



FOUNDATION FOR
Health Care Quality

**CARDIAC CARE OUTCOMES
ASSESSMENT PROGRAM (COAP)**

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Medical Director, COAP

Interventional Cardiologist, MultiCare Pulse Heart Institute

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Chair, COAP Management Committee

Interventional Cardiologist, VA Puget Sound and University of Washington

Disclosures:

RH, JD: No financial conflicts of interest

Objectives:

- Describe the Cardiac Care Outcomes Assessment Program (Cardiac COAP) and available data for PCI program assessment
- Review results of a study analyzing the impact of Washington's CON program
- Discuss clinical society guidance for PCI in hospitals without cardiac surgery backup
- Present data-driven recommendations for the CON program changes

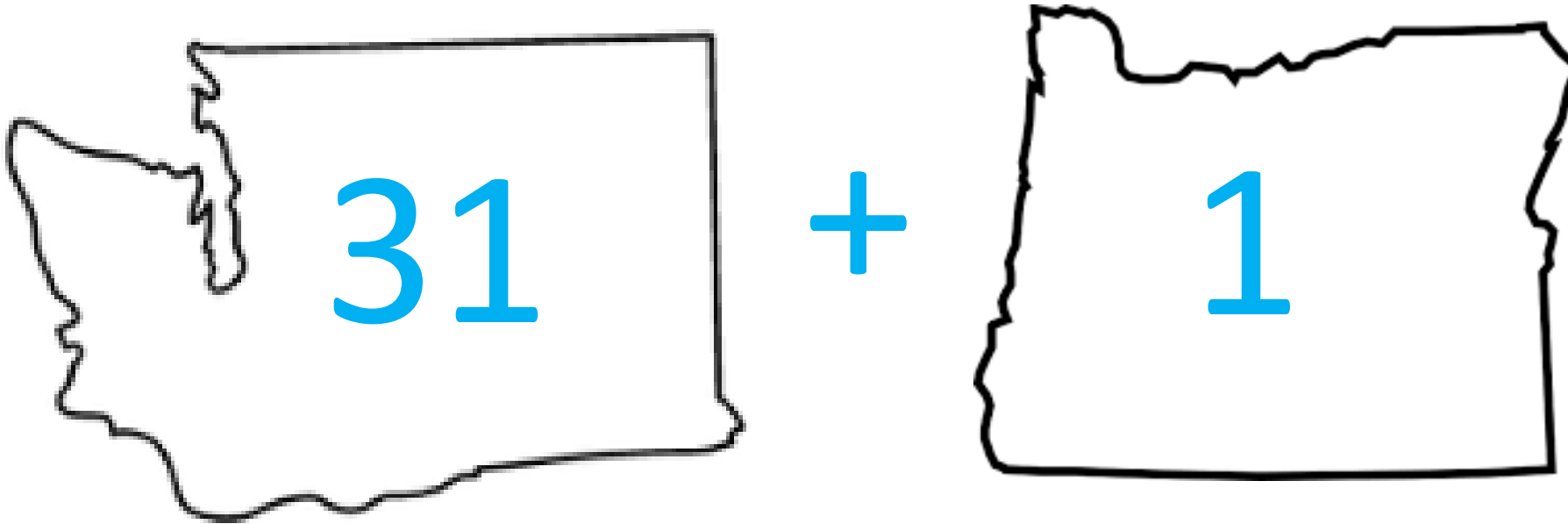
Bottom Line Up Front:

- The Washington State PCI community has two unique resources to support care quality:
 - The CON program
 - Cardiac COAP
- Hospitals with and without CON designation have different clinical outcomes
- Alternative strategies to coordinate statewide PCI services are possible.

Cardiac Care Outcomes Assessment Program (Cardiac COAP)

- Part of the Foundation for HealthCare Quality (FHCQ)
 - Surgical COAP
 - Spine SCOAP
 - Obstetrics COAP
- Data collection and reporting since 1998 (26 years)
- Data for all PCIs and cardiac surgeries at all non federal hospitals in WA and 1 in Oregon.
- Public reporting of site level 1 and 2 metrics on COAP website.
- Newly added transcatheter valve procedures (TAVR and MitraClip)
- Physician led management committee with representatives from all healthcare systems in WA

COAP Membership



32 Sites:

16 Sites = PCI Only

16 Sites = PCI + Cardiac Surgery

Changes in 2023: VMFH St. Anne and Sunnyside no longer performing PCI
NEW PCI Site: **Trios Health** in Kennewick

COAP Management Committee


Aaron Holm, *President, Mended Hearts of Puget Sound*
Ashok Venkataraman, MD, *PeaceHealth Sacred Heart, River Bend, OR*
Drew Baldwin, MD, *VMFH Virginia Mason Medical Center, Seattle WA*
Eric Lehr, MD, FRCSC, PhD, Vice Chair, *Swedish Medical Center Cherry Hill, Seattle WA*
Daniel Mumme, MD, *MultiCare General Hospital, Tacoma WA*
Geoffrey Harms, MD, *Central Washington Hospital, Wenatchee WA*
Gopi Dandamudi, MD, *Virginia Mason Franciscan Health, Tacoma WA*
Jacob Doll, MD, Chair, *VA Puget Sound Health Systems, Seattle WA*
John Peterson, MD, *Providence Sacred Heart, Spokane WA*
Kirill Gelfenbeyn, MD, *VMFH St. Michael, Silverdale WA*
Lara Oyetunji, MD, *University of Washington Medical Center Montlake, Seattle WA*
Richard Goss, MD, MPH, *Harborview Medical Center, Seattle WA*
Sarah Speck, MD, MPH, FACC, *Swedish Medical Center, Seattle WA*
Tariq Salam, MD, FACC, FHRS, *MultiCare Health System, Tacoma WA*
Theodore Koutlas, MD, *Providence Sacred Heart, Spokane WA*



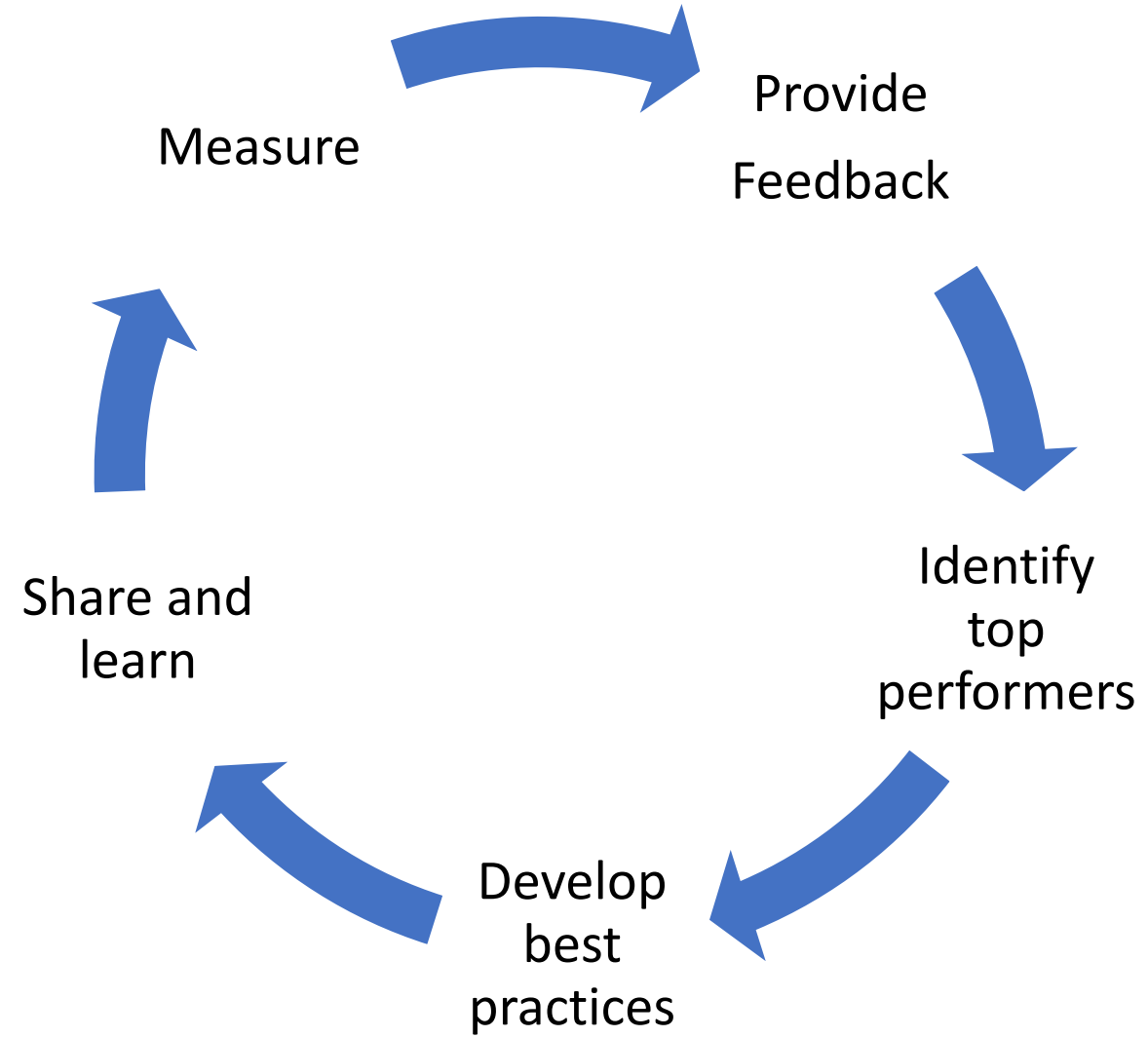
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COAP Advisors

Ashby Wolfe, MD, *Centers for Medicare and Medicaid*
Ginny Weir, MPH, CEO, *Foundation for Health Care Quality*
Jeanna Blitz, MD, *Noridian Healthcare Solutions*
Judy Zerzan, MD, *Washington State Health Care Authority*
Paula Hudson, RN, *American Heart Association, Seattle WA*
Richard Whitten, MD, MBA, *Noridian Healthcare Solutions*
Zeila Schmidt, *ARMUS by Health Catalyst*



COAP is a physician-led regional quality improvement collaborative that leverages medical expertise and clinical data to establish and drive best practices in cardiac care. Our purpose is to support all hospitals and clinicians in achieving the highest levels of patient care and outcomes.





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COAP PCI Subcommittee Members:

- Geoffrey Harms, MD, Chair, Central WA Hospital
- Drew Baldwin, MD, Virginia Mason
- Ravi Hira, MD, MultiCare Pulse Heart Institute, FHCQ
- Jacob Doll, MD, VA Puget Sound Health System, UWMC
- John Peterson, MD, Providence Sacred Heart

COAP Quality Indicators

Level I

- A persistent outlier may signal a serious program deficiency

Level II

- Focus on specific areas of patient management
- A pattern of persistent outliers in three or more of these may also suggest a serious program deficiency

Level III

- New or developing metrics
- Recently retired



COAP PCI Quality Indicators

Level I

- In-hospital Mortality, risk-adjusted (*New: excluding cardiogenic shock and cardiac arrest*)
- % Door to Balloon Time \leq 90 Minutes

Level II

- Bleeding Rate – Risk Adjusted
- Transfusion PCI
- Cardiogenic Shock
- Radial Artery Use for STEMI
- Emergency CABG
- Stroke
- Acute Kidney Injury – Risk Adjusted
- Median Cumulative Air Kerma

Level III

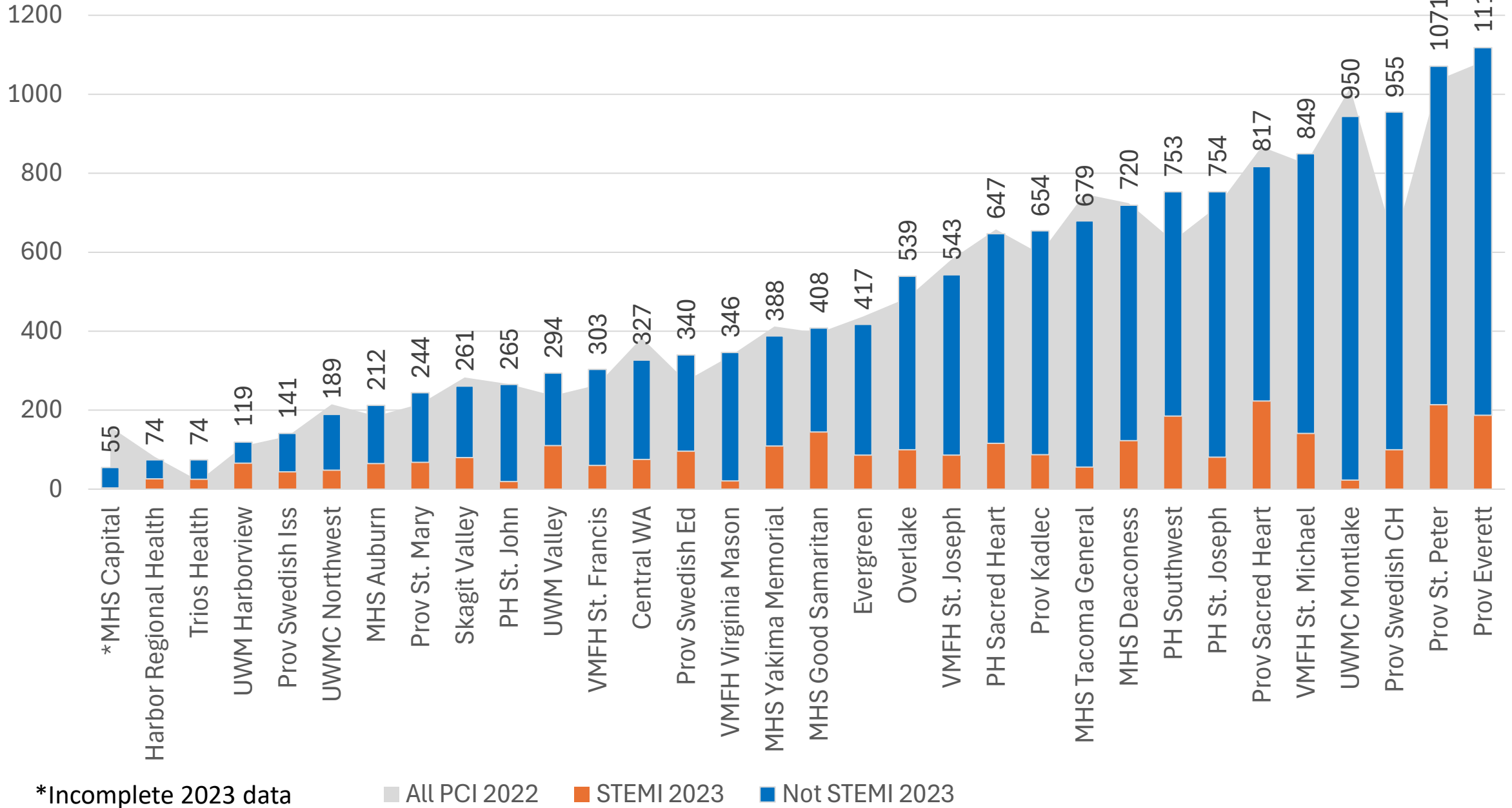
- Tamponade
- Median Contrast Volume
- **Intracoronary Imaging***
- **Cardiac Rehab Participation***
- **Failure to Rescue***
- **Appropriate Use***

*reporting in development



Hospital Performance is Compared To	In graphs, shown as...
Regional Average	Red Line
Regional Benchmarks (The weighted average of top performing hospitals that make up 10% or more of total volumes)	Gold box
Other hospitals across the region	Blue bars (2023 data)
Last year's performance (2022)	Gray mountain behind 2023 data
National averages, when available	

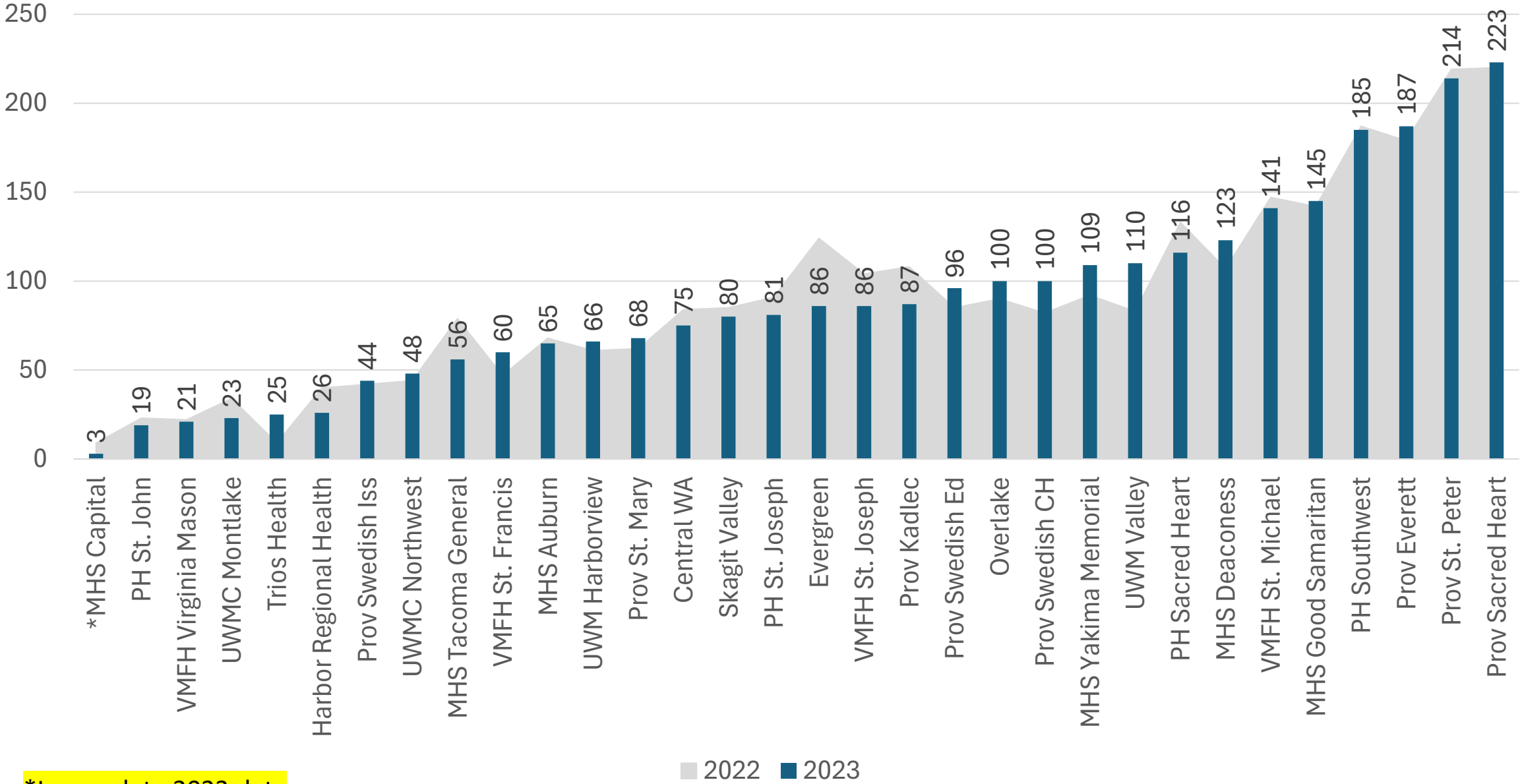
All PCI Volumes



*Incomplete 2023 data

■ All PCI 2022
 ■ STEMI 2023
 ■ Not STEMI 2023

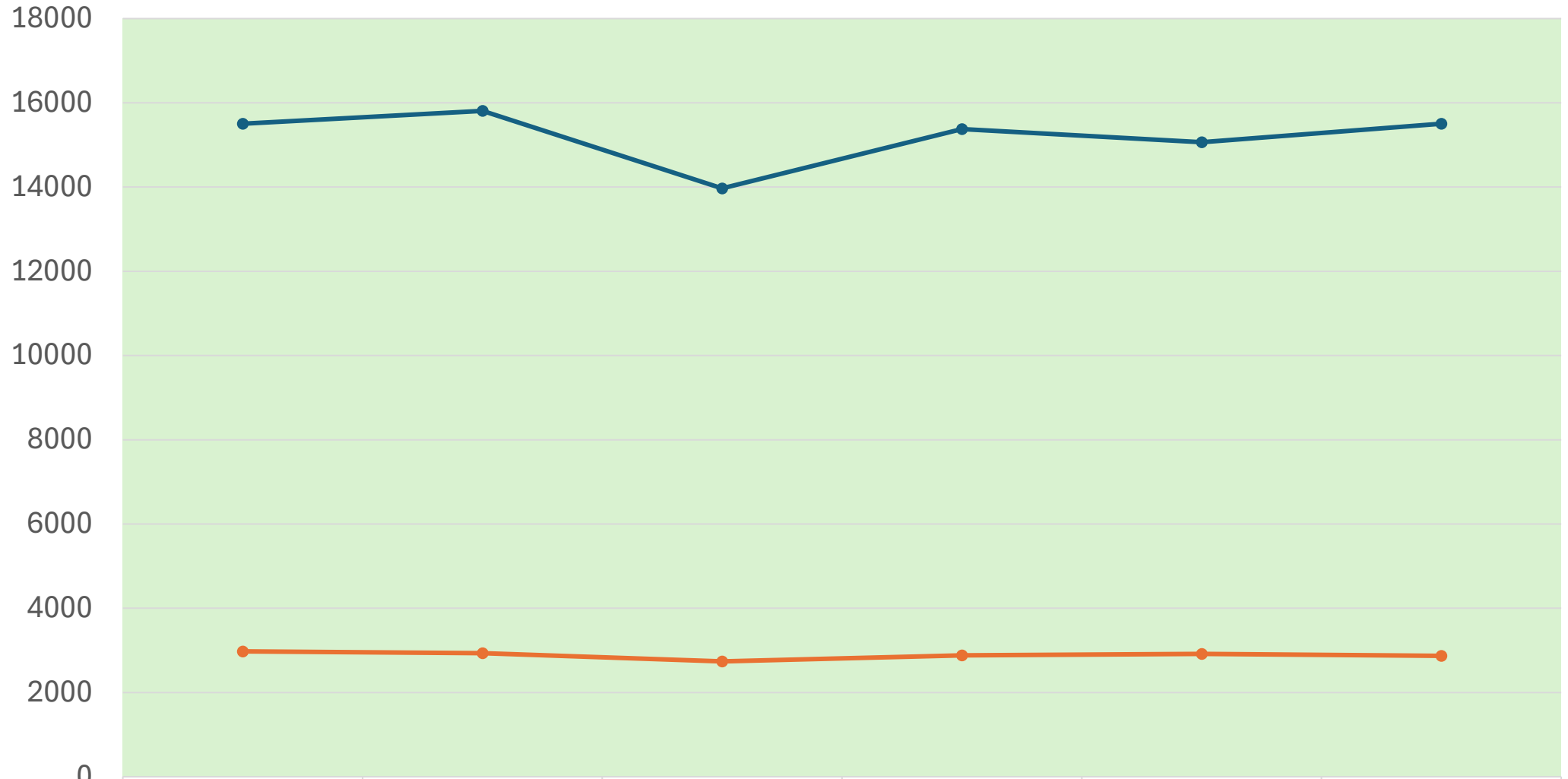
STEMI Volumes



*Incomplete 2023 data

2022 2023

Volume Trends 2018-2023



	2018	2019	2020	2021	2022	2023
All PCI Volumes	15506	15809	13969	15374	15066	15506
STEMI Volumes	2976	2933	2738	2883	2918	2868

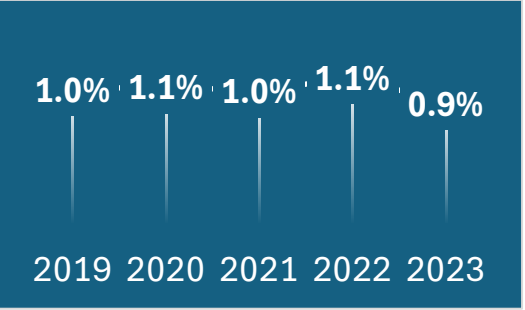
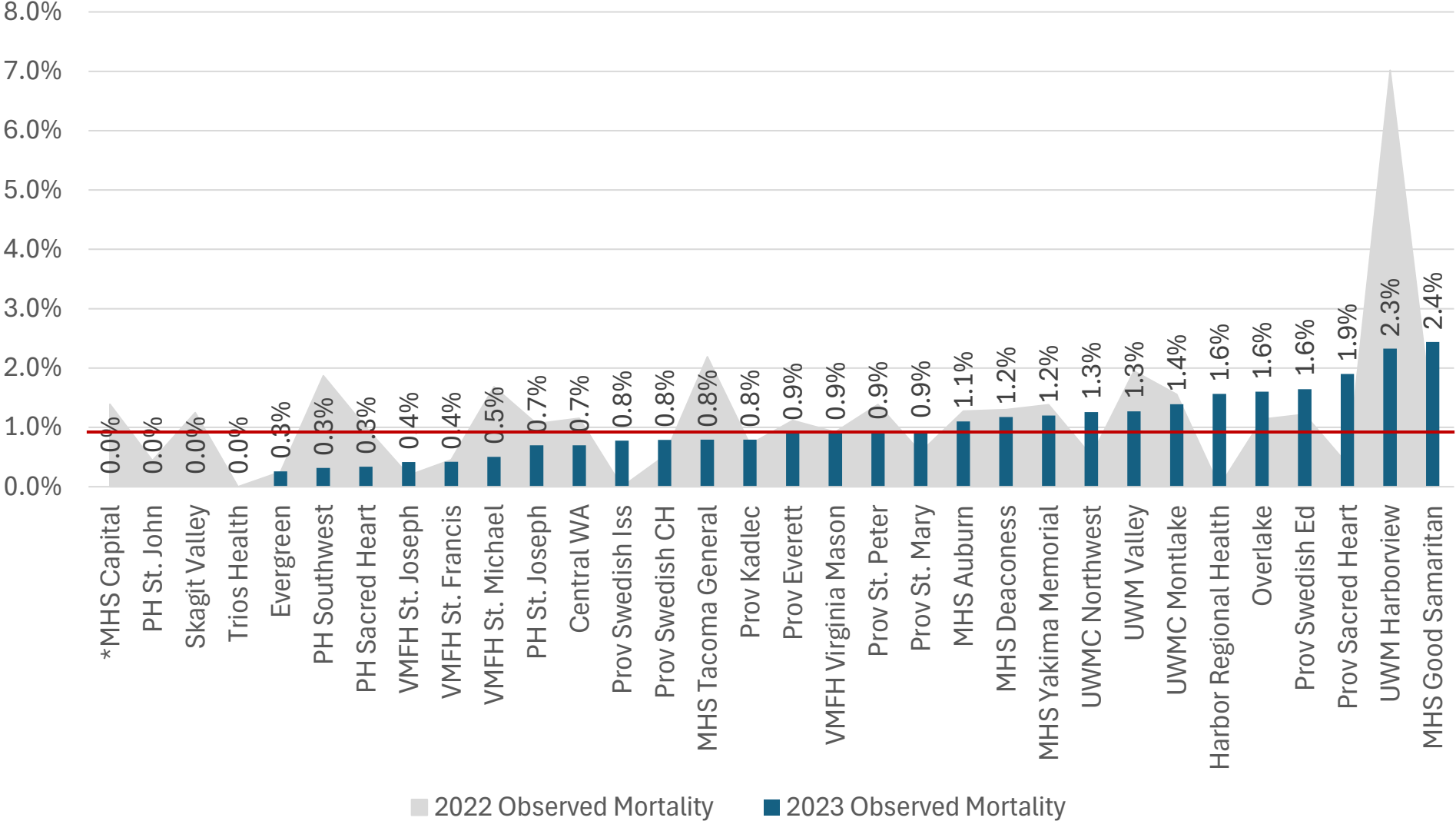
Quality Metrics:

COAP 2023 Regional Averages as compared to ACC National Averages All PCI

	COAP average	ACC national average
In-hospital mortality, observed (all PCI)	2.2%	2.1%
PCI within 90 mins for STEMI (non-transfer pts)	93.4%	92.8%
Stroke - Intra/Post procedure (all PCI)	0.4%	0.3%
Bleeding - risk adjusted (all PCI)	3.5%	2.1%
Transfusion post PCI (all PCI)	0.4%	0.6%
AKI – risk adjusted (all PCI)	6.6%	7.7%

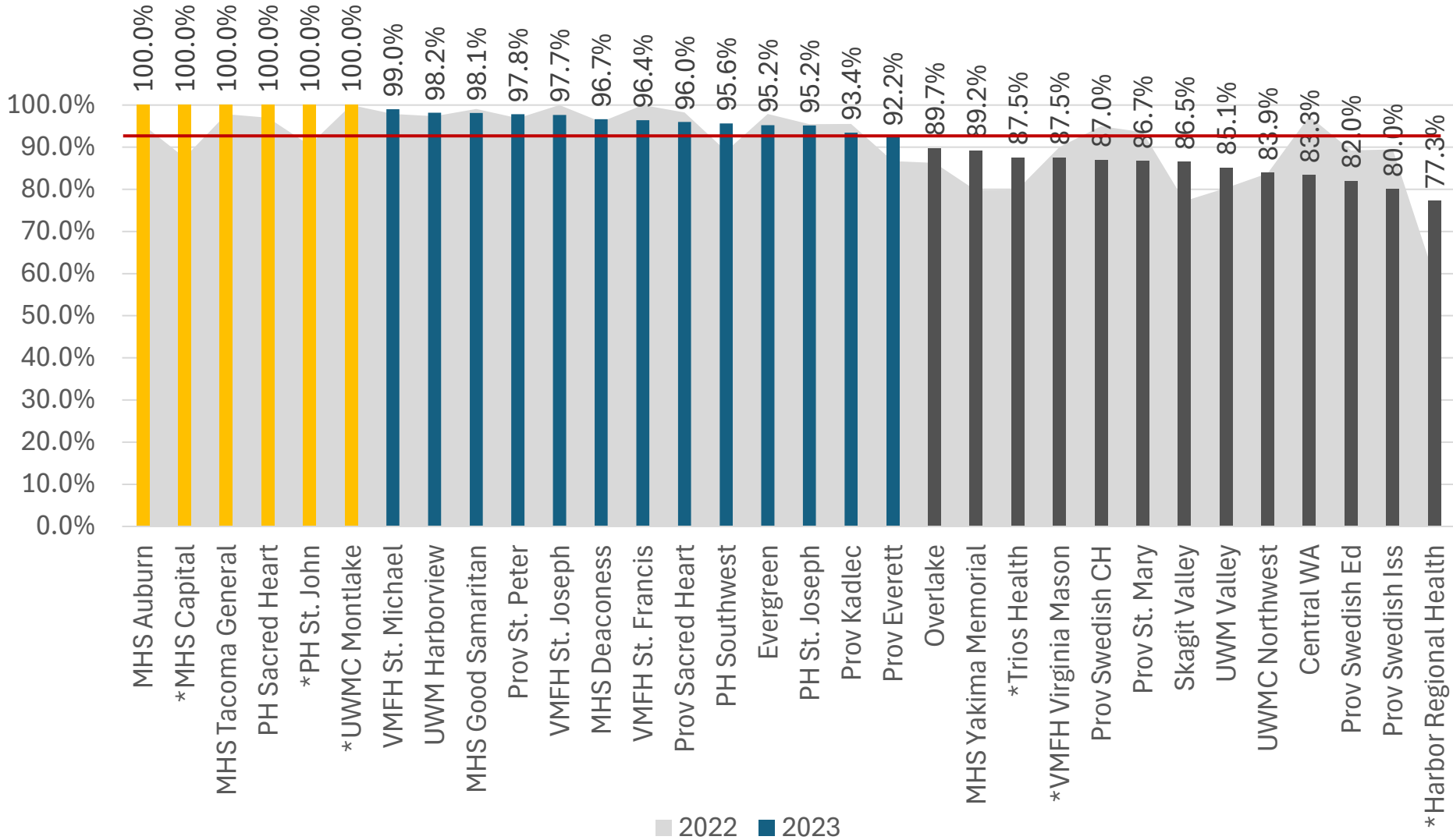
≥ 50%	25-50%	10-25%	1-10%	0-1%	1-10%	10-25%	25-50%	≥ 50%
Worse by				Within	Better by			

Observed Mortality All PCI, pts with Cardiogenic Shock and Cardiac Arrest excluded
(risk adjustment currently unavailable)



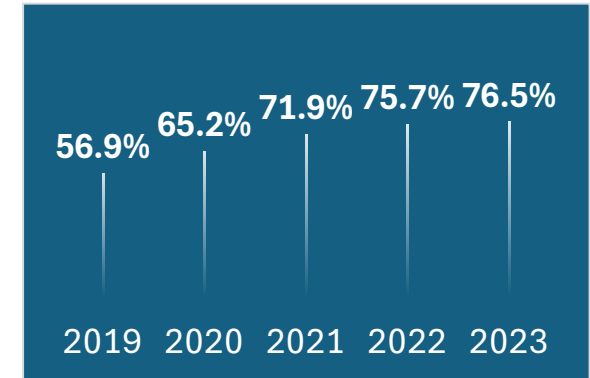
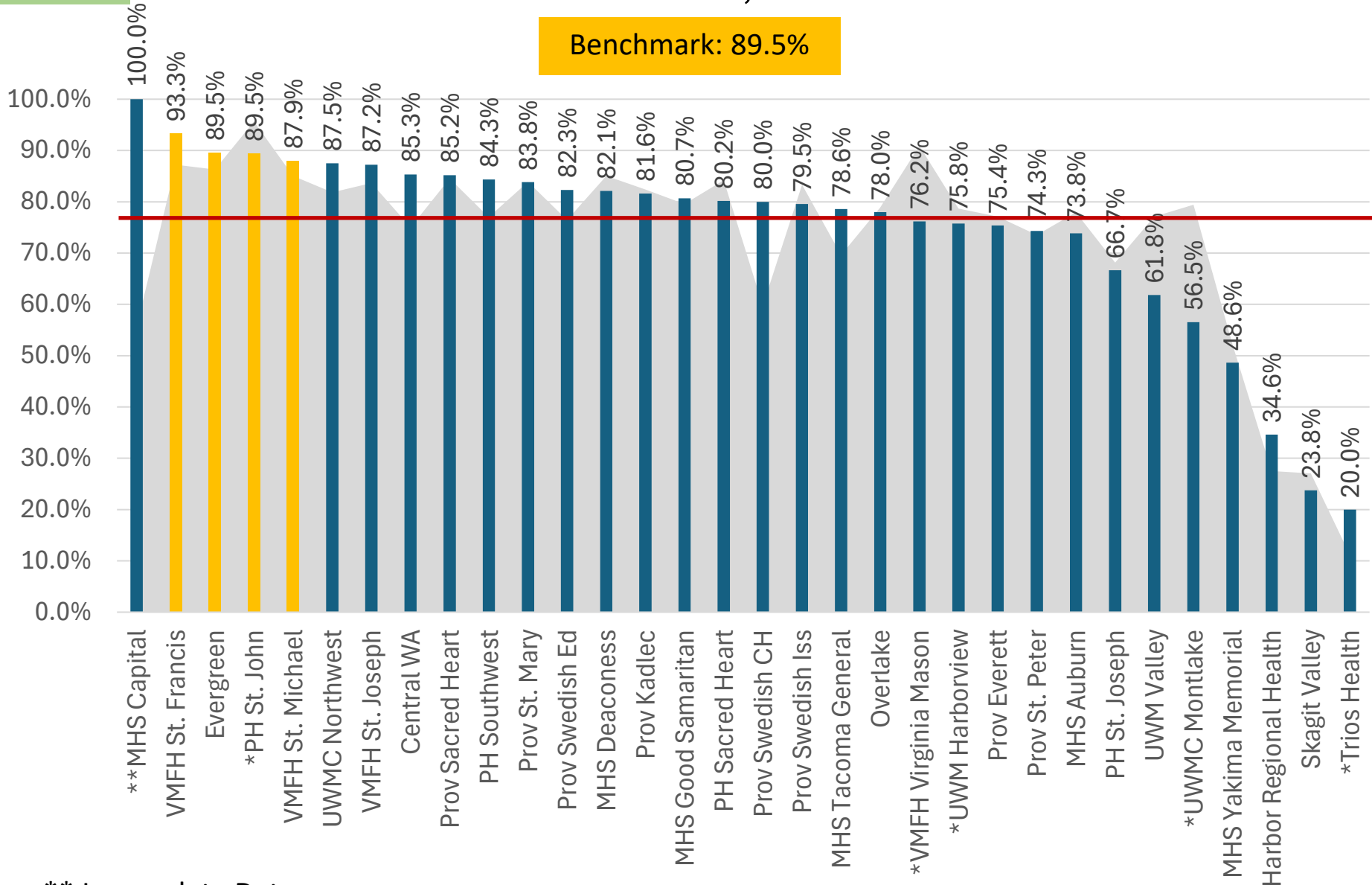
*Incomplete 2023 data

Benchmark: 100%



* STEMI Volumes < 30

Radial Access, STEMI

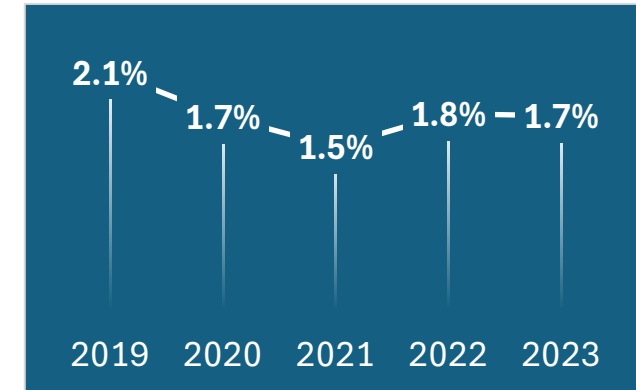
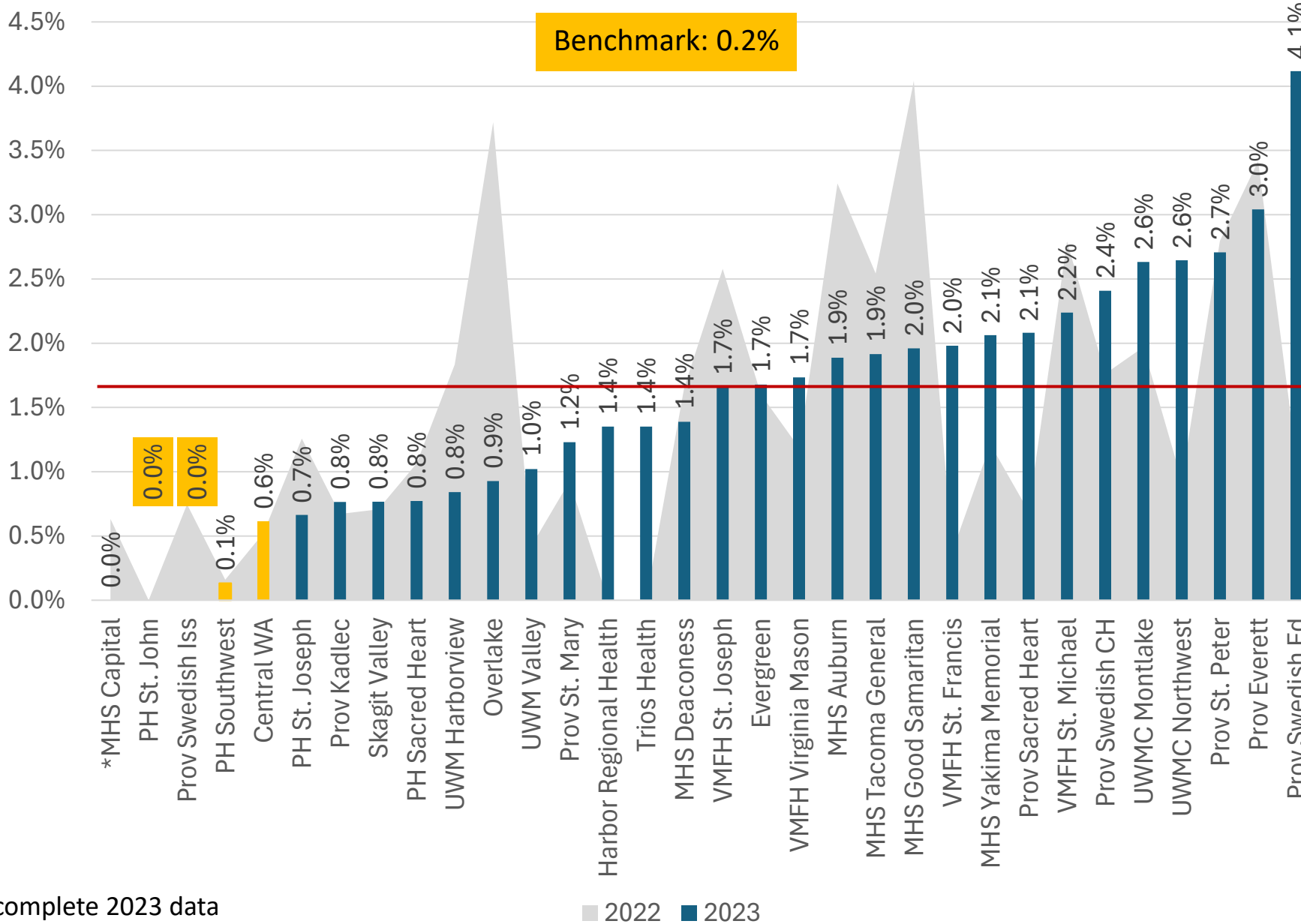


** Incomplete Data

* STEMI Volumes < 30

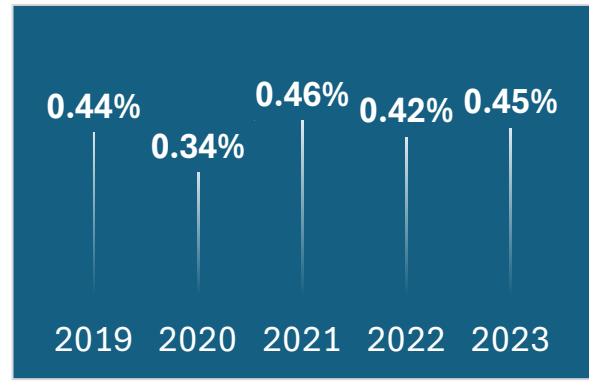
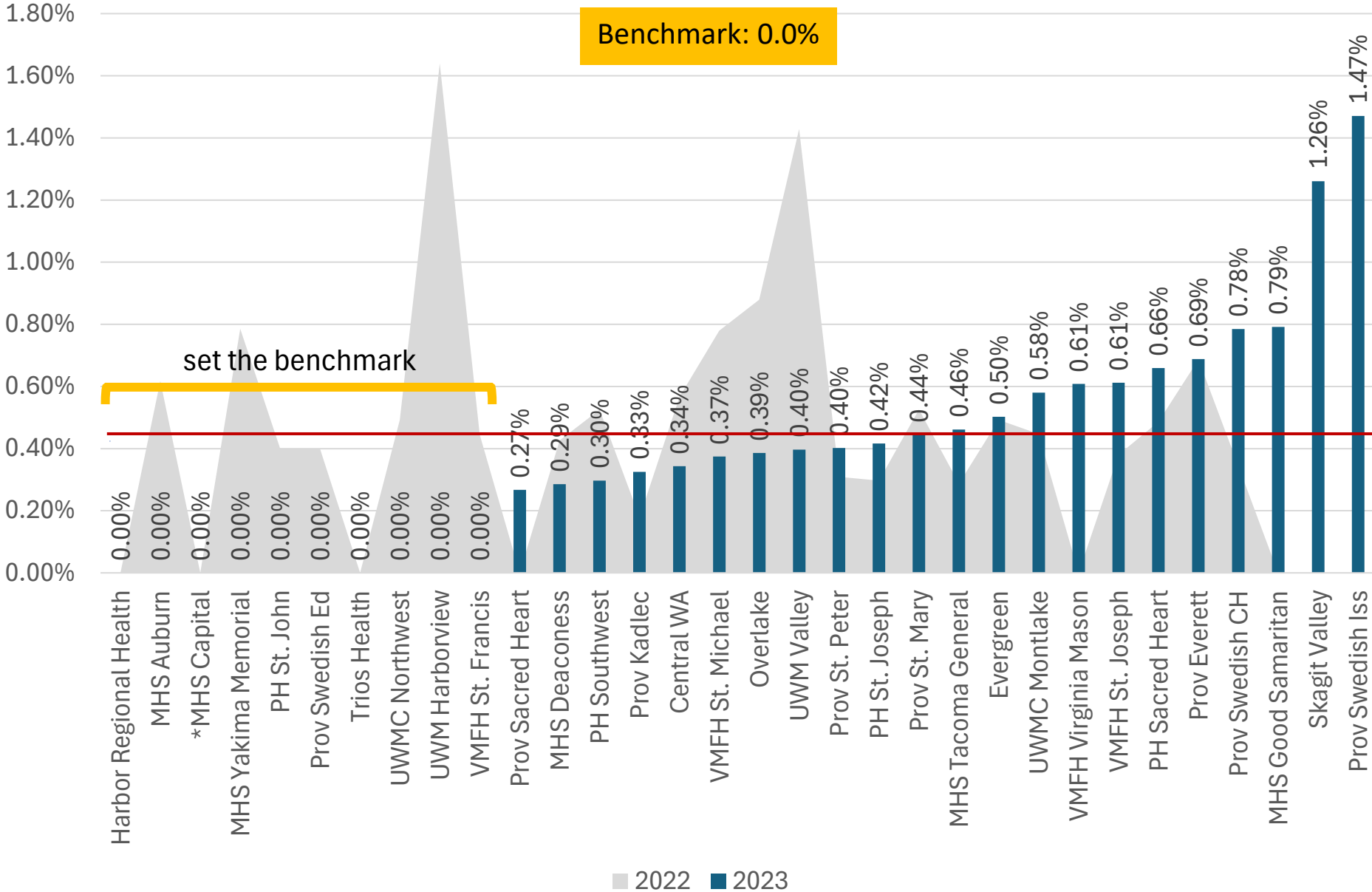
2022 2023

Cardiogenic Shock - Intra/Post-procedure , All PCI

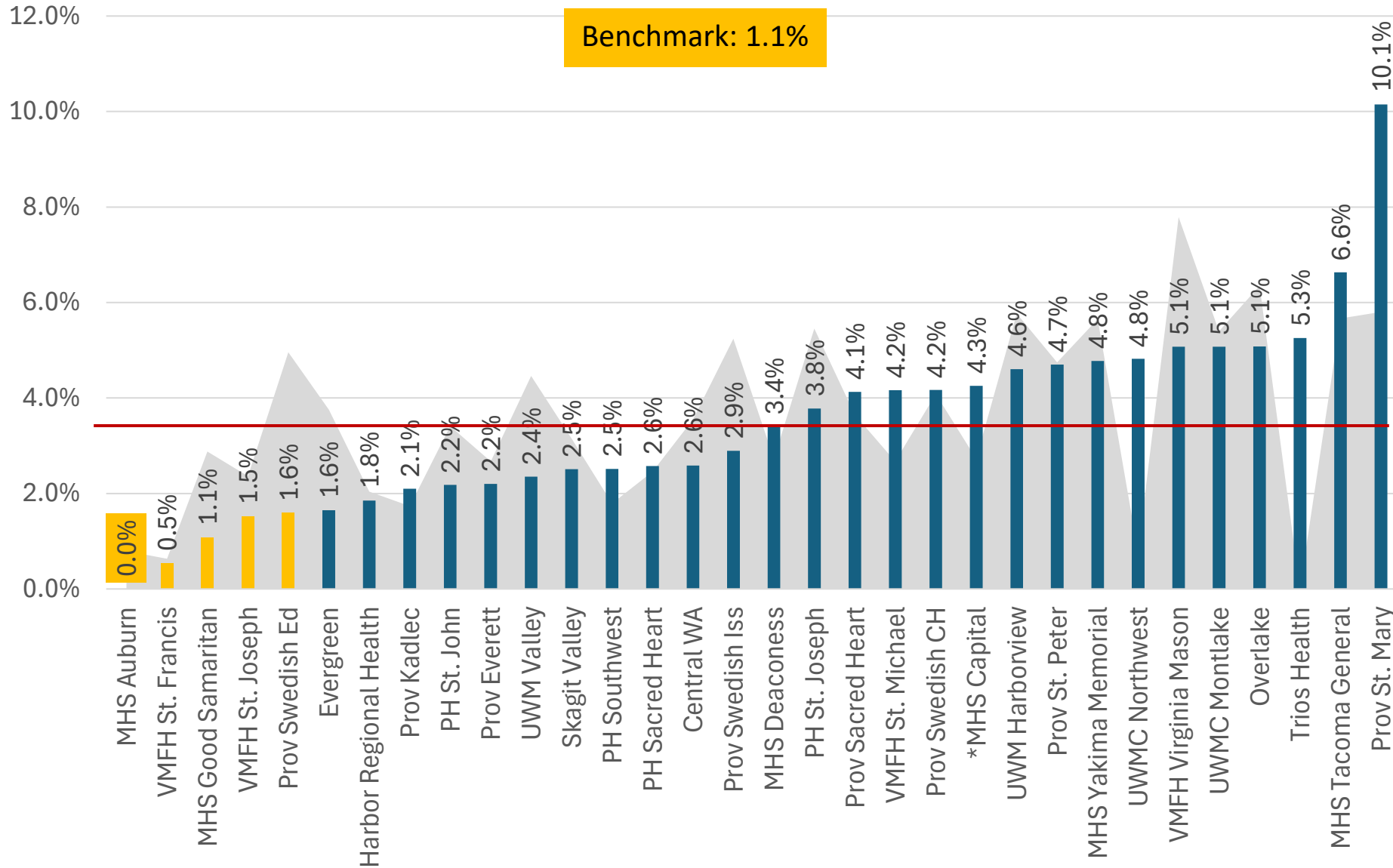


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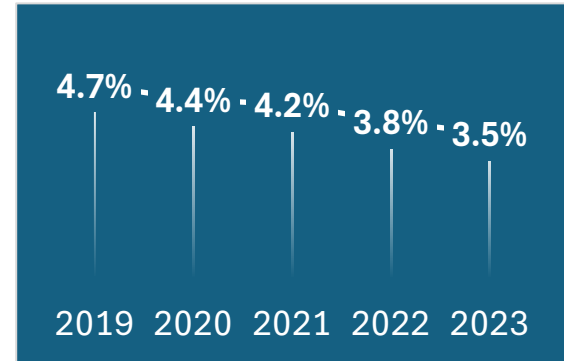
Stroke – Intra/Post-procedure , All PCI



Bleeding Rate Risk-Adjusted, All PCI



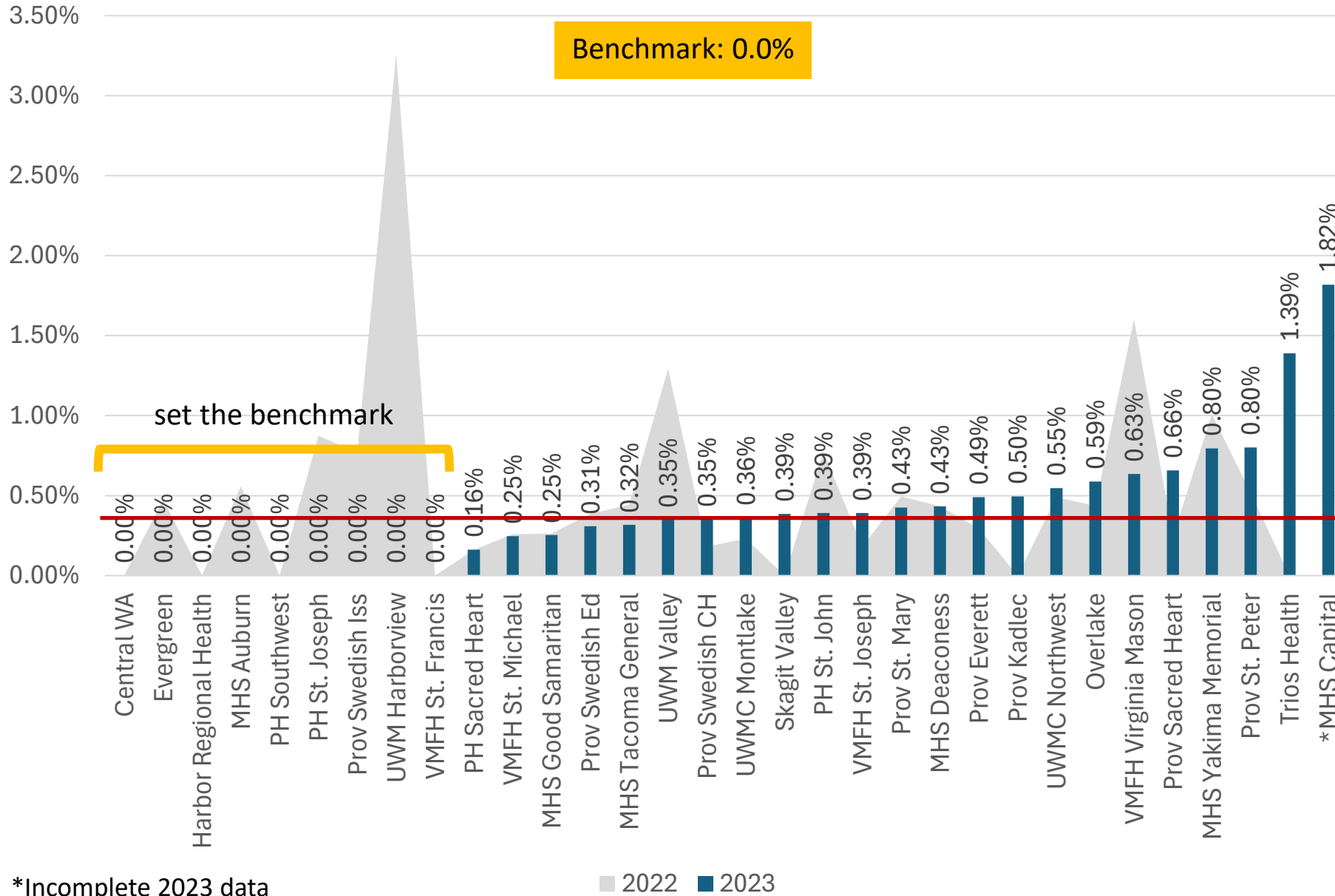
Benchmark: 1.1%



*Incomplete 2023 data

■ 2022 ■ 2023

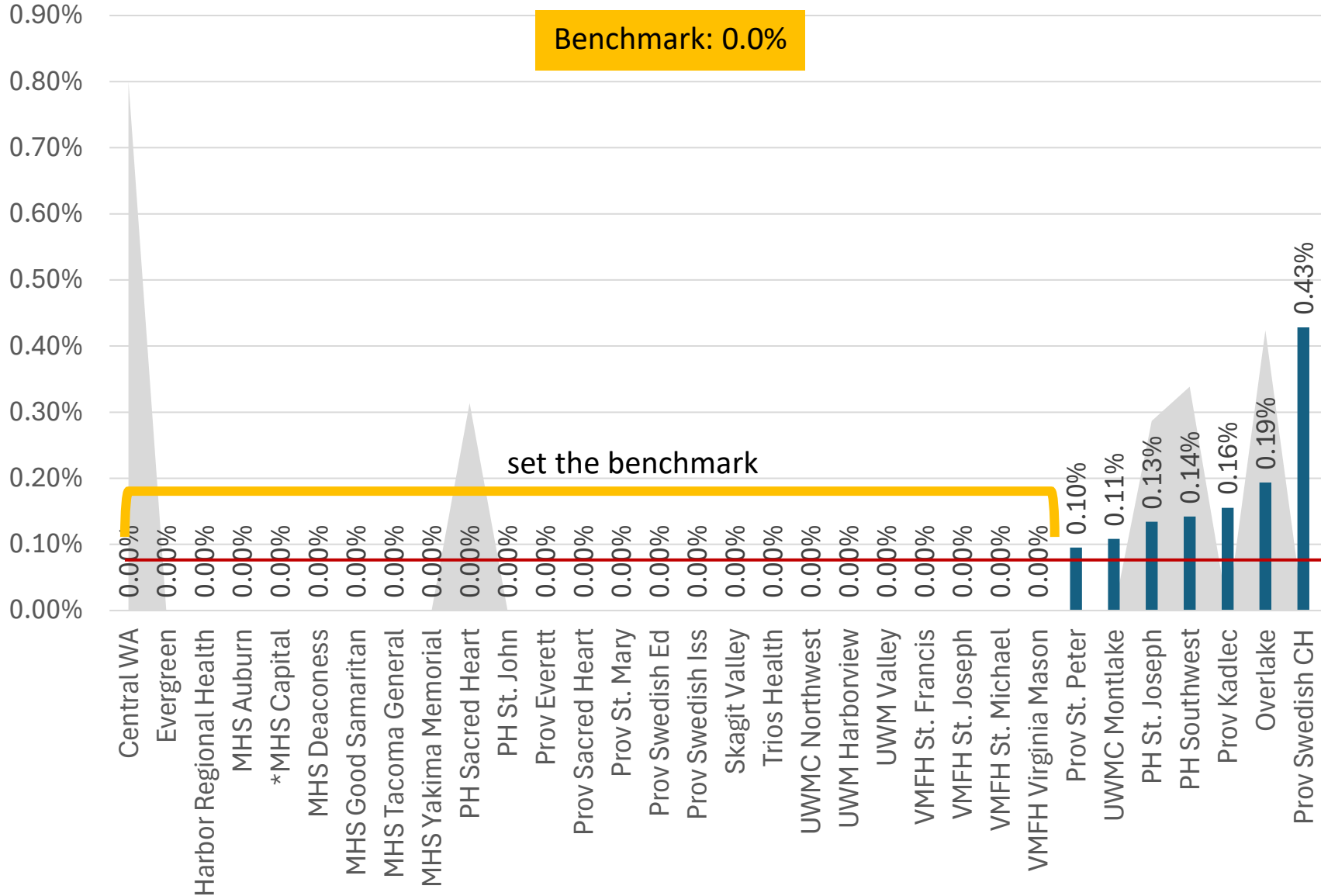
Transfusion Post PCI, All PCI



*Incomplete 2023 data

Emergency CABG Post PCI, All PCI

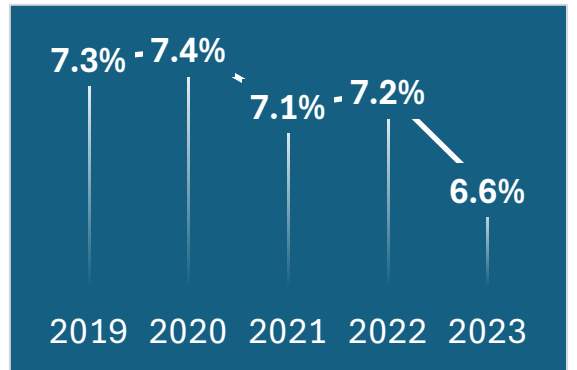
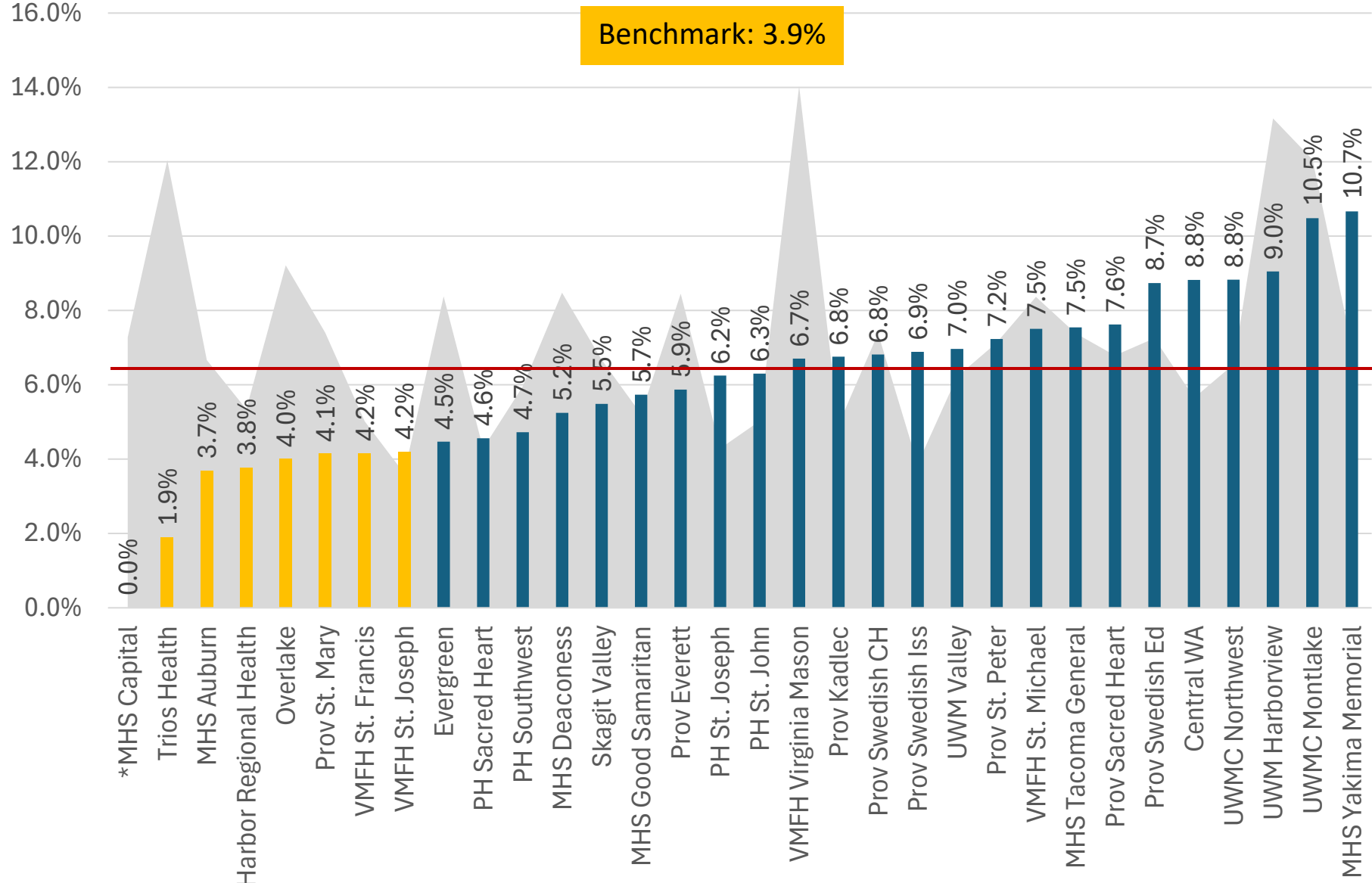
Benchmark: 0.0%



*Incomplete 2023 data

■ 2022 ■ 2023

Acute Kidney Injury Risk-Adjusted, All PCI

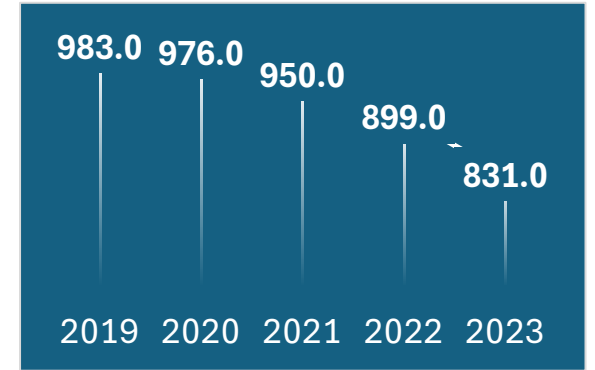
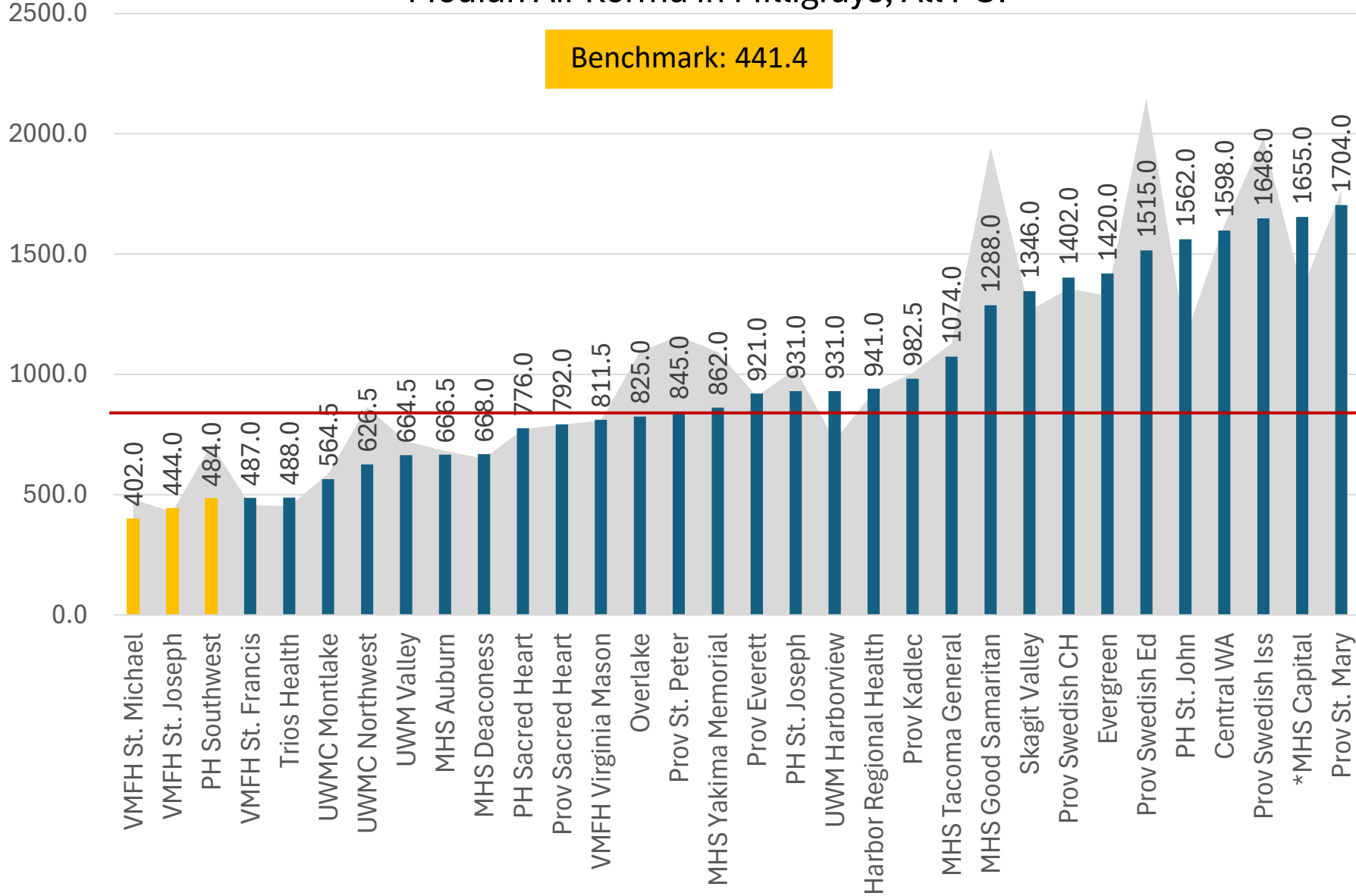


*Incomplete 2023 data

■ 2022 ■ 2023

Median Air Kerma in Milligrays, All PCI

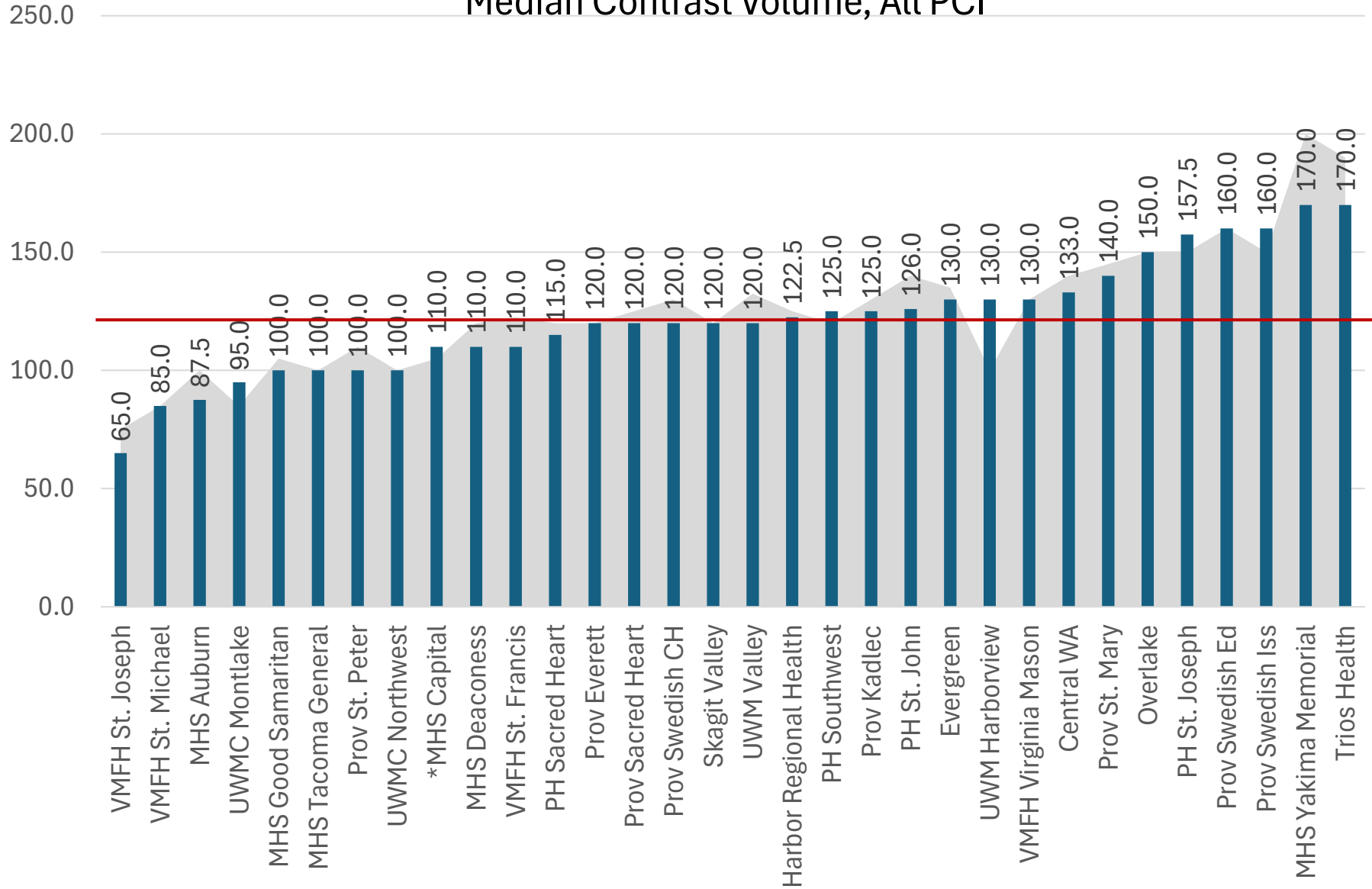
Benchmark: 441.4



*Incomplete 2023 data

■ 2022 ■ 2023

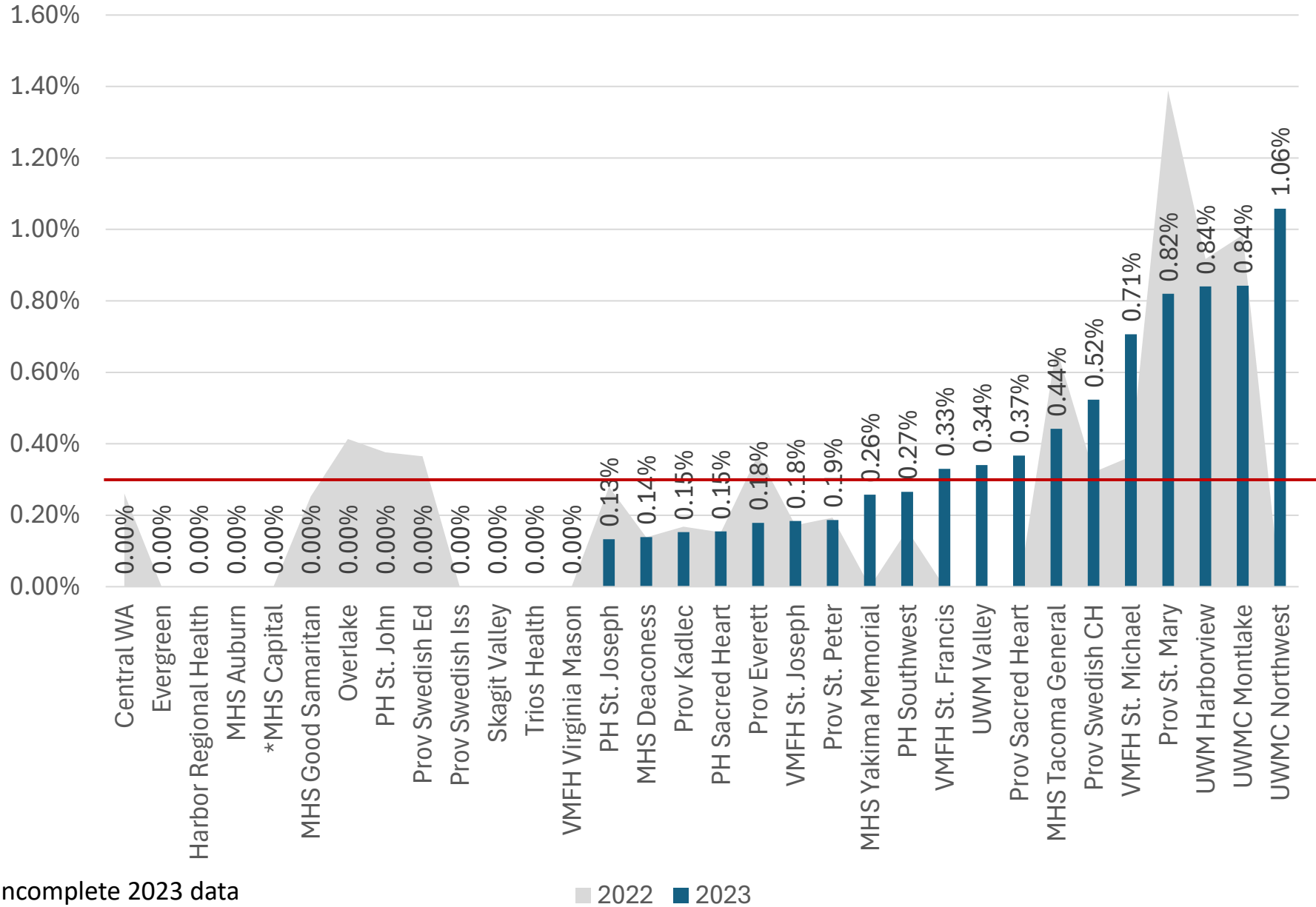
Median Contrast Volume, All PCI



*Incomplete 2023 data

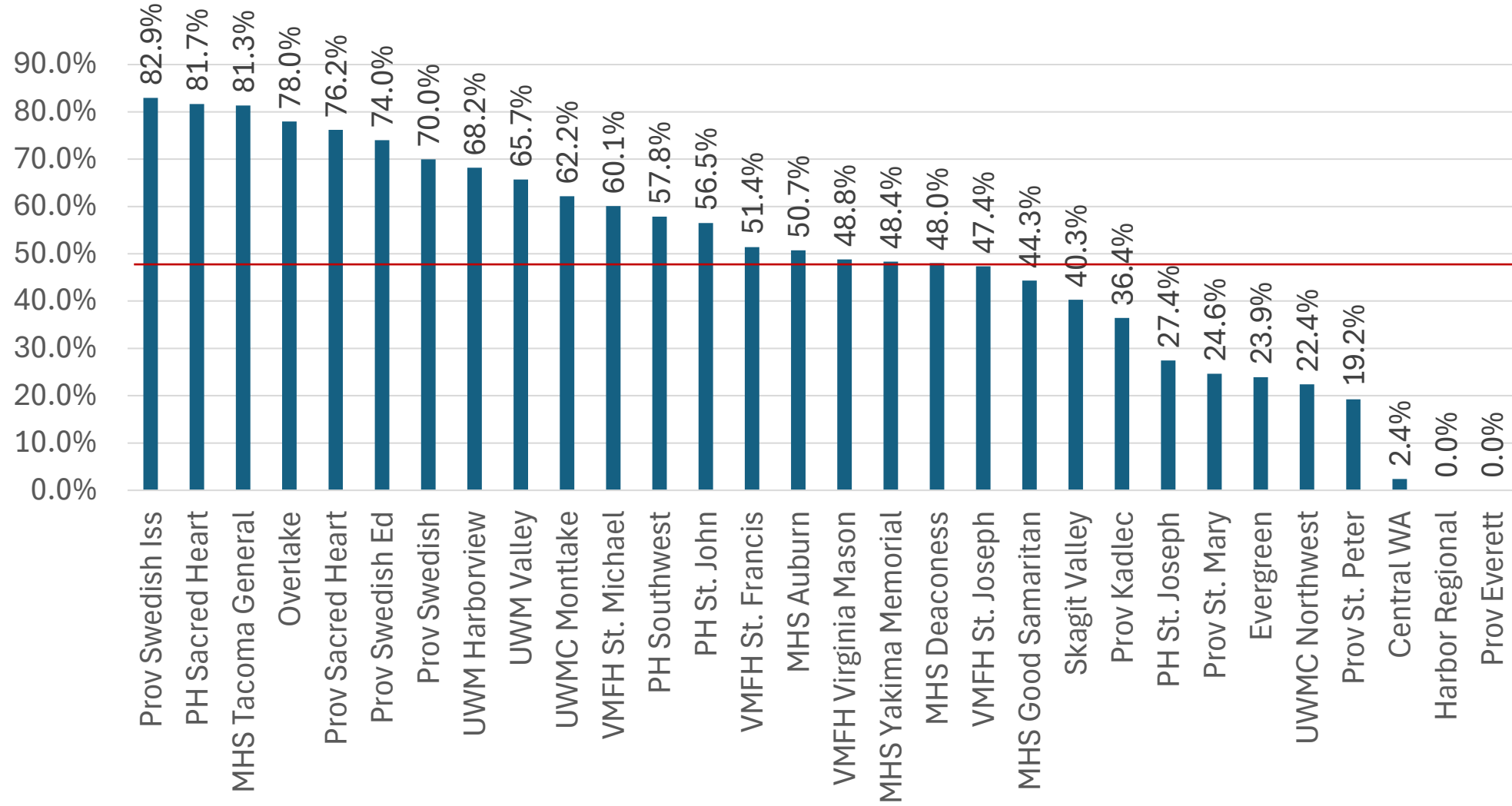
2022 2023

Tamponade, All PCI

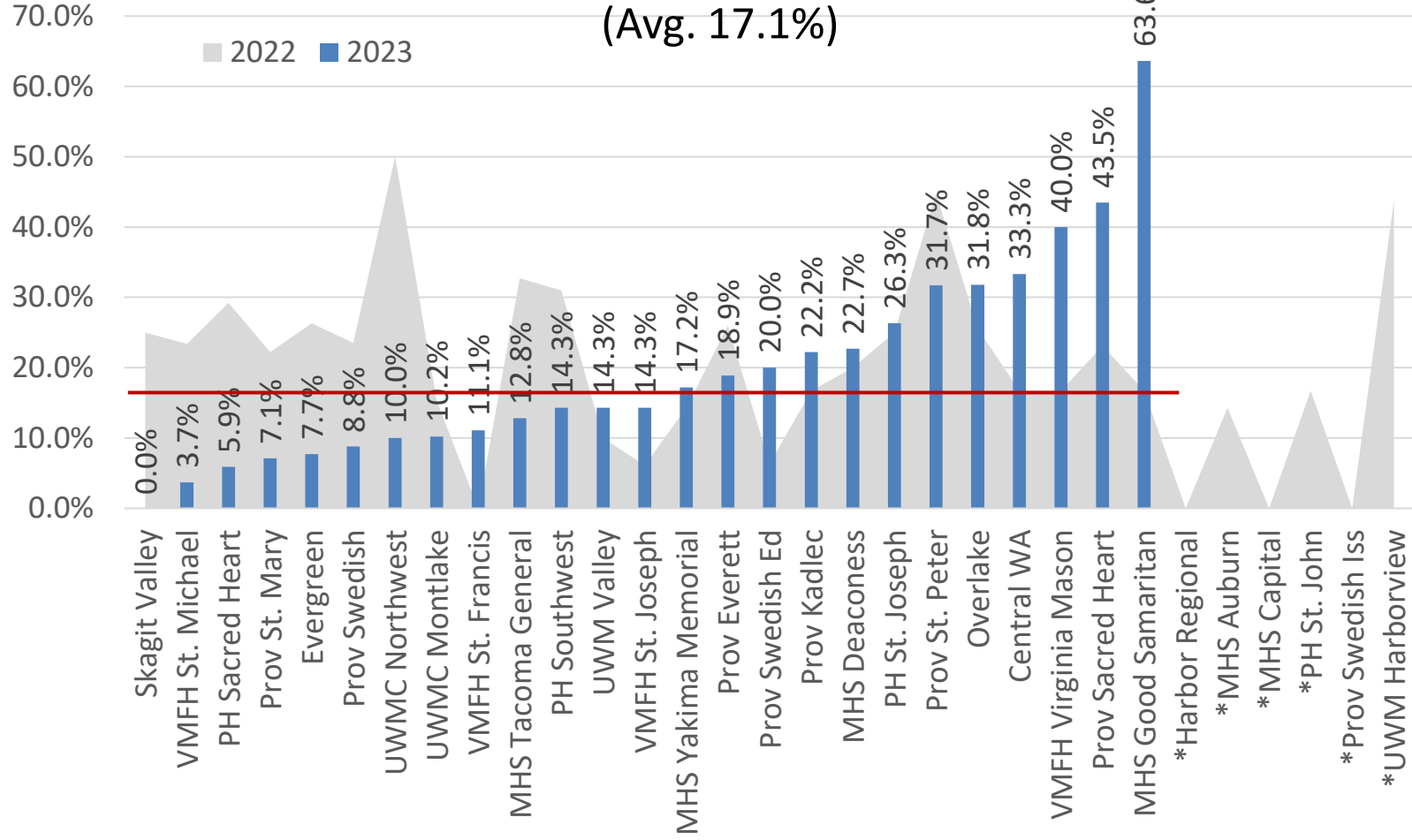


*Incomplete 2023 data

Intracoronary Imaging: IVUS/OCT used, All PCI, Q4 2023 only (Avg. 49.1%)



Level III Failure to Rescue following PCI Complication, Unadjusted Rate (Avg. 17.1%)



Complications Included in FTR following PCI:

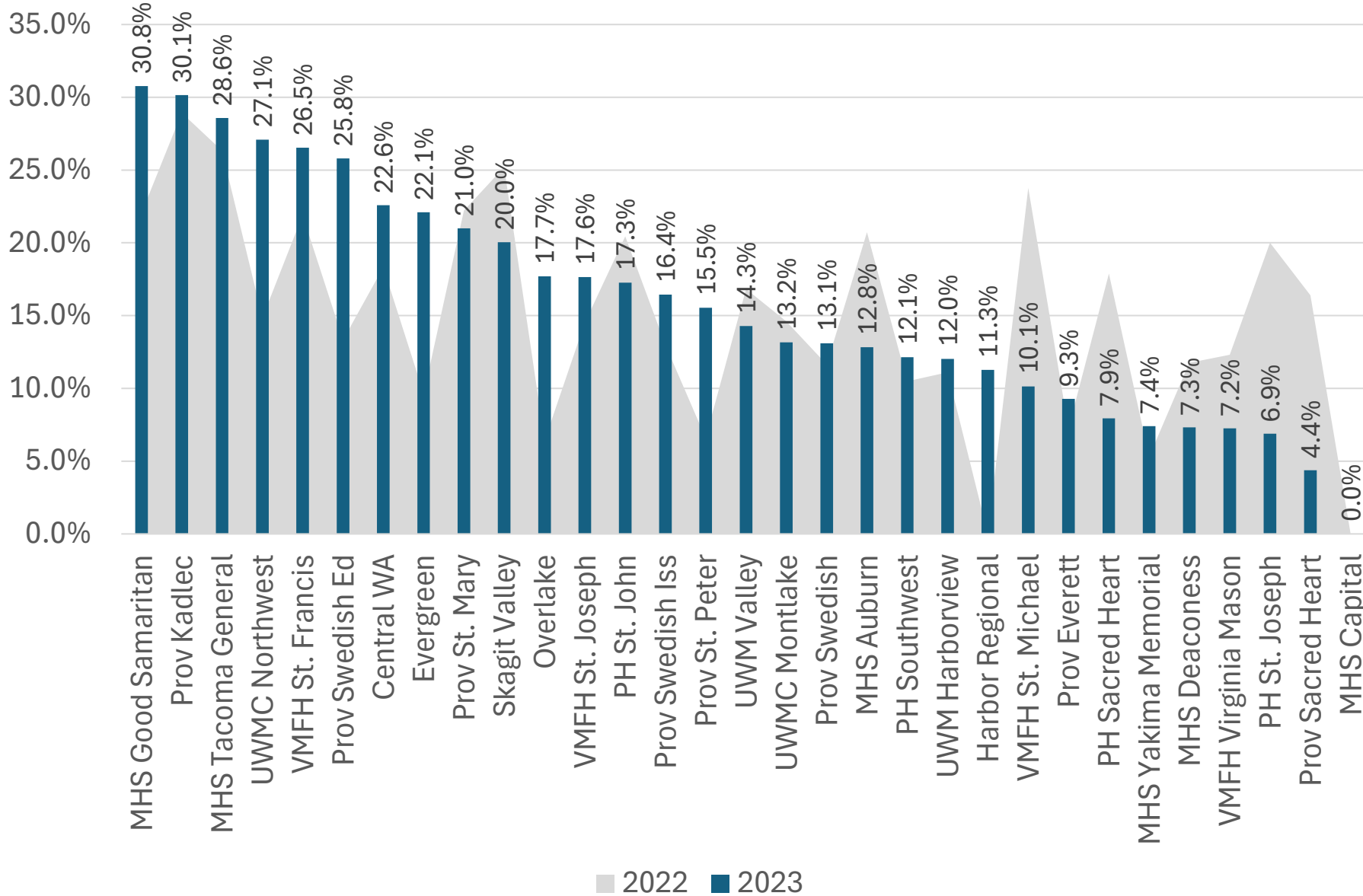
Emergency CABG; Perforation; Tamponade; Access site injury; Any bleeding event within 72 hours; Cardiogenic shock; Stroke; New requirement for dialysis; Significant dissection; Repeat target revascularization

	Complications
*MHS Auburn	
Central WA	9
Evergreen	13
MHS Good Samaritan	11
*Harbor Regional	
*UWM Harborview	
Prov Kadlec	18
*MHS Capital	
MHS Deaconess	22
UWMC Northwest	10
Overlake	22
*PH Southwest	7
PH St. Joseph	19
Prov Everett	37
Prov Sacred Heart	23
Prov St. Mary	14
Prov St. Peter	41
PH Sacred Heart	17
VMFH St. Francis	9
VMFH St. Joseph	14
Skagit Valley	7
*PH St. John	
VMFH St. Michael	54
Prov Swedish	57
*Prov Swedish Iss	
Prov Swedish Ed	20
MHS Tacoma General	39
UWMC Montlake	118
UWM Valley	14
VMFH Virginia Mason	10
MHS Yakima Memorial	29
Total Complications	634

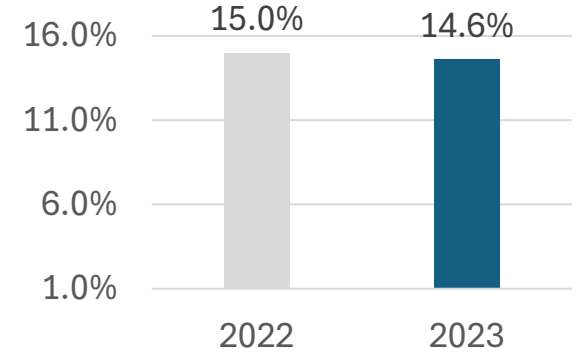
*FTR not calculated for sites with ≤ 5 complications.

Cardiac Rehabilitation Participation Rates

N=>1 visit; D=matched case count (pts. 65+)



Avg. Cardiac Participation Rate



Avg. COAP/Noridian Match Rate 83.9%

COAP Regional PCI Performance Summary 2023

	All PCI Volumes	STEMI Volumes	Bleeding Rate - Risk Adjusted	PCI within 90 minutes (Non- transfer)	Emergen cy/Salvag e CABG	Intra/post procedur e stroke	Transfusi on post- PCI	Acute Kidney Injury - Risk Adjusted	Radial for STEMI	Cardioge nic Shock Post PCI	Median Cumulative Air Kerma in Milligrays
Central WA	327	75	2.6%	83.3%	0.00%	0.34%	0.00%	8.8%	85.3%	0.6%	1598.0
Evergreen	417	86	1.6%	95.2%	0.00%	0.50%	0.00%	4.5%	89.5%	1.7%	1420.0
Harbor Regional Health	74	26	1.8%	77.3%	0.00%	0.00%	0.00%	3.8%	34.6%	1.4%	941.0
MHS Auburn	212	65	0.0%	100.0%	0.00%	0.00%	0.00%	3.7%	73.8%	1.9%	666.5
MHS Capital**	53	3	4.5%	100.0%	0.00%	0.00%	1.89%	0.0%	100.0%	0.0%	1749.0
MHS Deaconess	720	123	3.4%	96.7%	0.00%	0.29%	0.43%	5.2%	82.1%	1.4%	668.0
MHS Good Samaritan	408	145	1.1%	98.1%	0.00%	0.79%	0.25%	5.7%	80.7%	2.0%	1288.0
MHS Tacoma General	679	56	6.6%	100.0%	0.00%	0.46%	0.32%	7.5%	78.6%	1.9%	1074.0
MHS Yakima Memorial	388	109	4.8%	89.2%	0.00%	0.00%	0.80%	10.7%	48.6%	2.1%	862.0
Overlake	539	100	5.1%	89.7%	0.19%	0.39%	0.59%	4.0%	78.0%	0.9%	825.0
PH Sacred Heart	647	116	2.6%	100.0%	0.00%	0.66%	0.16%	4.6%	80.2%	0.8%	776.0
PH Southwest	753	185	2.5%	95.6%	0.14%	0.30%	0.00%	4.7%	84.3%	0.1%	484.0
PH St. John	265	19	2.2%	100.0%	0.00%	0.00%	0.39%	6.3%	89.5%	0.0%	1562.0
PH St. Joseph	754	81	3.8%	95.2%	0.13%	0.42%	0.00%	6.2%	66.7%	0.7%	931.0
Prov Everett	1118	187	2.2%	92.2%	0.00%	0.69%	0.49%	5.9%	75.4%	3.0%	921.0
Prov Kadlec	654	87	2.1%	93.4%	0.16%	0.33%	0.50%	6.8%	81.6%	0.8%	982.5
Prov Sacred Heart	817	223	4.1%	96.0%	0.00%	0.27%	0.66%	7.6%	85.2%	2.1%	792.0
Prov St. Mary	244	68	10.1%	86.7%	0.00%	0.44%	0.43%	4.1%	83.8%	1.2%	1704.0
Prov St. Peter	1071	214	4.7%	97.8%	0.10%	0.40%	0.80%	7.2%	74.3%	2.7%	845.0
Prov Swedish CH	955	100	4.2%	87.0%	0.43%	0.78%	0.35%	6.8%	80.0%	2.4%	1402.0
Prov Swedish Ed	340	96	1.6%	82.0%	0.00%	0.00%	0.31%	8.7%	82.3%	4.1%	1515.0
Prov Swedish Iss	141	44	2.9%	80.0%	0.00%	1.47%	0.00%	6.9%	79.5%	0.0%	1648.0
Skagit Valley	261	80	2.5%	86.5%	0.00%	1.26%	0.39%	5.5%	23.8%	0.8%	1346.0
UWMC Montlake	950	23	5.1%	100.0%	0.11%	0.58%	0.36%	10.5%	56.5%	2.6%	564.5
UWMC Northwest	189	48	4.8%	83.9%	0.00%	0.00%	0.55%	8.8%	87.5%	2.6%	626.5
UWM Harborview	119	66	4.6%	98.2%	0.00%	0.00%	0.00%	9.0%	75.8%	0.8%	931.0
UWM Valley	294	110	2.4%	85.1%	0.00%	0.40%	0.35%	7.0%	61.8%	1.0%	664.5
VMFH St. Francis	303	60	0.5%	96.4%	0.00%	0.00%	0.00%	4.2%	93.3%	2.0%	487.0
VMFH St. Joseph	543	86	1.5%	97.7%	0.00%	0.61%	0.39%	4.2%	87.2%	1.7%	444.0
VMFH St. Michael	849	141	4.2%	99.0%	0.00%	0.37%	0.25%	7.5%	87.9%	2.2%	402.0
VMFH Virginia Mason	346	21	5.1%	87.5%	0.00%	0.61%	0.63%	6.7%	76.2%	1.7%	811.5
All COAP	15430	2843	3.5%	93.4%	0.07%	0.45%	0.37%	6.6%	77.0%	1.7%	833.0
2 STD worse than COAP avg.			7.5%	79.6%	0.25%	1.17%	1.12%	11.1%	44.3%	3.7%	1653.0

**Incomplete data

COAP PCI Bleeding Reduction Initiative

- Initiative launched October 2021
- Baseline data: 2020
- Two full years of data since launch: 2022-2023

REVIEW: Why the Initiative?

- Bleeding is associated with 3-fold increase in mortality after PCI
- Post-PCI bleeding is associated with higher costs of care (~\$8,000 for major bleeding)
- There are evidence-based strategies to reduce bleeding risk
- COAP bleeding and transfusion rates are higher than national averages.

Goals of COAP PCI Bleeding Reduction Initiative:

Promote bleeding reduction best practices:

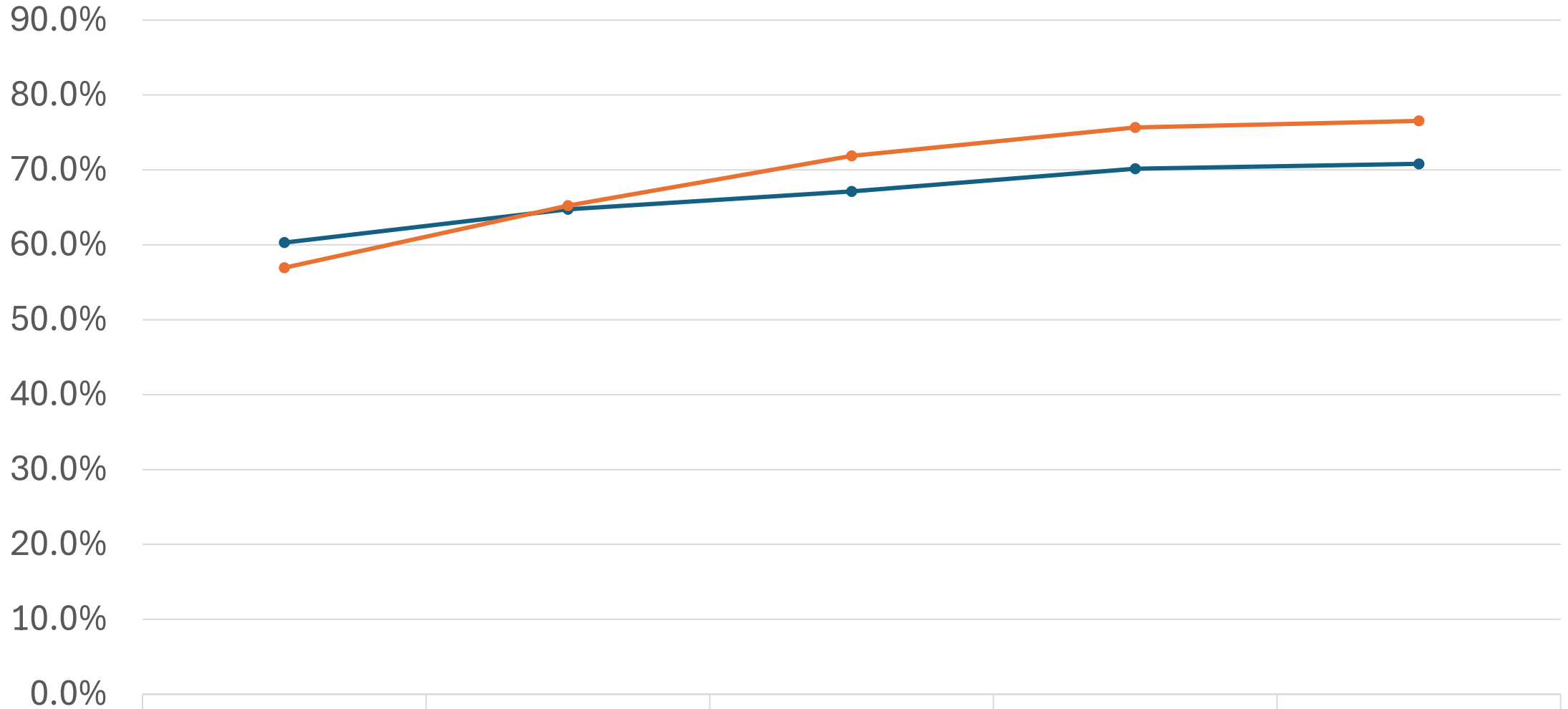
- 1) Increase rates of radial access for STEMI by 10% within 1 year
- 2) Decrease routine use of GP IIb/IIIa inhibitors by 5% within 1 year

Reduce overall bleeding and transfusion rates

- 3) Decrease rates of risk adjusted post-PCI bleeding by 10% within 1 year and 25% within 3 years
- 4) Decrease post-PCI transfusion (within 72 hours) by 5% within 1 year

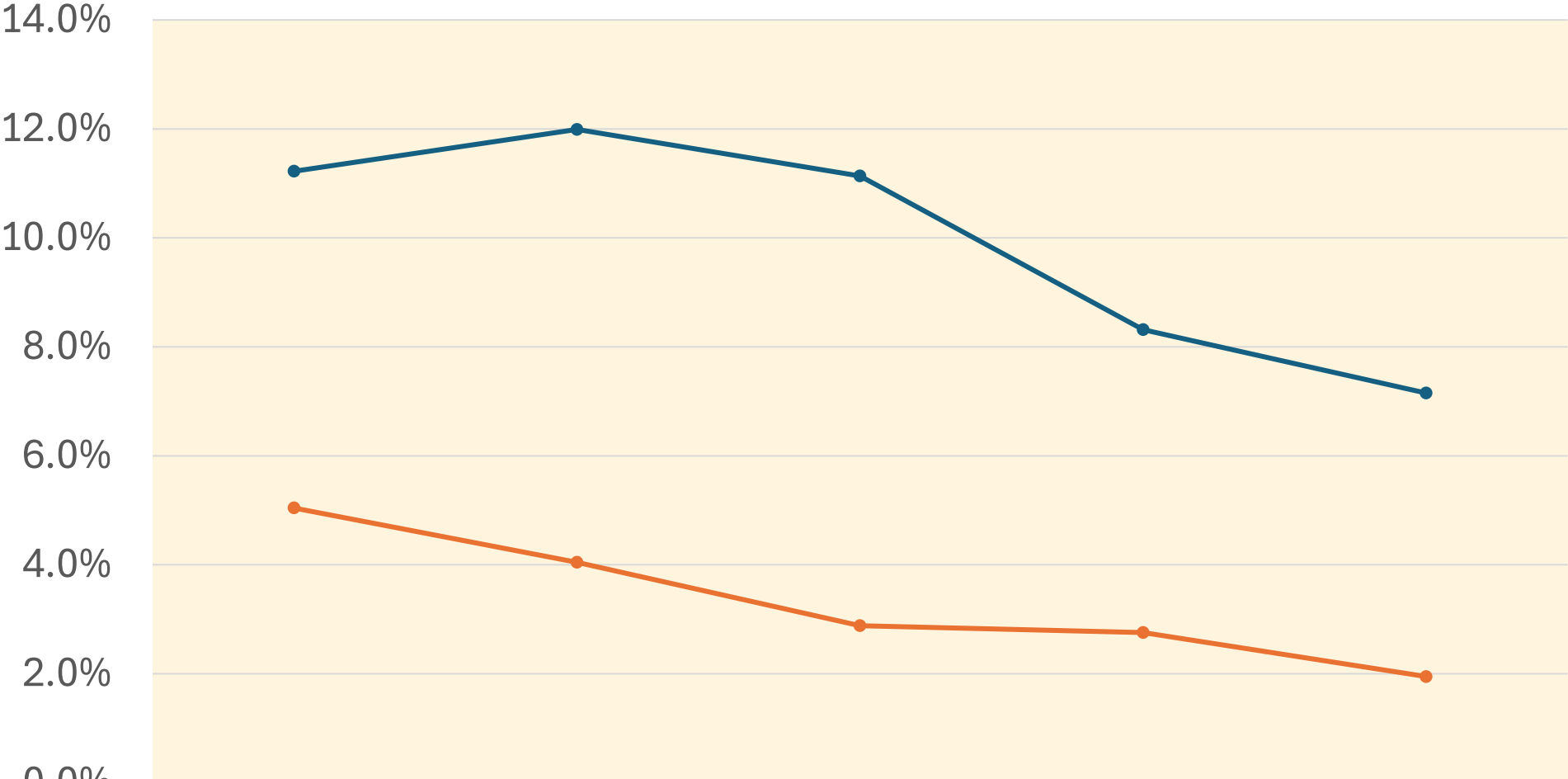
Develop collaborative relationships between COAP hospitals and health systems

Increase rates of radial access for STEMI by 10% within 1 year, GOAL #1



	2019	2020	2021	2022	2023
All PCI	60.3%	64.7%	67.1%	70.2%	70.8%
STEMI	56.9%	65.2%	71.9%	75.7%	76.5%

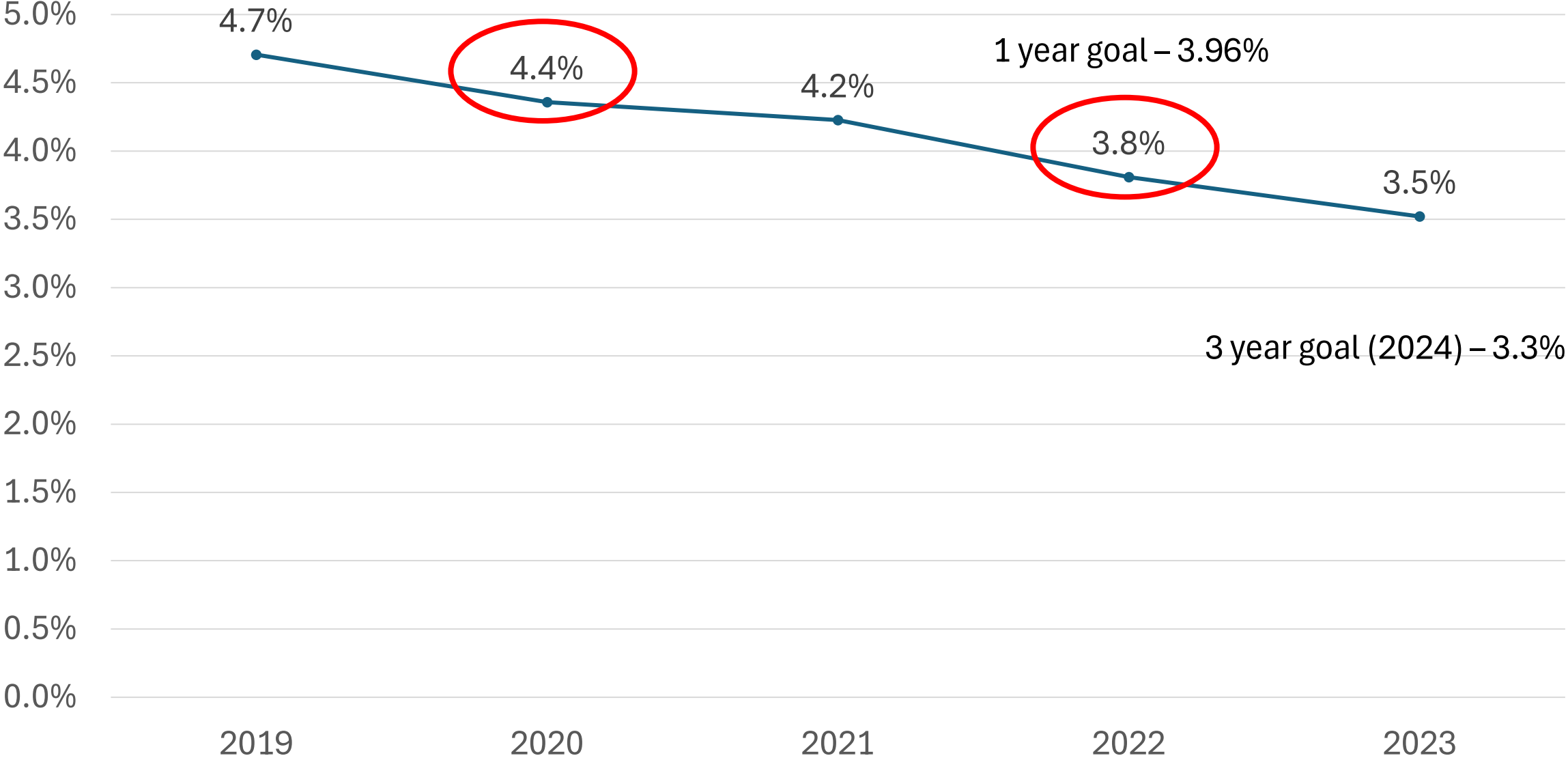
Decrease routine use of GP IIb/IIIa inhibitors by 5% within 1 year , GOAL #2



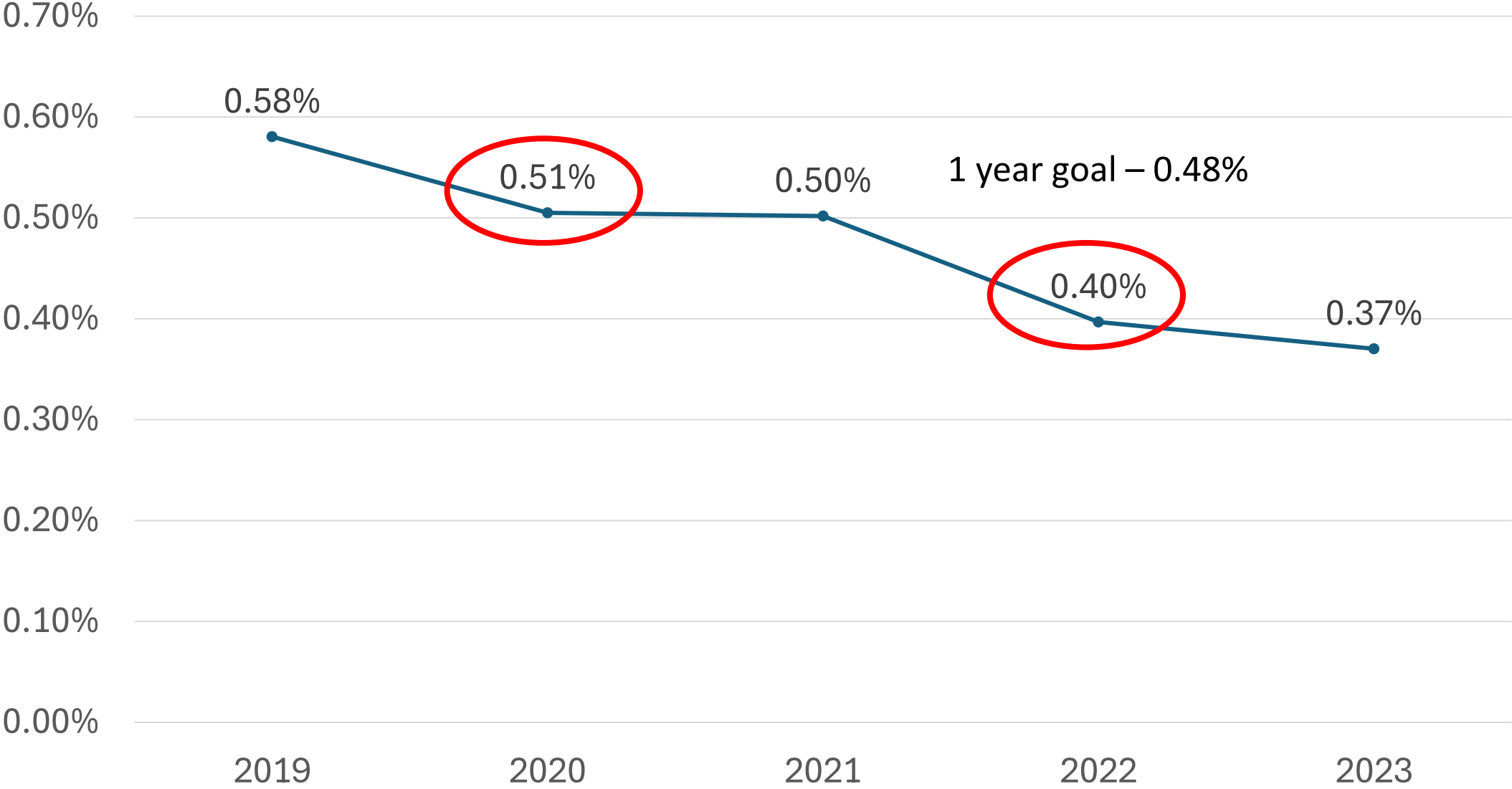
● GP IIb/IIIa
● Direct Thrombin Inhibitors

	2019	2020	2021	2022	2023
GP IIb/IIIa	11.2%	12.0%	11.1%	8.3%	7.2%
Direct Thrombin Inhibitors	5.0%	4.0%	2.9%	2.8%	1.9%

Decrease rates of risk adjusted PCI bleeding by 10% within 1 year and 25% within 3 years , GOAL #3



Decrease post-PCI transfusion (within 72 hours) by 5% within 1 year, GOAL #4



COAP Best Practice Recommendations

- 1) Perform a formal bleeding risk assessment for all patients, including the use of a risk calculator when feasible
- 2) Use transradial access when possible, especially for high bleeding risk patients such as patients with STEMI
- 3) Avoid routine use of GP IIb/IIIa inhibitors
- 4) Avoid blood transfusions for stable patients with Hb > 8 g/dl
- 5) Consider shorter duration of DAPT therapy for high bleeding risk patients receiving current-generation drug-eluting stents for stable ischemic disease



COAP PCI Bleeding Reduction Initiative Interventions:

- Physician-to-Physician Bleeding Reports (Now every 6 months)
 - Emailed to individual operators with > 10 PCIs in Fall 2021, 2022, 2023 & Spring 2024
 - Provides comparative rates of bleeding and use of bleeding reduction strategies
 - NOT publicly reported
- COAP Webinars
- COAP Bleeding Best Practices Document
- Facilitated learning with peer physicians
 - Contact COAP with requests for collaboration

Cardiac Care Outcomes Assessment Program (COAP) PCI Bleeding Initiative: Individualized Physician Report

Hira, Ravi S
 January 1, 2023 - June 30, 2023

NOTE: This data is intended for YOUR review and is not publicly reported.

Individualized Q1-2
 2023 PCI Operator
 Reports sent May
 2024

2023 Reports will be
 sent in fall 2024.

Metric	Your Data	All COAP
All PCI Volumes	82	7,803
STEMI Volumes	12	1,442
Radial Access, All PCI	70.7%	72.1%
Radial Access, STEMI	91.7%	75.8%
Observed Bleeding Rate	2.4%	1.9%
Expected Bleeding Rate	1.9%	2.9%
Bleeding Rate O/E	1.30	0.65
Retroperitoneal Bleeding	0.0%	0.2%
Cardiac Tamponade	0.0%	0.2%
Transfusion Post PCI	1.2%	1.0%
Closure Device	83.3%	77.3%
Bivalirudin used	0.0%	3.7%
IIb/IIIa used	6.1%	9.3%

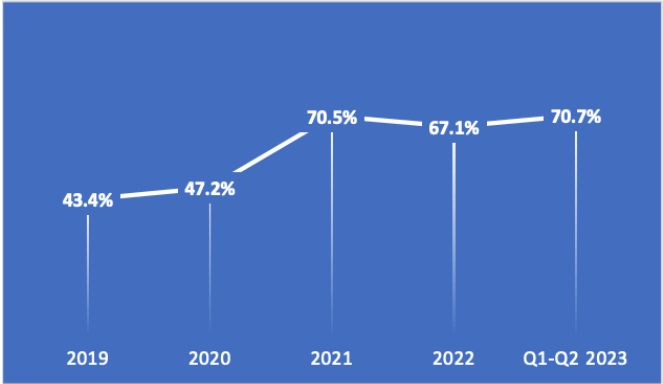
How to interpret this report
 All physician data is captured at the site level; if you work in multiple hospitals, your data is aggregated. Data is for all PCIs unless otherwise noted.

Bleeding rate is a composite metric that includes one or more: a bleeding event that occurred during PCI, a bleeding event within 72 hours of PCI, hemorrhagic stroke, tamponade, transfusion Post-PCI for patients with a pre-procedure Hgb>8 g/dL and pre-procedure Hgb not missing, absolute Hgb decrease from pre-PCI to post-PCI of >=4g/dL (excluded if any of the following: pre-procedure Hgb>16 g/dL or MVSupport=yes). **Risk adjustment is based on STEMI, age, BMI, prior PCI, GFR/dialysis, cardiogenic shock, preop hemoglobin, gender.**

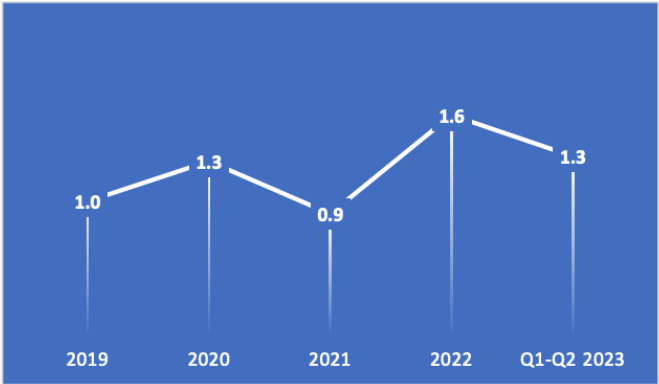
O/E (Observed/Expected) Rate: An O/E rate of 1.0 means you performed just as the model predicted. If O/E < 1.0 you performed better than the model predicted; if O/E > 1.0 you performed worse than the model predicted.

Why it matters
 Bleeding Post-PCI is associated with increased death and other complications. There is considerable variation in bleeding events and transfusion rates amongst physicians in our region, and evidence-based strategies to minimize this.

YOUR All PCI Radial Access Trend



YOUR Bleeding O/E Trend



ORIGINAL RESEARCH

Government Regulation and Percutaneous Coronary Intervention Volume, Access and Outcomes: Insights From the Washington State Cardiac Care Outcomes Assessment Program

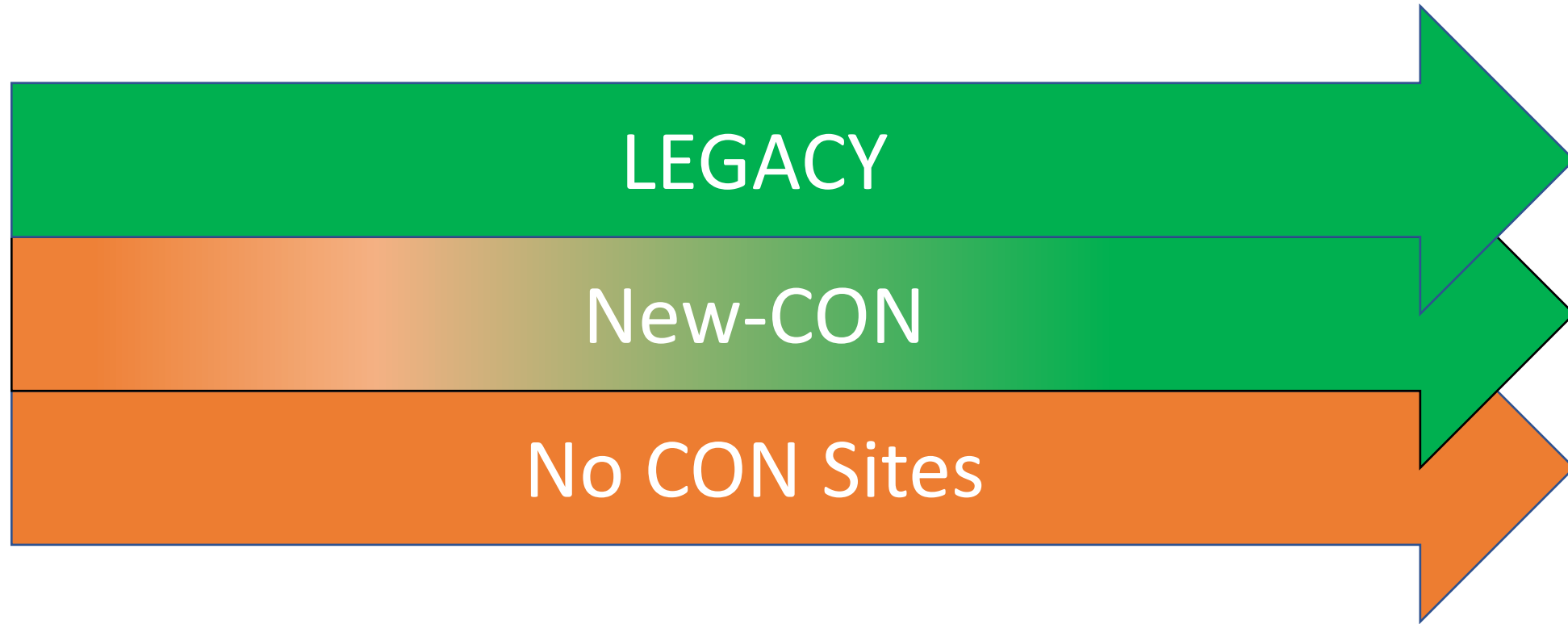
Akash Kataruka, MD; Charles C. Maynard, PhD; Ravi S. Hira , MD; Larry Dean, MD; Todd Dardas, MD; Hitinder Gurm, MBBS; Josiah Brown, MD; Michael E. Ring, MD; Jacob A. Doll , MD

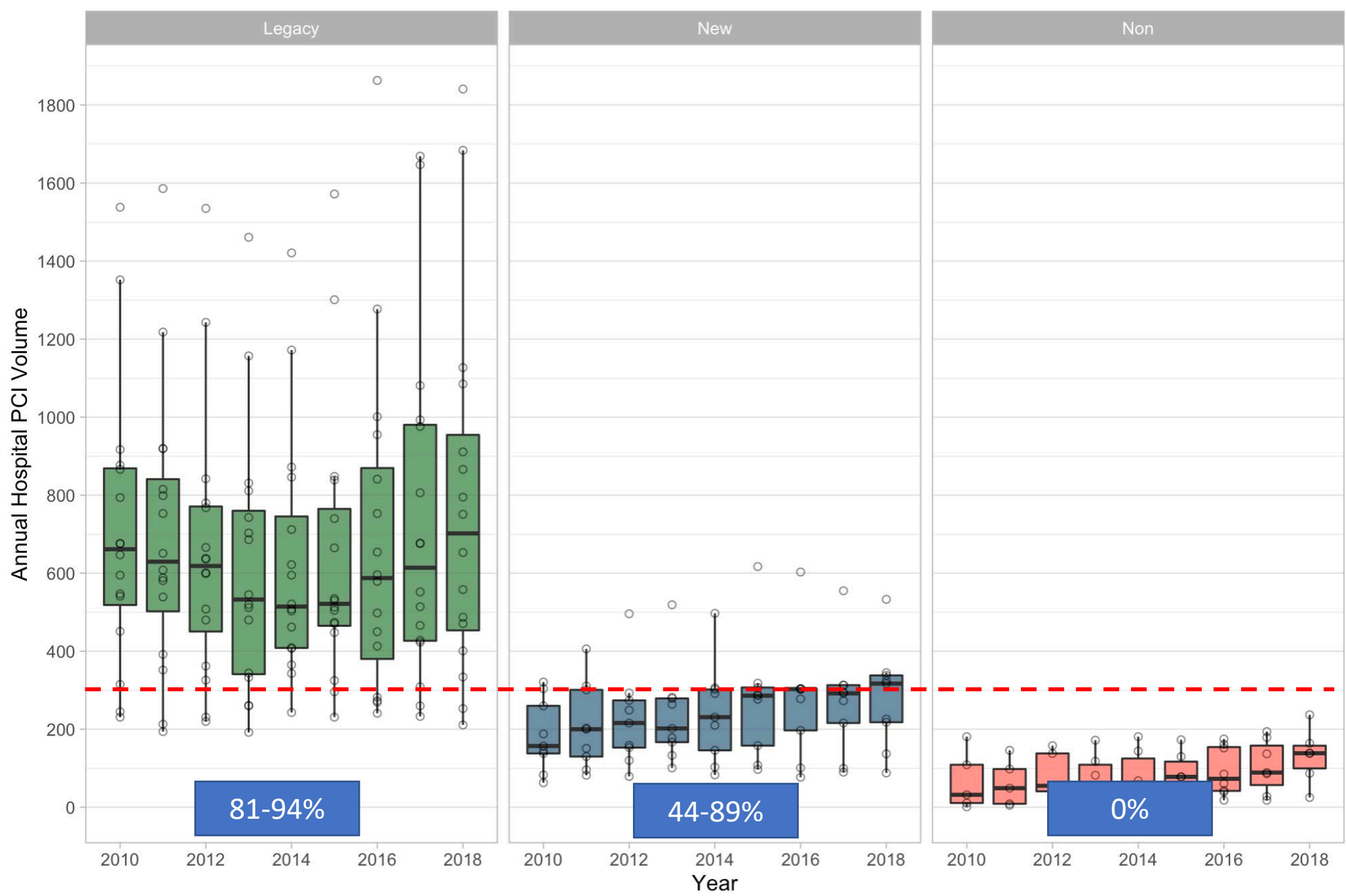
Washington State CON: Historical Background

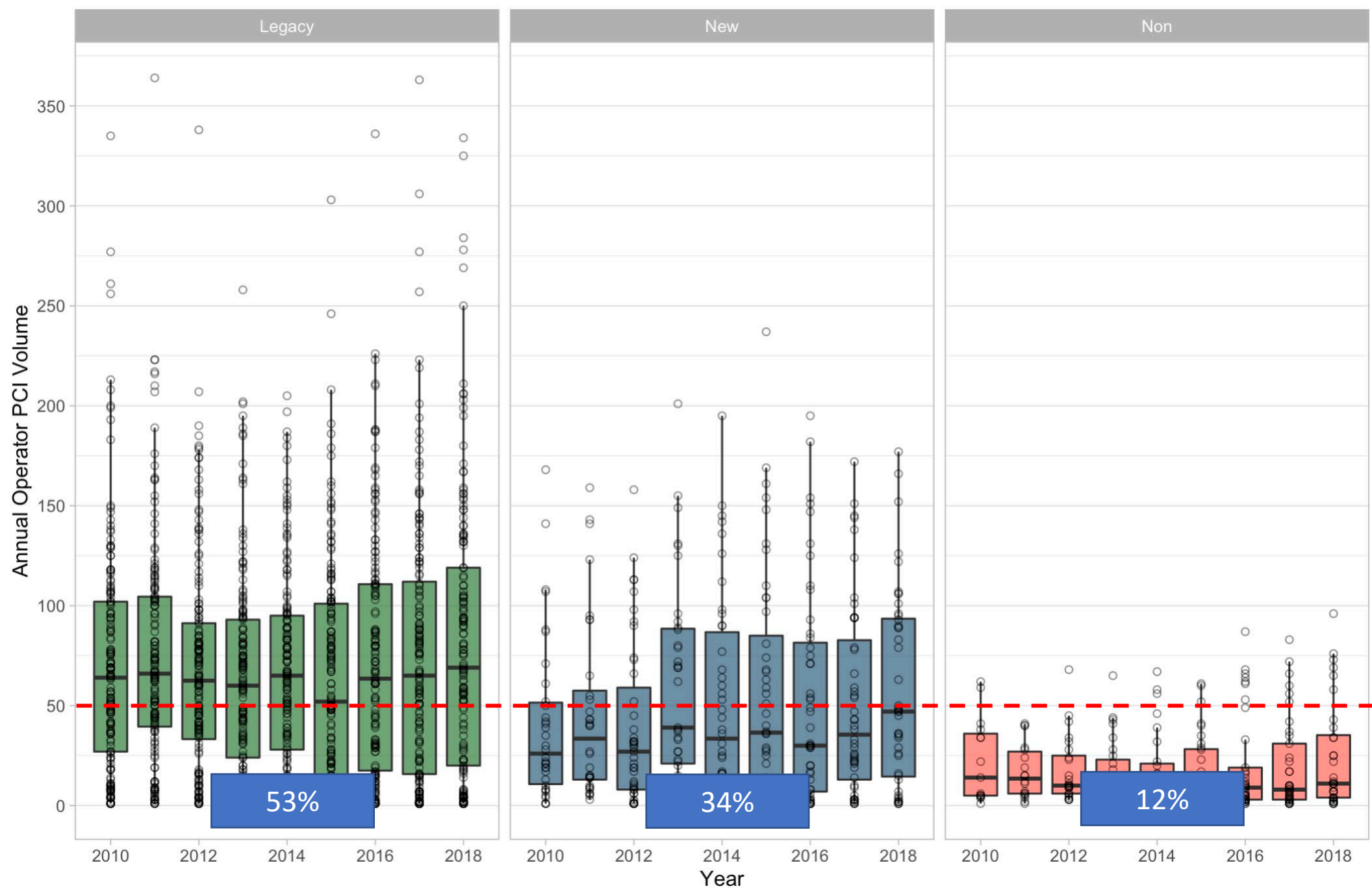
- Prior to 2008, only PCI programs with CT surgery backup were performing elective PCI
- The CON process in 2008 permitted 9 additional hospitals/systems to perform elective PCI. Nine hospitals did not receive CON.
- These designations were stable over the subsequent decade
- The CON process has essentially created a 3-tiered system.
- How has this system impacted access and outcomes for PCI patients in Washington?



Washington State Experience









Washington State Experience for Acute Coronary Syndrome

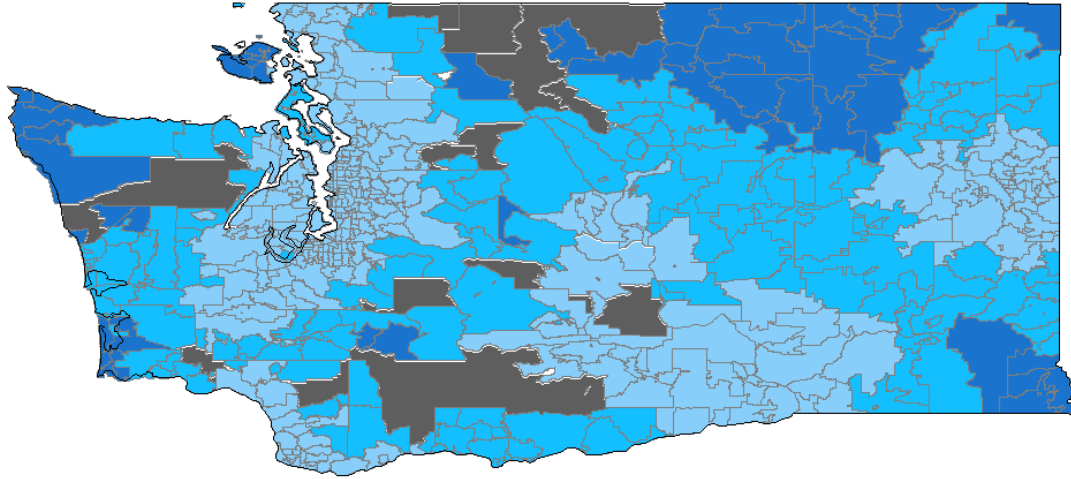
Characteristic	Legacy (n=60,866)	New CON (n=14,539)	No CON (n=4,012)	Legacy vs. no CON	New CON vs no CON
In-hospital Death	1655 (2.7%)	398 (2.7%)	205 (5.1%)	<0.0001	<0.0001
Adjusted Odds Ratio for death	0.59 (0.48-0.72)	0.55 (0.46-0.65)	----		

Washington State Experience for Stable PCI

Characteristic	Legacy (n=27,775)	New CON (n=3303)	P value
In-hospital death	159 (0.6%)	7 (0.2%)	0.007



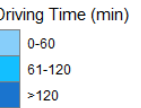
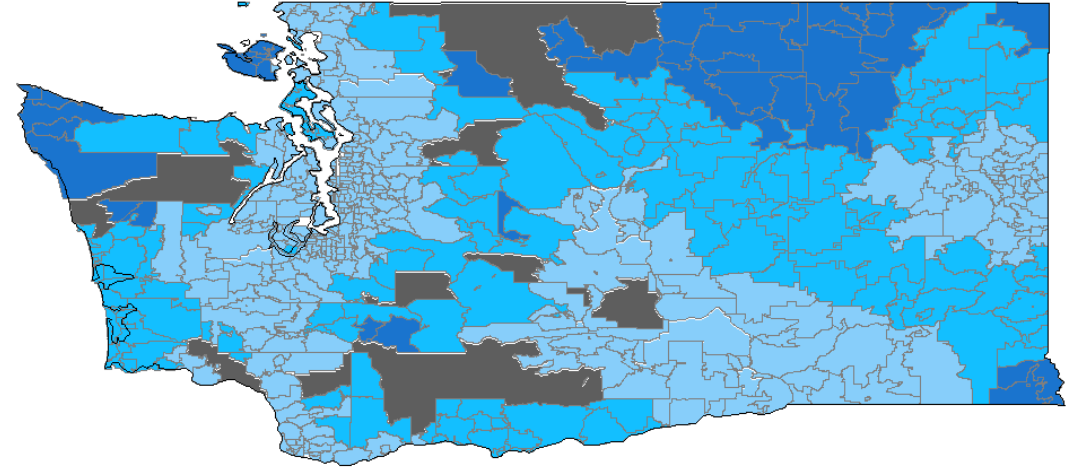
Driving Time



LEGACY HOSPITALS



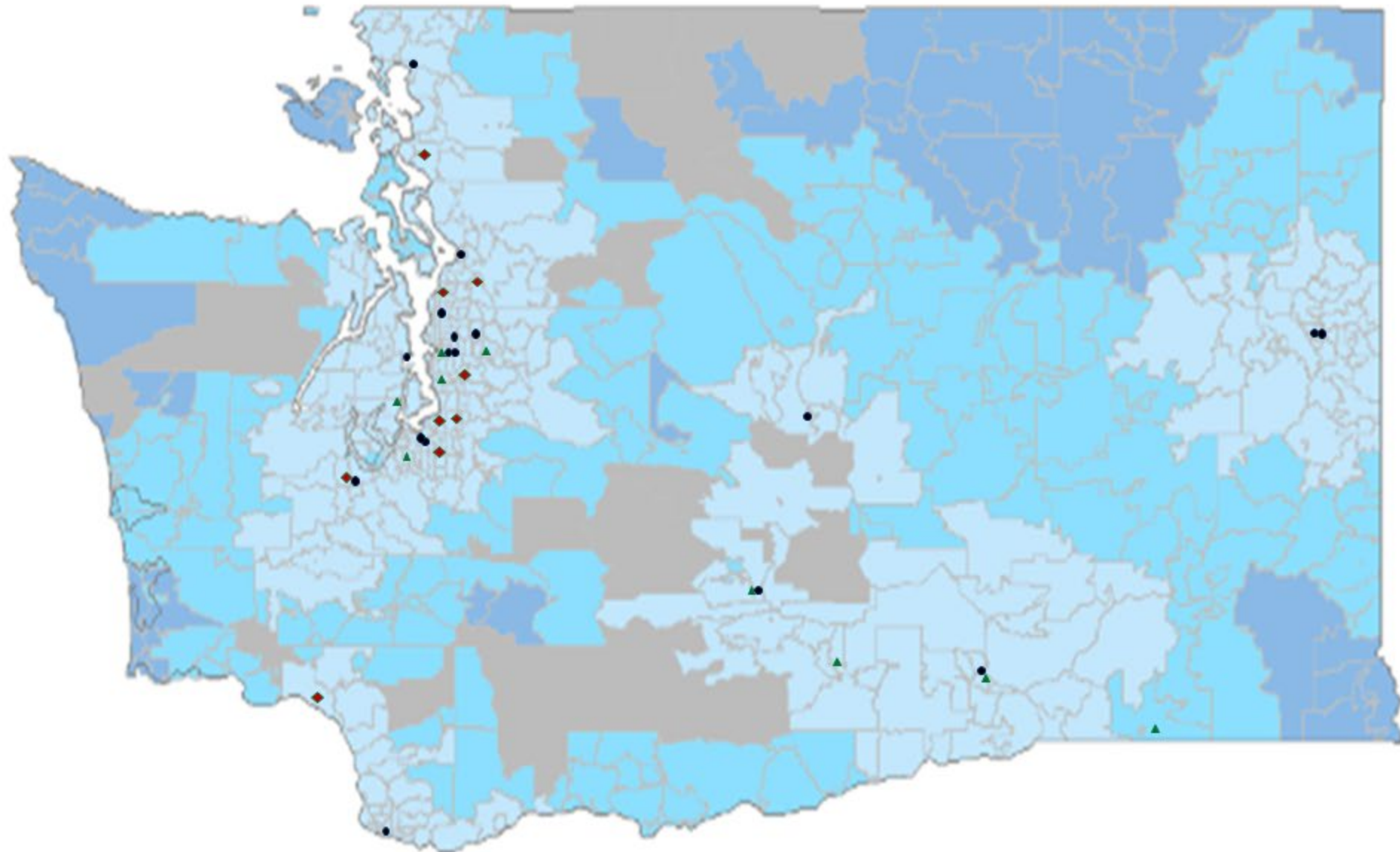
90.0% < 60 minutes



ALL HOSPITALS

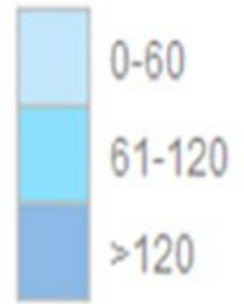


Improved for 1.5% of the population

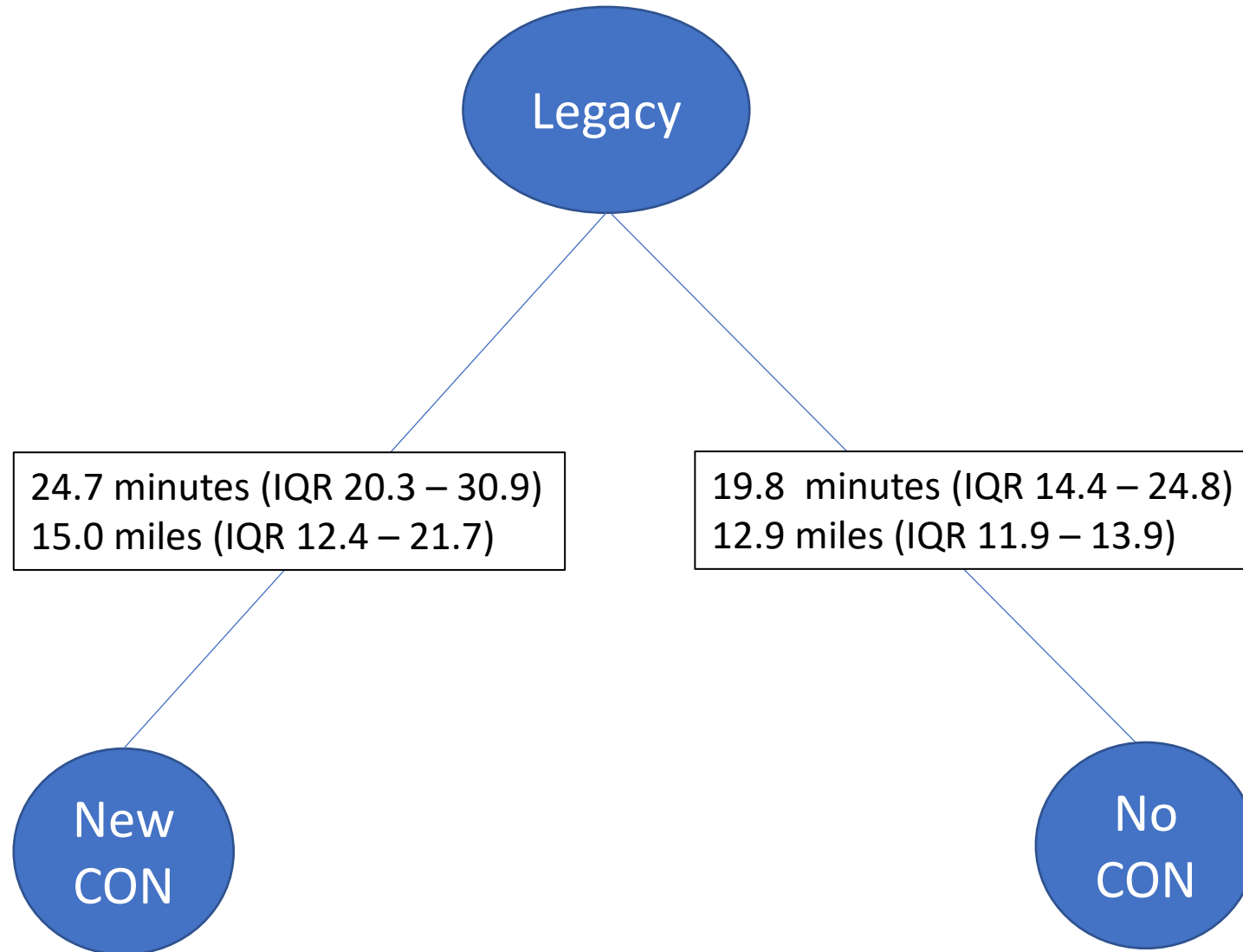


- Legacy Hospitals
- ◆ Certificate of Need Hospitals
- ▲ MI Access Hospitals

Driving Time (min)



Driving Time



Conclusions

- Hospitals receiving CON designation in 2009 have mostly not met volume targets
- Geographic access to care is modestly impacted by non-CON hospitals
- Legacy hospitals and “new CON” hospitals have similar in-hospital mortality outcomes
- Non-CON hospitals have very low volumes, sicker patients, and outcomes are worse

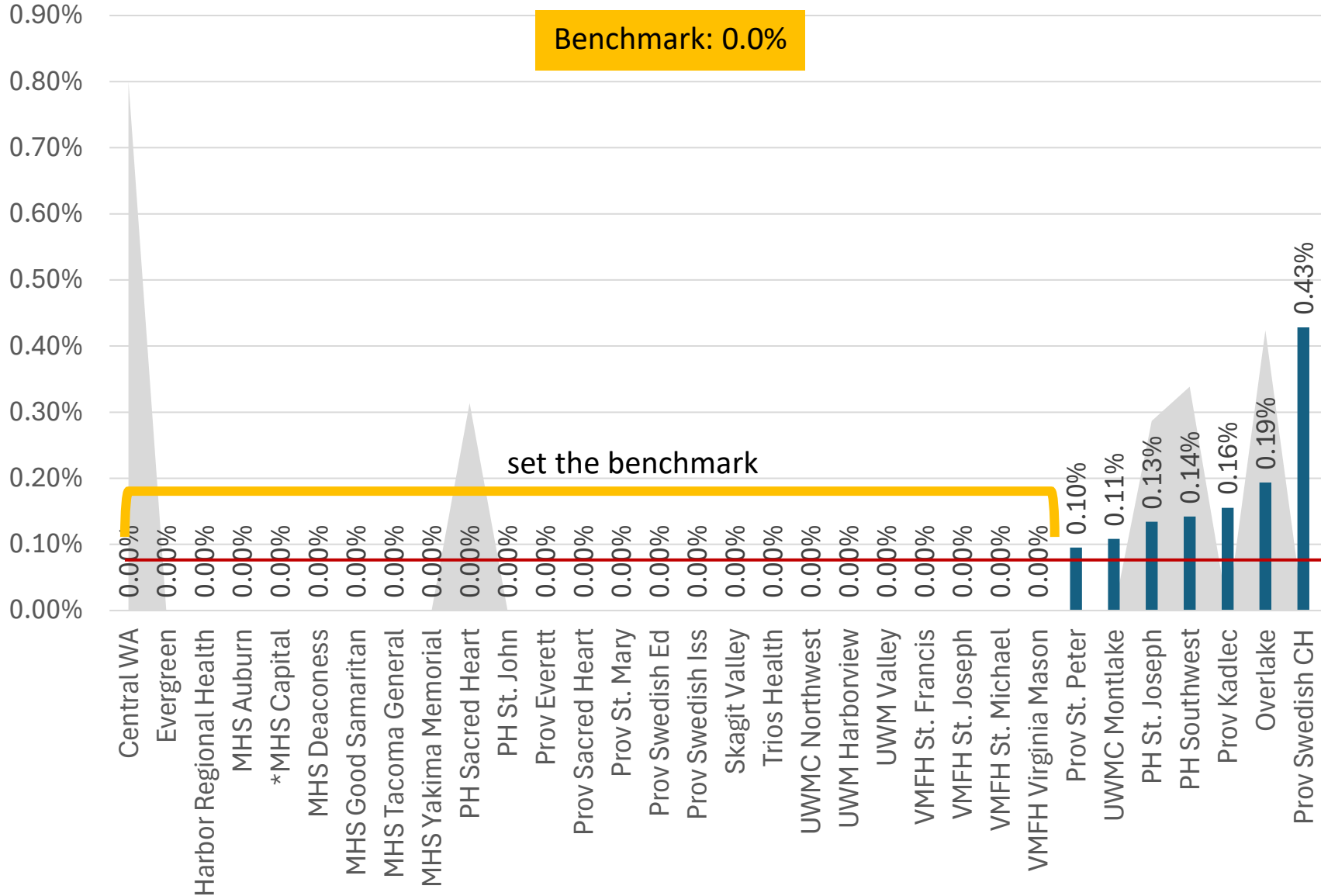
SCAI Expert Consensus on PCI without on-site surgical backup

SCAI expert consensus

- Elective PCI without surgery on site (no-SOS) increased in volume and complexity
- PCI is now being performed outside of the hospital setting in office-based laboratories (OBLs) and ambulatory surgery centers (ASCs) in some states
- Several studies have demonstrated that PCI at no-SOS centers have very low rates of complications and similar outcomes to PCI at surgical centers.
- Despite increase in age, comorbidities, and lesion complexity, periprocedural complication rates remained constant or declined, with rates of emergency surgery 0.1% in many series.

Emergency CABG Post PCI, All PCI

Benchmark: 0.0%



*Incomplete 2023 data

■ 2022 ■ 2023

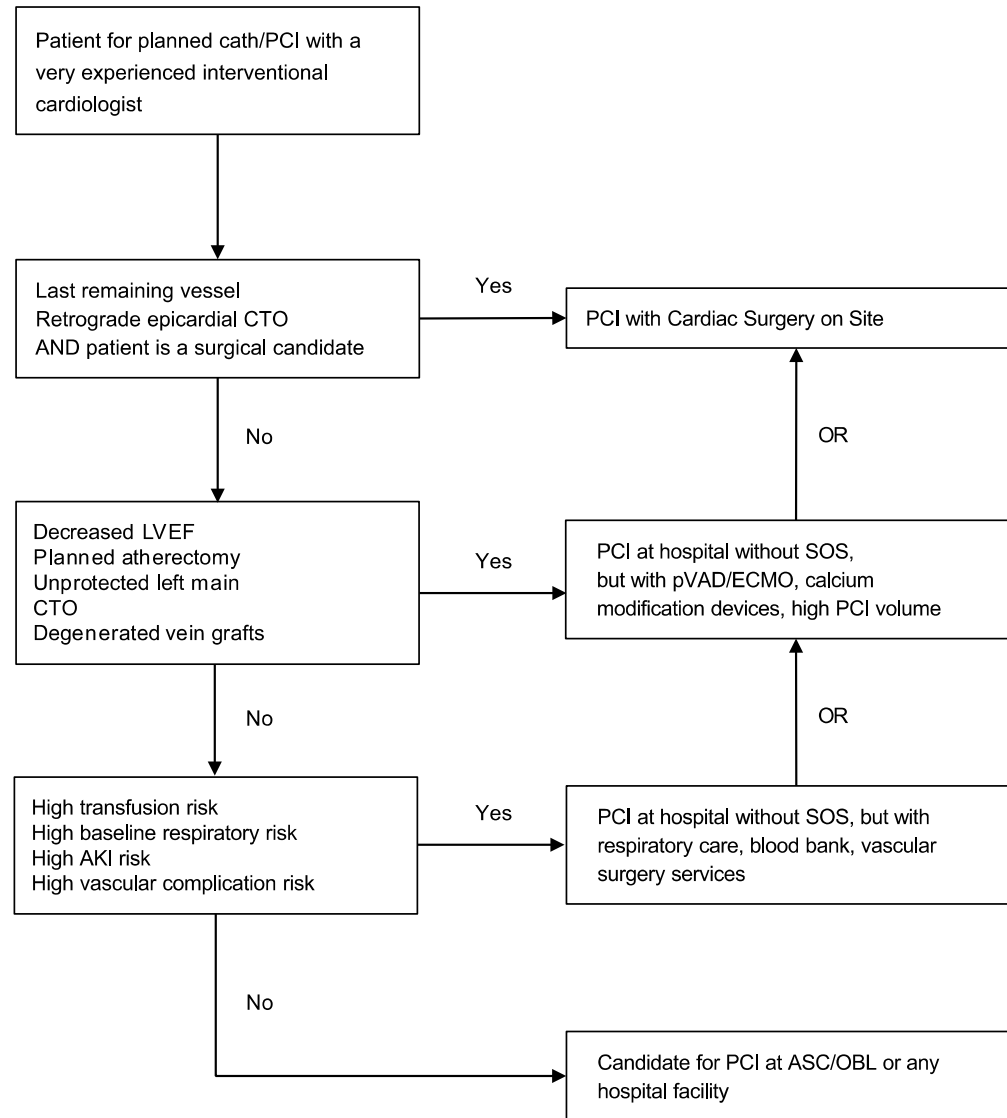


Figure 1.

Simplified algorithm for case selection for elective PCI at different facilities, assuming an experienced interventional cardiologist. AKI, acute kidney injury; ASC, ambulatory surgery centers; CTO, chronic total occlusions; ECMO, extracorporeal membrane oxygenation; LVEF, left ventricular ejection fraction; OBL, office-based laboratories; PCI, percutaneous coronary intervention; pVAD, percutaneous ventricular assist device; SOS, surgery on site.

Standards at no SOS PCI hospitals, ASCs, OBLs

- Equipment and supplies – routine as well as bailout/rescue for complications
- Transfer agreements and need for intensive care transport
- Quality assurance – standardized mechanism for evaluation and credentialing, QI, peer review
- Informed consent regarding need for transfer for surgery
- Operator and Staff requirements – experience, mentorship
- Surgical consultation
- Case selection and management

Table 2. Case selection.

	ASC/OBL	Level 1 No-SOS Hospital	Level 2 No-SOS Hospital	Cardiac Surgery Facility
Typical characteristics	No ICU, Code team, blood bank.	Low volume (<200 PCI) cath lab	Experienced interventional cardiologists Well-staffed team (4/room) Well-resourced Often multiple cath labs and ORs 24/7 ICU/anesthesia/radiology/OR support	Experienced interventional cardiologists High-volume cath lab Structural heart procedures Well-staffed, resourced, on-call cath lab team Multiple operating rooms On-call cardiac surgeon and perfusionist Shock team
Rescue/support capabilities	IABP	IABP	IABP pVAD or ECMO Vascular/thoracic surgery	IABP pVAD Cardiopulmonary bypass +/-ECMO +/- RVAD +/- LVAD +/- transplant
Plaque modification devices	Often cutting balloon or IVL	Often cutting balloon or IVL	Rotational atherectomy Orbital atherectomy IVL	Rotational atherectomy Orbital atherectomy IVL
Cases that may be higher risk to avoid	High transfusion risk Calcified lesions Atherectomy Low EF CTO Unprotected left main Degenerated vein grafts	Calcified lesions Atherectomy Low EF CTO Unprotected left main Degenerated vein grafts	Epicardial retrograde CTO Last remaining vessel/conduit	

Cath lab, catheterization laboratory; CTO, chronic total occlusion; ECMO, extracorporeal membrane oxygenation; EF, ejection fraction; IABP, intra-aortic balloon pump; ICU, intensive care unit; IVL, intravascular lithotripsy; LVAD, left ventricular assist device; OR, operating room; pVAD, percutaneous ventricular assist device; PCI, percutaneous coronary intervention; RVAD, right ventricular assist device.

COAP suggested modifications to CON

- CON should apply for all PCI and not differentiate between elective and urgent/emergent PCI
 - Improve access for appropriately selected patients for elective PCI locally.
 - Improve training and competence of cath lab staff for higher acuity patients
- Use SCAI expert consensus to guide case selection for sites based on training and resources available.
- Quality metrics should factor as part of CON (as deemed appropriate by DOH) to provide feedback to sites.

Discussion

Extra slides

SCAI expert consensus

- Complex PCI, including unprotected LM, is being performed in some no-SOS centers, with no increase in MACE or emergency CABG compared with PCI at surgical centers.
- No comparative studies in other complex PCI - CTO and atherectomy; however, observational studies demonstrate reasonable outcomes and suggest feasibility with experienced ICs.
- Propose a new PCI treatment algorithm with consideration of the patients' clinical and lesion risk, operator experience (both recent and accumulated), and the experience and rescue capabilities of the site.
- In the US, there are considerable financial savings (to insurers and Medicare) for PCI to be performed in ASC and OBL settings, thus out-migration of procedures from hospitals should be anticipated.

SCAI Expert consensus

Changes since 2014:

- Increased same day discharge (outpatient based PCI)
- Increased radial
- Intracoronary imaging and physiology
- Better tools available for PCI and management of complications (covered stents, MCS)
- Multidisciplinary conferences, heart team and peer review systems

Data for emergency CABG

- 2 randomized controlled studies - excluded primary PCI (PPCI) or high-risk features such as poor left ventricular function
- CPORT-E trial - noninferiority of PCI at hospitals with no-SOS compared with surgical centers at 6 weeks and 9 months
- MASS-COM trial showed no significant differences in the rates of death, MI, repeat revascularization, stroke. No difference in the need for emergency surgery, with an incidence of 0.3% with vs 0.1% without on-site surgery.
- Meta-analysis of 23 studies comparing outcomes - 1,101,123. For PPCI (133,574 patients), all-cause mortality and emergency CABG did not differ. For non-PPCI (967,549 patients), all-cause mortality (OR, 1.15; 95% CI, 0.94-1.41; P = 0.172) and emergency CABG (OR, 1.14; 95% CI, 0.62-2.13; P = 0.669) were not significantly different. Rate of emergent CABG 0.5%.
- Michigan and the VA Healthcare System rates below 0.1%.
- Scoring developed to predict need for emergent surgical support - highest tertile required emergent surgery in only 0.6% of cases

After emergency CABG

- High mortality rates 7.4 - 21%
- UK registry in-hospital MACCE of 14%
- In-hospital LOS 9 days longer in those surviving surgery
- Good long-term prognosis
- Time to surgery longer for transferred pts (306 minutes) compared with patients at centers with surgical capability (160 minutes).
- Paradoxically, in-hospital mortality rate was 12-fold higher in non-transferred pts. Possibly, the highest risk pts that were transferred died prior to transfer or en-route.

Table 5. Example reimbursement differences based on place of service and type of insurance.

Place of service	Diagnostic catheterization facility fee	PCI facility fee, Single vessel DES	Physician professional fee
Hospital outpatient-commercial insurance ^a	\$8100	\$29,426	Contractual rates
Hospital outpatient-Medicare ^b	\$2962	\$10,259	\$137-\$436 for cath \$628 one-vessel DES
ASC-Medicare ^b	\$1321	\$6111	\$253-\$650 depending on procedure
ASC commercial	Contractual rates	Contractual rates	Contractual rates
OBL Medicare ^b	\$891-\$1418	Not covered	Global payment
OBL commercial	Contractual rates	Contractual rates in certain states	Global payment

ASC, ambulatory surgery center; cath, catheterization; DES, drug-eluting stent; OBL, office-based laboratory; PCI, percutaneous coronary intervention.

^a Contractual average estimate based on Shields et al⁹ showing average commercial rate was 293% of Medicare rate

^b Based on US Medicare rates for 2022 published on [CMS.gov](https://www.cms.gov)

Endorsed by

- American College of Cardiology (ACC)
- British Cardiovascular Intervention Society (BCIS)
- Canadian Association of Interventional Cardiologists (CAIC)
- Outpatient Endovascular and Interventional Society (OEIS)