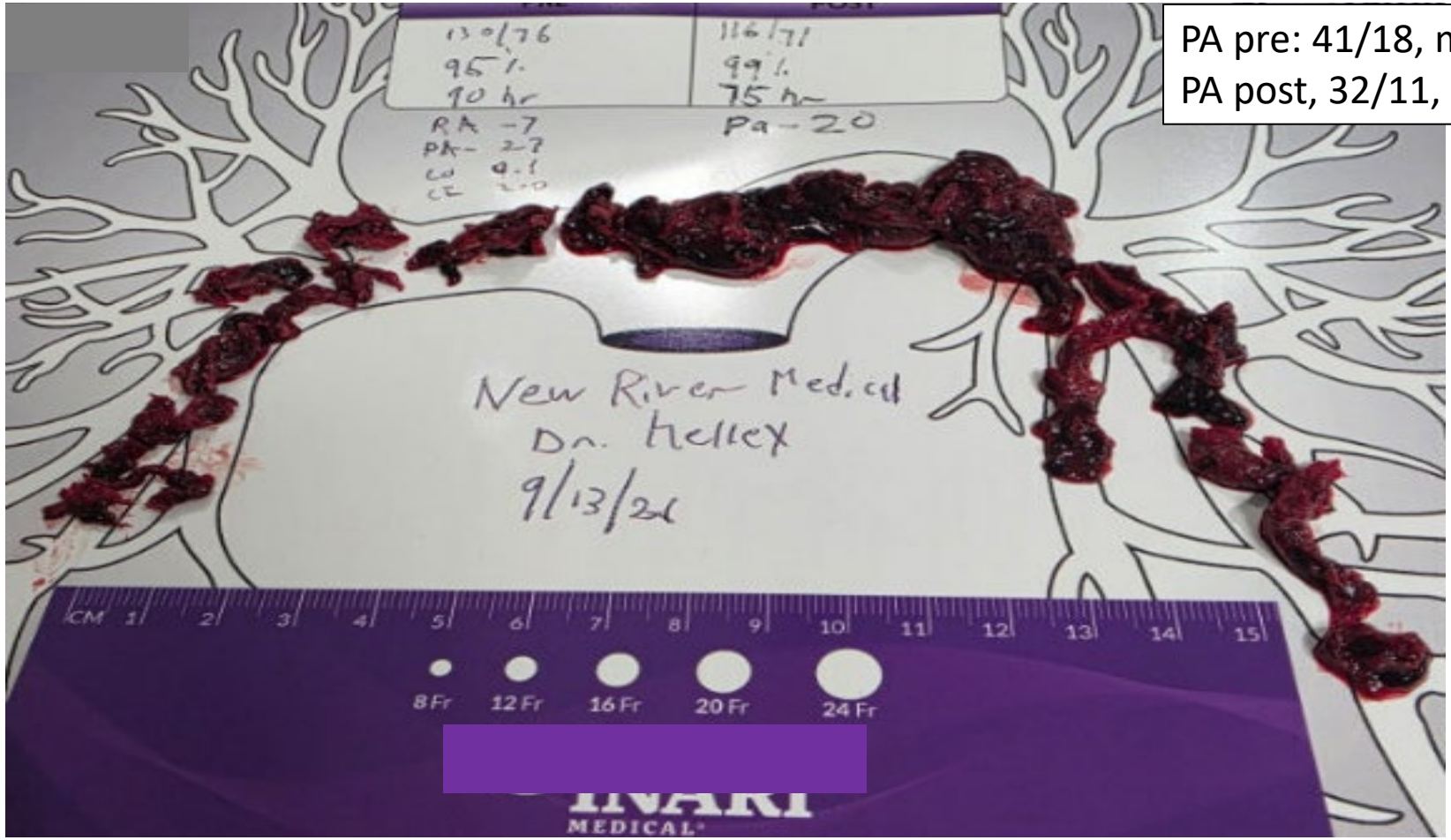
Chest CTA: Severe RV Strain



Venous Duplex: L DVT

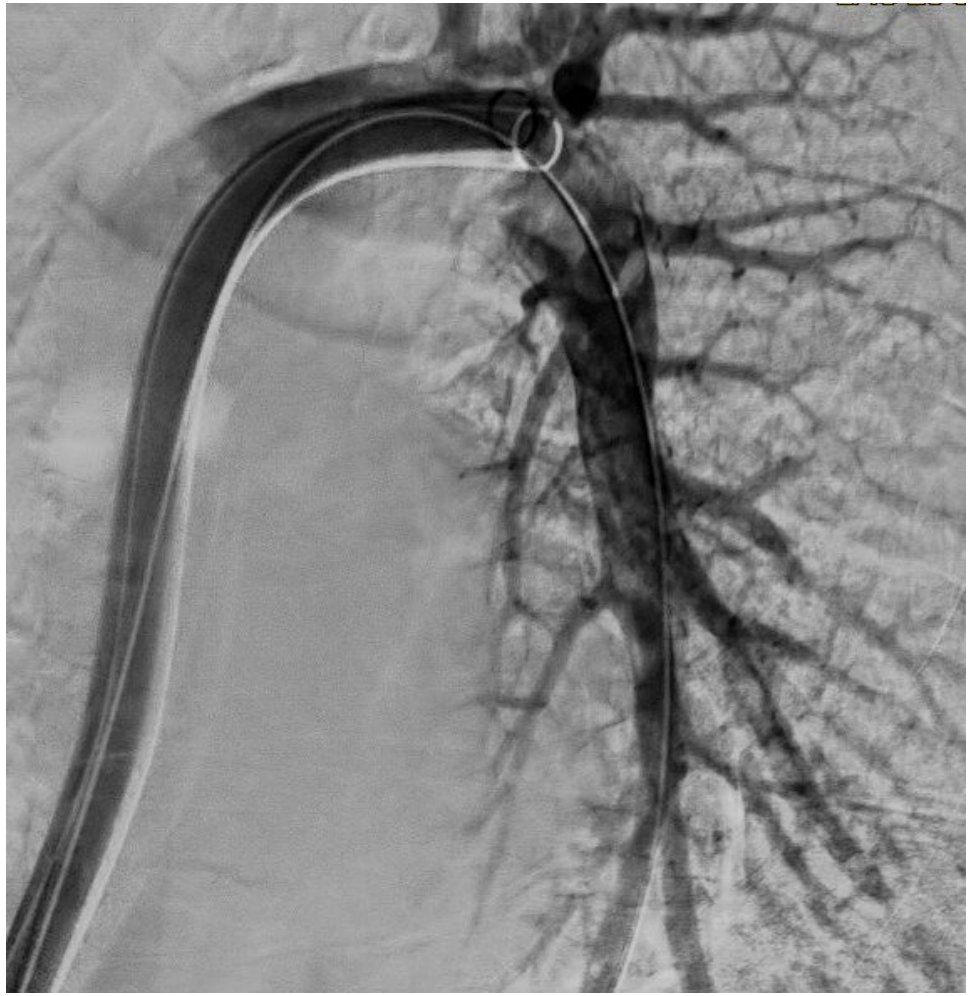


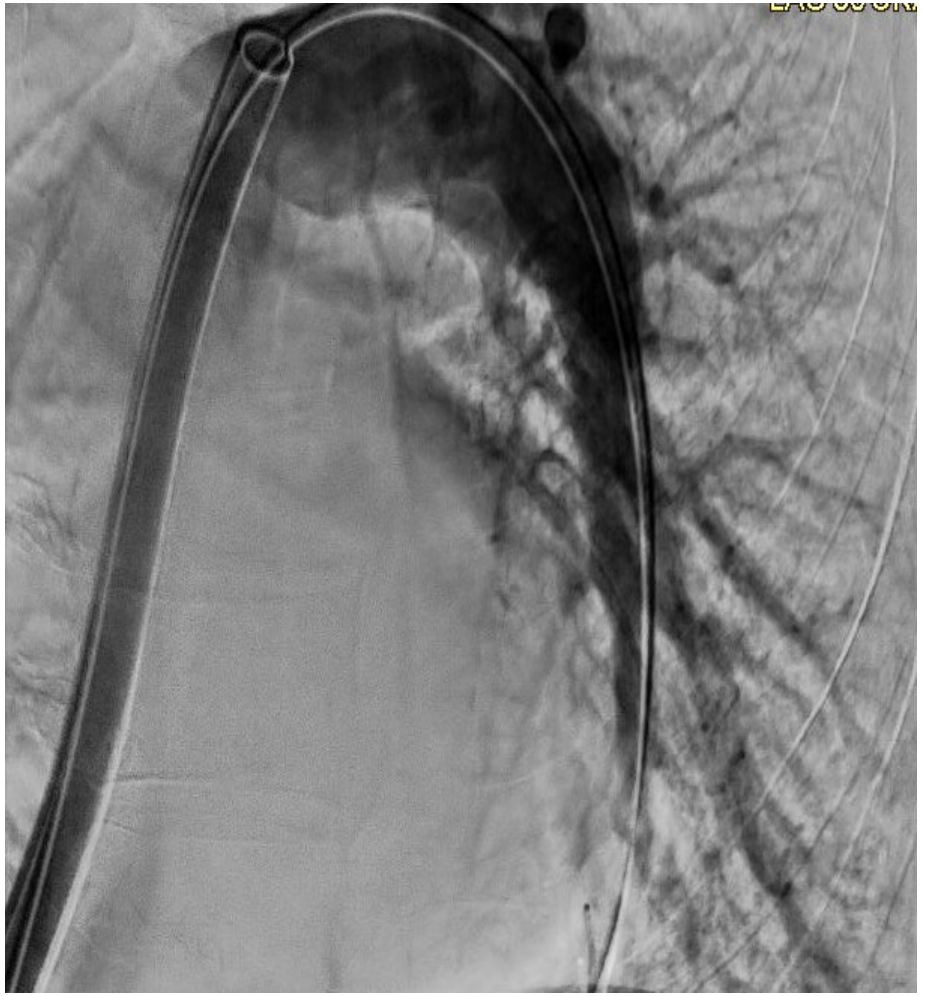
PE Thrombectomy



PA pre: 41/18, m 27
PA post, 32/11, m 19

Pulmonary Angiogram



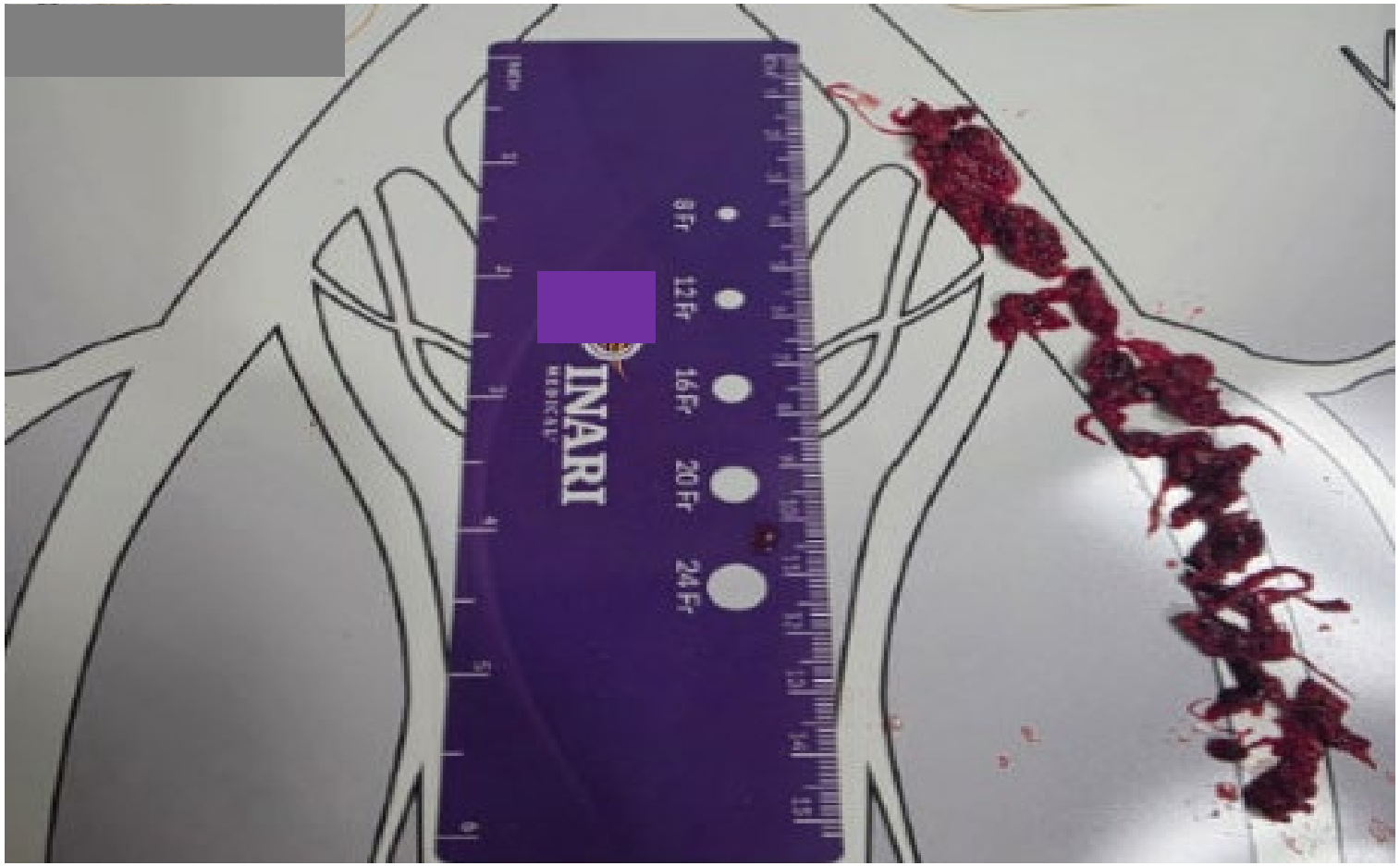


DVT Thrombectomy

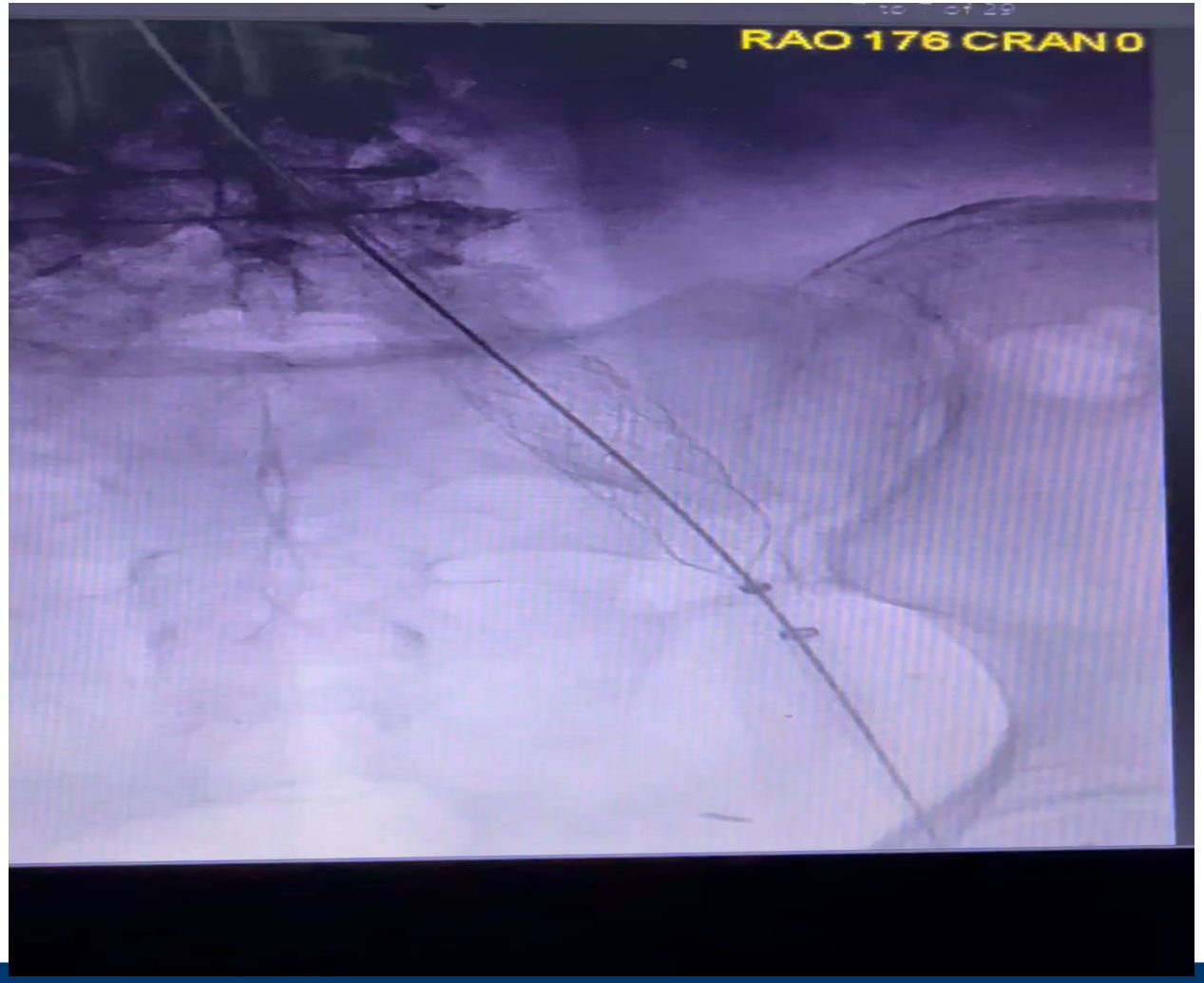
Inari ClotTriever Device



DVT Thrombectomy

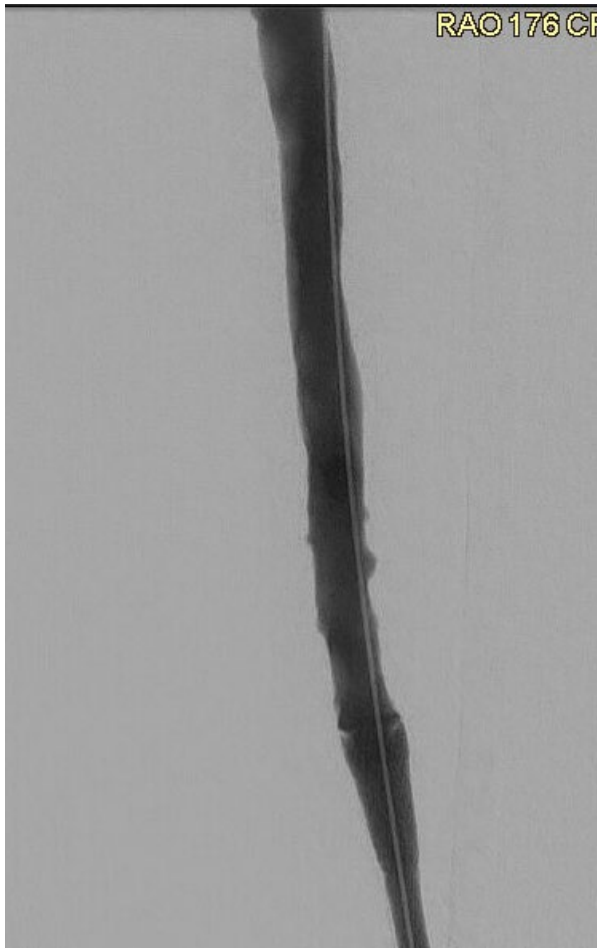


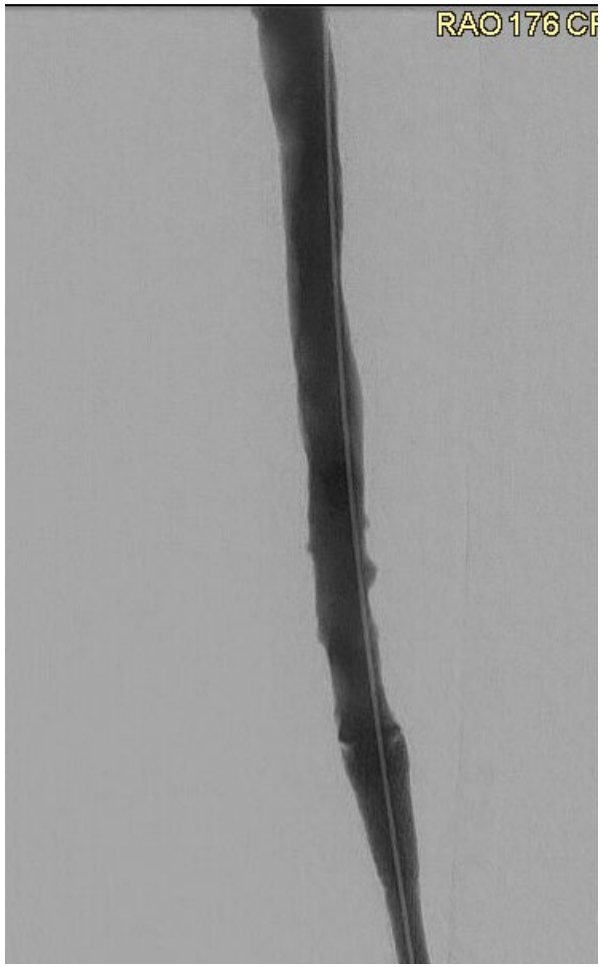
DVT Thrombectomy



Post DVT Thrombectomy

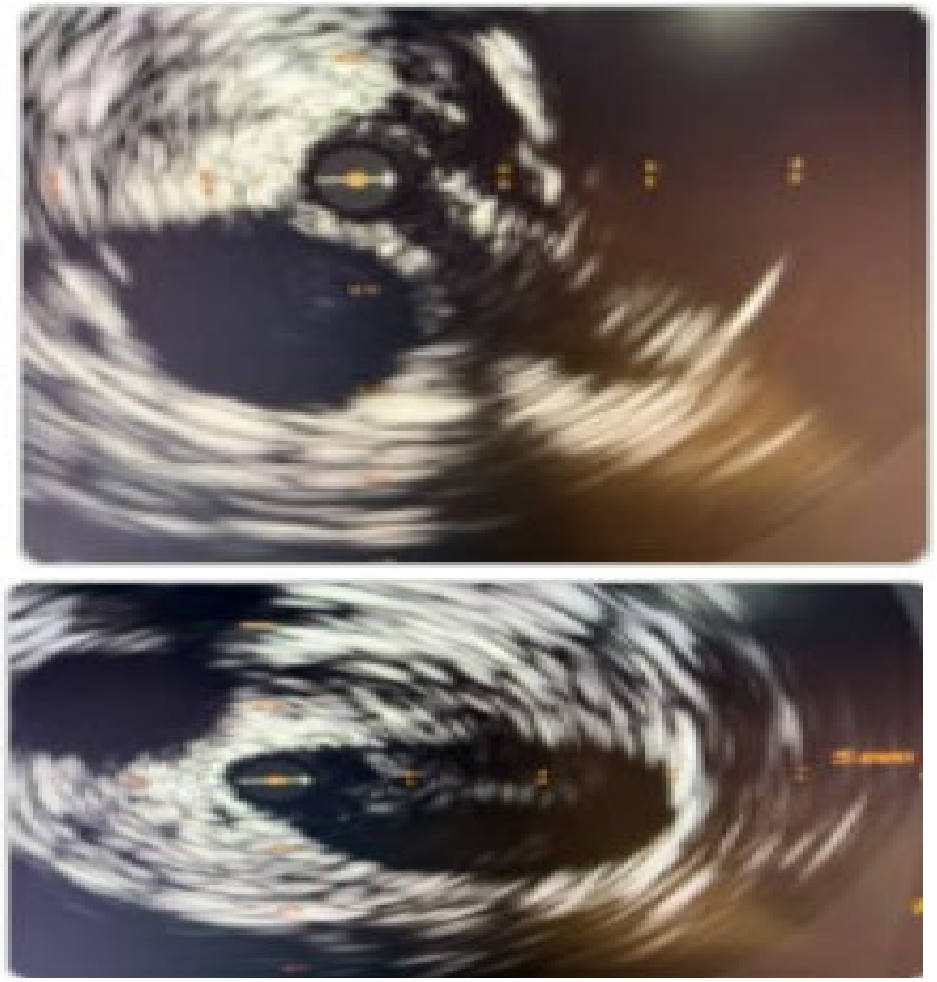






May Thurner Syndrome



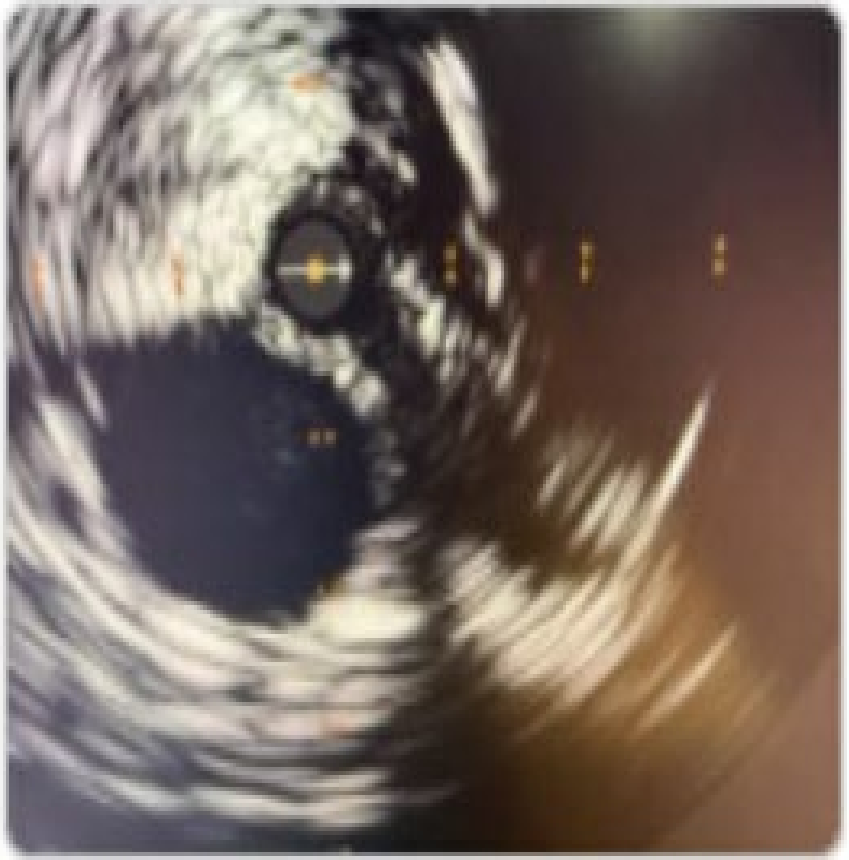


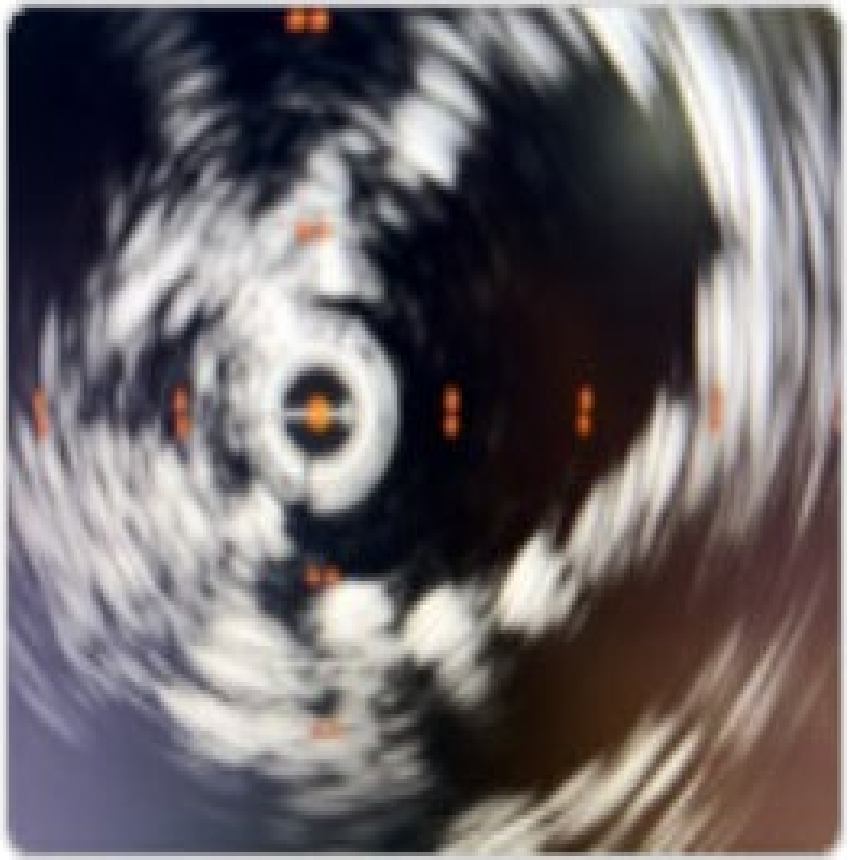
Iliac Vein Stent



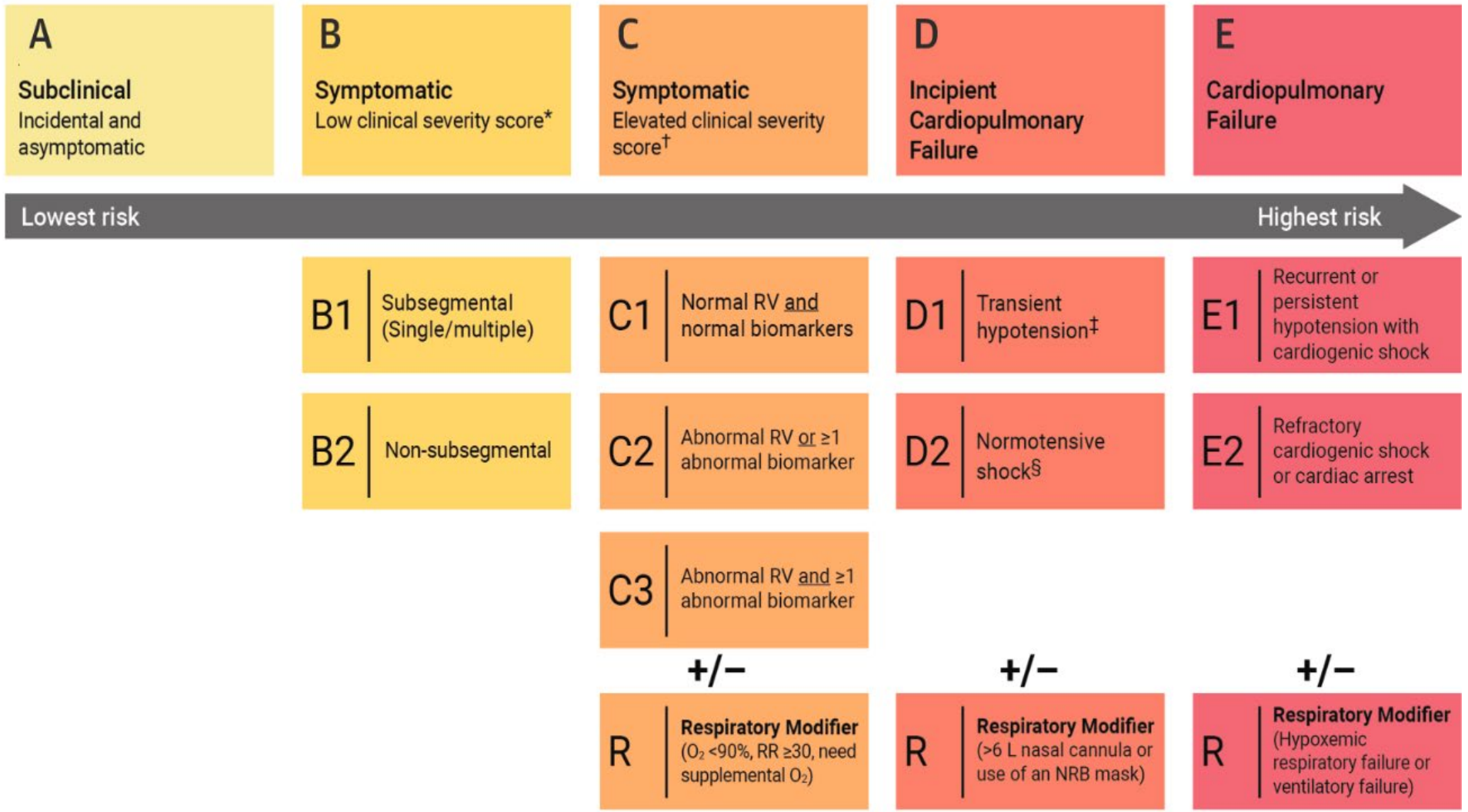


Iliac Vein Stent



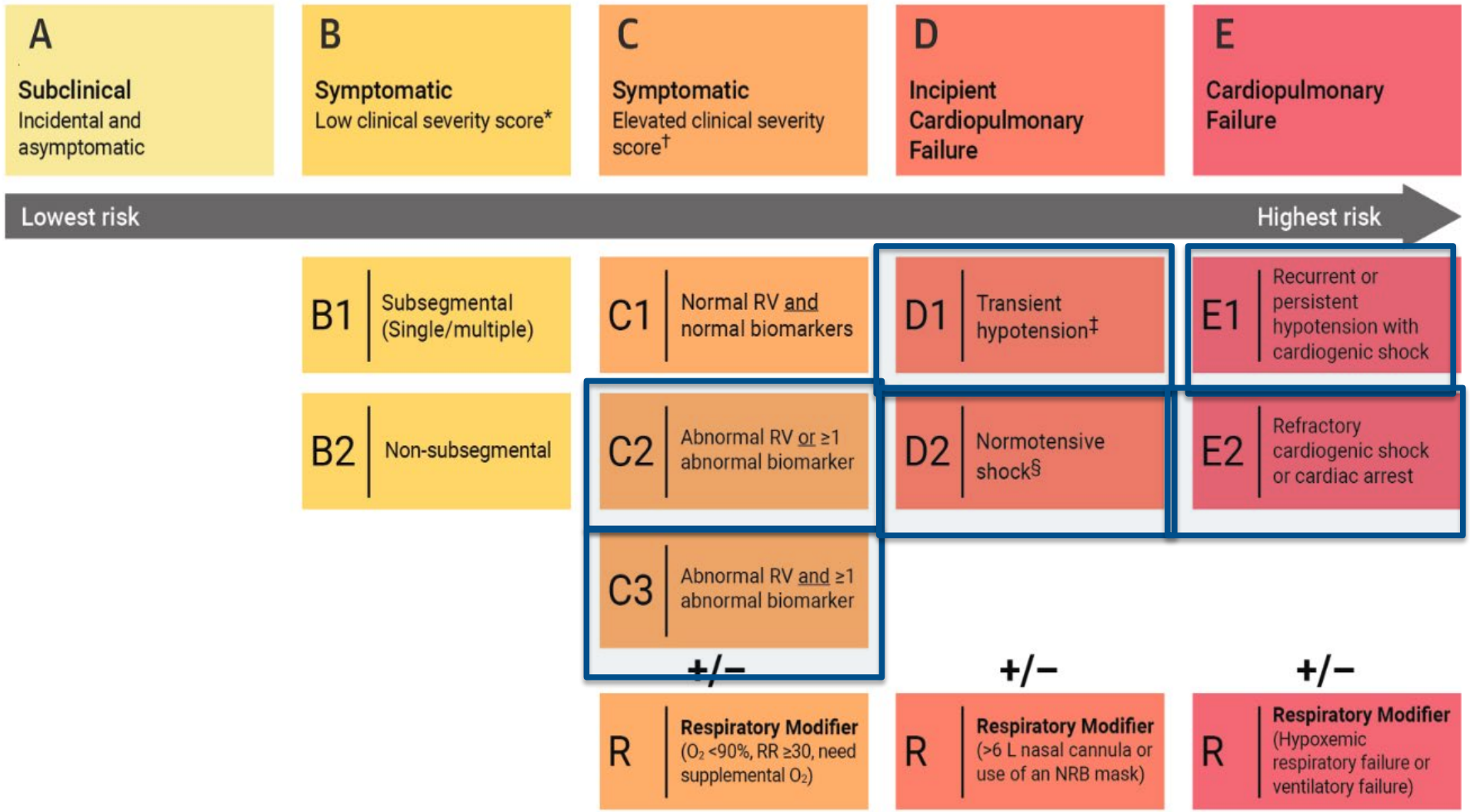


AHA/ACC Acute PE Clinical Categories



AHA/ACC Acute PE Clinical Categories

PERT CALL



HI-PEITHO

The Higher-risk Pulmonary Embolism Thrombolysis Study

Mainz University & PEITHO Network • The PERT Consortium® • Boston Scientific Corporation

Study Design	**Multinational, multicenter, adaptive-design, open-label, parallel-group comparison trial with blinded primary outcome adjudication**	
Intervention	**USCDT (EKOS™ Endovascular System) + anticoagulation** r-tPA (alteplase) 9 mg per catheter total dose + anticoagulation	**Anticoagulation alone** Standardized anticoagulation regimens using LMWH or UFH
Patients	**N=544** patients with **intermediate-risk PE** 59 sites in the US and Europe	
Primary Outcome	**7-day composite of:** • PE-related mortality • Cardiorespiratory decompensation or collapse • PE recurrence	

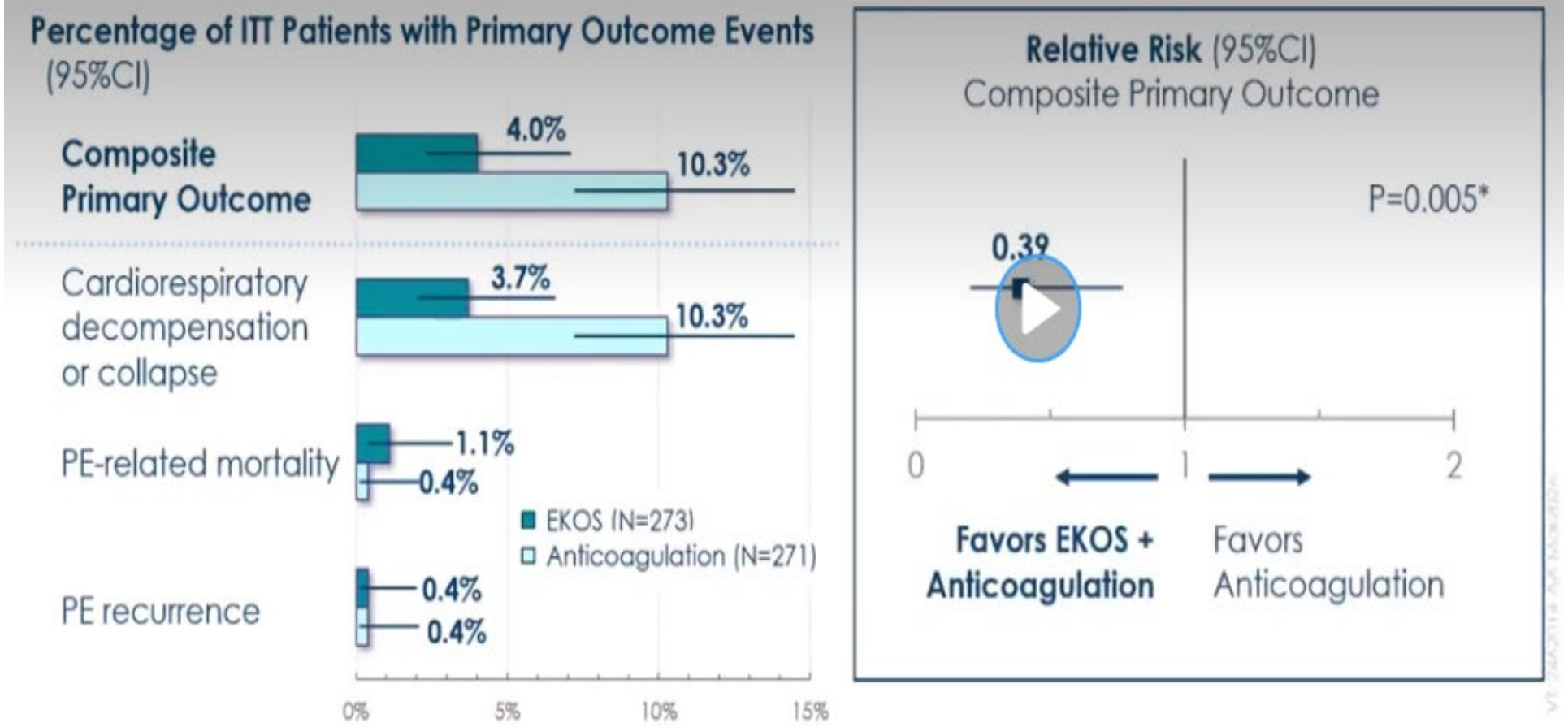
ACC.26

LMWH, low molecular weight heparin; PE, pulmonary embolism; r-tPA, recombinant tissue-type plasminogen activator; UFH, unfractionated heparin; USCDT, ultrasound-assisted catheter-directed thrombolysis.

NEJM, March 28, 2026:394;1979-1990..

Primary Efficacy Outcome

HI-PEITHO



Rosenfield K, et al. N Engl J Med. 2026. doi: 10.1056/NEJMoa2516567.
Konstantinides S, ACC26. Mar 28, 2026; New Orleans, USA.

Primary outcome events occurred within 7 (+2) days of randomization or at discharge and were adjudicated by an independent, blinded clinical events committee.
* Two-sided P-value using Fisher's exact test; P-value <0.02938 indicates significance.

NEJM, March 28, 2026:394;1979-1990..

PRAGUE-26 Results

Table 3. Outcomes (Intention-to-Treat Population).*

Outcome	Thrombolysis (N=280)		Standard Care (N=278)		Relative Risk (95% CI)
	no. of patients	*% of patients (95% CI)†*	*no. of patients*	*% of patients (95% CI)†*	
Primary outcome					
Death from any cause, recurrence of pulmonary embolism, or cardiorespiratory decompensation or collapse	2	0.7 (0.0–2.7)	19	6.8 (4.4–10.5)	0.10 (0.02–0.44)‡
Secondary outcomes					
Death from any cause	0	0 (0.0–1.6)	4	1.4 (0.4–3.8)	0
Recurrence of pulmonary embolism	2	0.7 (0.0–2.7)	1	0.4 (0.0–2.2)	1.99 (0.18–21.77)
Cardiorespiratory decompensation or collapse	2	0.7 (0.0–2.7)	15	5.4 (3.2–8.8)	0.13 (0.03–0.57)

NEJM, August 31, 2026.

PEERLESS Trial Design

RCT: FlowTriever vs. catheter-directed thrombolytics (CDT) in pulmonary embolism (PE)

550 PATIENTS RANDOMIZED 1:1

Intermediate-risk acute PE, low contraindication to lytics (low risk of bleeding).

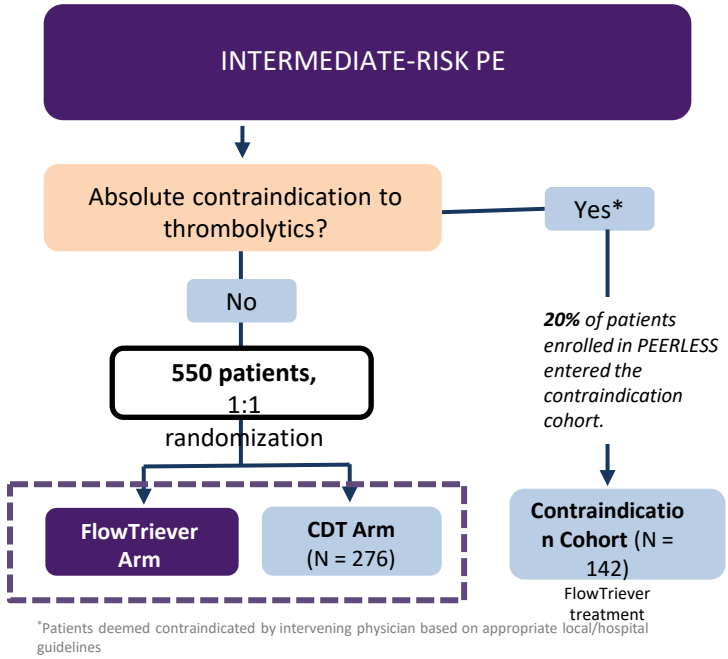
PRIMARY ENDPOINT

Win Ratio composite at discharge (7d max):

1. All-cause mortality
2. Intracranial hemorrhage
3. Major bleeding (ISTH)
4. Clinical deterioration and/or bailout
5. ICU admission and ICU length of stay (LOS)

FOLLOW UP

Through 30 days

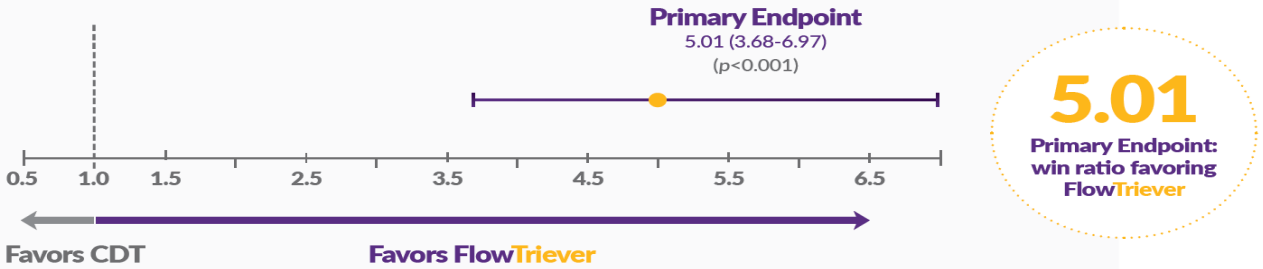


Circulation, February 2 2025:151;260-73..

Results: Clear Superiority Win for FlowTriever

5X more wins with FlowTriever vs. CDT on primary endpoint of 5 clinically relevant components

The primary advantage of a win ratio approach is the ability to rank the outcomes included in the composite by clinical importance and assess them in a hierarchical manner.



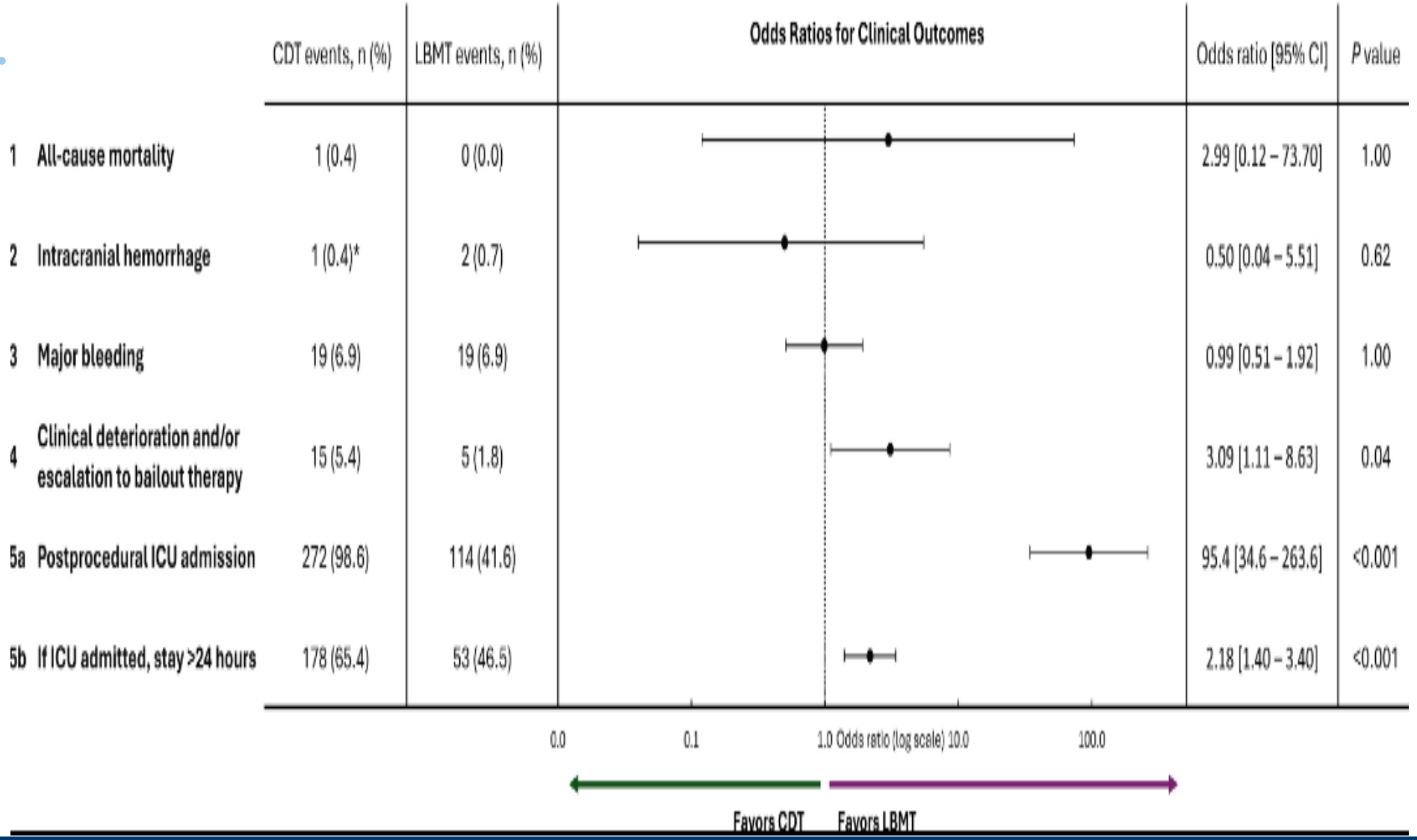
5.01
Primary Endpoint: win ratio favoring FlowTriever

	Win ratio [95% CI]	*P* value
Primary Endpoint: 5-component win ratio*	**5.01** [3.68 – 6.97]	**<0.001**

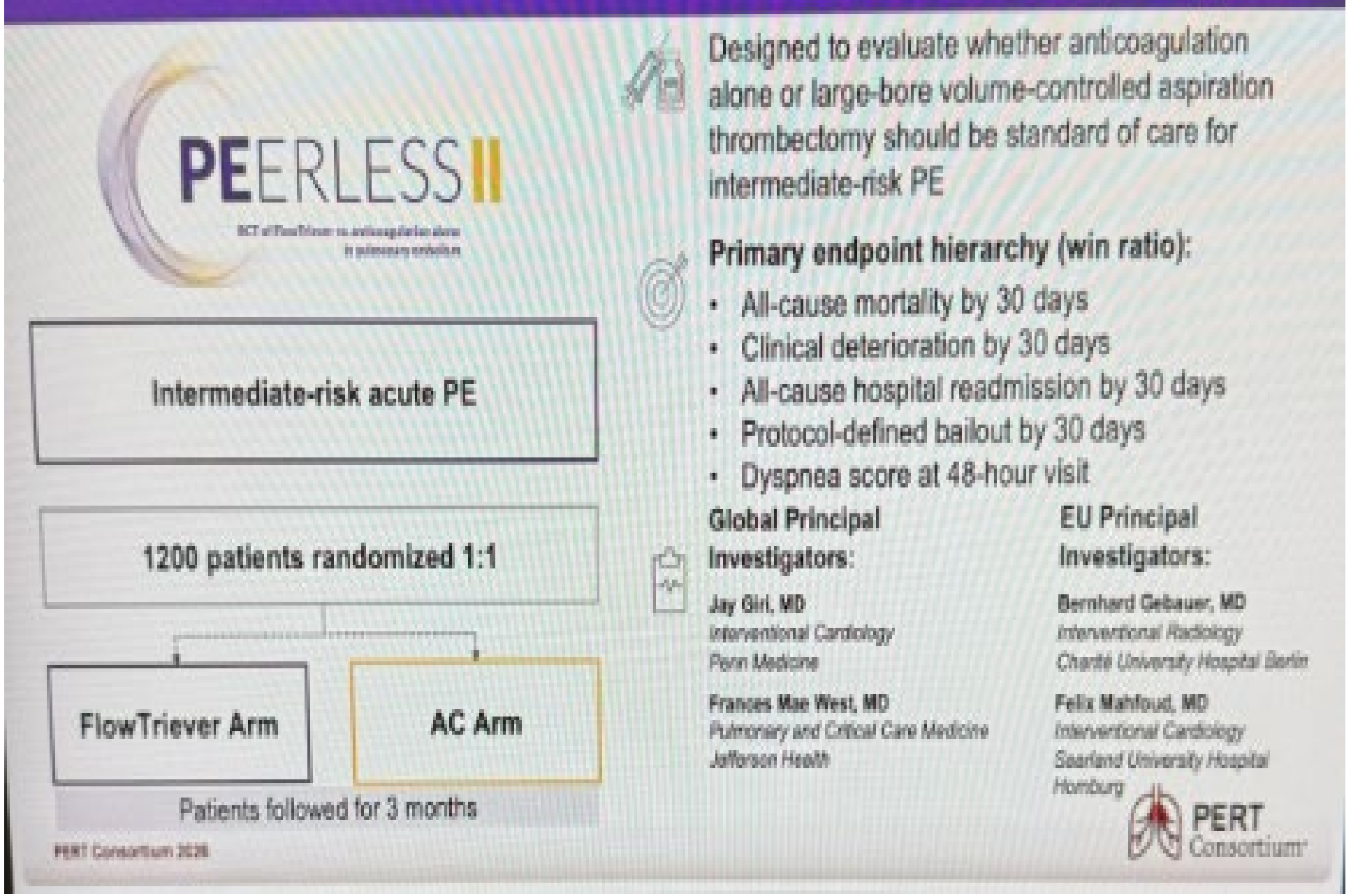
***Primary endpoint components:** 1) all-cause mortality, 2) intracranial hemorrhage, 3) major bleeding, 4) clinical deterioration and/or escalation to a bailout therapy, and 5) ICU admission and length of stay.

Two-sided *P* value calculated using a modified generalized Wilcoxon test (F-S test) proposed by Finkelstein & Schoenfeld.
A win ratio of 5.01 represents 5.01 times more wins for FlowTriever than CDT when every patient in each study arm is compared across the study's 5 components in hierarchical order: 1. all-cause mortality; 2. intracranial hemorrhage (ICH); 3. major bleeding; 4. clinical deterioration and/or escalation to bailout; and 5. ICU admission and ICU length-of-stay (LOS). The win ratio primary endpoint was assessed through discharge or 7 days post-procedure, whichever occurred first.

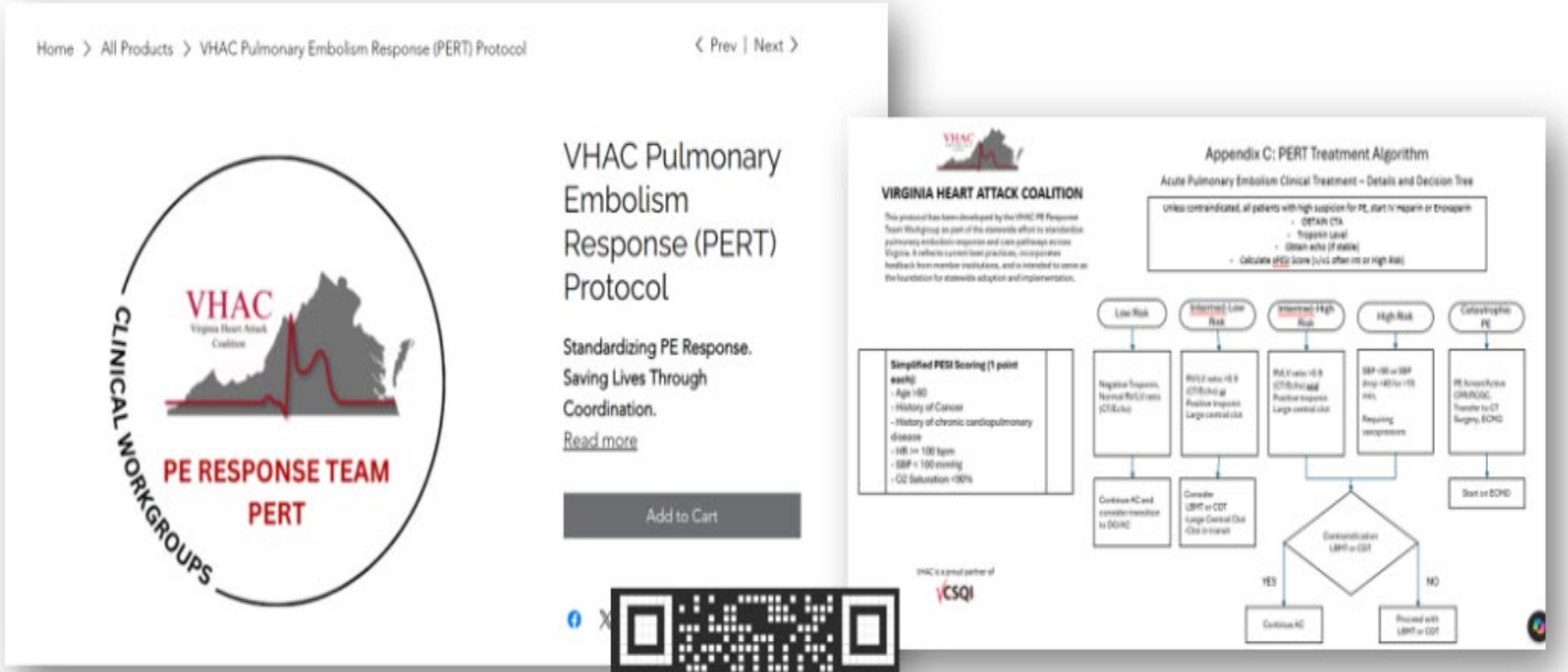
PEERLESS Results: Composite Outcomes



Circulation, February 2 2025:151;260-73..


PEERLESS II
Designed to evaluate whether anticoagulation alone or large-bore volume-controlled aspiration thrombectomy should be standard of care for intermediate-risk PE
Primary endpoint hierarchy (win ratio):
• All-cause mortality by 30 days
• Clinical deterioration by 30 days
• All-cause hospital readmission by 30 days
• Protocol-defined bailout by 30 days
• Dyspnea score at 48-hour visit
Intermediate-risk acute PE
1200 patients randomized 1:1
FlowTriever Arm
AC Arm
Patients followed for 3 months
Global Principal Investigators:
Jay Giri, MD
Interventional Cardiology
Penn Medicine
Frances Mae West, MD
Pulmonary and Critical Care Medicine
Jefferson Health
EU Principal Investigators:
Bernhard Gebauer, MD
Interventional Radiology
Charité University Hospital Berlin
Felix Mahfoud, MD
Interventional Cardiology
Saarland University Hospital
Homburg
PERT Consortium

PERT Protocol



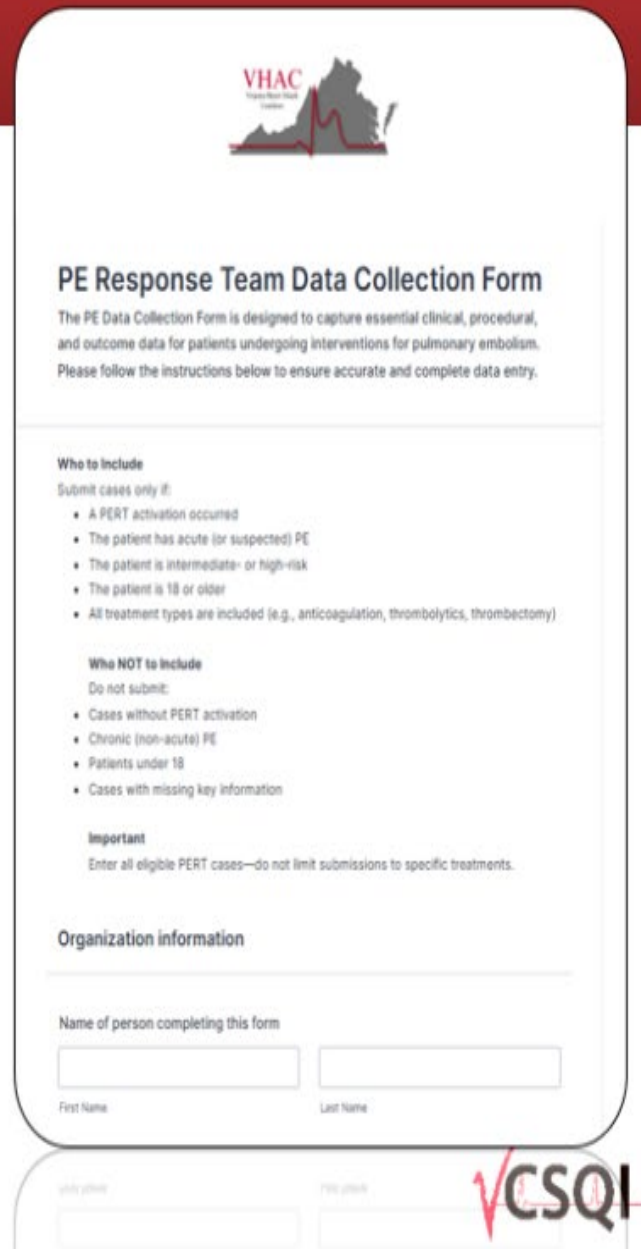
Protocol Available at:
https://www.vaheartattackcoalition.org/

From Data Collection to Meaningful Measurement

The PE Response Data Collection Form captures patient presentation, risk factors, treatment, procedural measures, complications, and outcomes.

Recent enhancements and proposed measures focus on:

- More consistent capture of quantitative RV/LV ratios.
- Pre- and post-procedure pulmonary artery pressures.
- Cardiac index and hemodynamic assessment.
- Vasopressor use and clinical shock indicators.
- Treatment selection, adverse events, and clinical outcomes.



VHAC

VCSQI

Statewide PE Response | Data Snapshot

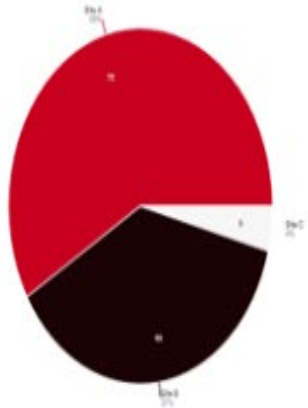
Updated Jotform report • site coverage and risk classification

133

Total records*

3

Participating sites



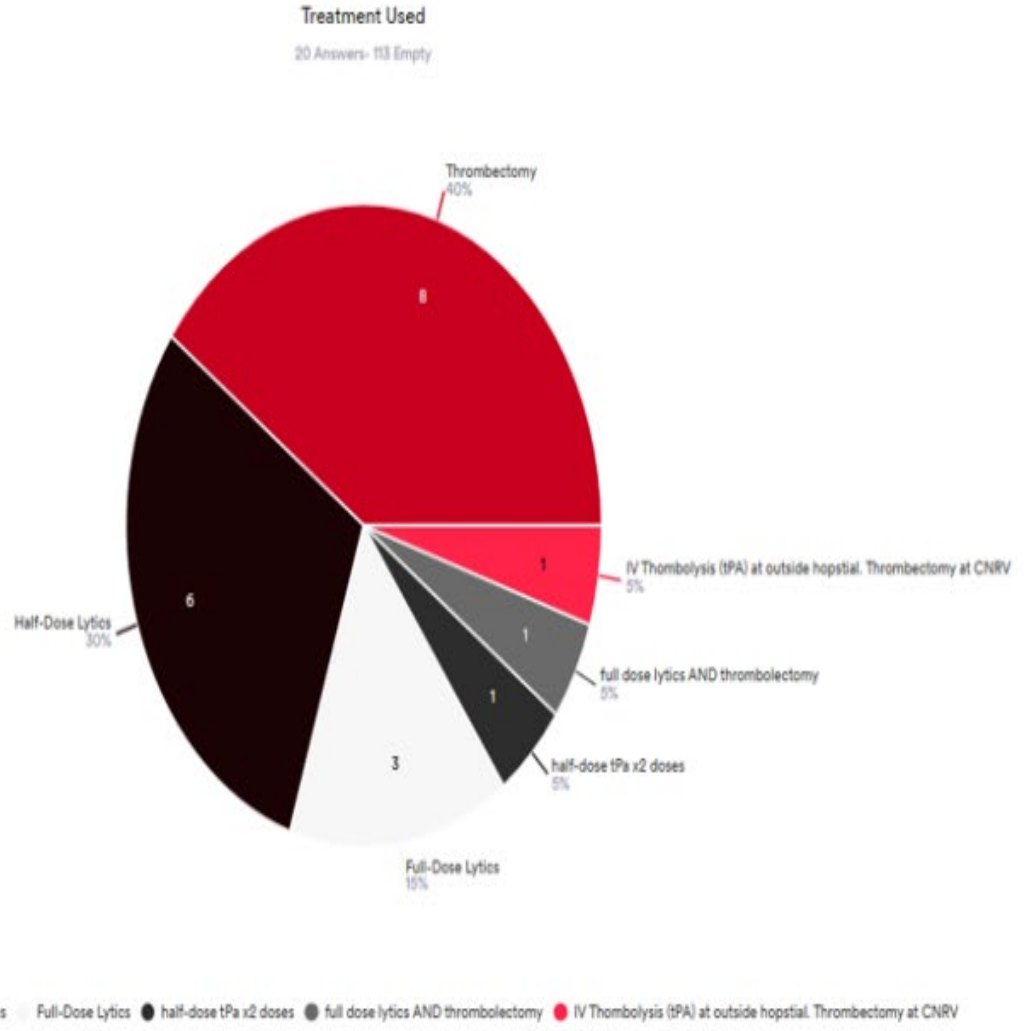
SITE CONTRIBUTIONS (n=123)

Site A		72 cases | 59%
Site B		46 cases | 37%
Site C		5 cases | 4%

RISK CLASSIFICATION

Intermediate: 90 / 127 (71%) | High: 37 / 127 (29%)

Clinical Outcomes | What the Data Show



Clinical Outcomes | What the Data Show

Current report snapshot • observed outcomes and reporting gaps

ICU admission

115 / 130

88% of responses

Reported admission

Major bleeding

6 / 129

4.7% of responses

Reported major bleeding

Apixaban (Eliquis)

104 / 130

80% of responses

Post-procedure therapy

ICU stay: 1–2 days

72 / 110

65% of answered stays

32 one-day; 40 two-day

Source: PE Response Team Data Summary (Jotform PDF), pp. 9–11. Verify final data extract before statewide presentation.

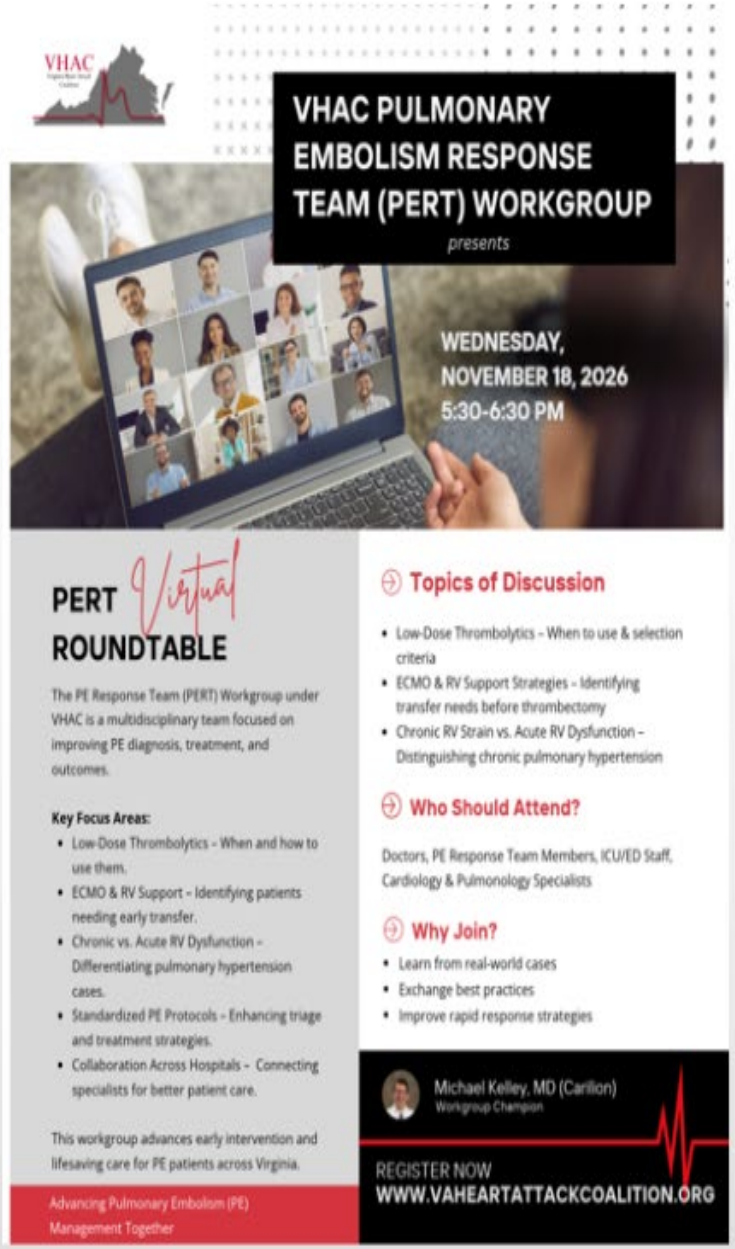
Progress Since the 2025 Statewide Meeting

- Standardized protocol: Established a common framework for PERT activation and multidisciplinary consultation.
- Clinical collaboration: Continued case-based discussion across participating institutions.
- Data infrastructure: Advanced the statewide PE Response Data Collection Form and reporting process.
- Measurement refinement: Identified additional clinical variables needed to strengthen risk assessment and outcome evaluation.
- Next phase: Transitioning from initial data collection toward actionable, comparable performance measures.

2027 Priorities: Moving Toward Statewide Impact

The next phase: Participation, consistency, and measurable improvement

- Expand participation: Engage additional hospitals and PERT programs across Virginia.
- Improve data completeness: Standardize key risk, treatment, and outcome definitions.
- Strengthen analytics: Develop descriptive reporting and clinically meaningful performance measures.
- Promote implementation: Encourage use and local evaluation of the VHAC PERT protocol.
- Share learning: Use multidisciplinary case reviews and aggregated data to identify improvement opportunities.



Bi-Monthly Meeting

3rd Wednesday of every odd month at 5:30 PM via Zoom.

Register at VAHeartAttackCoalition.org

VHAC

VCSQI

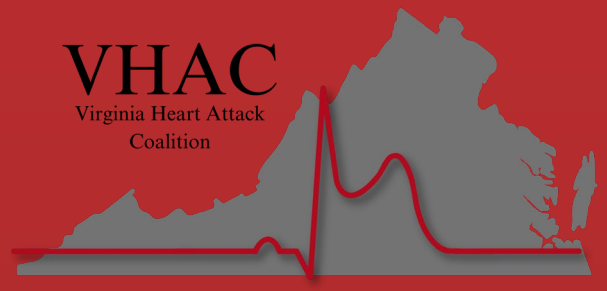
Thank You

info@VCSQI.org

mpkelley@carilionclinic.org

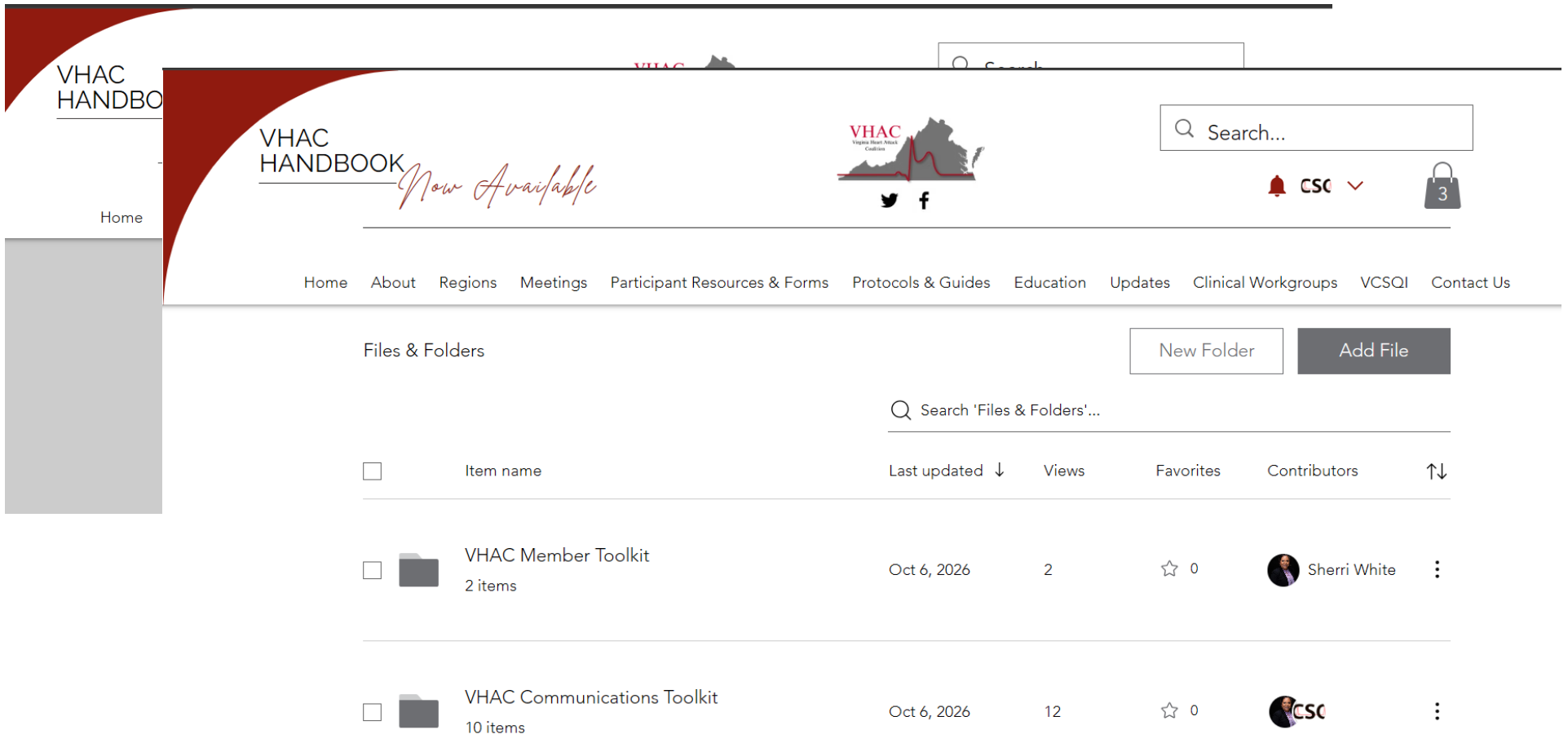
CLINICAL
WORKGROUP
RESOURCES

SCAN ME



CLOSING REMARKS

VHAC Library



VIRGINIA HEART ATTACK COALITION

INTRODUCING THE

VHAC CHAMPIONS CUP

A perpetual trophy honoring the VHAC region with the highest number of registered participants.

Participation is counted through the VHAC Participant Registration & Engagement Form.



CELEBRATING REGIONAL ENGAGEMENT

VAHEARTATTACKCOALITION.ORG

Thank you to our sponsors…

Viz AI

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Virginia Heart Attack Coalition

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Up Next…



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Virginia Heart Attack Coalition

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