



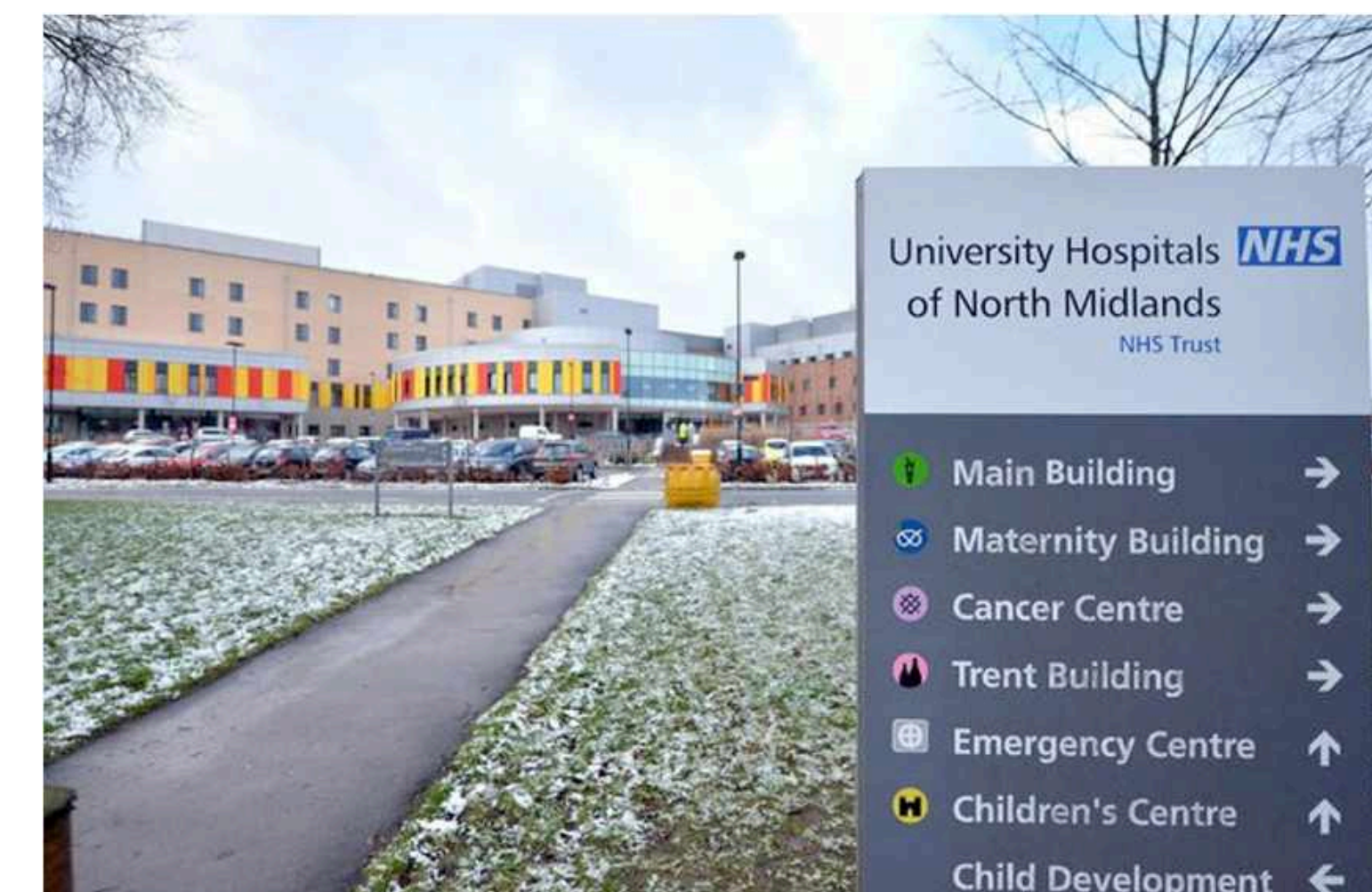
National Audit Presentation BCIS

1st April 2022 to 31st March 2023

Mamas A. Mamas
BCIS Audit Lead
On behalf of BCIS



@MMamas1973





"If I have seen further than others, it is by
standing on the shoulders of giants"

Isaac Newton





What's new

This year will only be a coronary presentation.

- New TAVR lead (Prof Raj Kharbanda) and Mitral lead (Dr Mamta Buch)
- The “slide deck” will be interactive – Power bi
- Coronary Slide deck reduced from 480 slides to around 240



Data Sources



Annual survey
data



Procedural data
uploaded by
centre to NICOR

Data Sources



- Annual survey
 - Structure
 - Procedure totals

Slides labelled "Survey"

- PCI Procedural data

csv file uploaded

Direct entry

- Extract
- ONS track
- Cleaning
- Analysis
- Outputs

Benchmarking / COP / QI

Slides labelled "Data Extract"

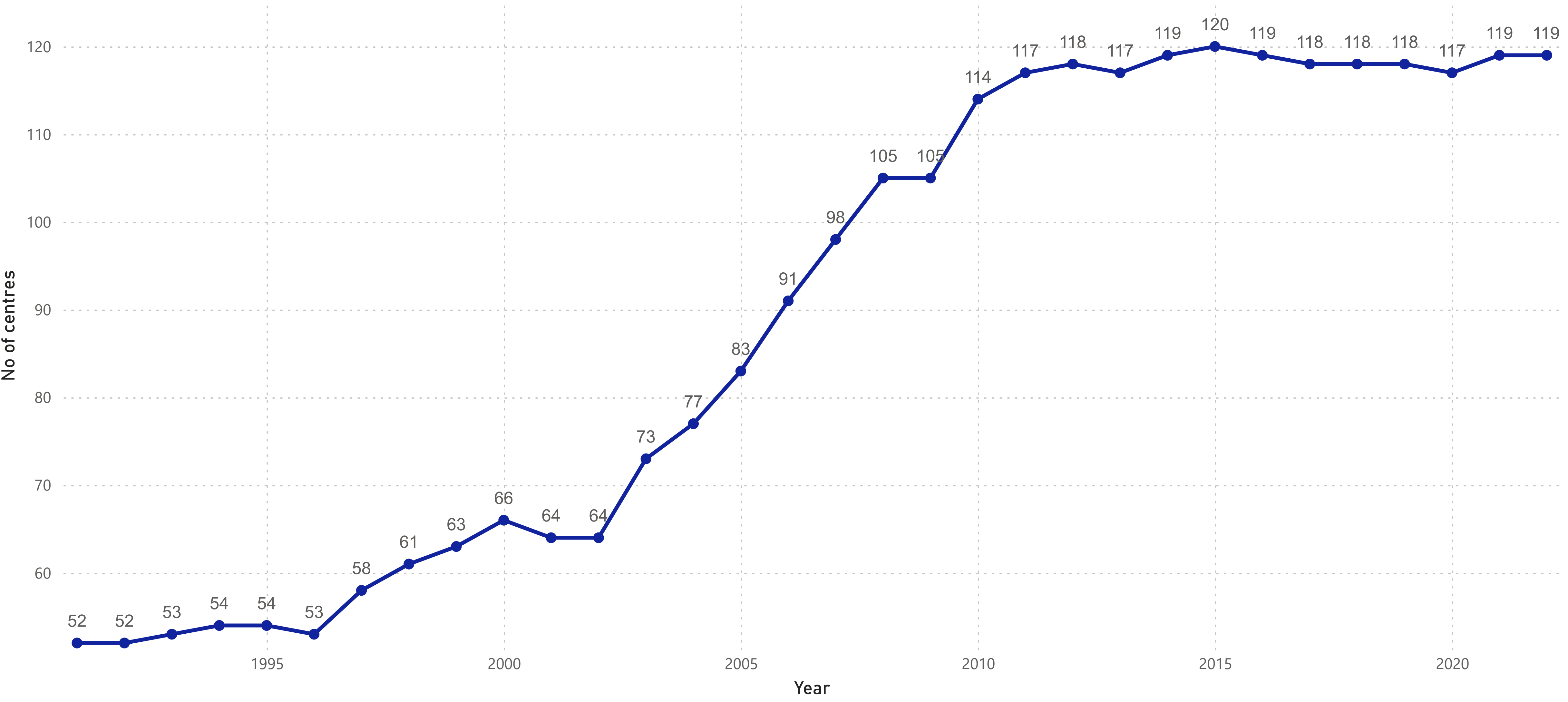


Survey

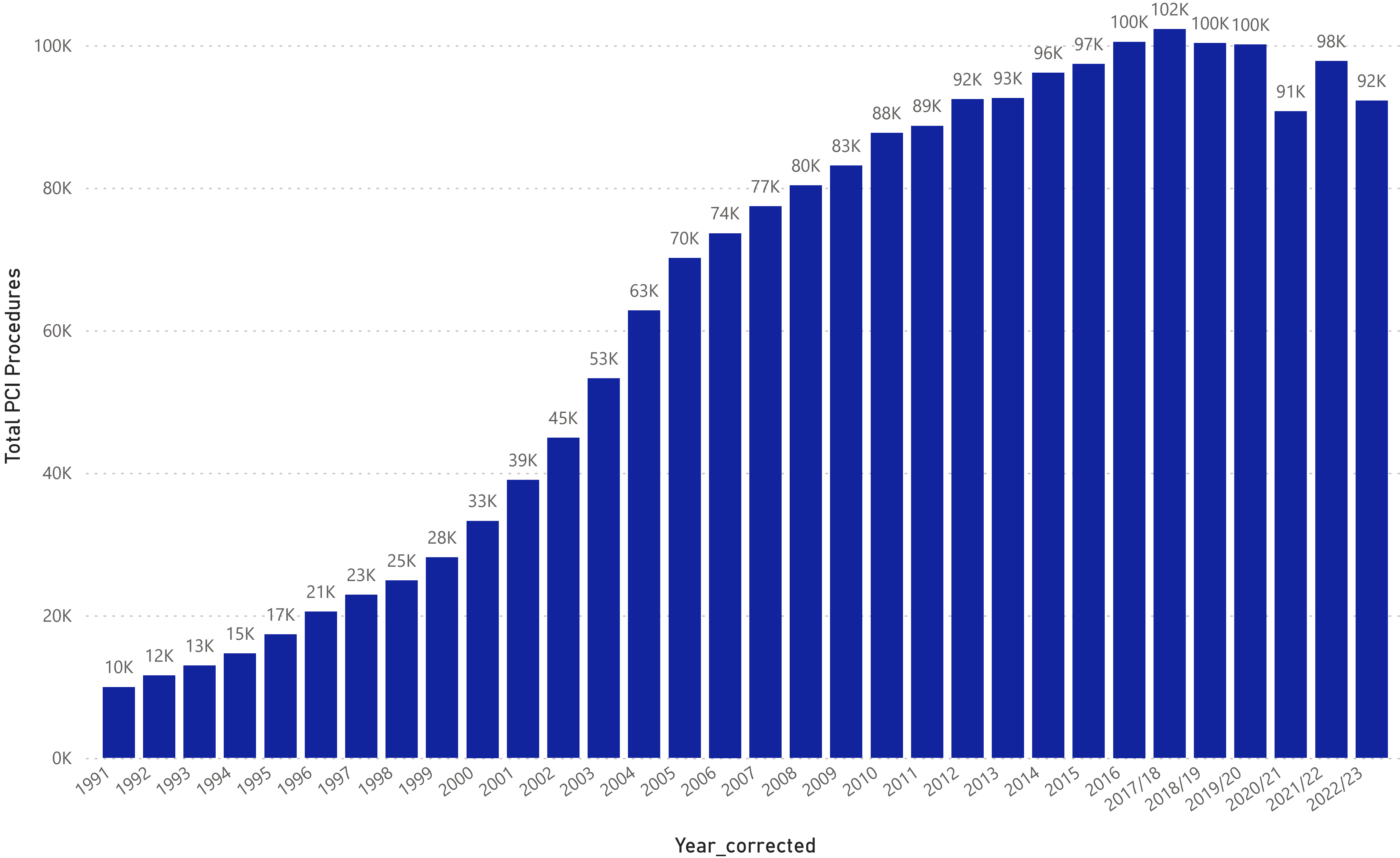


2022-23 Data
Mamas Mamas

UK Centres

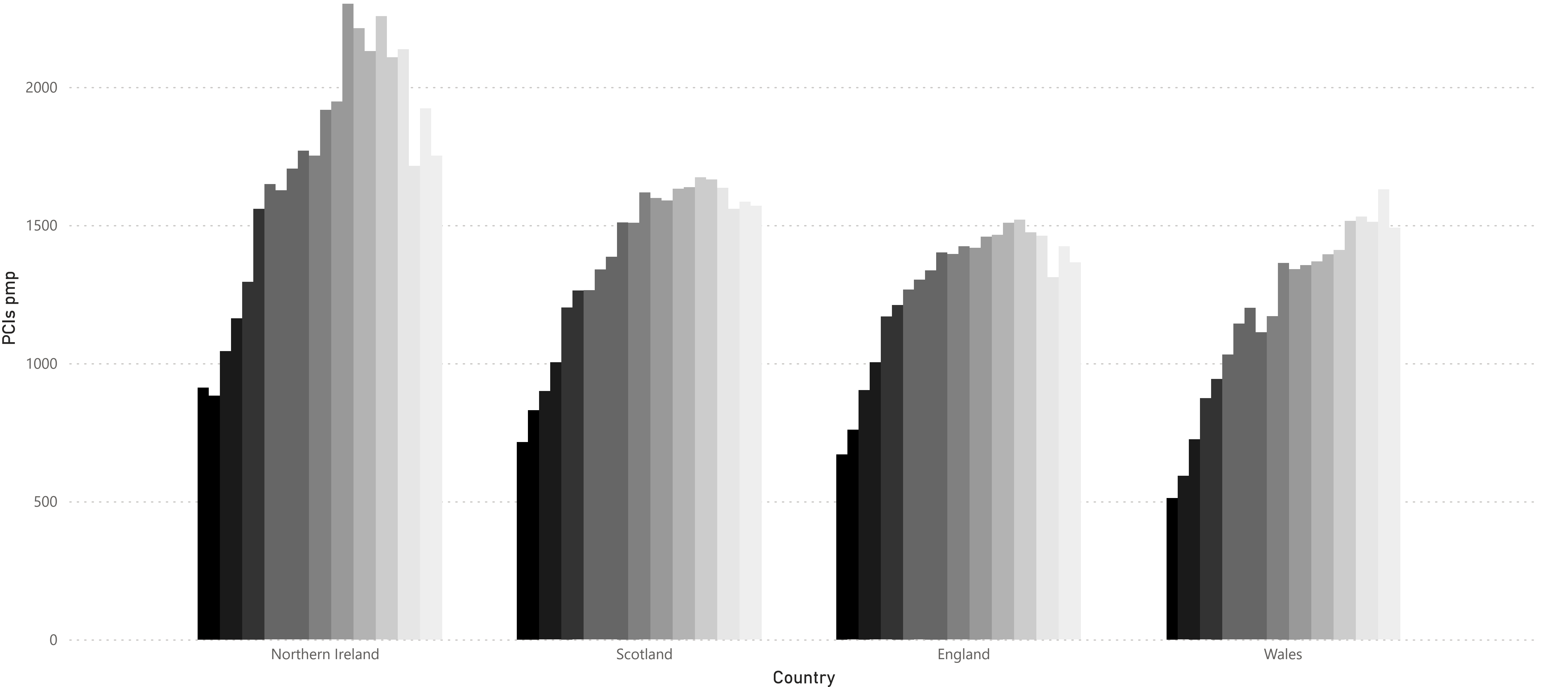


Total PCI activity all UK



PCIs pmp by Country

Year ● 2001 ● 2002 ● 2003 ● 2004 ● 2005 ● 2006 ● 2007 ● 2008 ● 2009 ● 2010 ● 2011 ● 2012 ● 2013 ● 2014 ● 2015 ● 2016 ● 2017 ● 2018 ● 2019 ● 2020 ● 2021 ● 2022





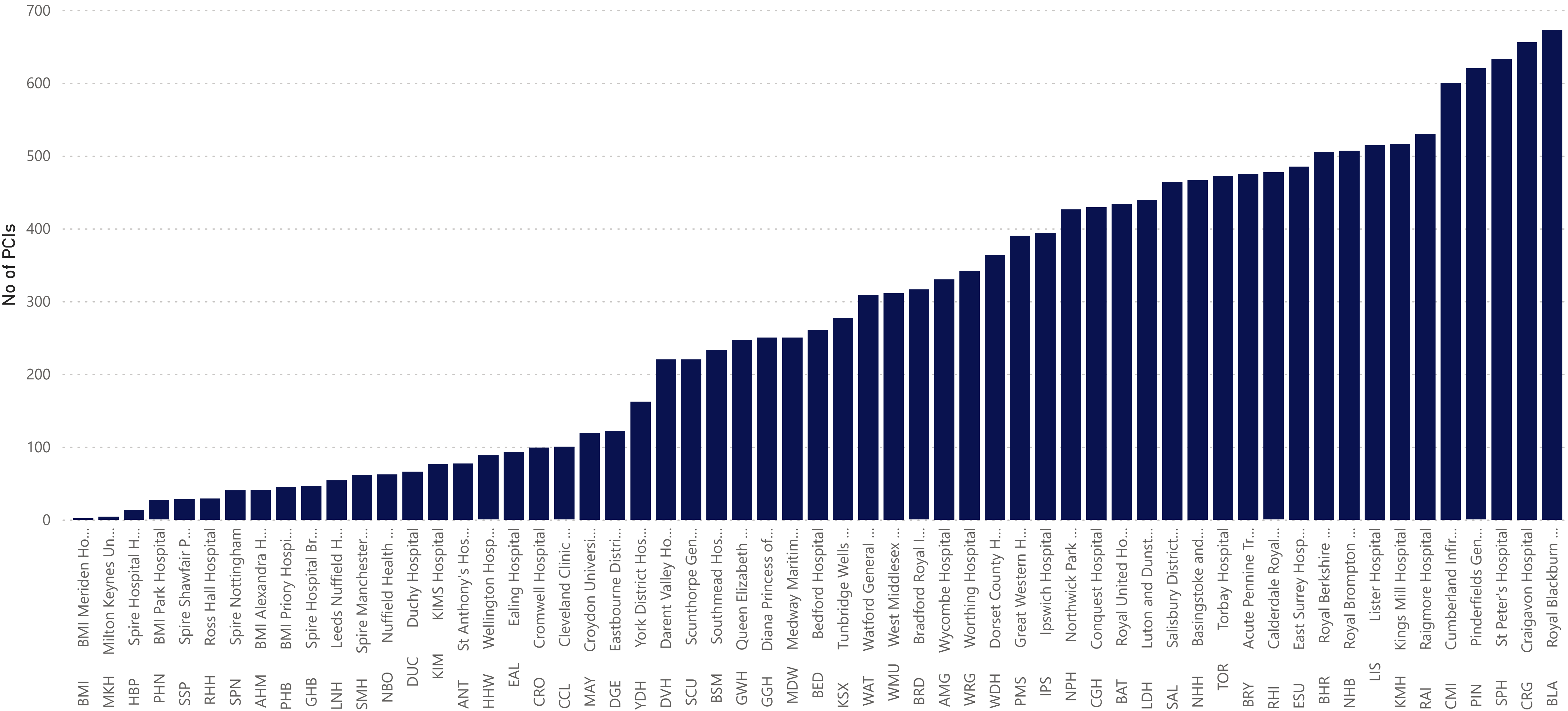
Survey

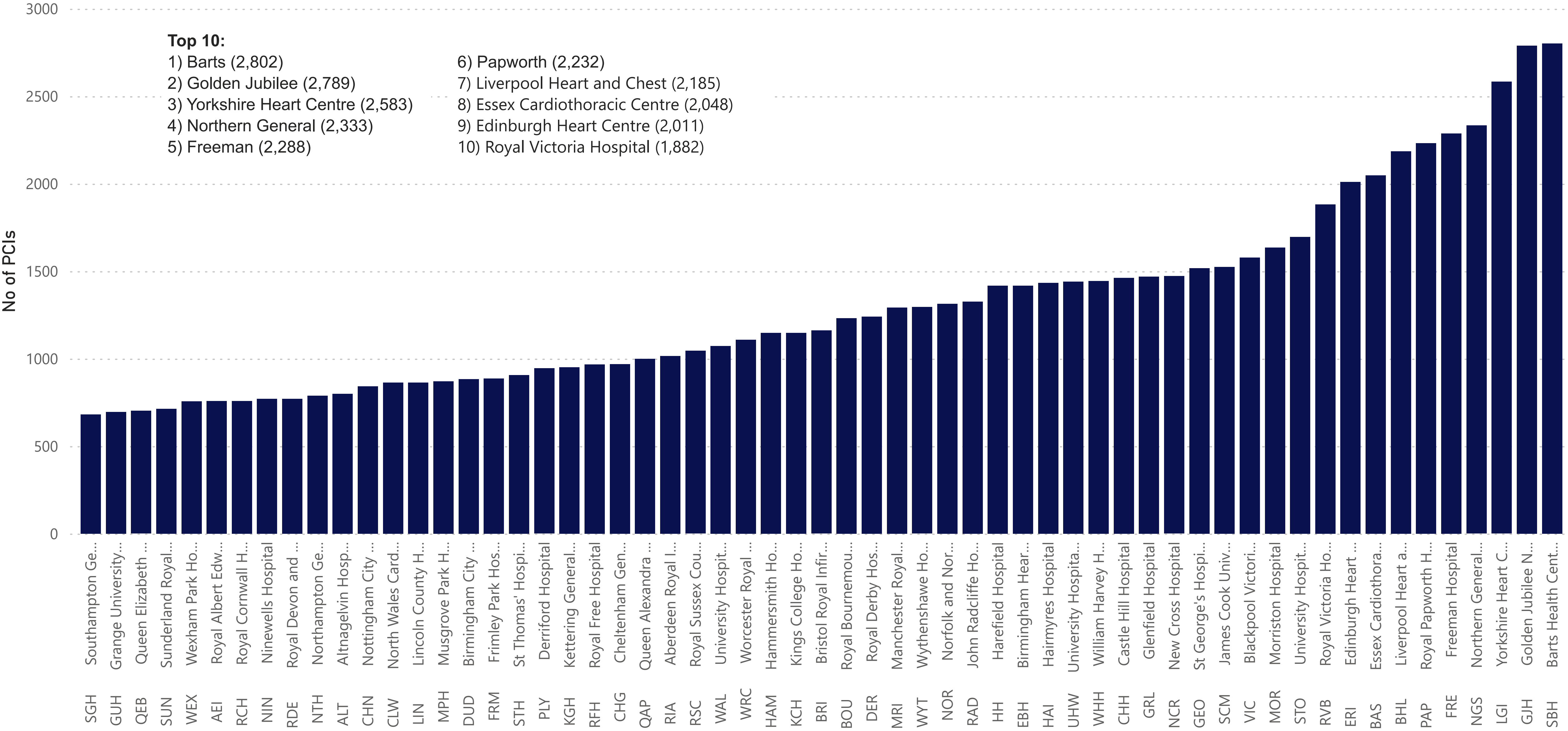


2022-23 Data
Mamas Mamas

Number of PCs per Centre

Ordered by 2022-23 activity (1 of 2)







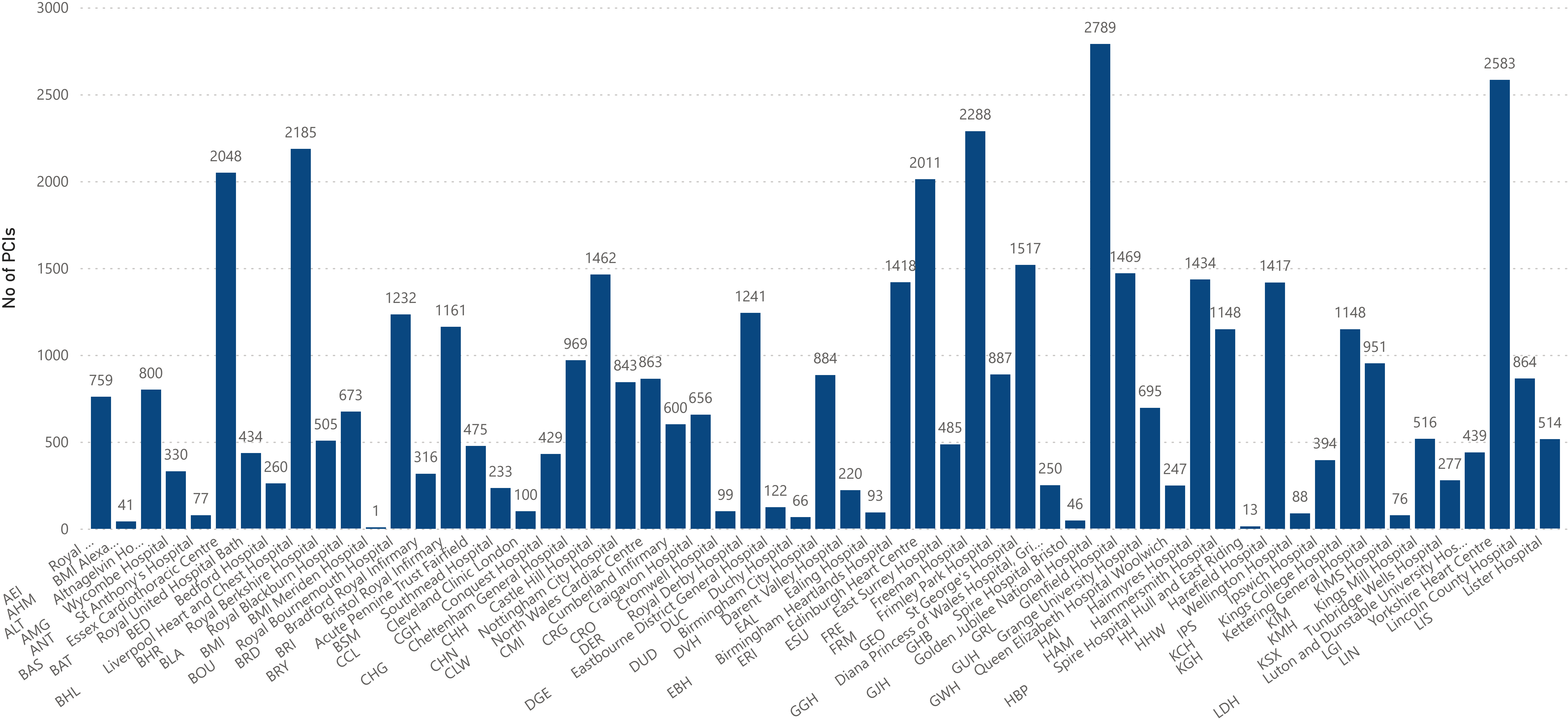
Survey



2022-23 Data
Mamas Mamas

Number of PCIs per Centre

Hosp Code A to L





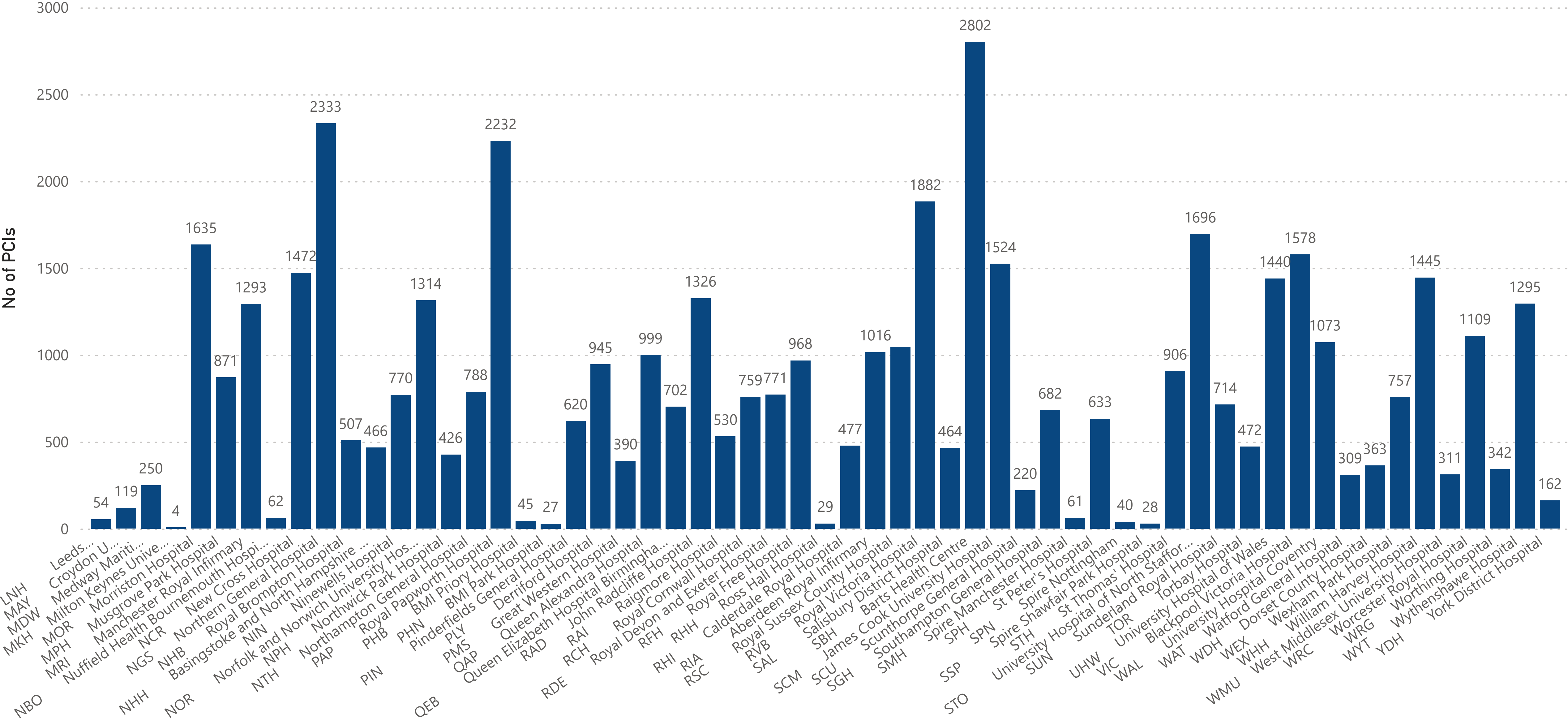
Survey



2022-23 Data
Mamas Mamas

Number of PCIs per Centre

Hosp Code M to Y





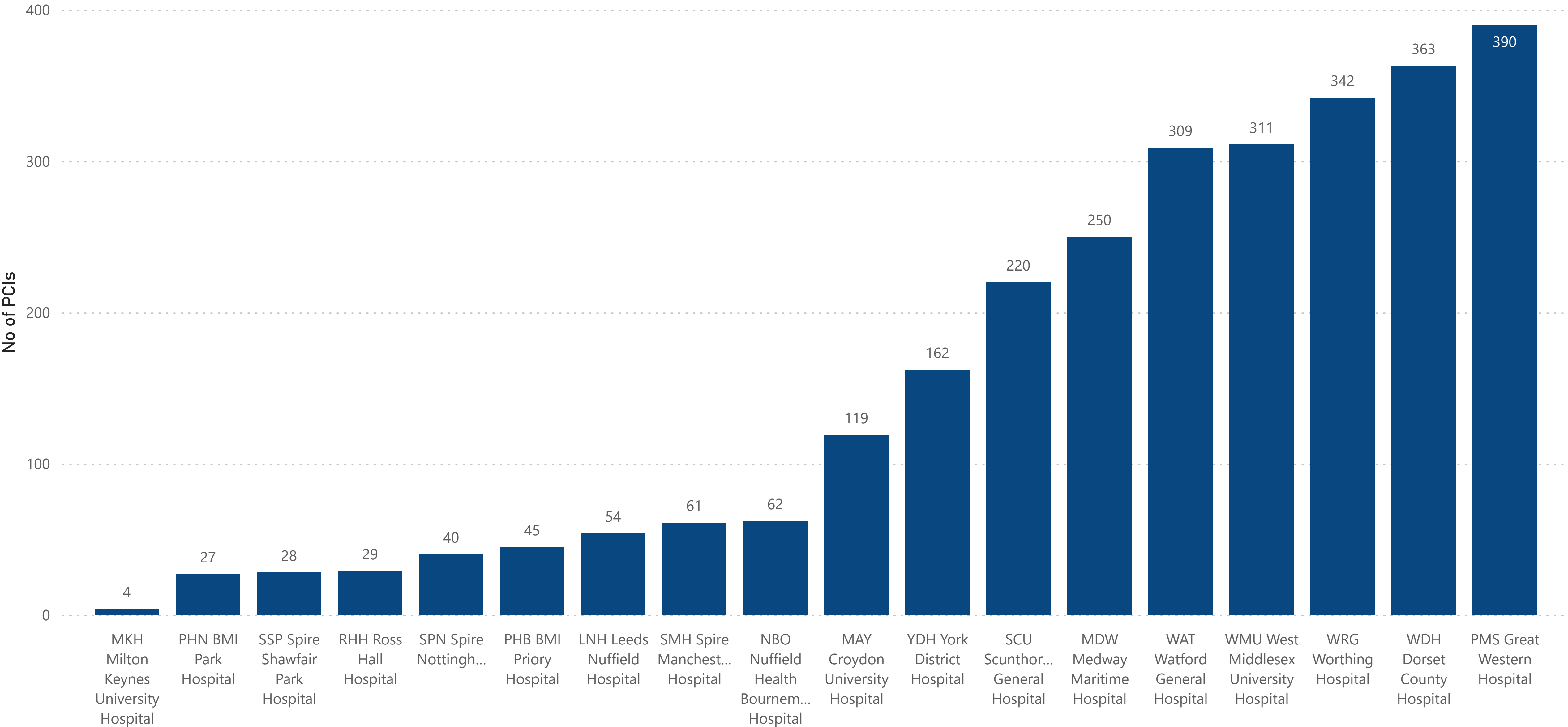
Survey

Centres < 400 PCIs

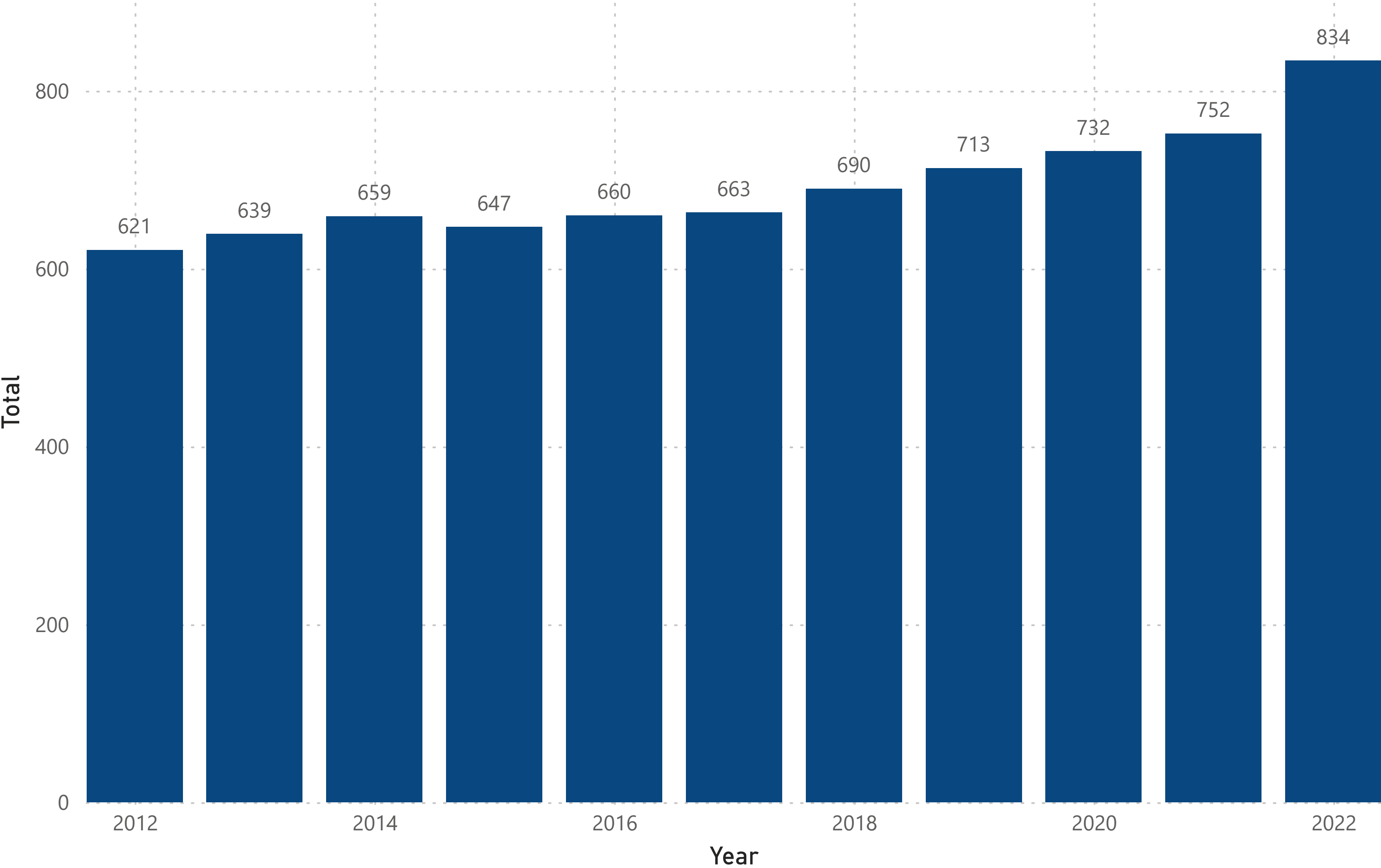
NHS and Private



2022-23 Data
Mamas Mamas



Interventional Consultants



Female 6.5%
(7% in 2021/22)

11% rise to 834 consultant interventional cardiologists



Survey

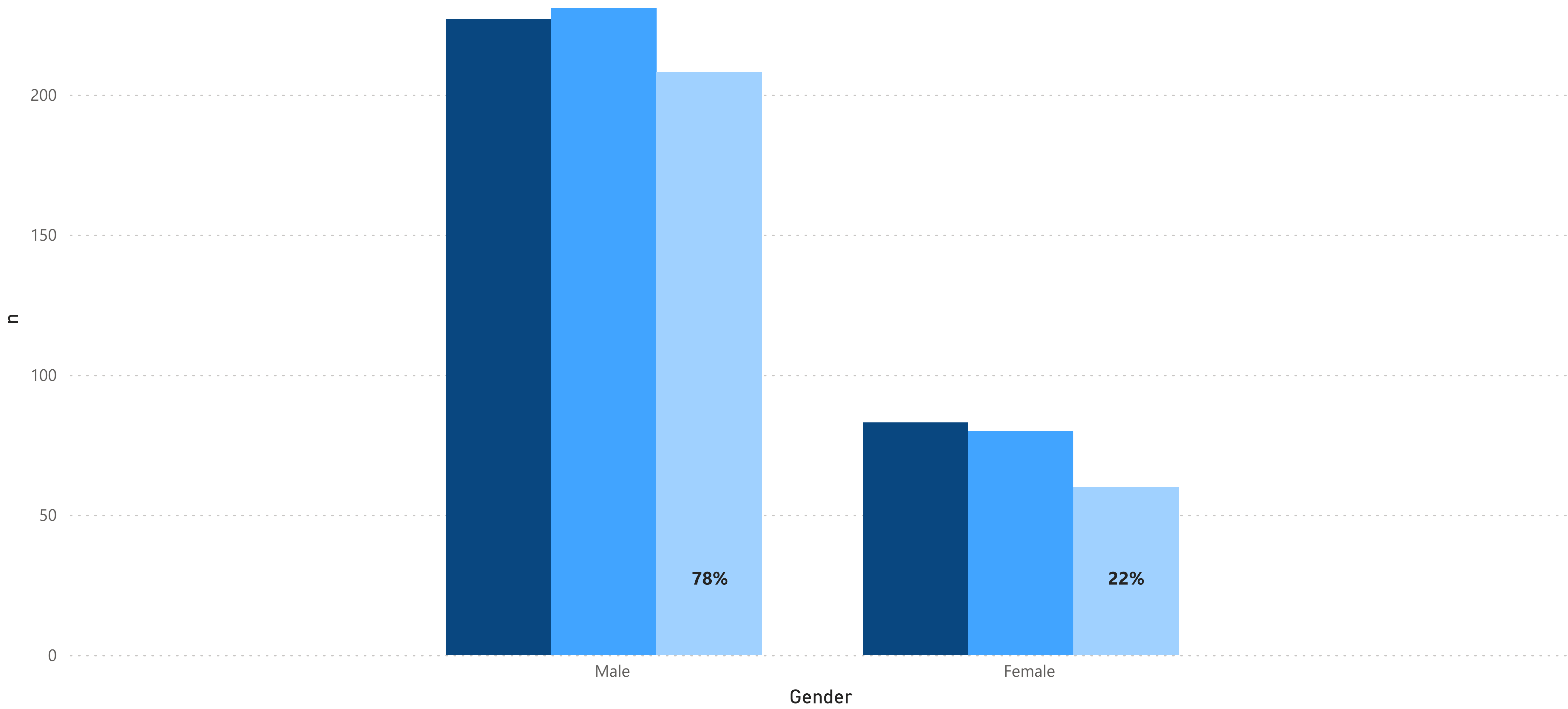


2022-23 Data
Mamas Mamas

Trainees

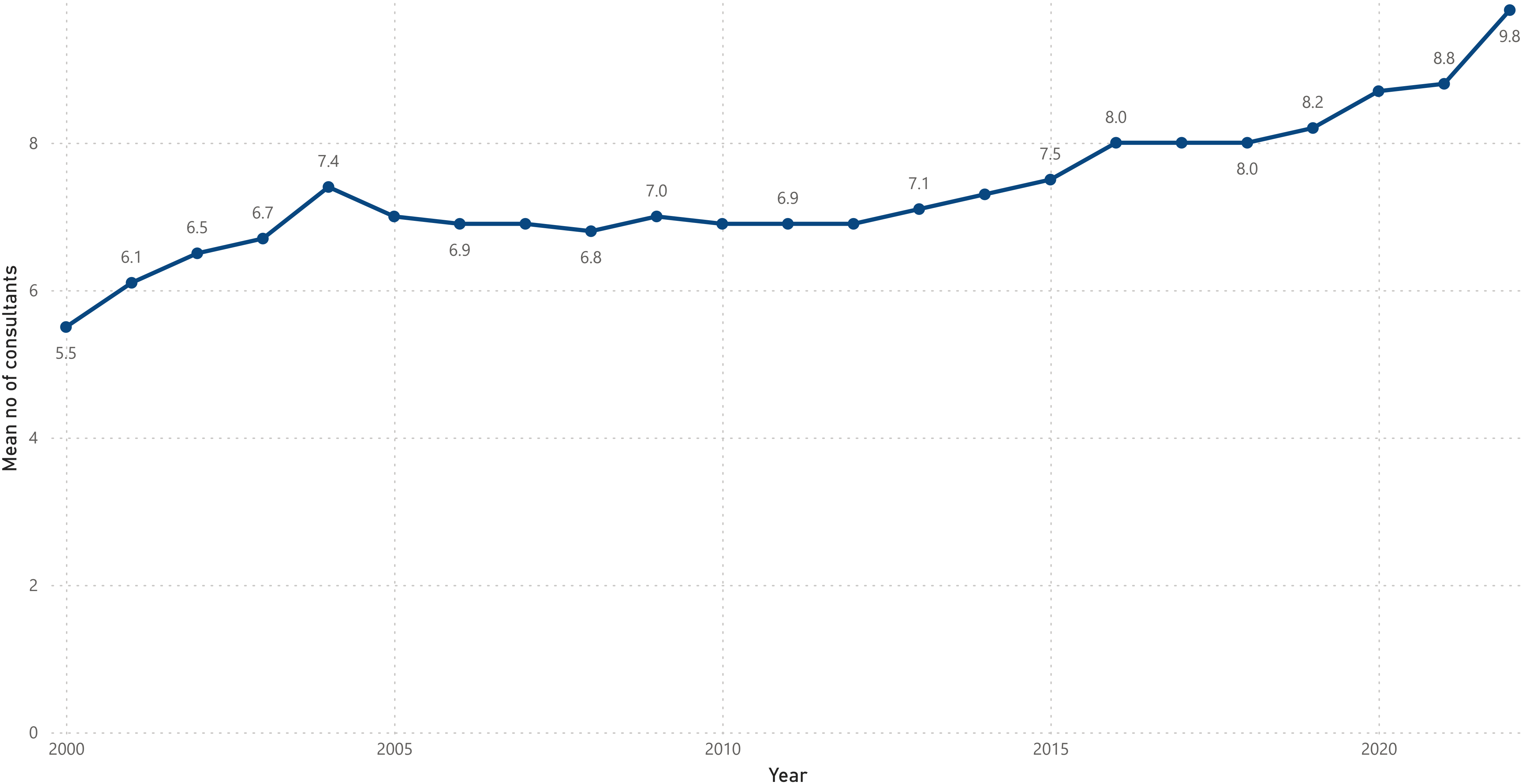
Number of SpRs as PCI trainees

Year ● 2020 ● 2021 ● 2022



Mean number of consultants

(Per NHS Centre)





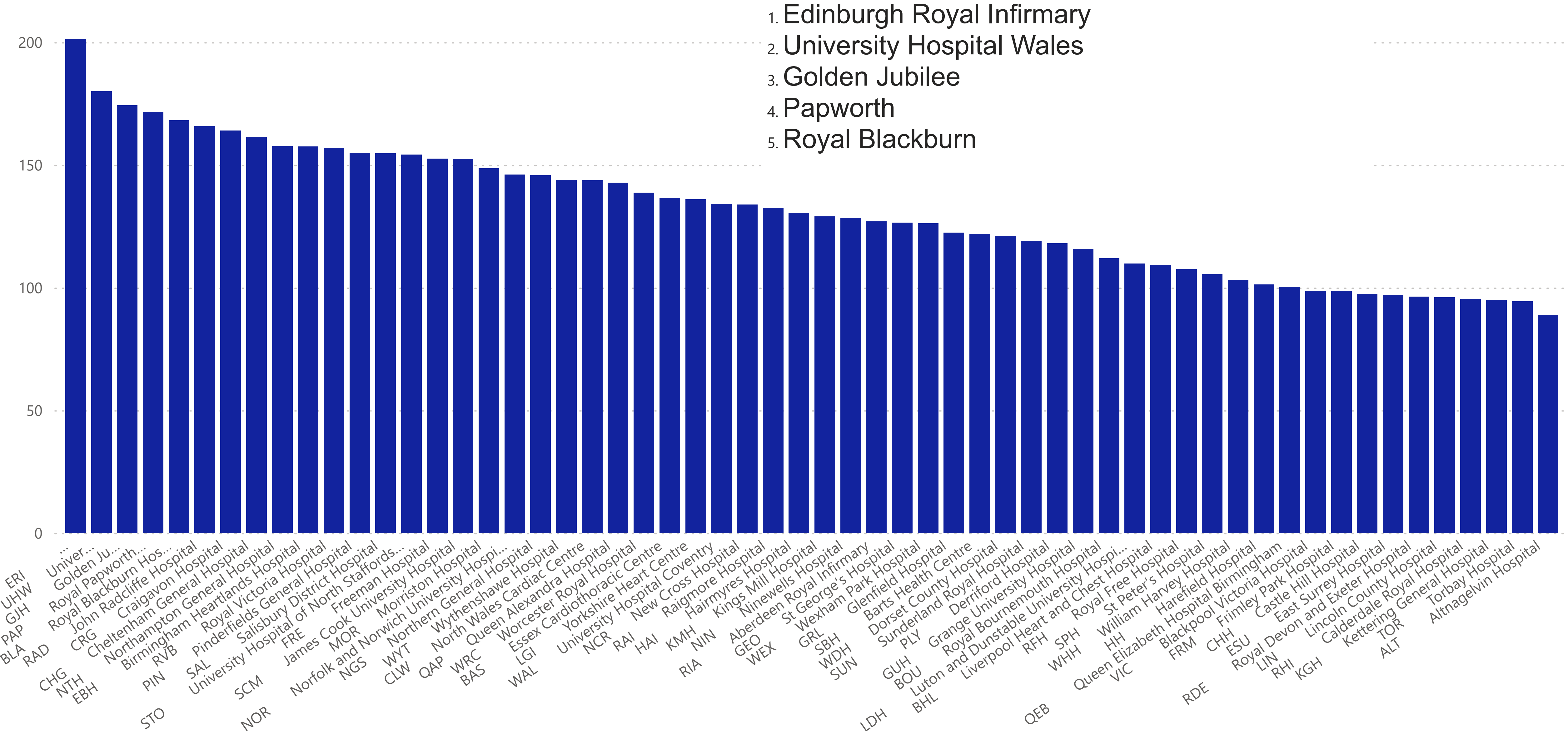
Survey

Mean number of PCs per Consultant

In NHS Centres (2022/23) (1 of 2)



2022-23 Data
Mamas Mamas





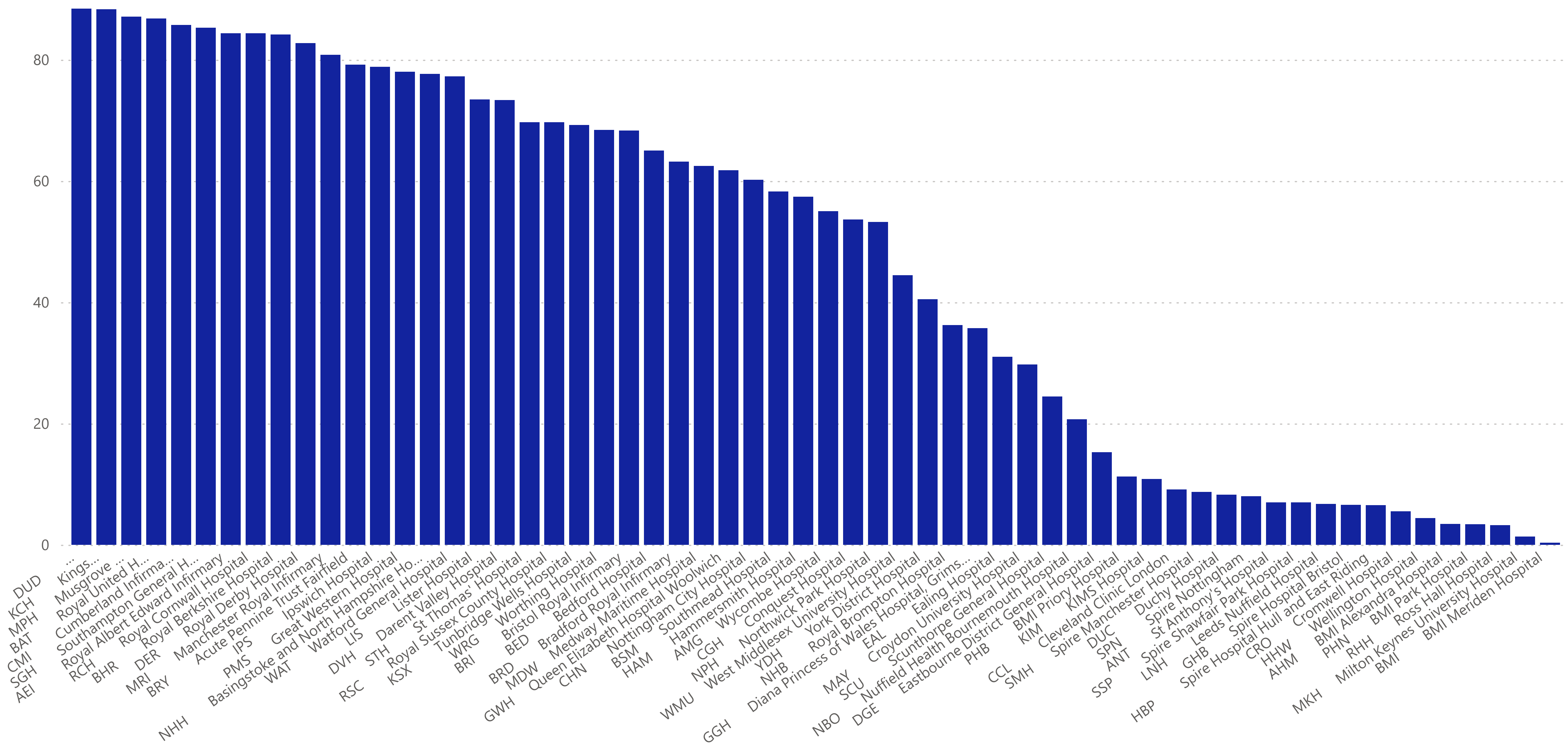
Survey

Mean number of PCs per Consultant



2022-23 Data
Mamas Mamas

In NHS Centres (2022/23) (2 of 2)





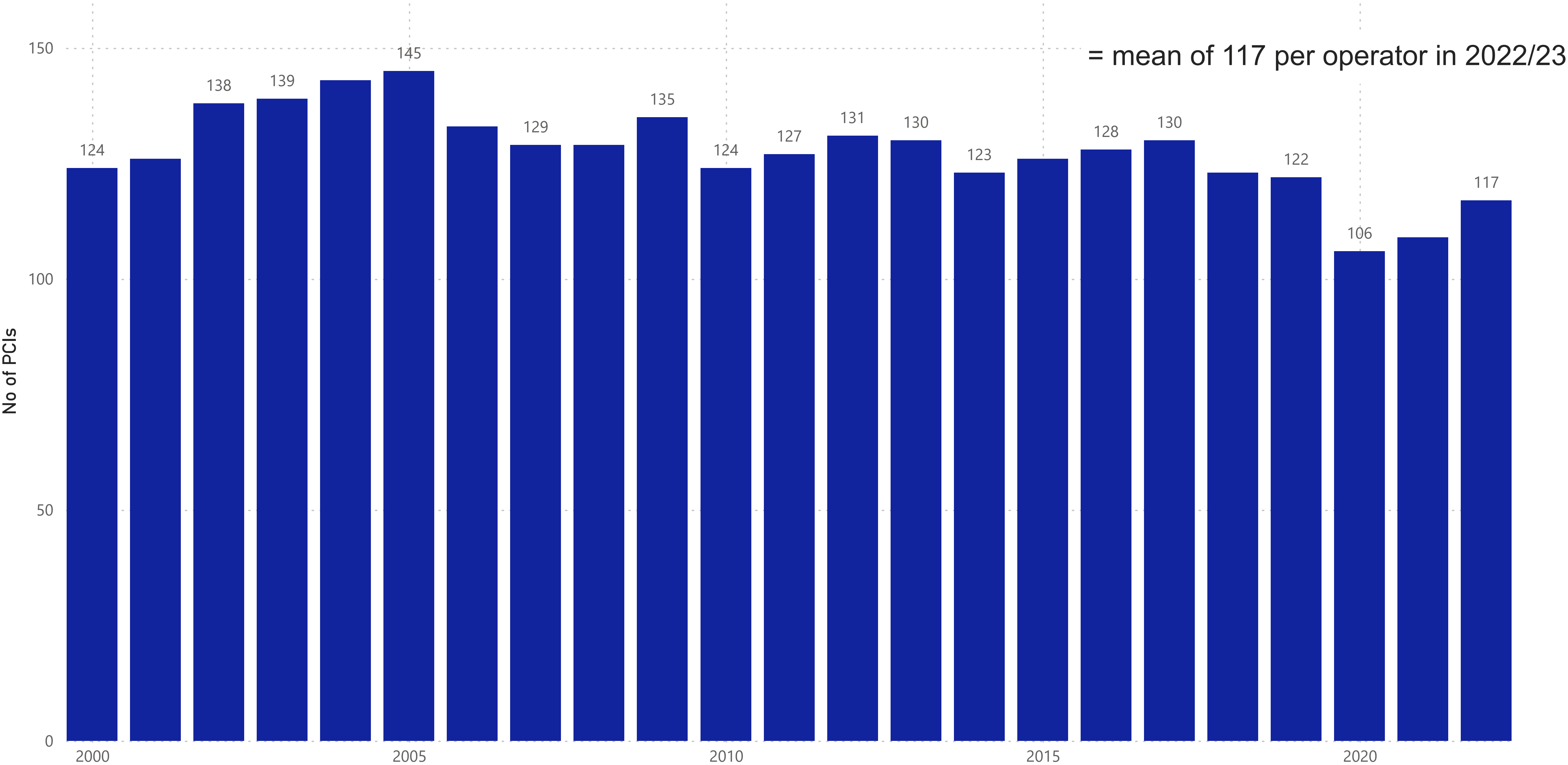
Survey

Mean number of PCIs per Consultant



2022-23 Data
Mamas Mamas

PCI Centre Volume / Number of Operators





Primary Percutaneous Coronary Intervention for ST Elevation Myocardial Infarction
Position statement for Facilities and Emergency Medical Staffing July 2016

MacCarthy PA, Blackman DJ, Hildick-Smith D, Banning AP

2 Staffing Standards

2.1 Primary PCI rotas:

Key Recommendations

- The maximum frequency of on-call rota for any individual should not be more frequent than 1:6
- A Consultant Interventional Cardiologists rota will include:-
 - One half-day of compensatory rest for each full day of consecutive on-call in lower volume centres (<400 PPCI procedures per year)
 - One full day of compensatory rest for each full day of consecutive on-call in lower volume centres ($\geq$ 400 PPCI procedures per year)



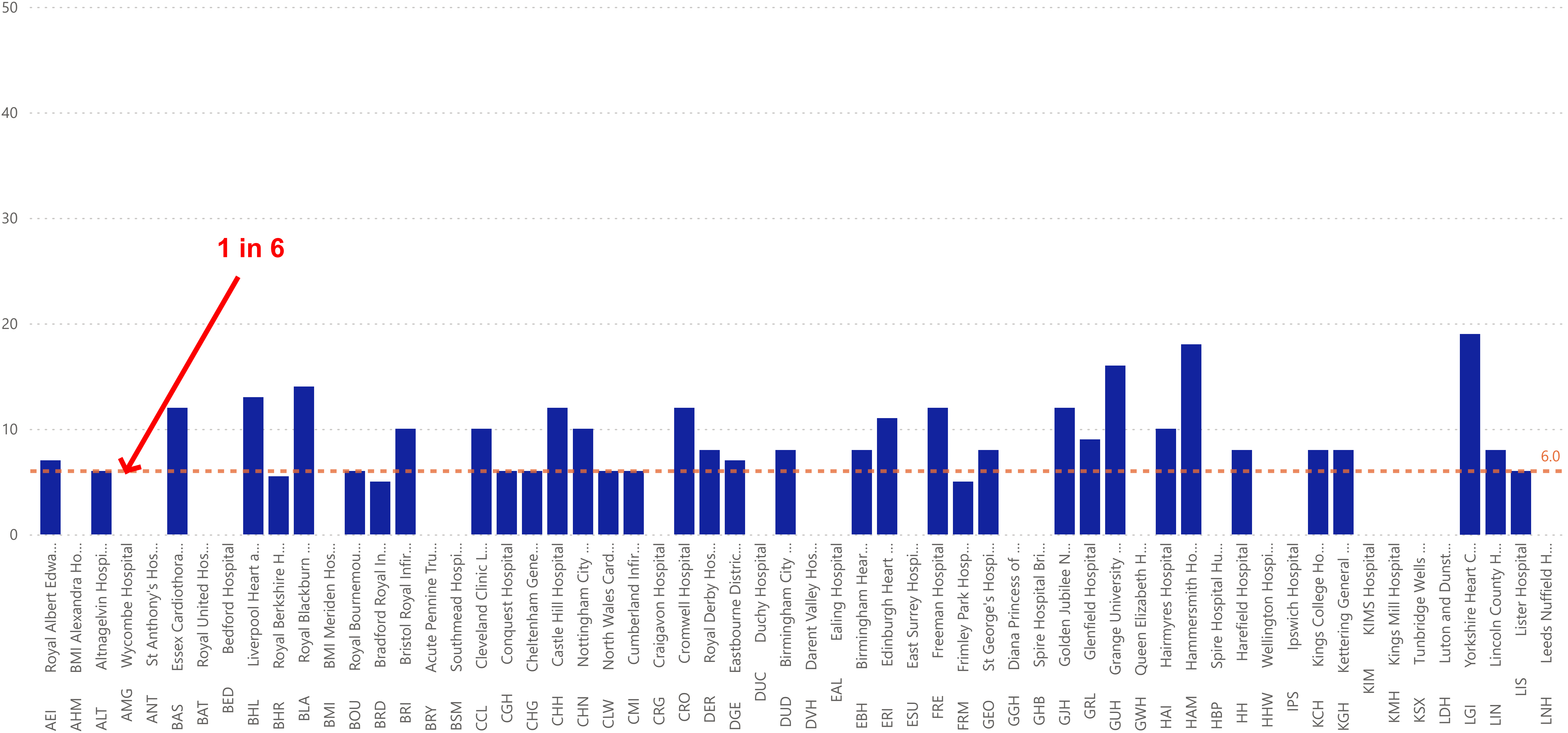
Survey



2022-23 Data
Mamas Mamas

PPCI

On call rotas (A to L)





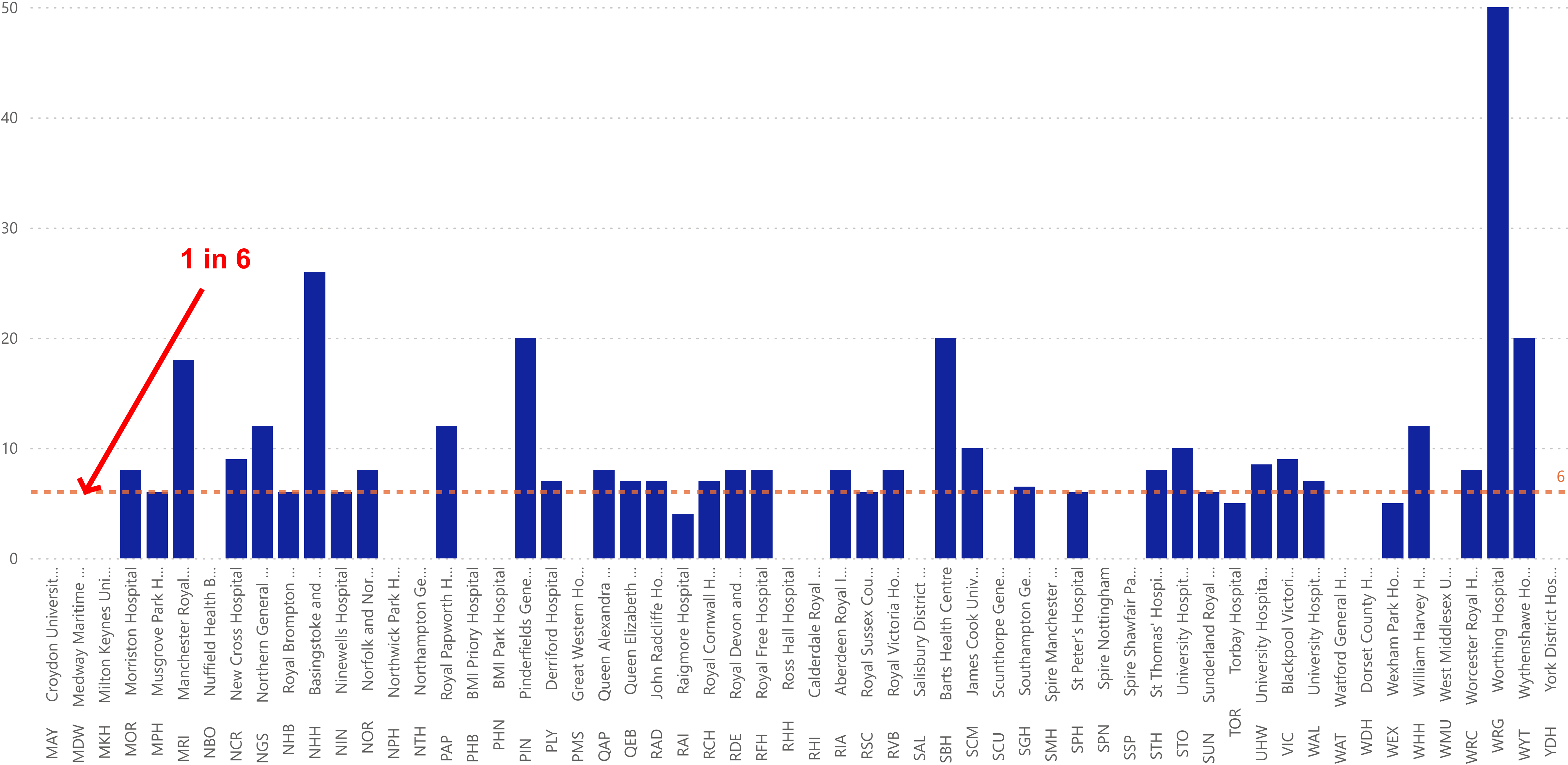
Survey



2022-23 Data
Mamas Mamas

PPCI

On call rotas (M to Y)





Survey

On vs Off Site Surgery

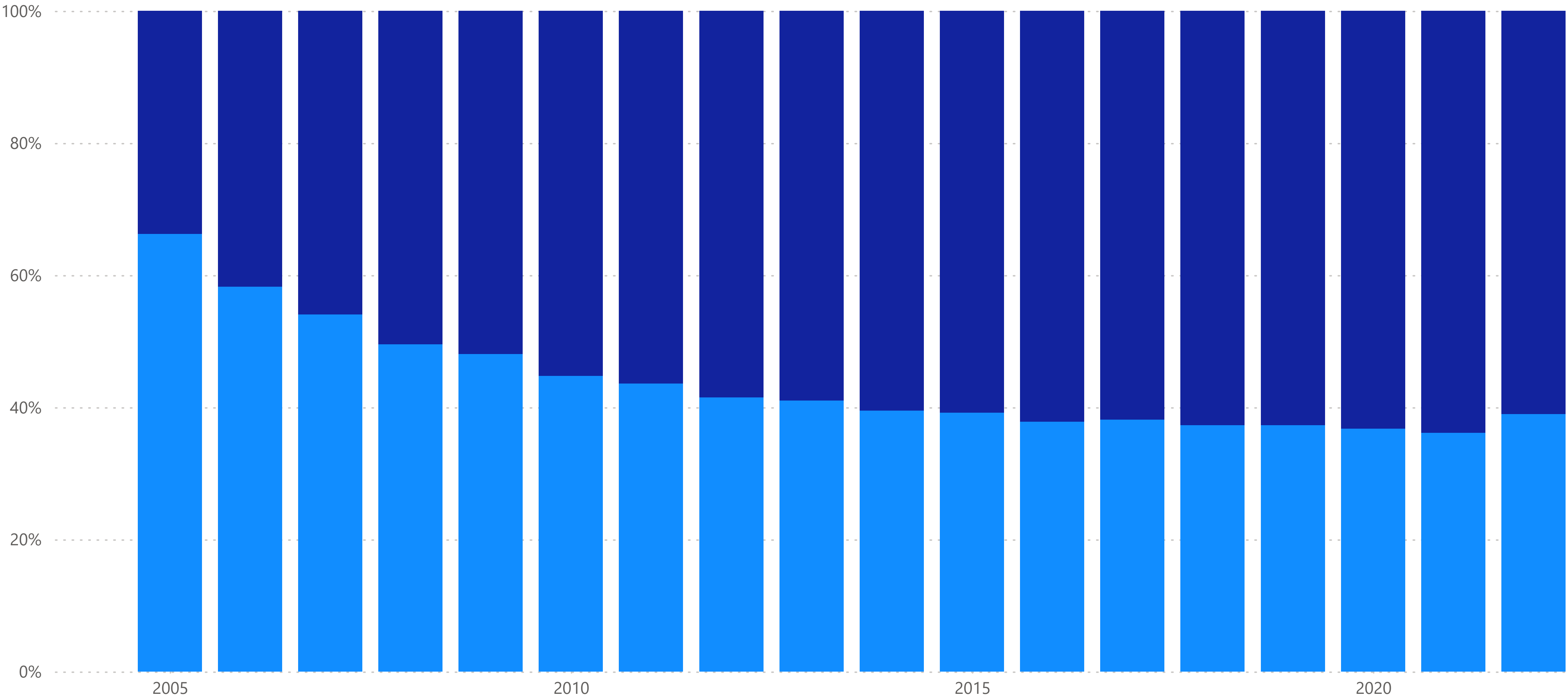
All Centres (NHS and Private)



2022-23 Data
Mamas Mamas

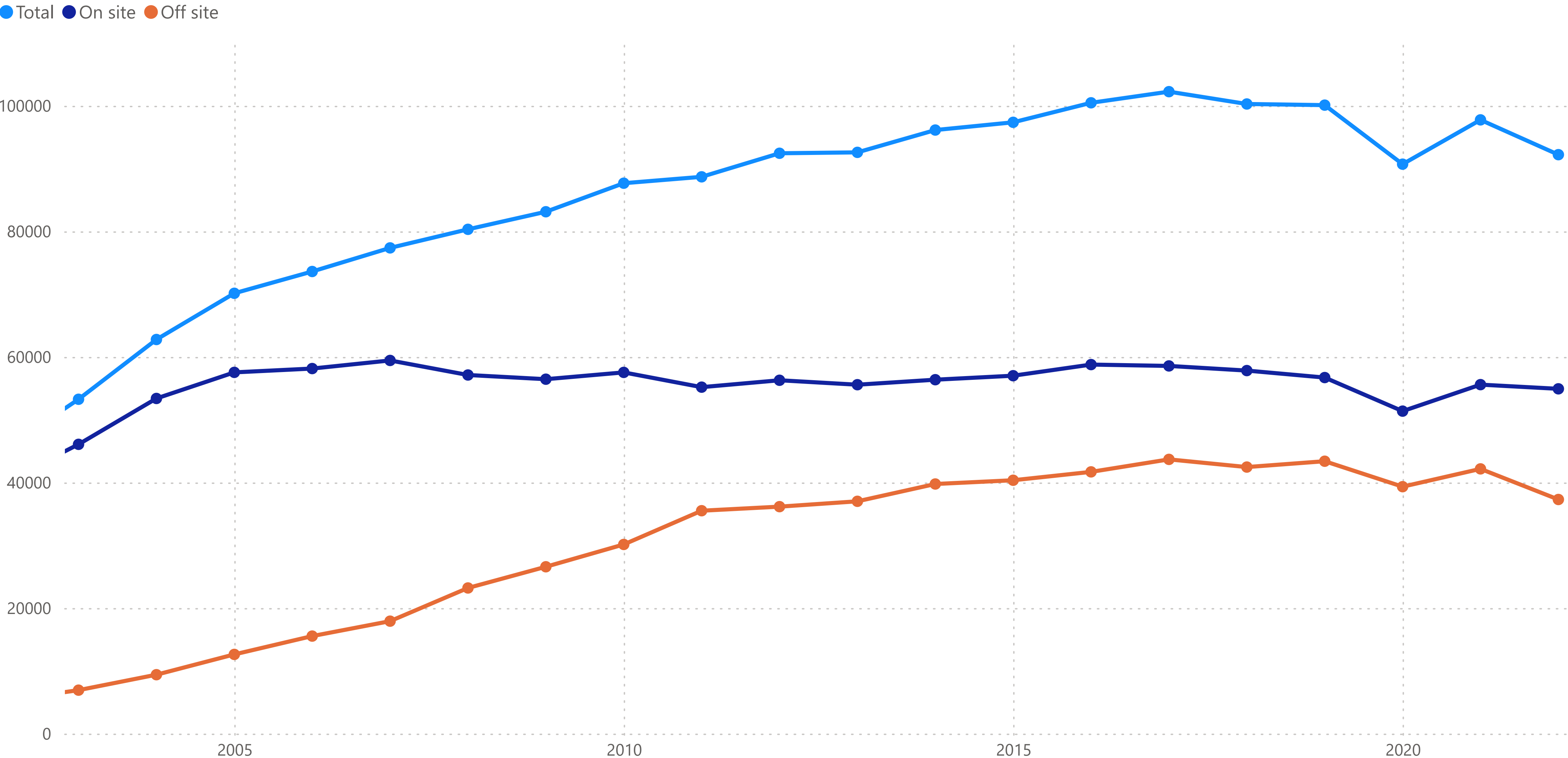
On-site = 39%

● On site ● Off site



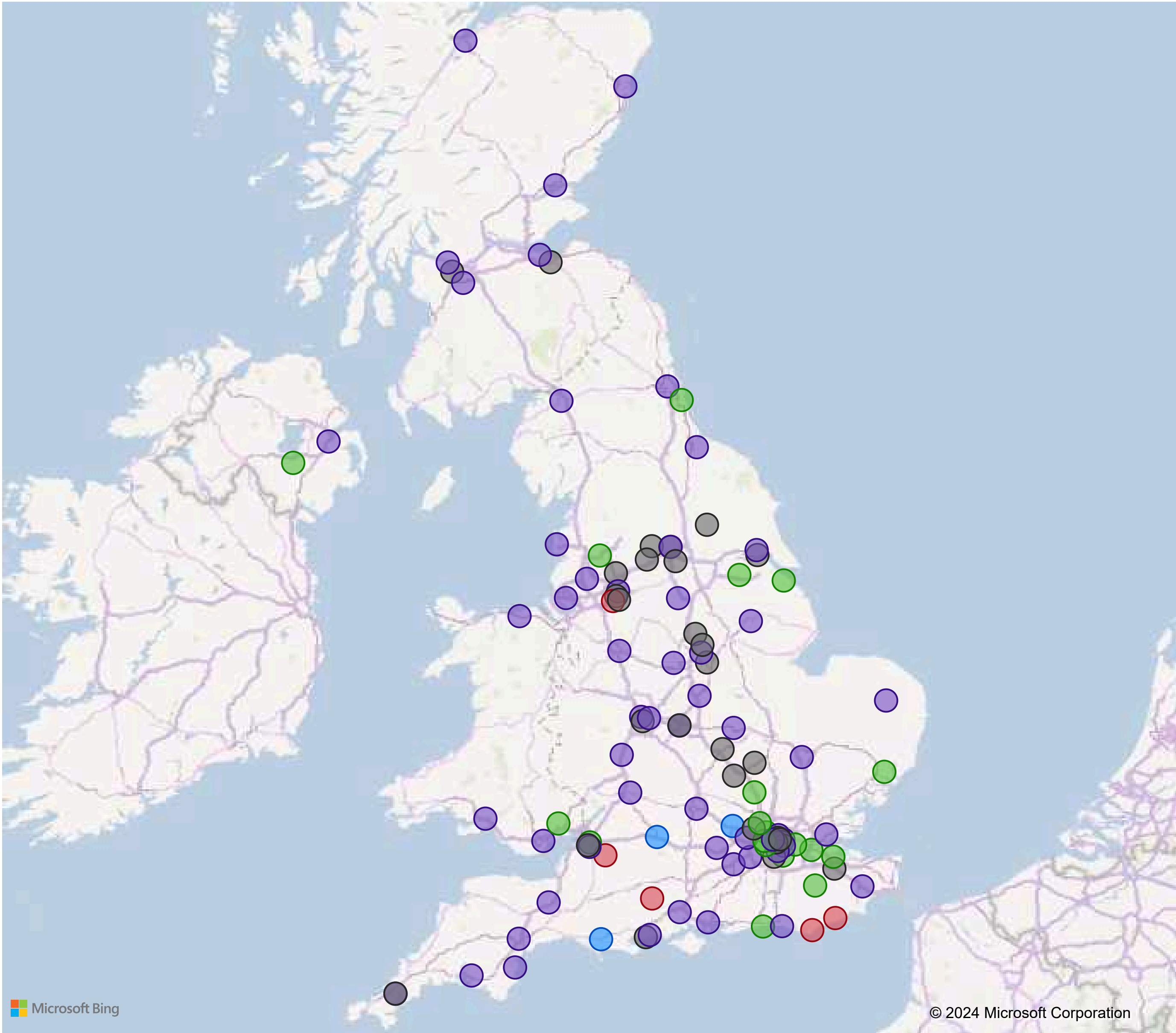
Total Number of PCIs

By Surgical Cover (NHS and Private)



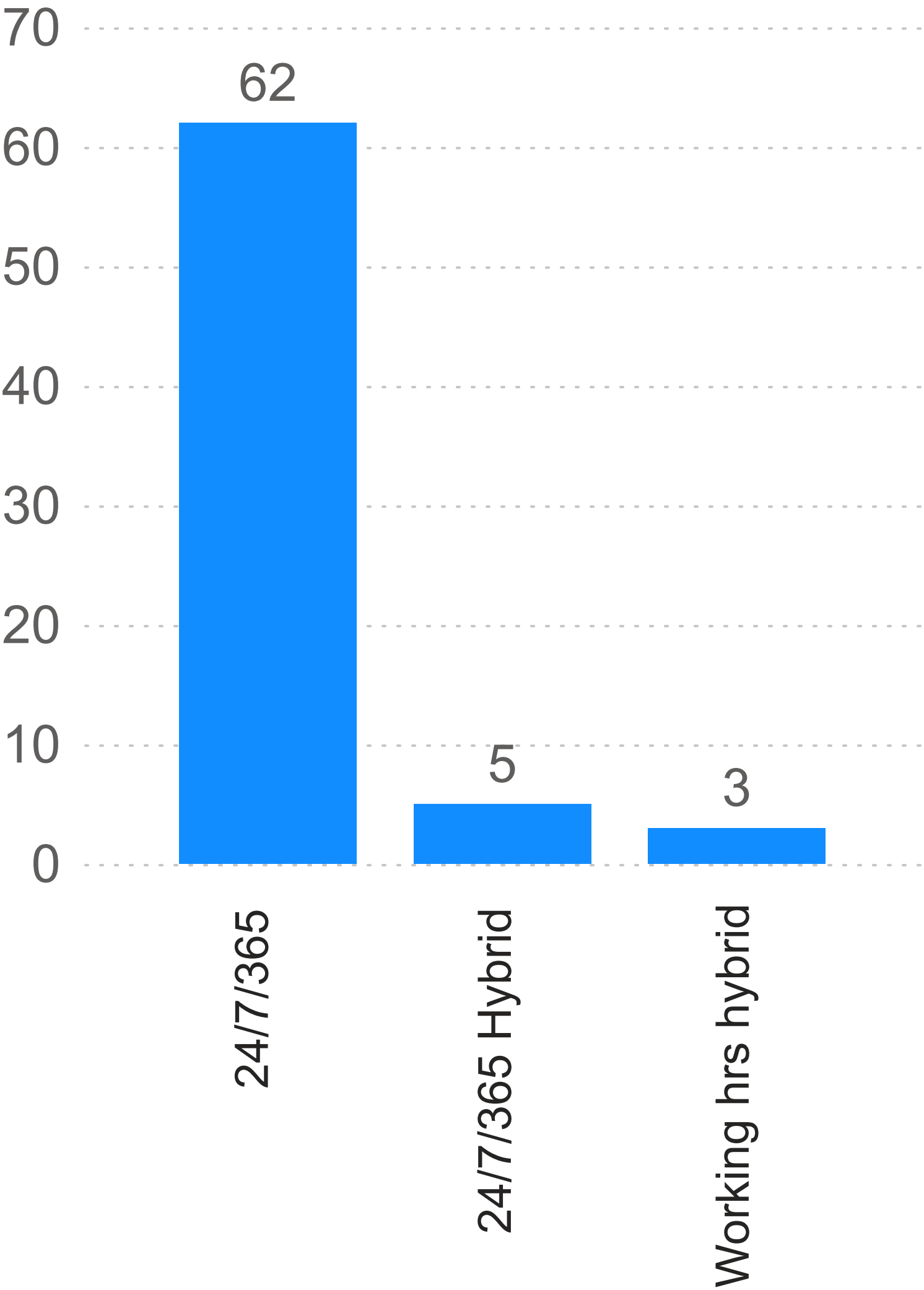
Primary PCI

2022/23



Primary PCI

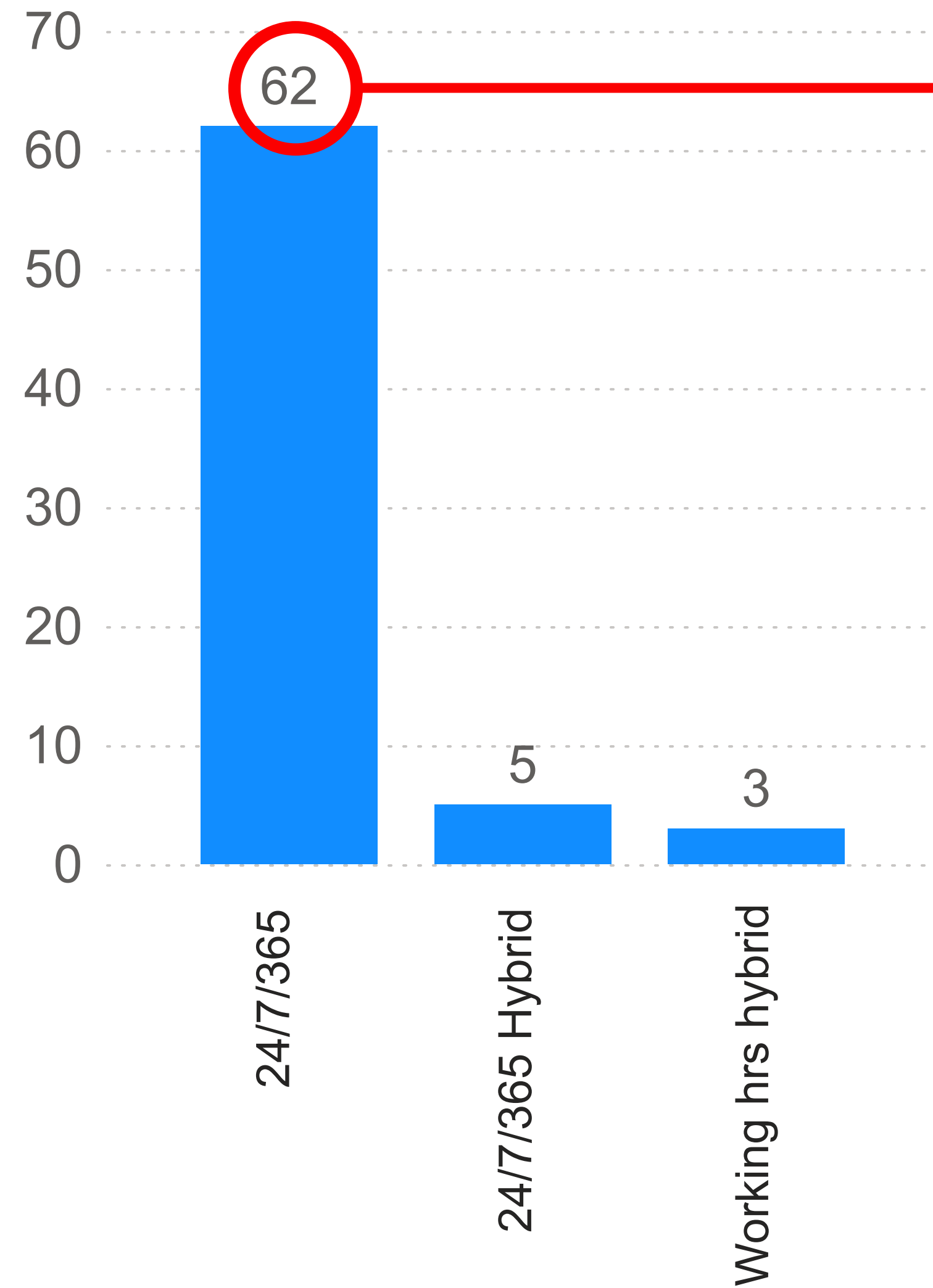
Pattern of activity offered (NHS 2022/23)



Paramedic Destinations for STEMI:
70 Centres

Primary PCI

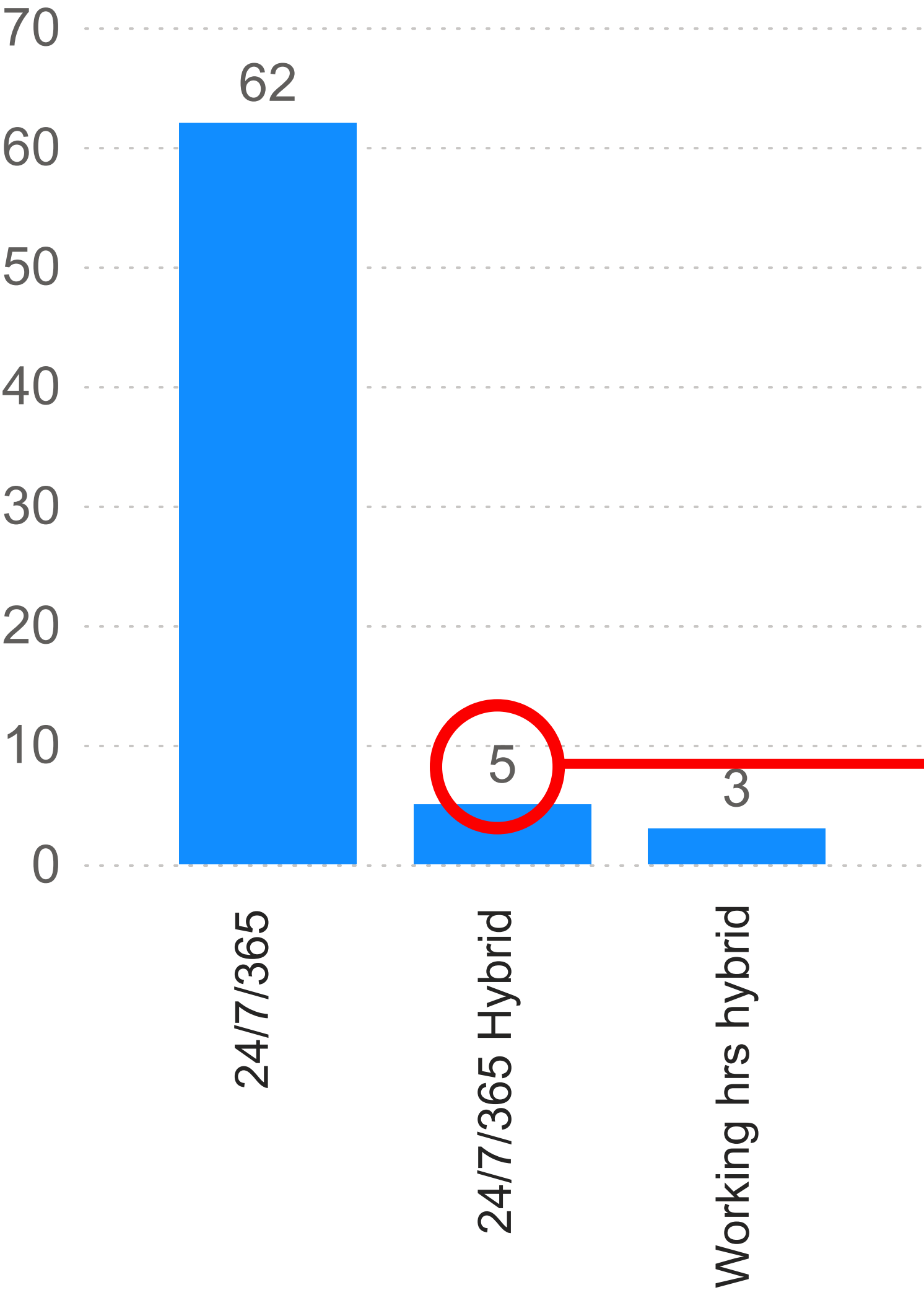
Pattern of activity offered (NHS 2022/23)



ALT	Altnagelvin Hospital	GJH	Golden Jubilee National Hospital
RAI	Raigmore Hospital	DUD	Birmingham City Hospital
CMI	Cumberland Infirmary	STO	University Hospital of North Staffordshire
BAS	Essex Cardiothoracic Centre	STH	St Thomas' Hospital
PLY	Derriford Hospital	HAM	Hammersmith Hospital
BOU	Royal Bournemouth Hospital	RDE	Royal Devon and Exeter Hospital
HAI	Hairmyres Hospital	SBH	Barts Health Centre
GEO	St George's Hospital	RFH	Royal Free Hospital
BRI	Bristol Royal Infirmary	CLW	North Wales Cardiac Centre
WAL	University Hospital Coventry	CHH	Castle Hill Hospital
NCR	New Cross Hospital	PAP	Royal Papworth Hospital
DER	Royal Derby Hospital	QAP	Queen Alexandra Hospital
NIN	Ninewells Hospital	VIC	Blackpool Victoria Hospital
UHW	University Hospital of Wales	WEX	Wexham Park Hospital
MRI	Manchester Royal Infirmary	SGH	Southampton General Hospital
LIN	Lincoln County Hospital	RIA	Aberdeen Royal Infirmary
FRE	Freeman Hospital	FRM	Frimley Park Hospital
MPH	Musgrove Park Hospital	NGS	Northern General Hospital
WHH	William Harvey Hospital	BHR	Royal Berkshire Hospital
RCH	Royal Cornwall Hospital	CHN	Nottingham City Hospital
RVB	Royal Victoria Hospital	TOR	Torbay Hospital
MOR	Morriston Hospital	GRL	Glenfield Hospital
KCH	Kings College Hospital	CHG	Cheltenham General Hospital
KGH	Kettering General Hospital	EBH	Birmingham Heartlands Hospital
HH	Harefield Hospital	NOR	Norfolk and Norwich University Hospital
LGI	Yorkshire Heart Centre	SPH	St Peter's Hospital
SCM	James Cook University Hospital	AEI	Royal Albert Edward Infirmary
BHL	Liverpool Heart and Chest Hospital	WRC	Worcester Royal Hospital
LIS	Lister Hospital	NHH	Basingstoke and North Hampshire Hospital
RAD	John Radcliffe Hospital	QEB	Queen Elizabeth Hospital Birmingham
RSC	Royal Sussex County Hospital	ERI	Edinburgh Heart Centre

Primary PCI

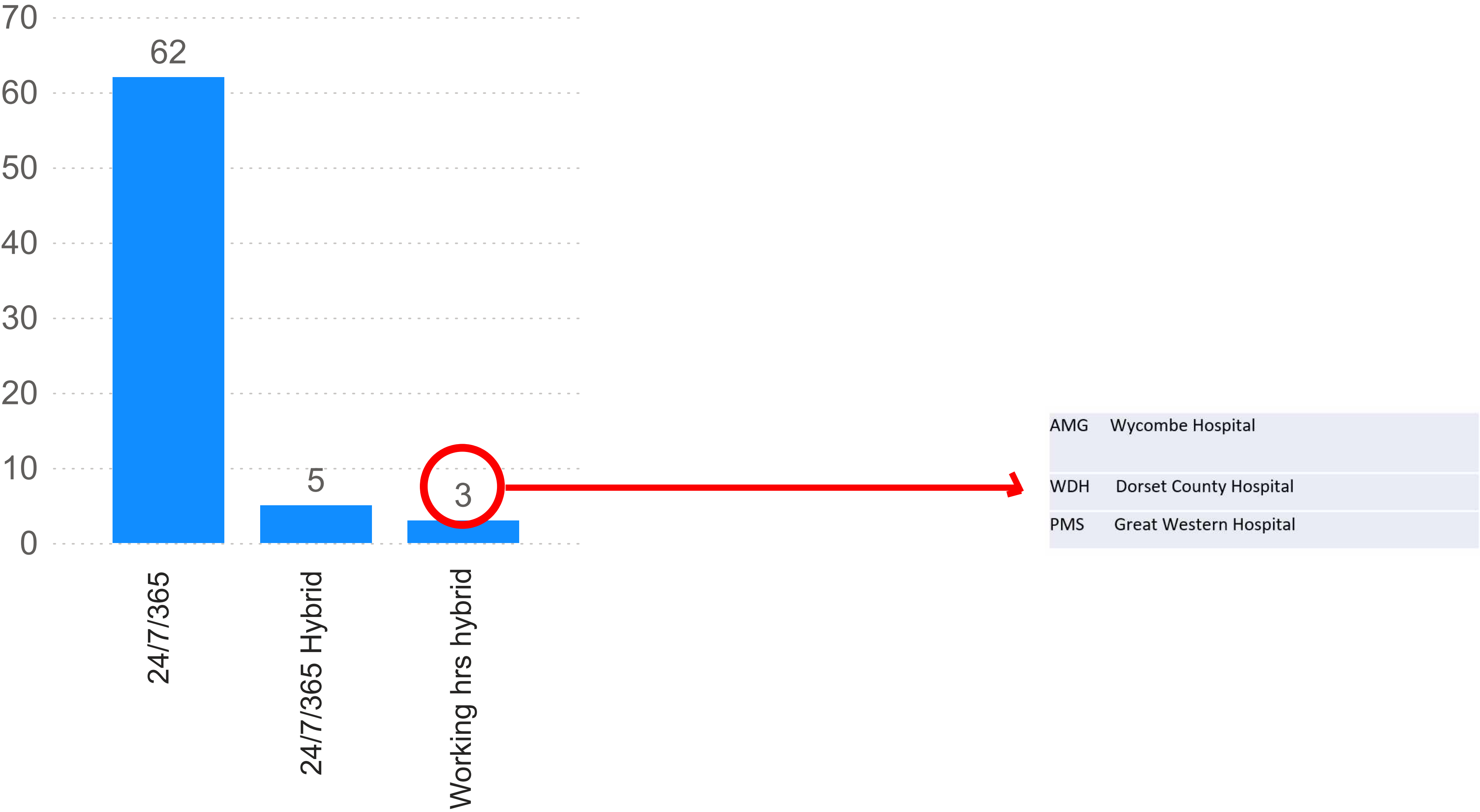
Pattern of activity offered (NHS 2022/23)



WYT	Wythenshawe Hospital
DGE	Eastbourne District General Hospital
CGH	Conquest Hospital
SAL	Salisbury District Hospital
BAT	Royal United Hospital Bath

Primary PCI

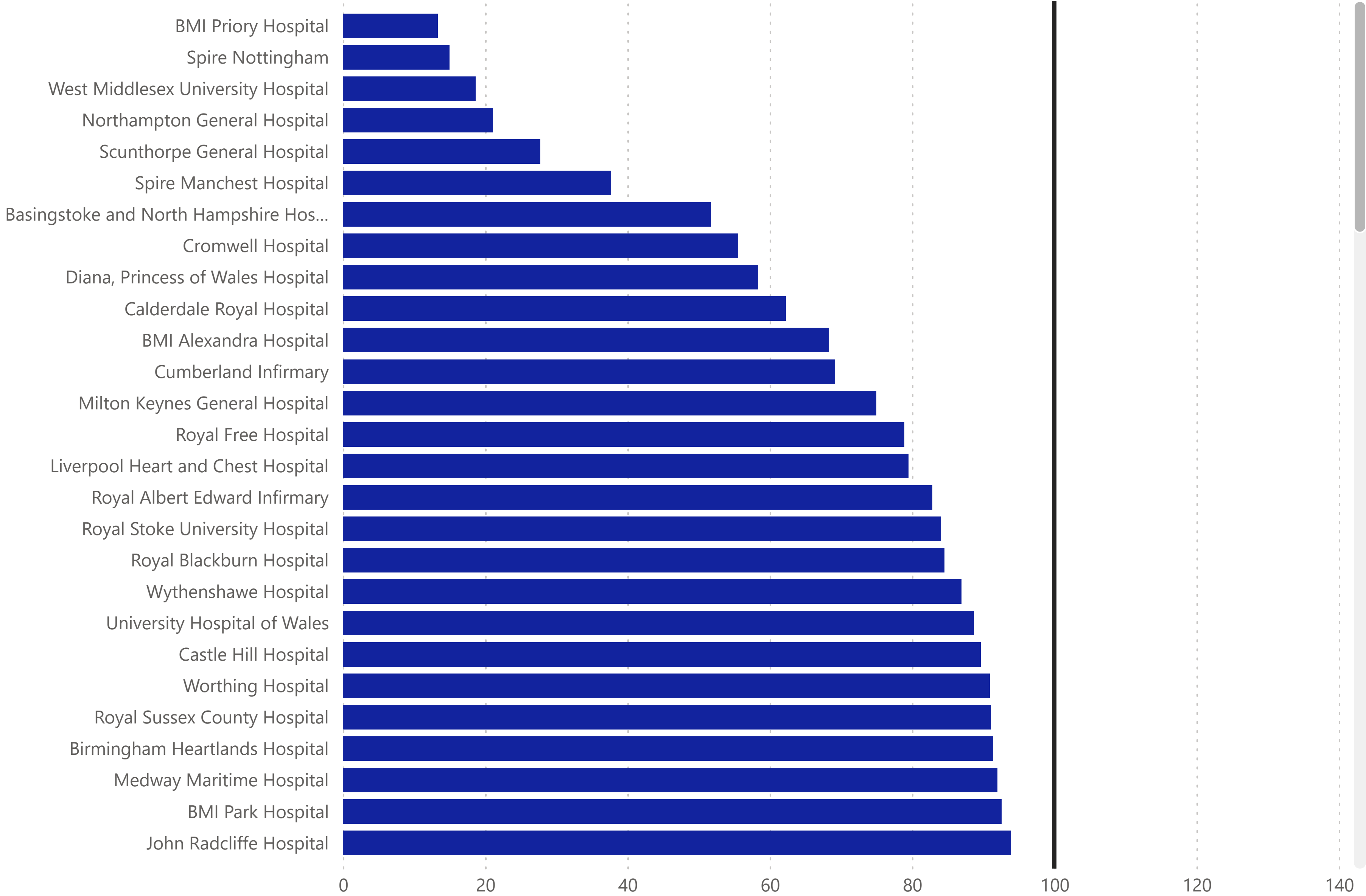
Pattern of activity offered (NHS 2022/23)



Procedure Specific Analysis

Participation in NICOR 2022/23

		Total No of Centres	Data to NICOR	Missing
England	NHS	87	87	0
	Private	16	12	4
Wales	NHS	4	4	0
N Ireland	NHS	3	0	3
Scotland	NHS	6	0	6
	Private	2	0	2



Zero data from:

Northern Ireland
Altnagelvin Hospital (ALT)
Royal Victoria Hospital (RVB)
Craigavon Hospital (CRG)

Scotland
Raigmore Hospital (RAI)
Hairmyres Hospital (HAI)
Ninewells Hospital (NIN)
Golden Jubilee Hospital (GJH)
Aberdeen Royal Infirmary (RIA)
Edinburgh Heart Centre (ERI)

Private
Spire Shawfair Park Hospital (SSP)
Wellington Hospital (HHW)
Cleveland Clinic London (CCL)
BMI Meridien (BMI)
Spire Hospital Hull and East Riding (HBP)

Data sharing agreements may not be in place

NICOR but no survey
Spire Cardiff Hospital (SPC) – **did not submit**

No NICOR data and no survey
Harley Street Clinic
Spire Cardiff Hospital



NICOR Case Ascertainment

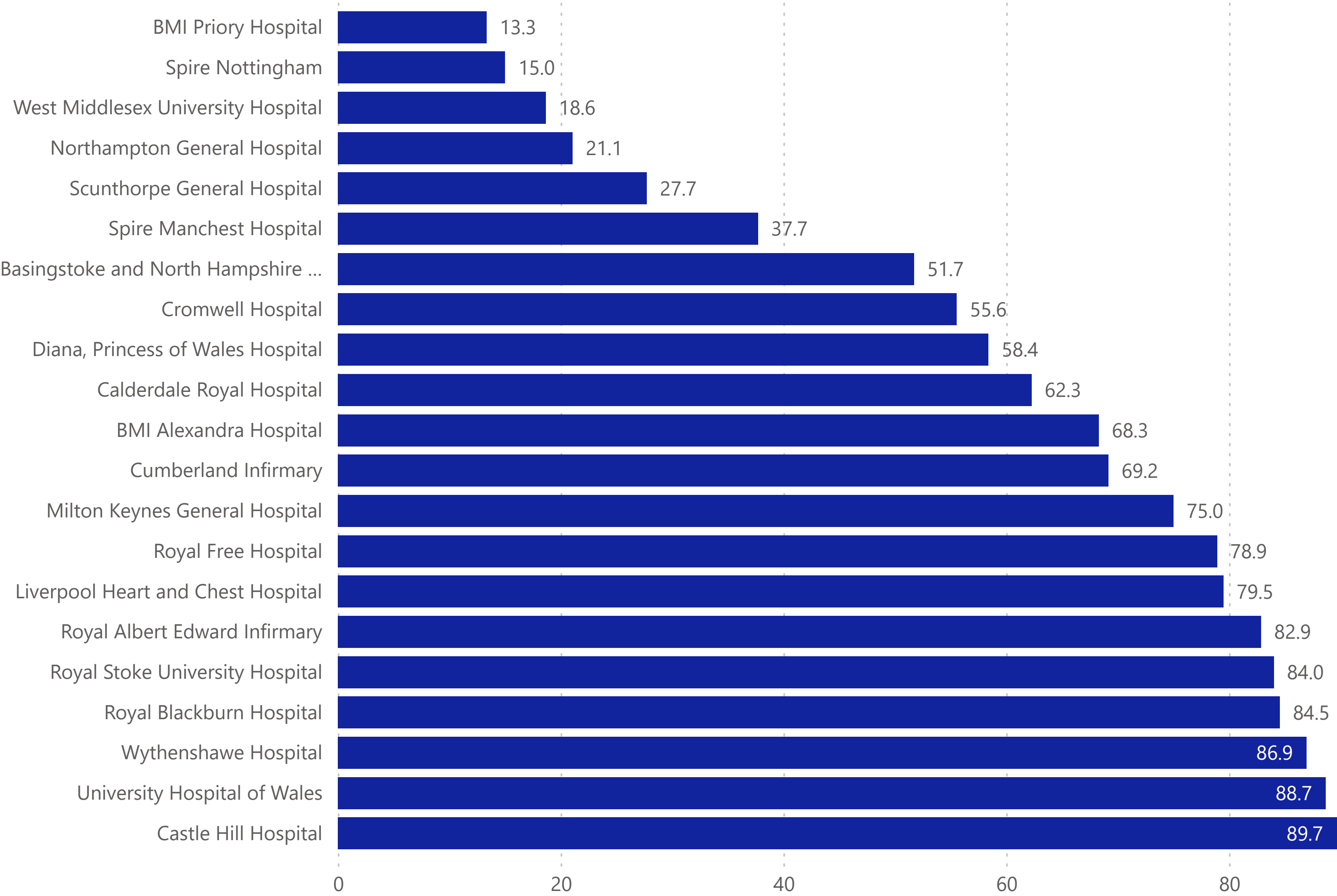


2022-23 Data
Mamas Mamas

Data Extract
10-11-2023

UK PCI data in NICOR as % of survey reported totals

< 90 % cases uploaded





Regional PCI activity

Adjustment per population size



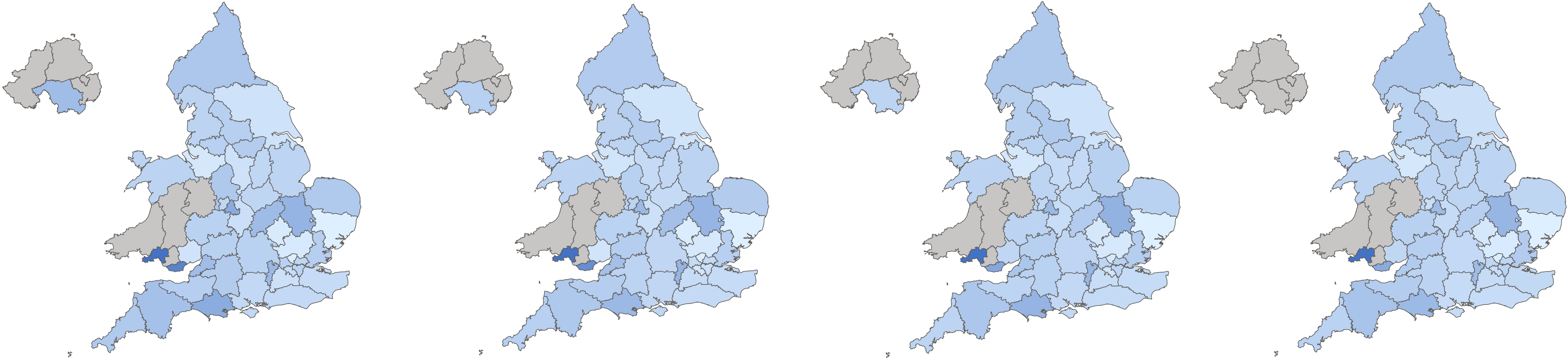
2019/20

2020/21

2021/22

2022/23

Ac





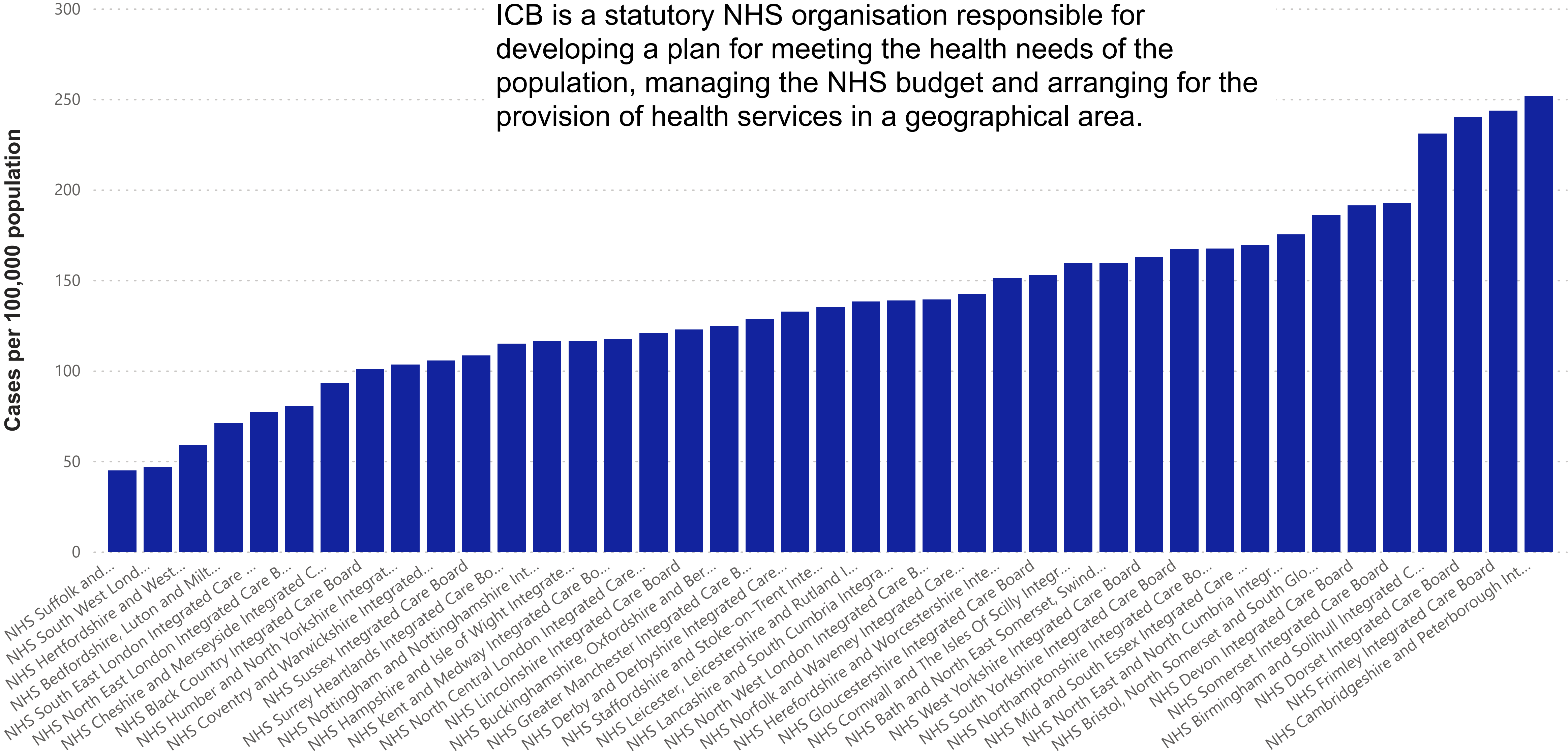
Data Extract
10-11-2023

PCI per 100,000 population

by ICB (Integrated Care Board)



2022-23 Data
Mamas Mamas





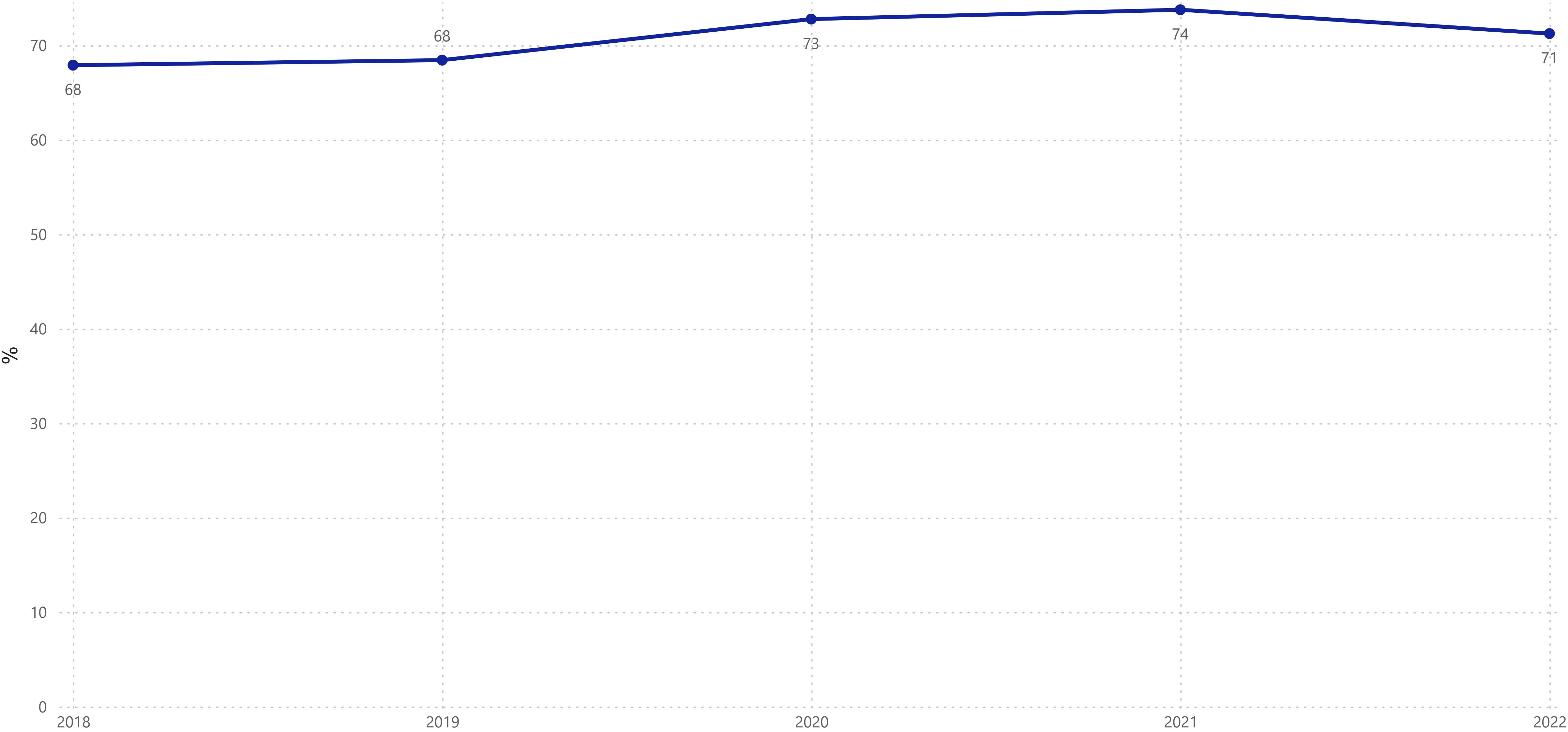
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

Day Case PCI

Elective Procedures - Trends (71% in 2022/23)





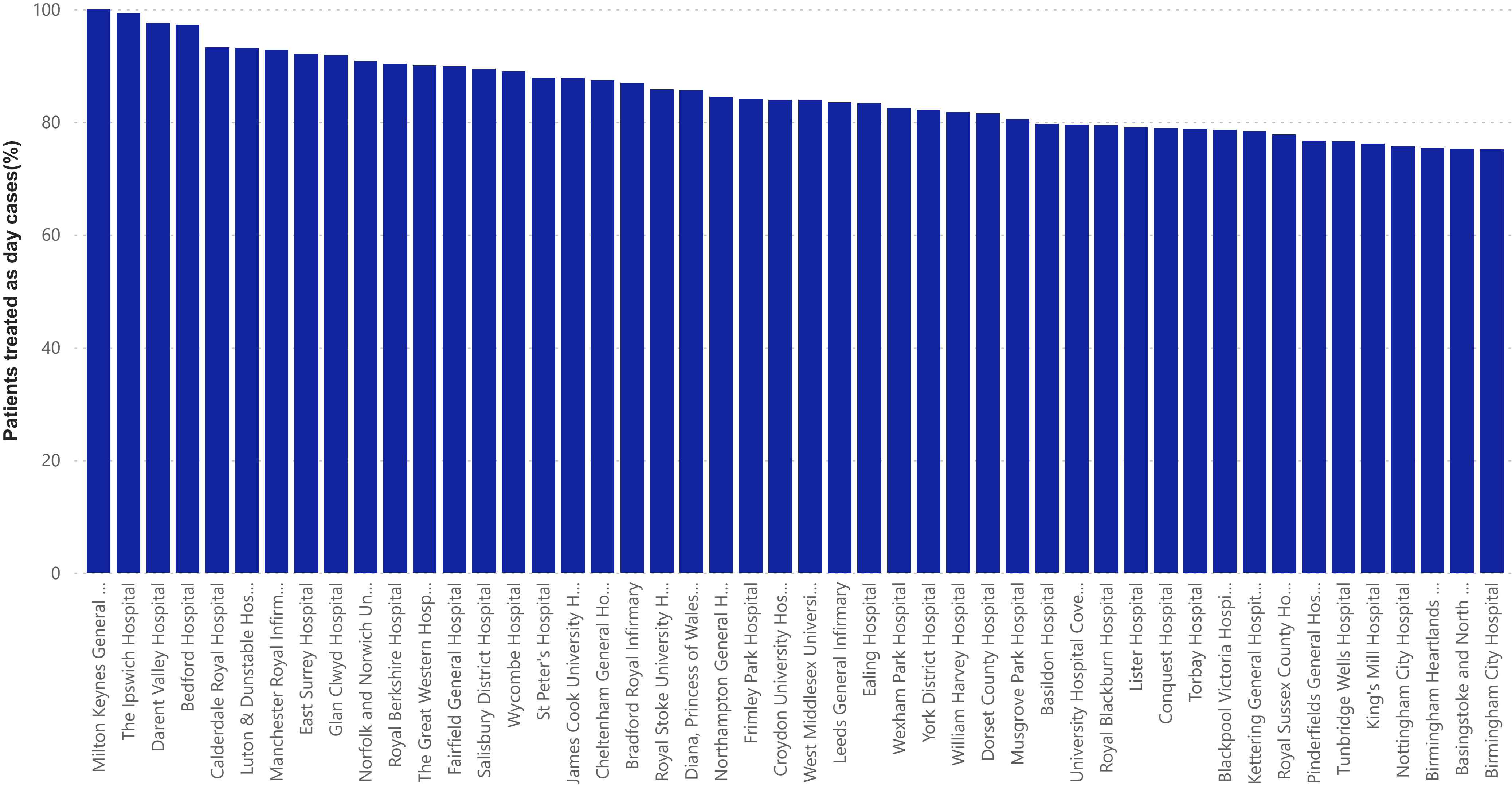
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

Day Case PCI

Planned Elective Procedures - (>75%)





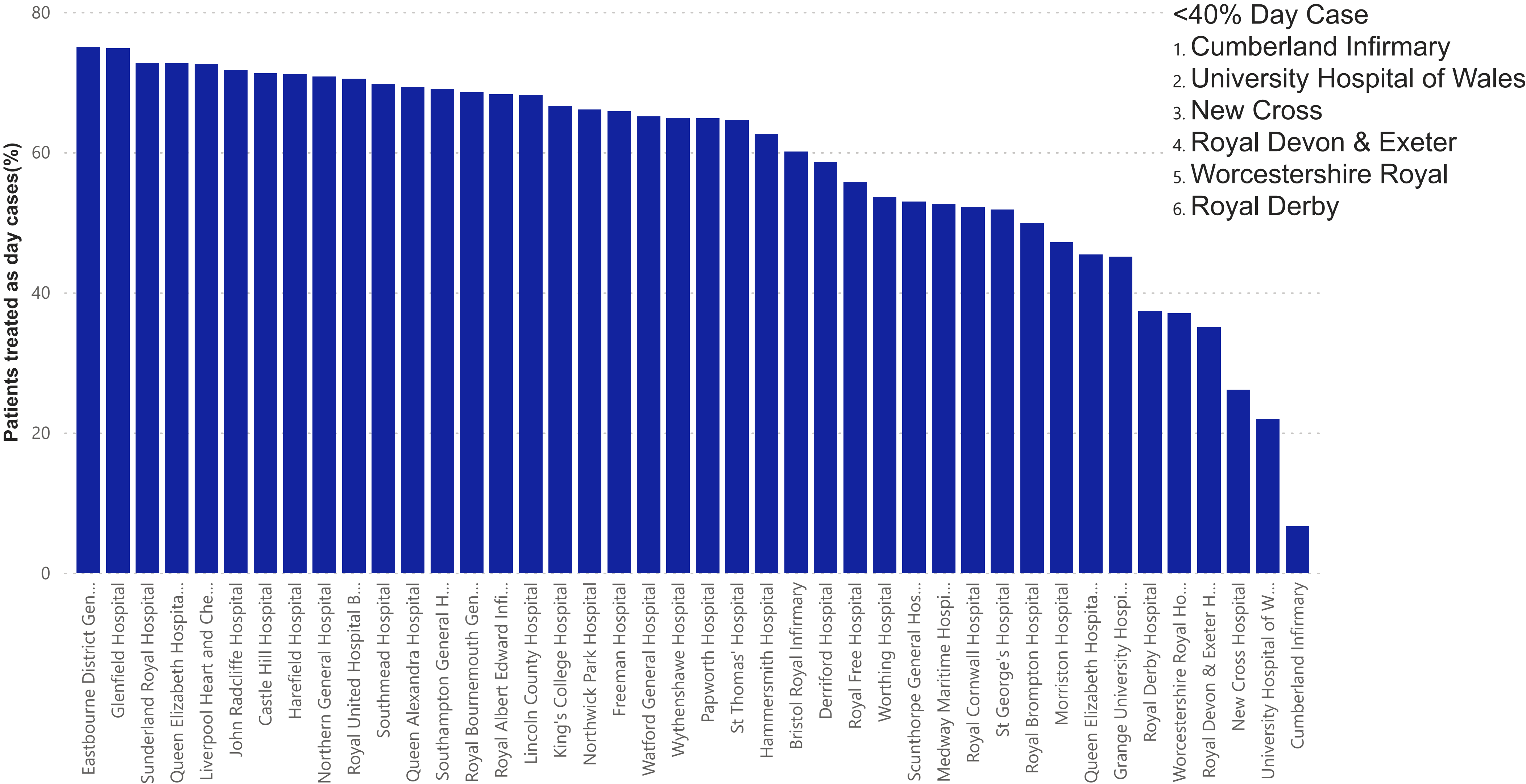
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

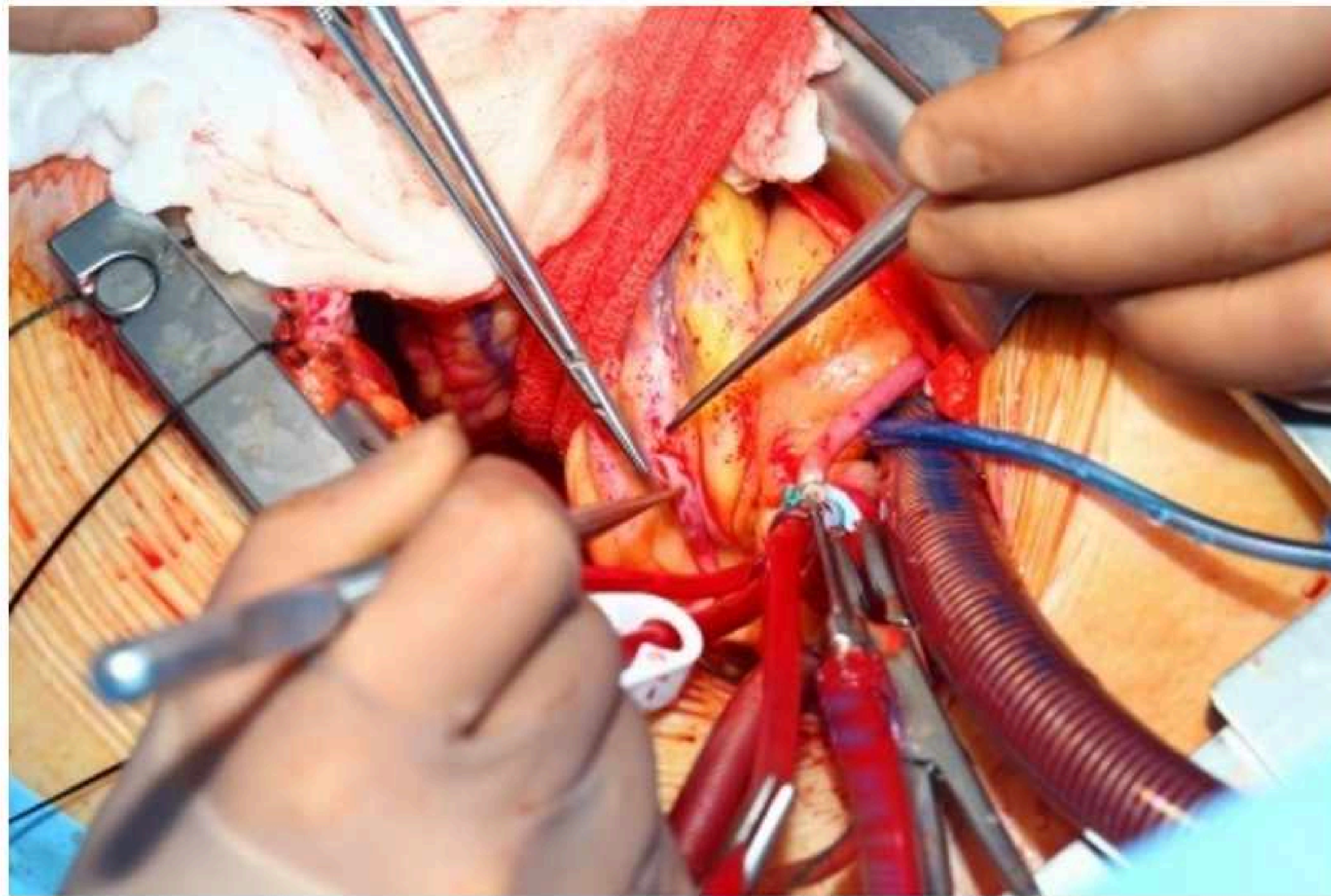
Day Case PCI

Planned Elective Procedures (<75%)





PCI vs CABG activity





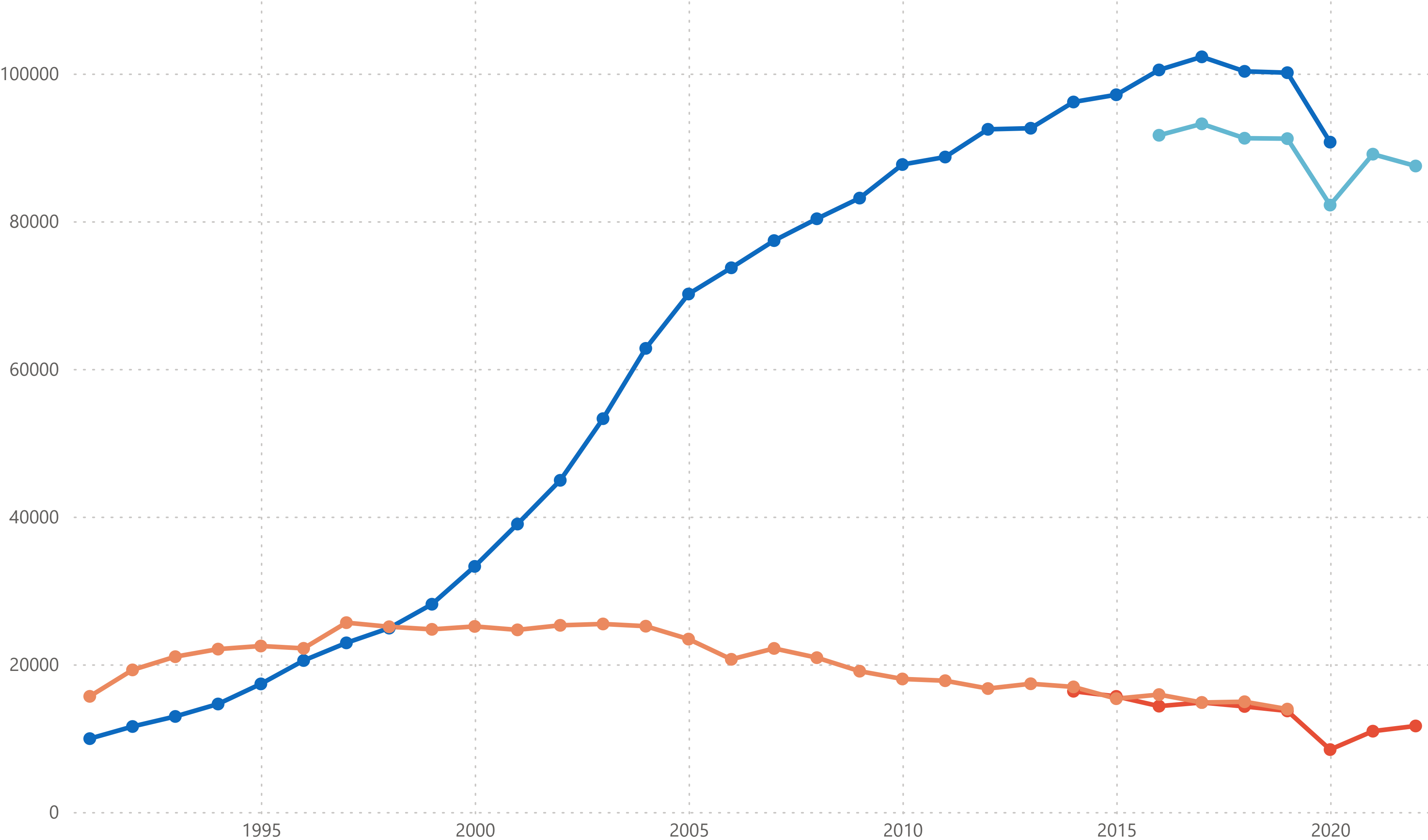
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

Total PCI vs Isolated CABG

● PCI ● PCI (Excluding Scotland) ● CABG (Excluding Scotland) ● CABG





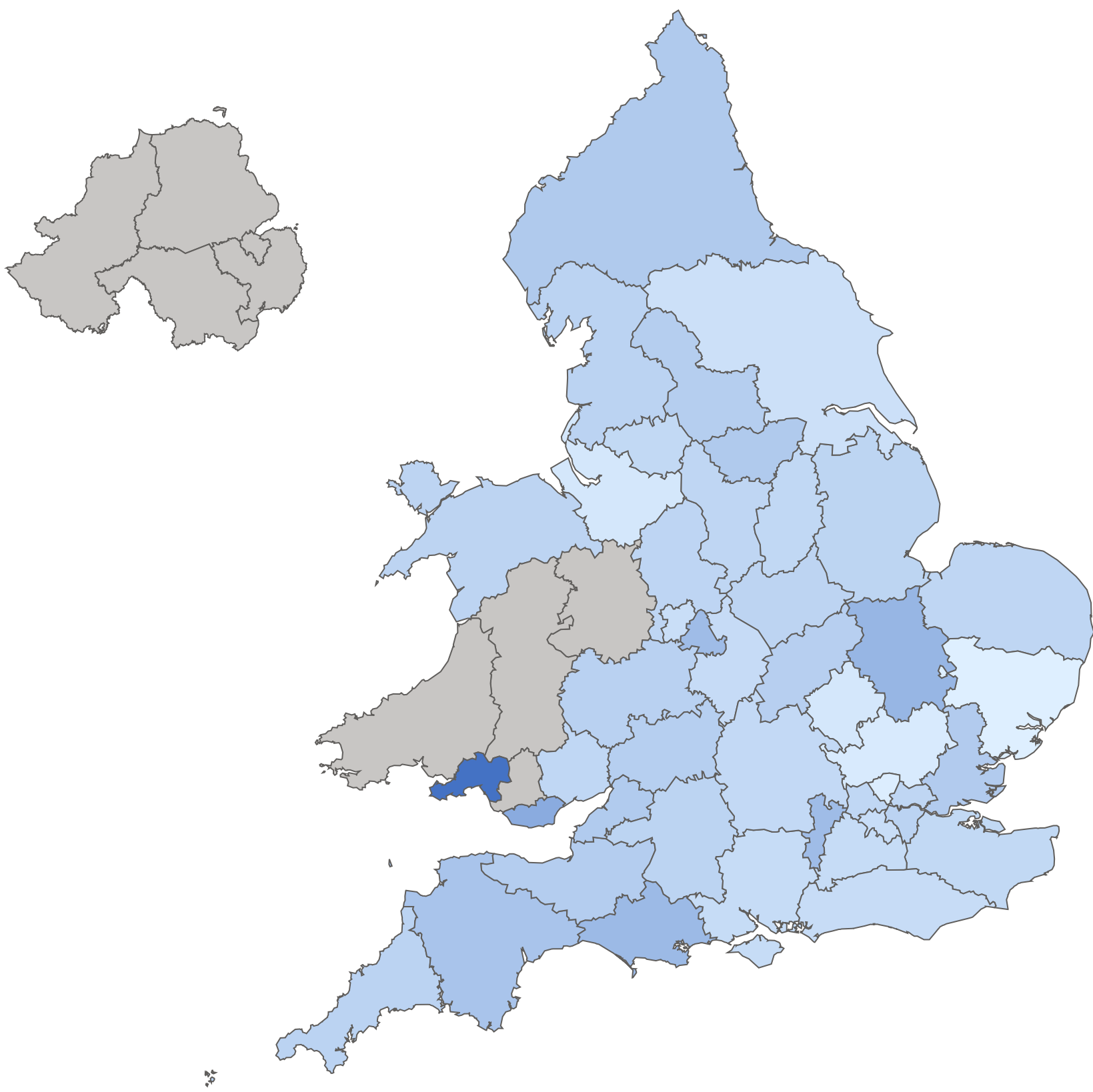
Data Extract
10-11-2023

PCI vs CABG

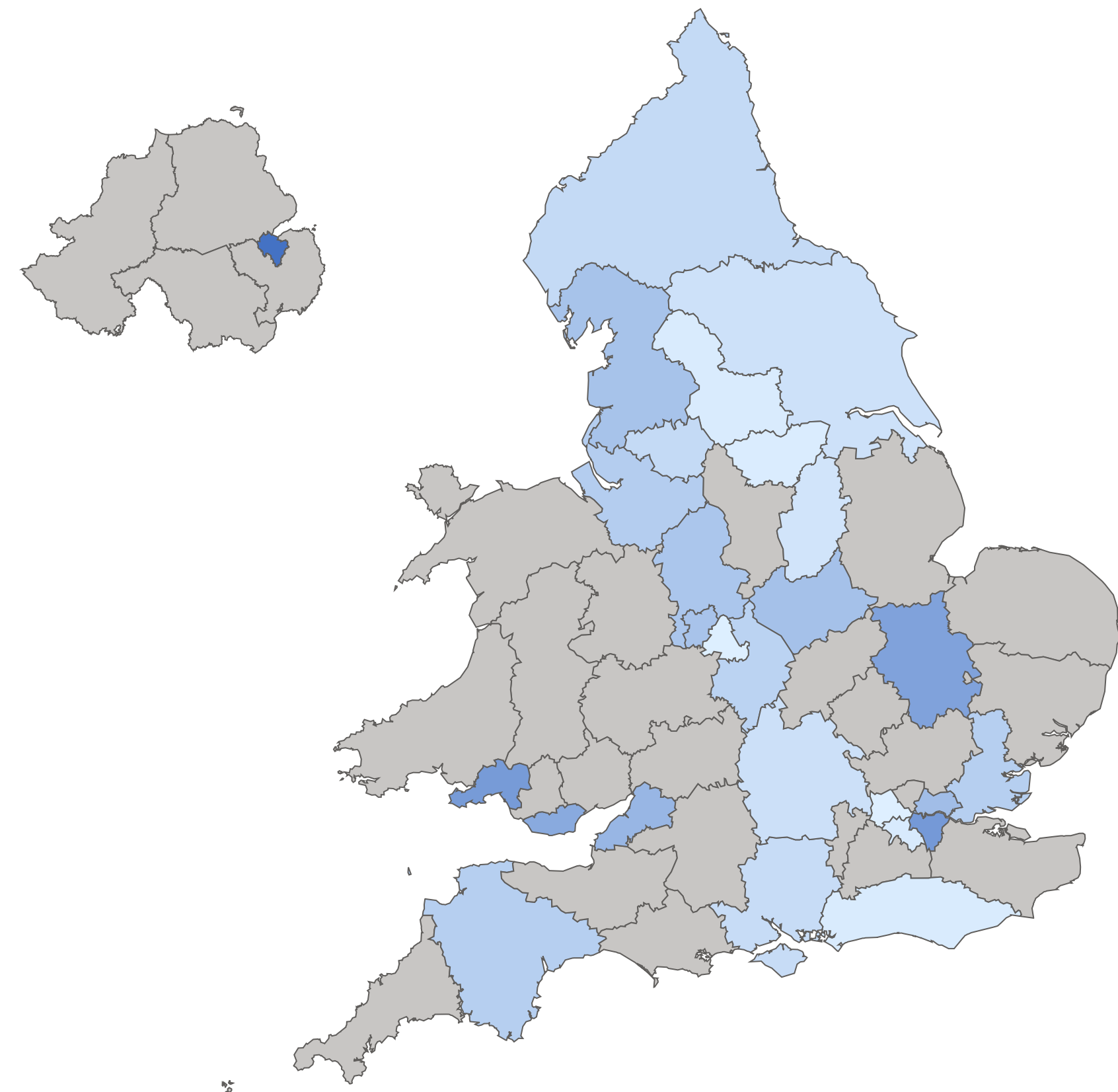


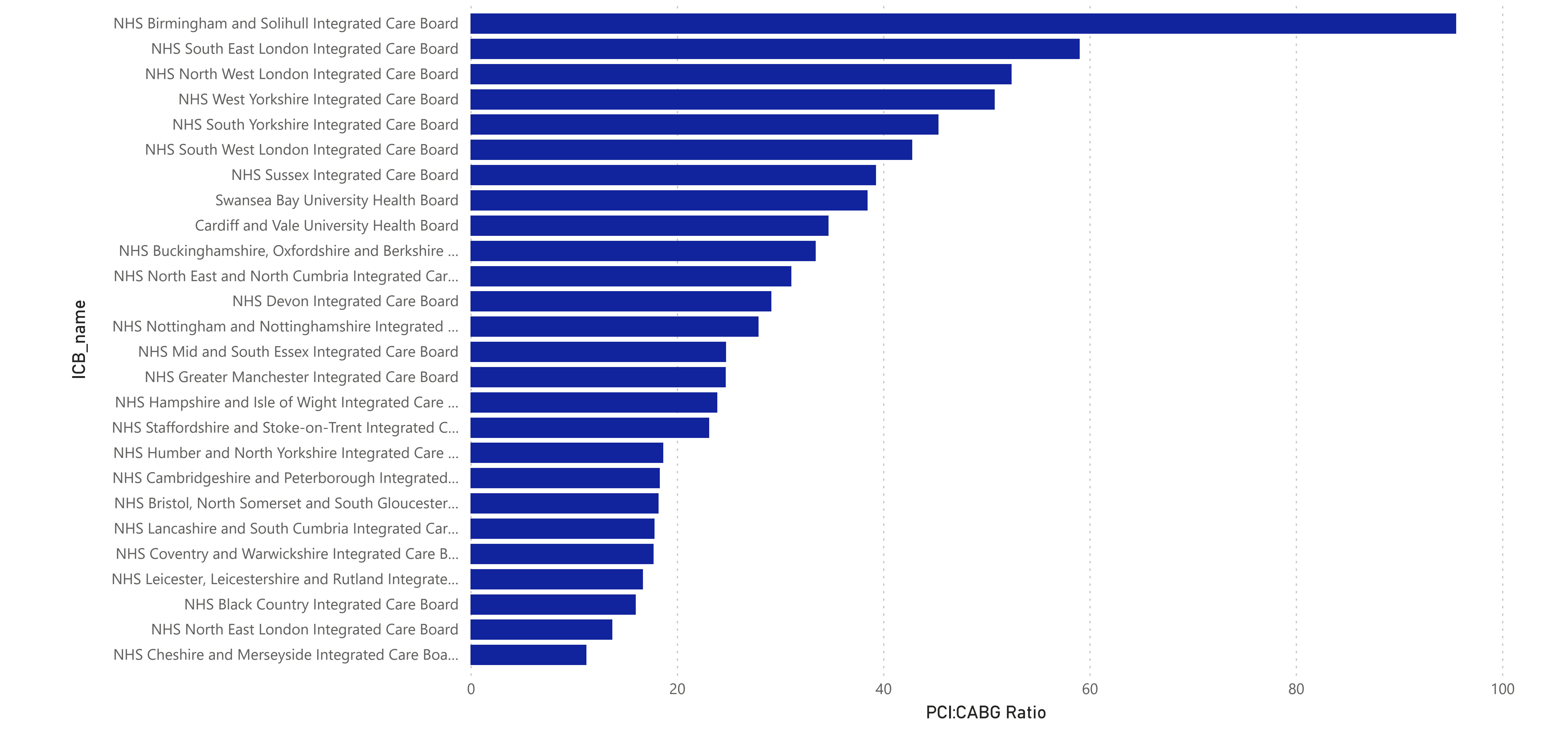
2022-23 Data
Mamas Mamas

PCI



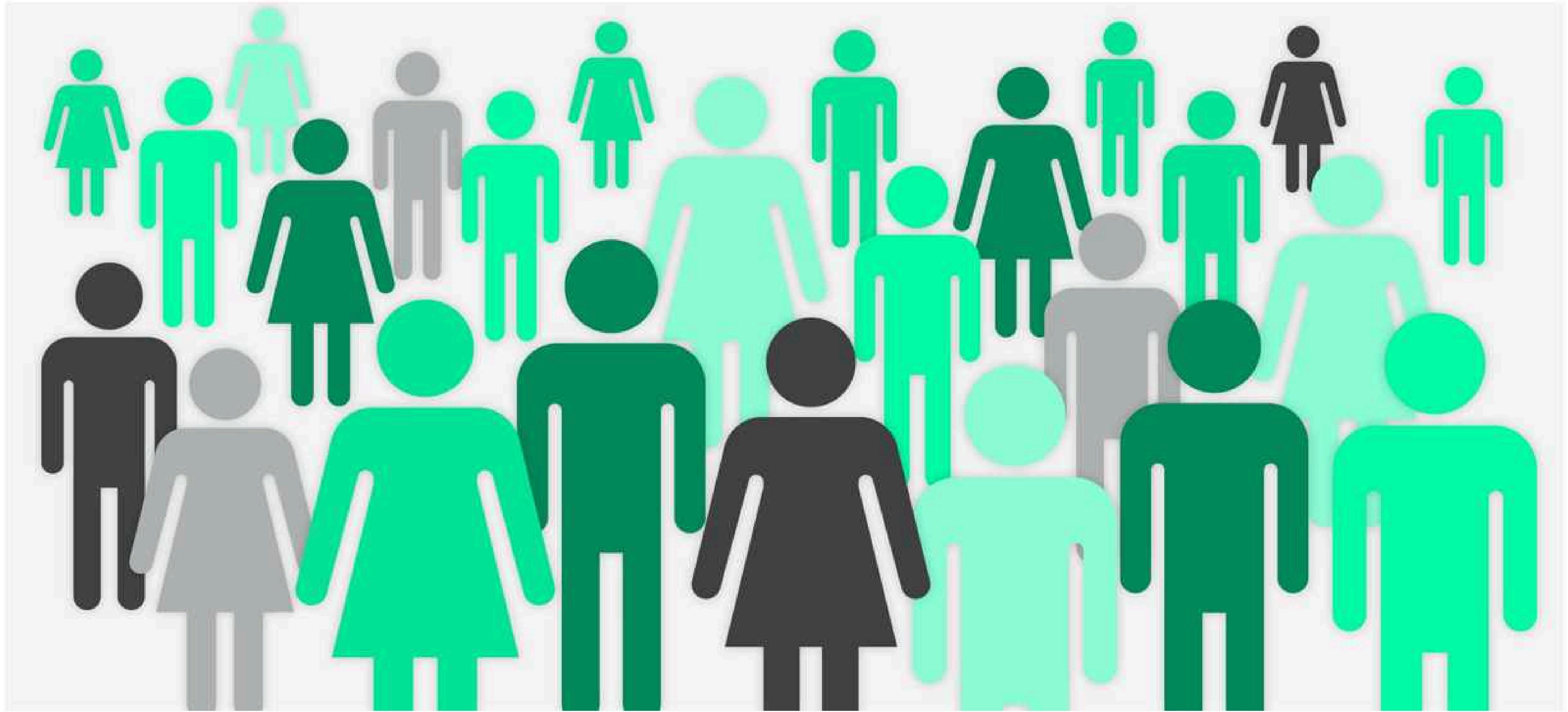
CABG







Clinical demographics



Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Age (mean)	64.90	65.10	65.10	65.30	65.40	65.60	65.70	65.20	65.50	65.50
Sex (male)	74.30	74.30	74.50	74.50	74.30	74.40	73.90	75.00	75.10	75.20
Diabetic (%)	20.70	21.00	22.00	22.90	23.50	24.20	24.30	24.10	25.50	25.90
Previous CABG (%)	8.60	8.40	8.40	8.60	7.50	6.90	7.50	5.70	6.00	5.50
Previous PCI (%)	24.70	25.60	26.40	27.00	26.90	27.90	28.70	26.90	27.70	27.70
Previous MI (%)	27.20	27.40	27.50	27.00	27.00	27.50	26.50	25.60	26.80	26.20
Current smoker (%)	25.00	24.40	24.00	22.90	22.70	22.40	22.00	23.50	22.90	22.50
Ex smoker (%)	37.70	37.30	37.90	37.60	36.50	37.00	35.70	33.90	33.50	33.10
Never smoked (%)	37.30	38.20	38.10	39.50	40.80	40.70	42.30	42.60	43.70	44.40



Data Extract
10-11-2023

Demographics - Ethnicity / Race



2022-23 Data
Mamas Mamas

30% Ethnicity / Race data missing

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Data available	62,499.00	63,872.00	63,305.00	63,771.00	66,987.00	61,567.00	65,993.00	58,306.00	65,388.00	63,058.00
European (%)	91.60	91.40	91.00	90.10	89.40	89.20	89.30	89.50	87.70	87.20
Asian (%)	7.30	7.60	8.10	8.70	9.40	9.40	9.30	9.30	10.80	11.30
Black (%)	0.98	0.85	0.80	1.00	1.10	1.20	1.20	1.10	1.30	1.40
Oriental (%)	0.16	0.18	0.12	0.17	0.19	0.17	0.19	0.12	0.18	0.15



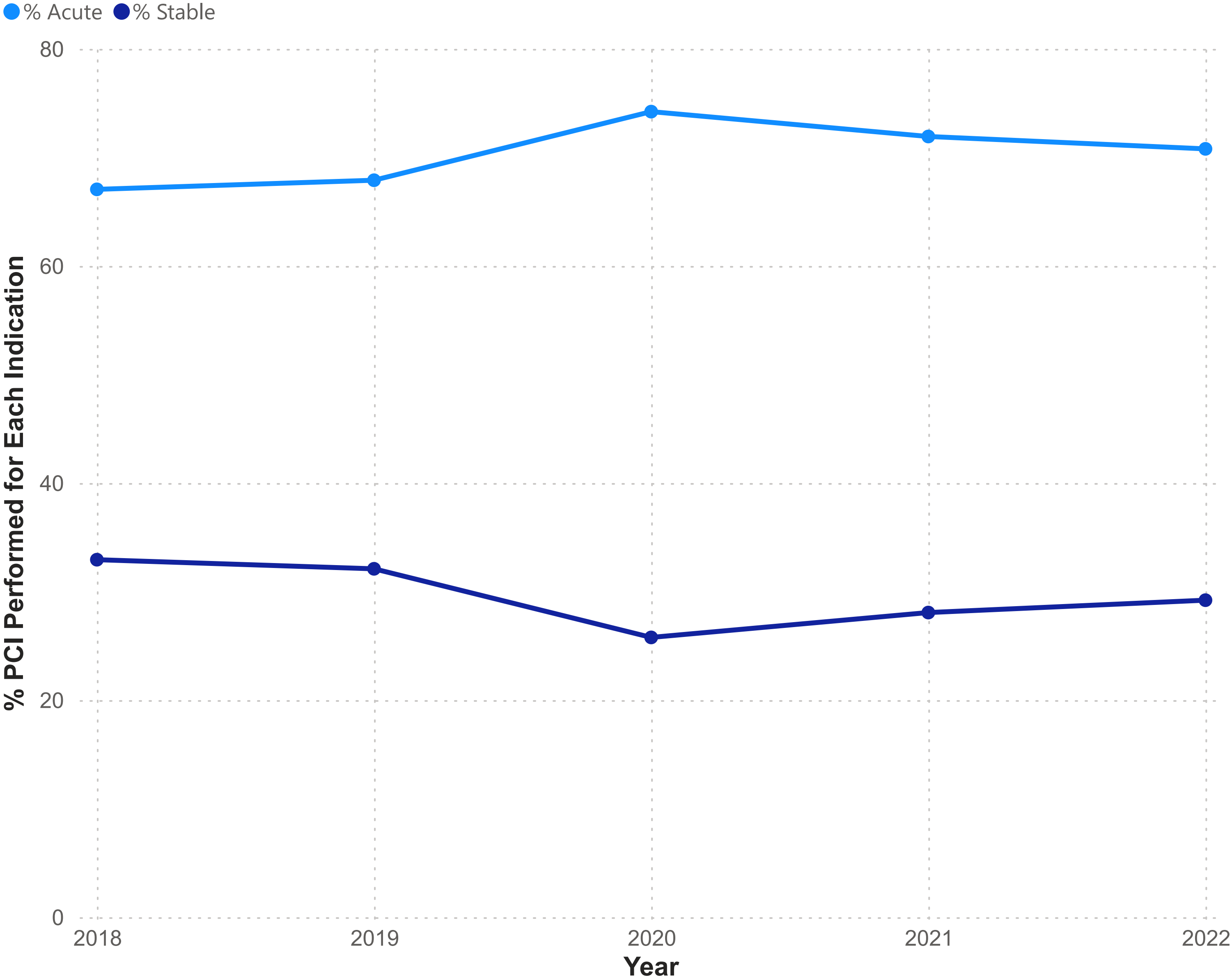
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

PCI vs CABG

by ICB of Hospital





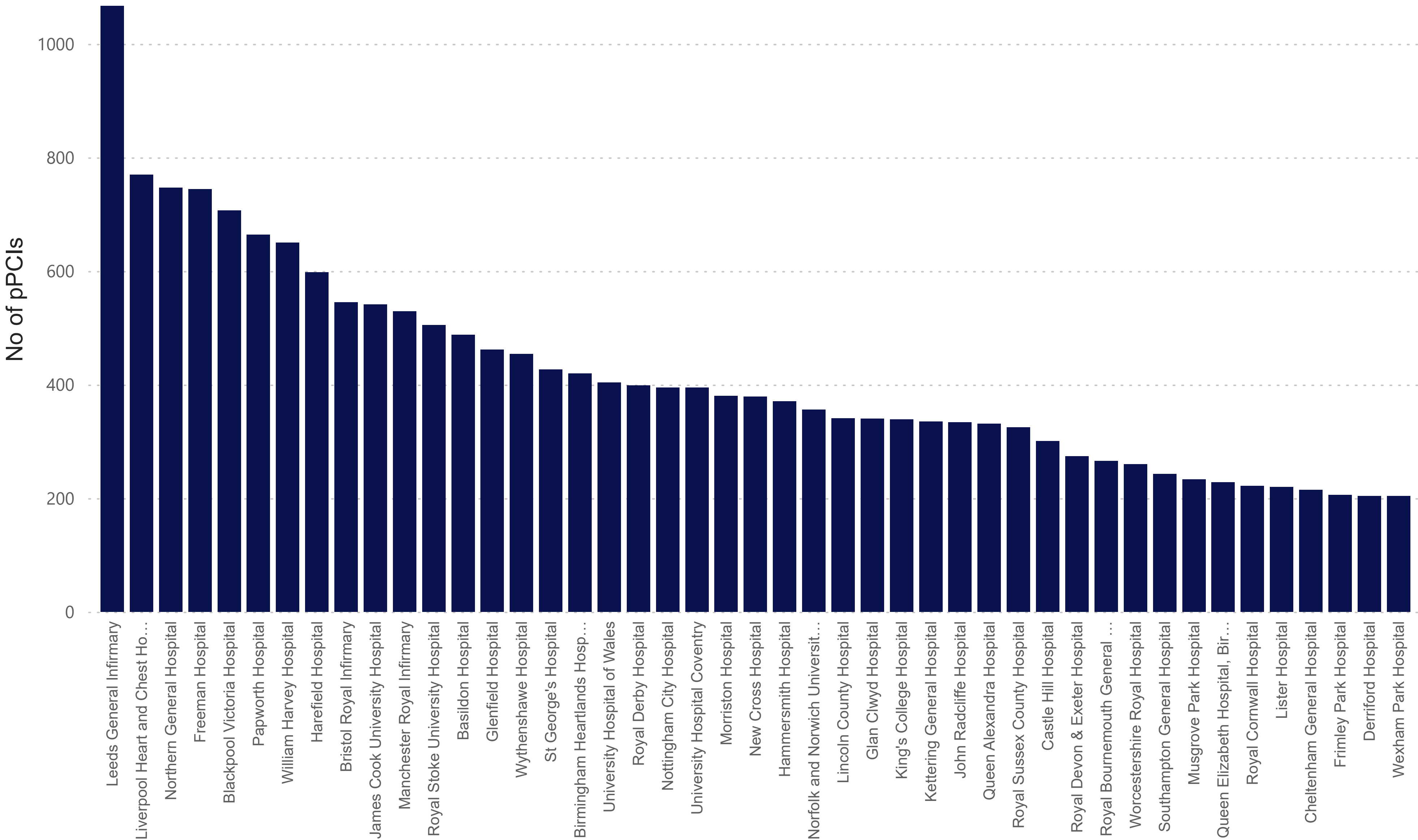
Data Extract
10-11-2023

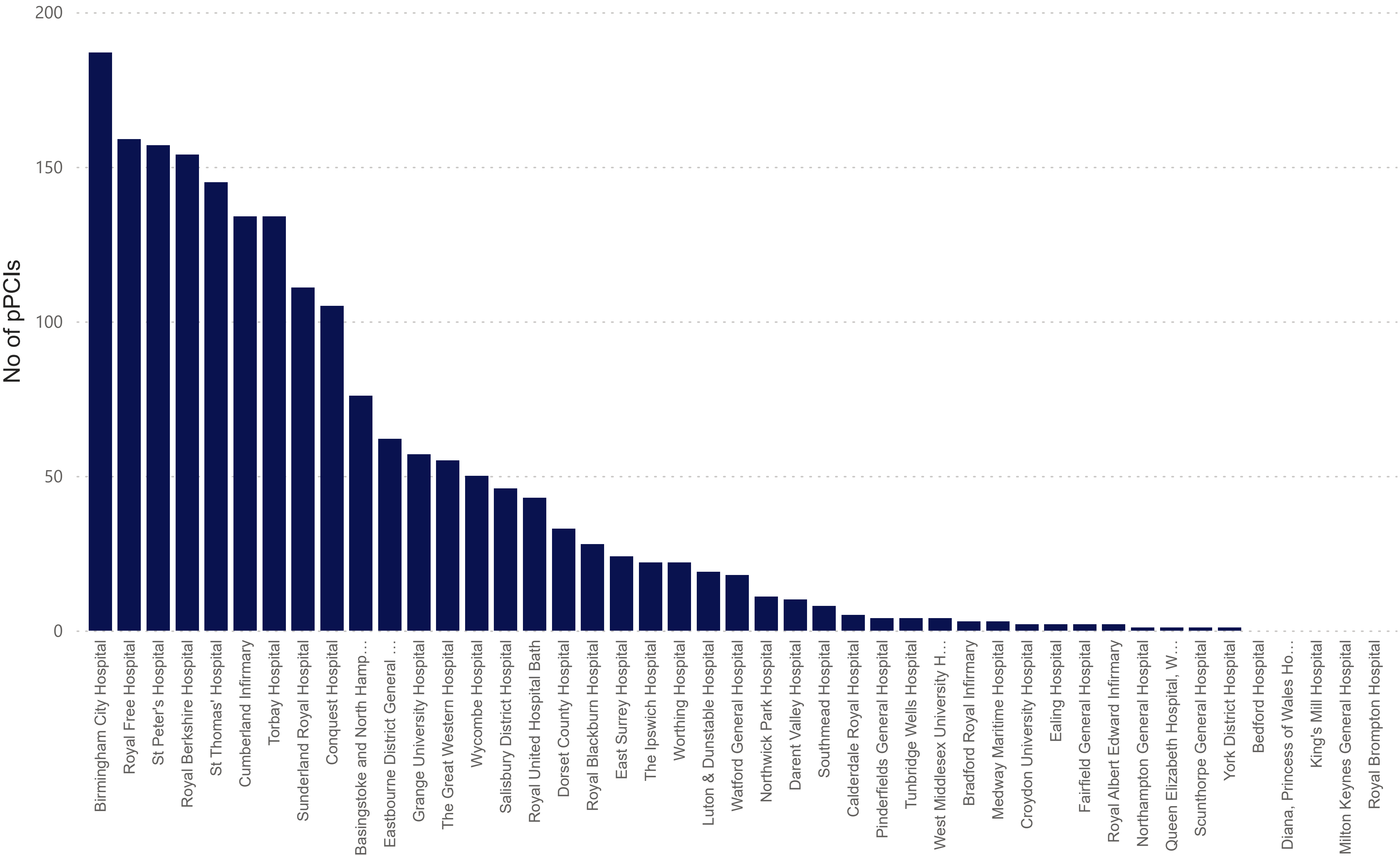


2022-23 Data
Mamas Mamas

Primary PCIs

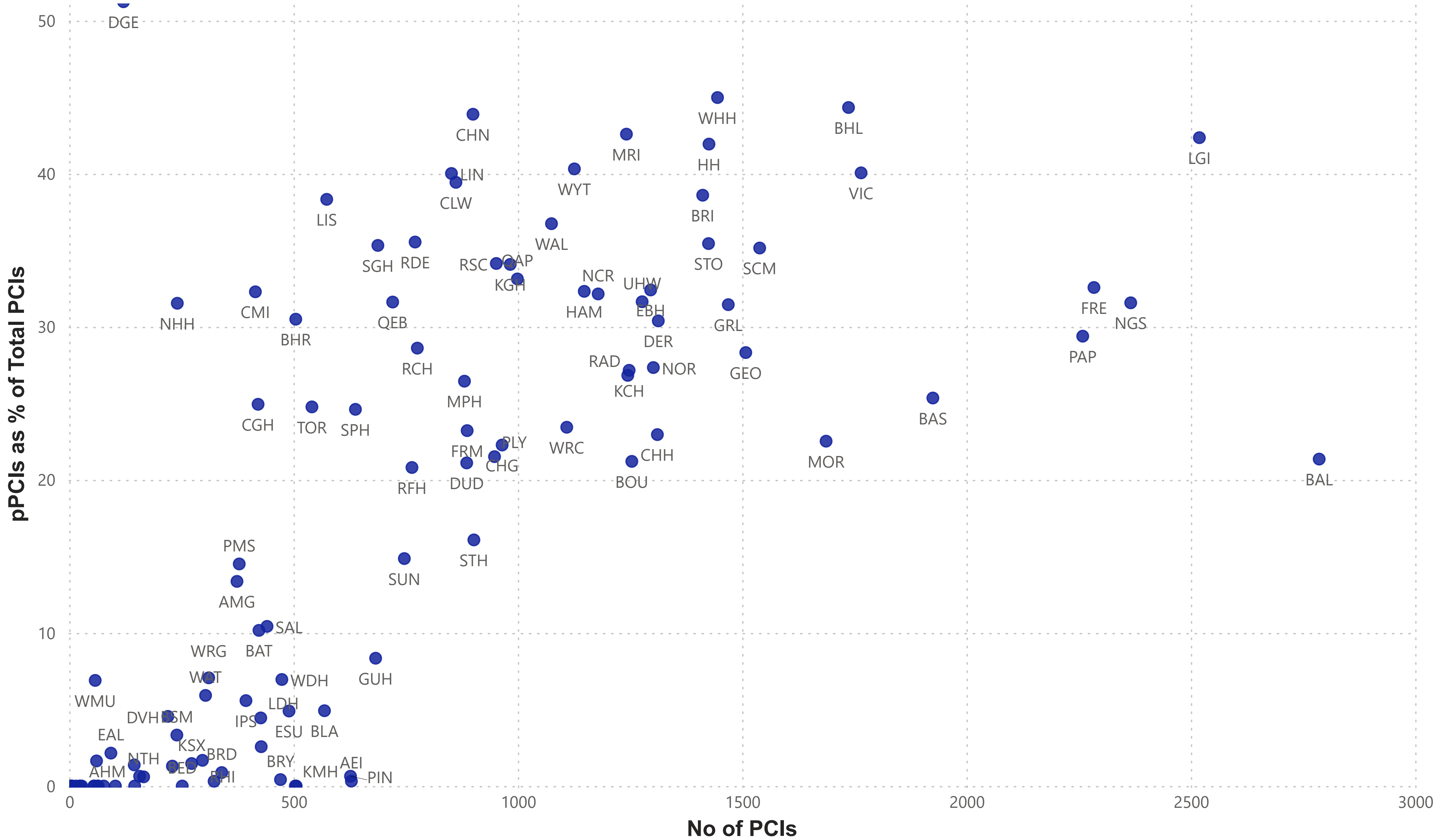
by Centre (1 of 2)





pPCI

As % of all PCIs



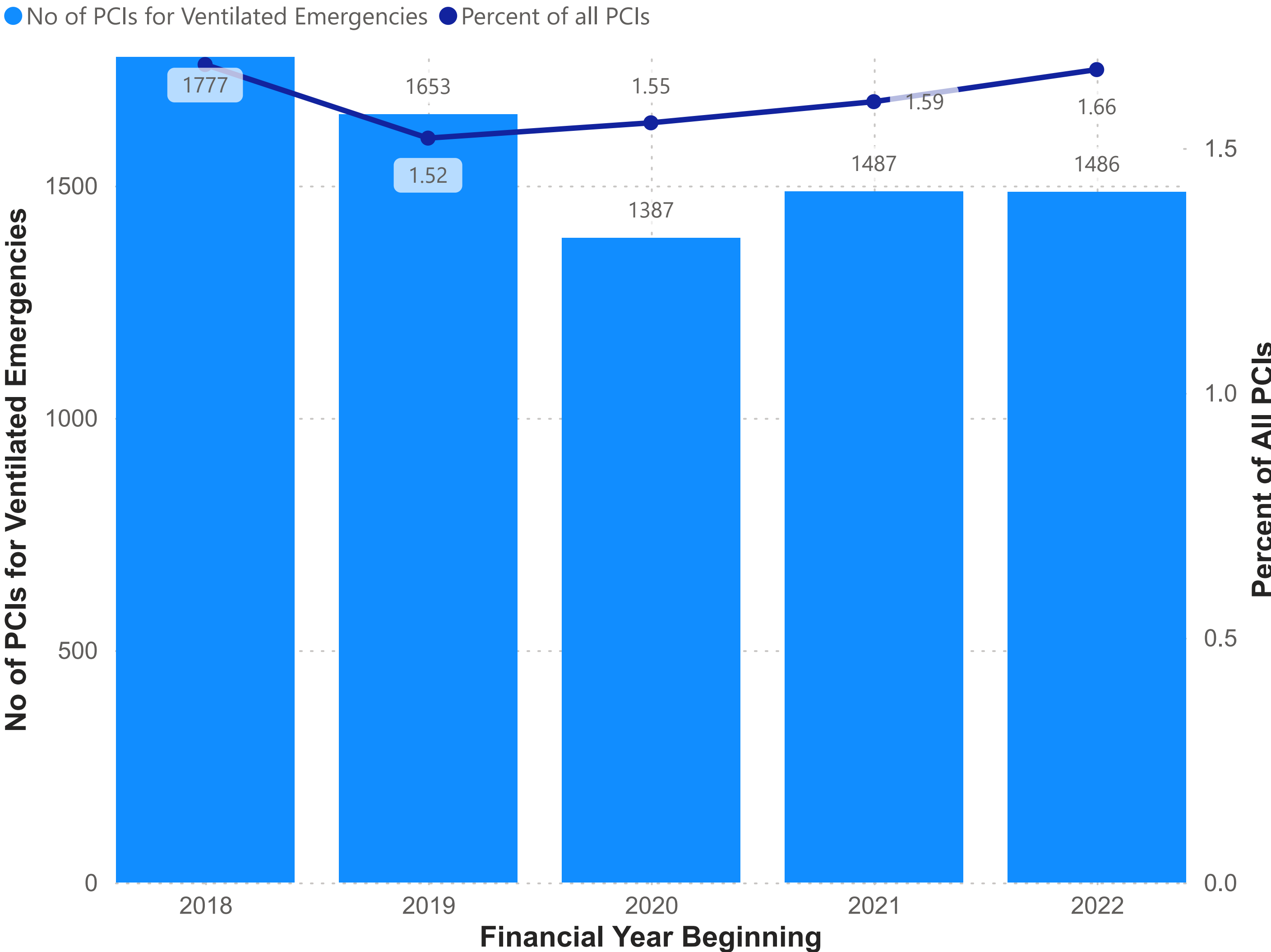


Data Extract
10-11-2023

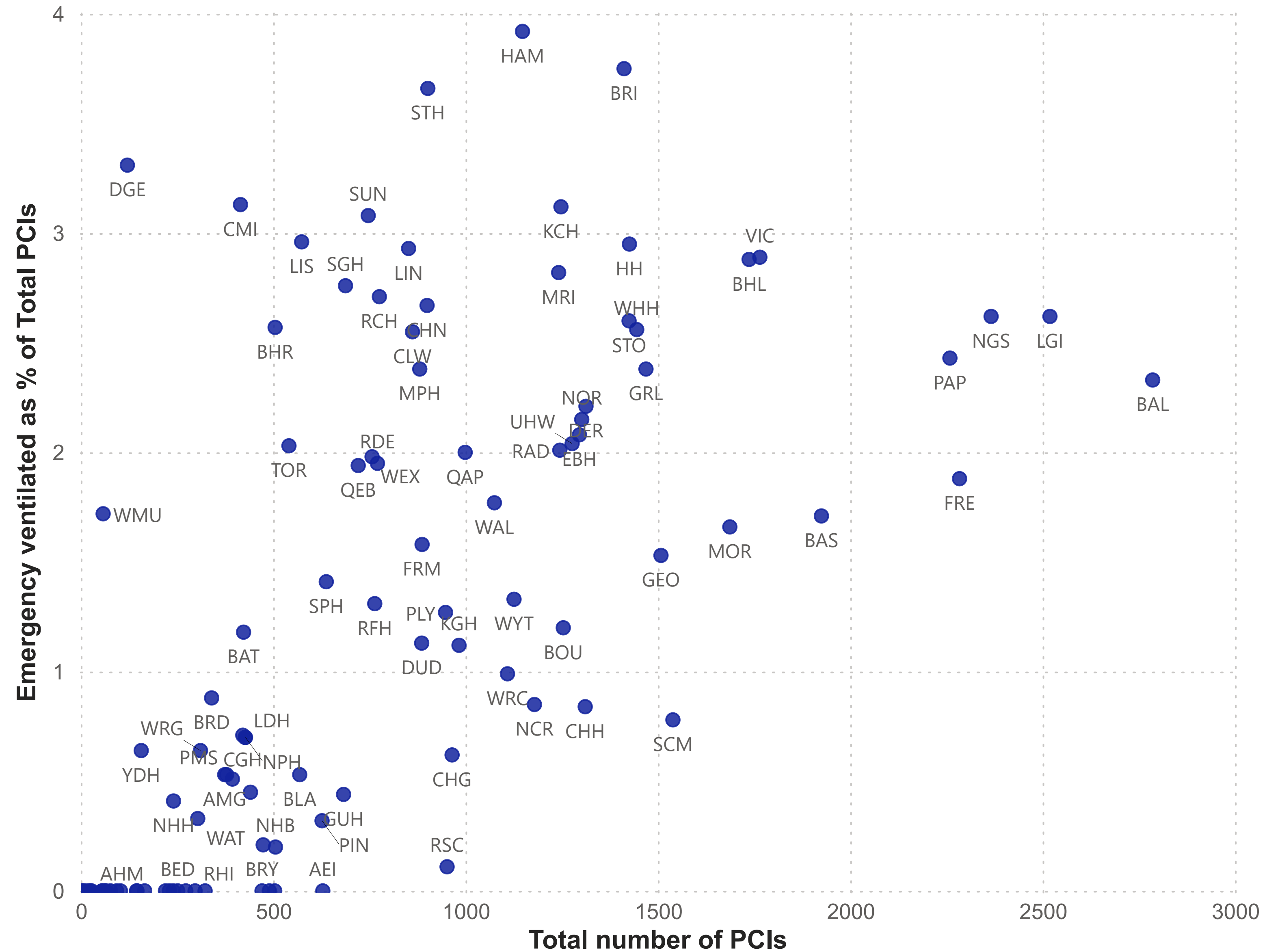


2022-23 Data
Mamas Mamas

Primary PCI on Ventilated Emergencies



Primary PCI on Ventilated Emergencies



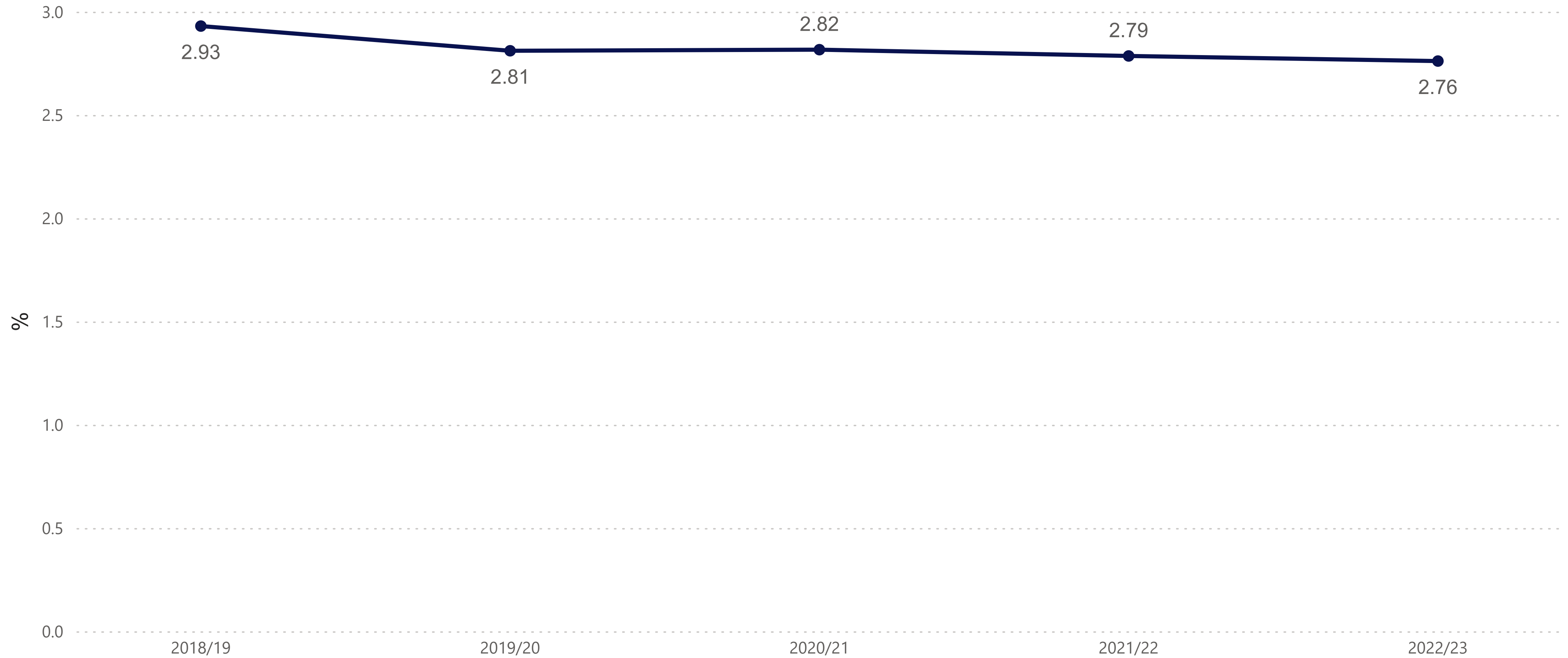


Out of hospital cardiac arrest



NB - only cases that had PCI included in subsequent slides as that is all BCIS captures

Out of Hospital Cardiac Arrest





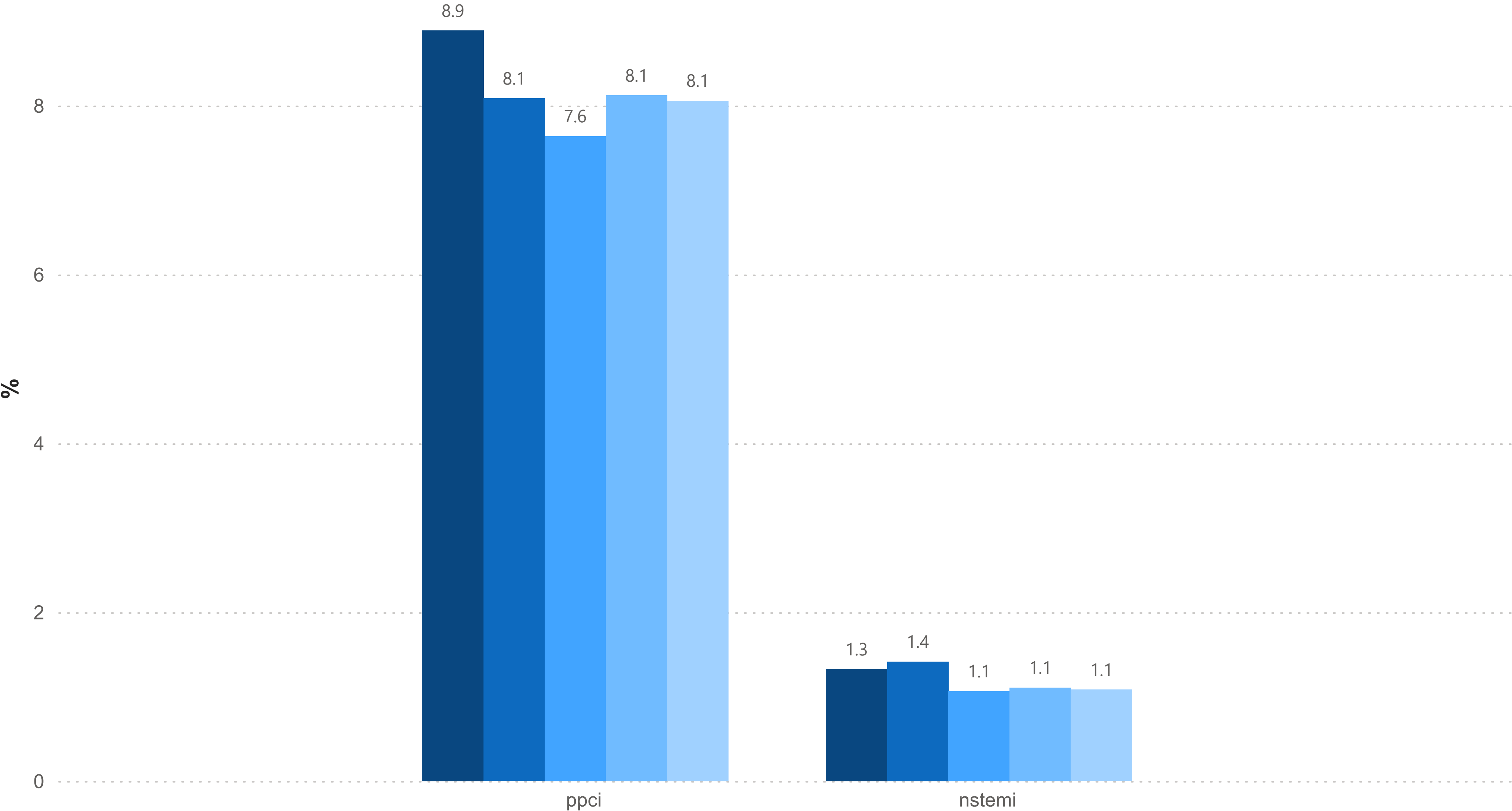
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

Out of Hospital Cardiac Arrest

● 2018/19 ● 2019/20 ● 2020/21 ● 2021/22 ● 2022/23





Data Extract
10-11-2023

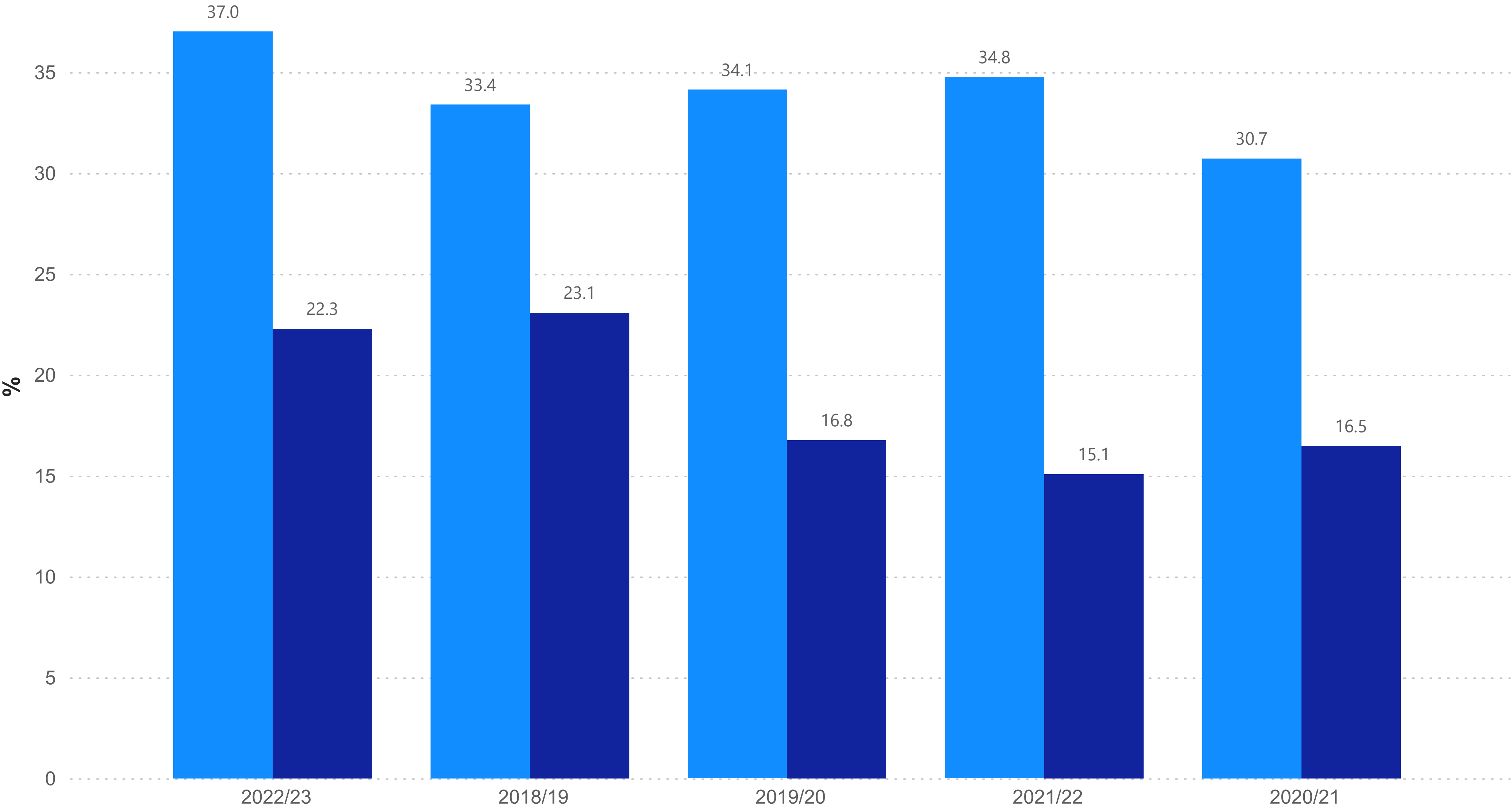


2022-23 Data
Mamas Mamas

Out of Hospital Cardiac Arrest

% of cases with OHCA treated by PCI in Shock

● ppci ● nstemi





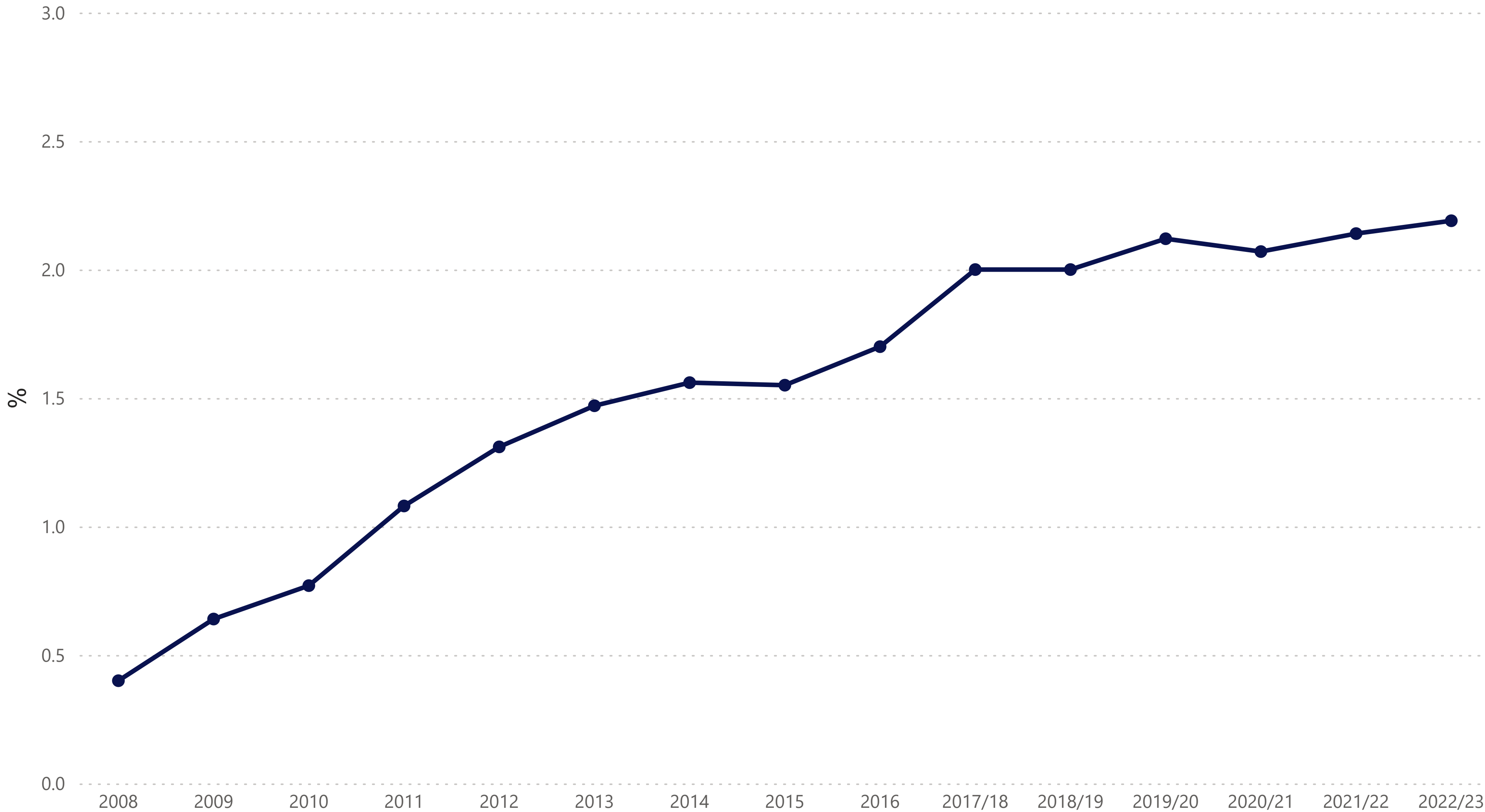
Data Extract
10-11-2023

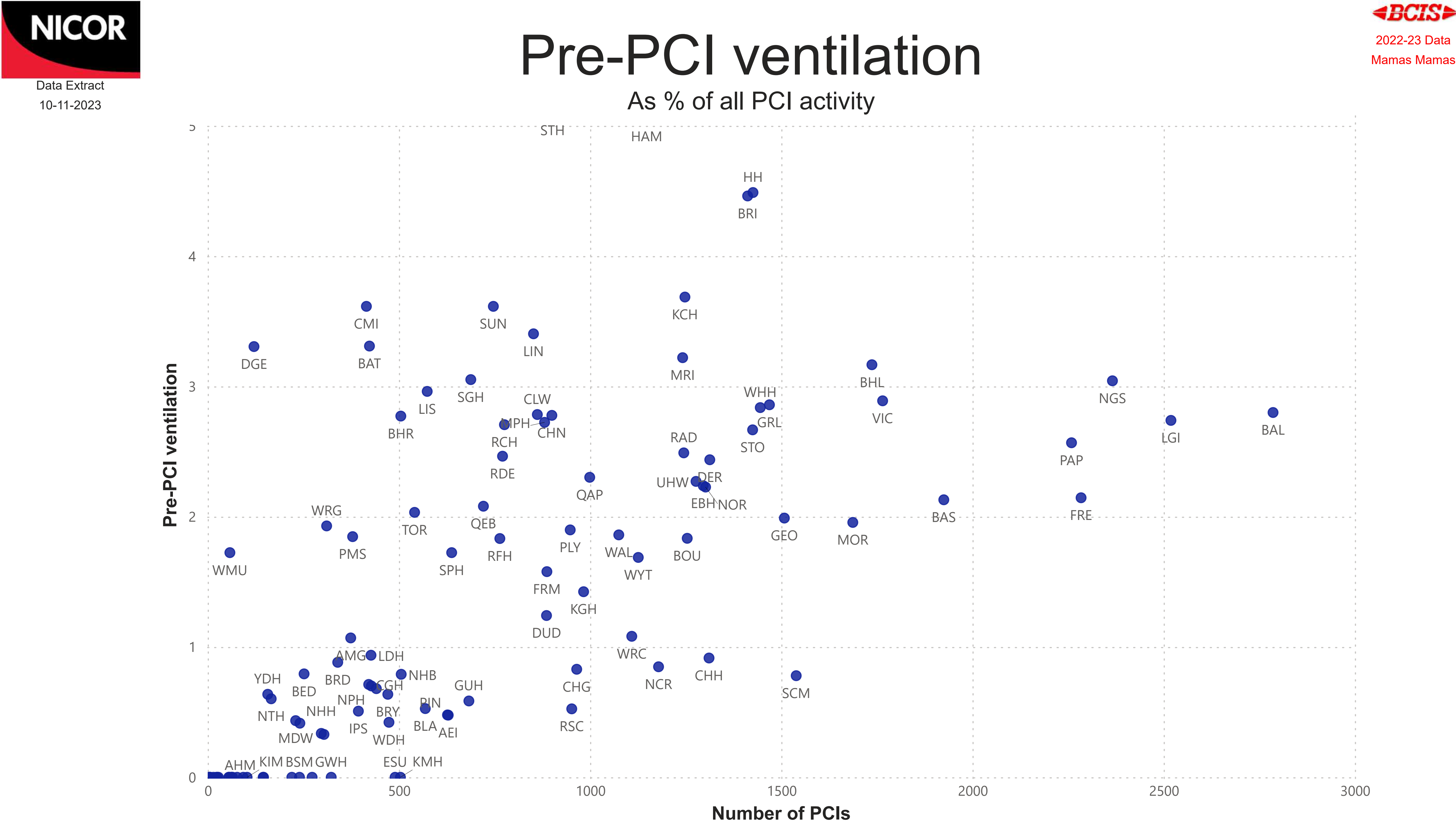


2022-23 Data
Mamas Mamas

Out of Hospital Cardiac Arrest

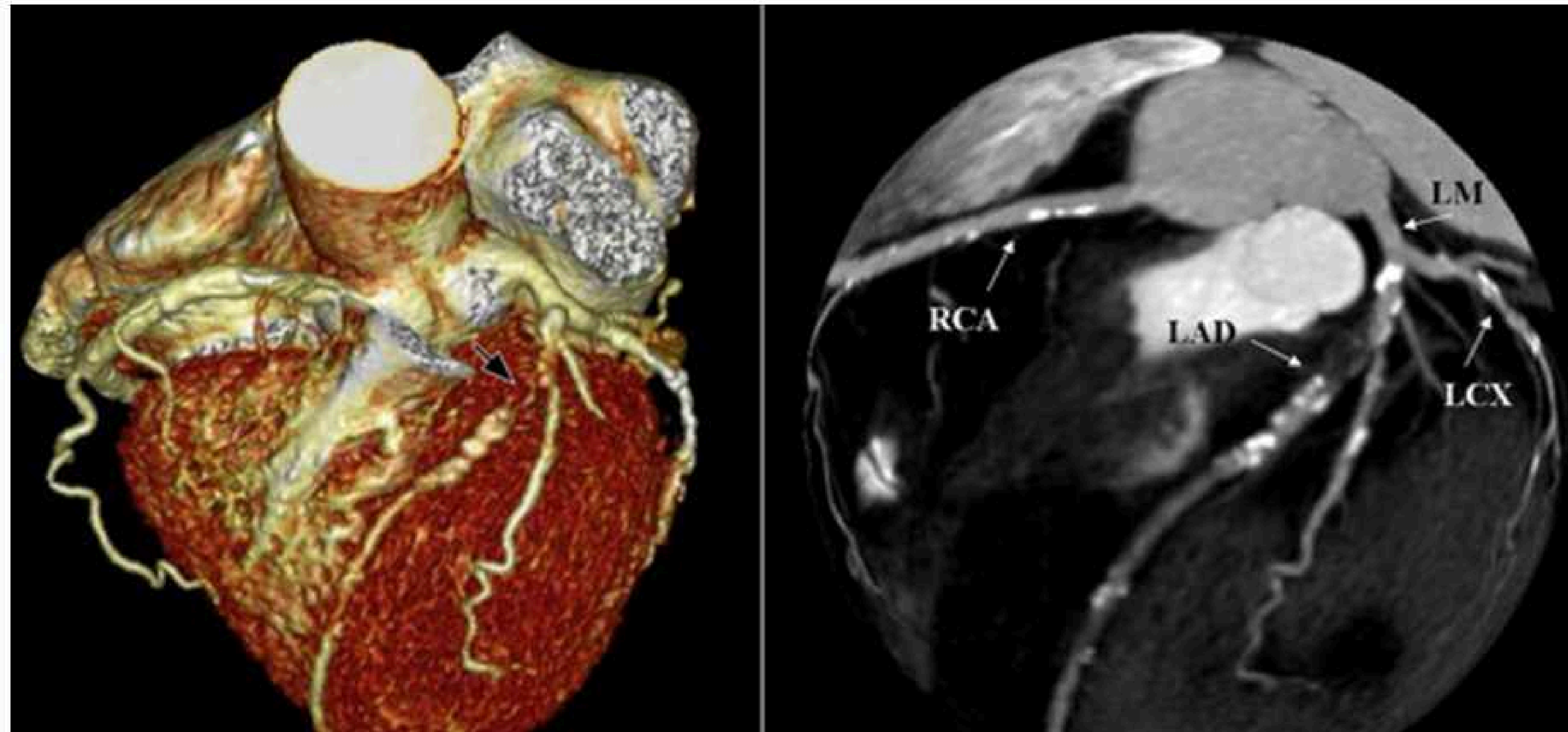
Total percentage of cases with pre-PCI ventilation







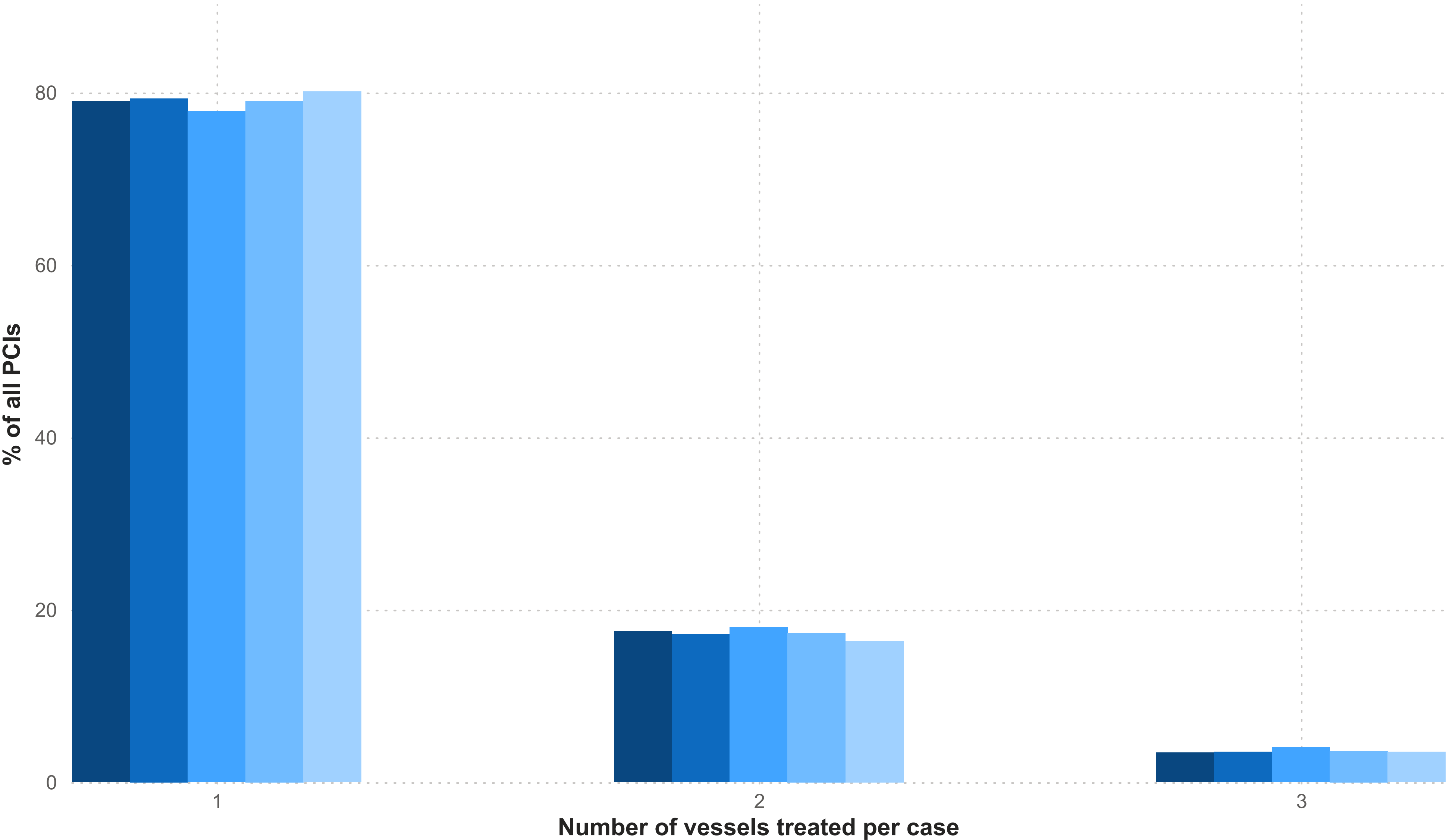
Multi-vessel disease



Pre-PCI ventilation

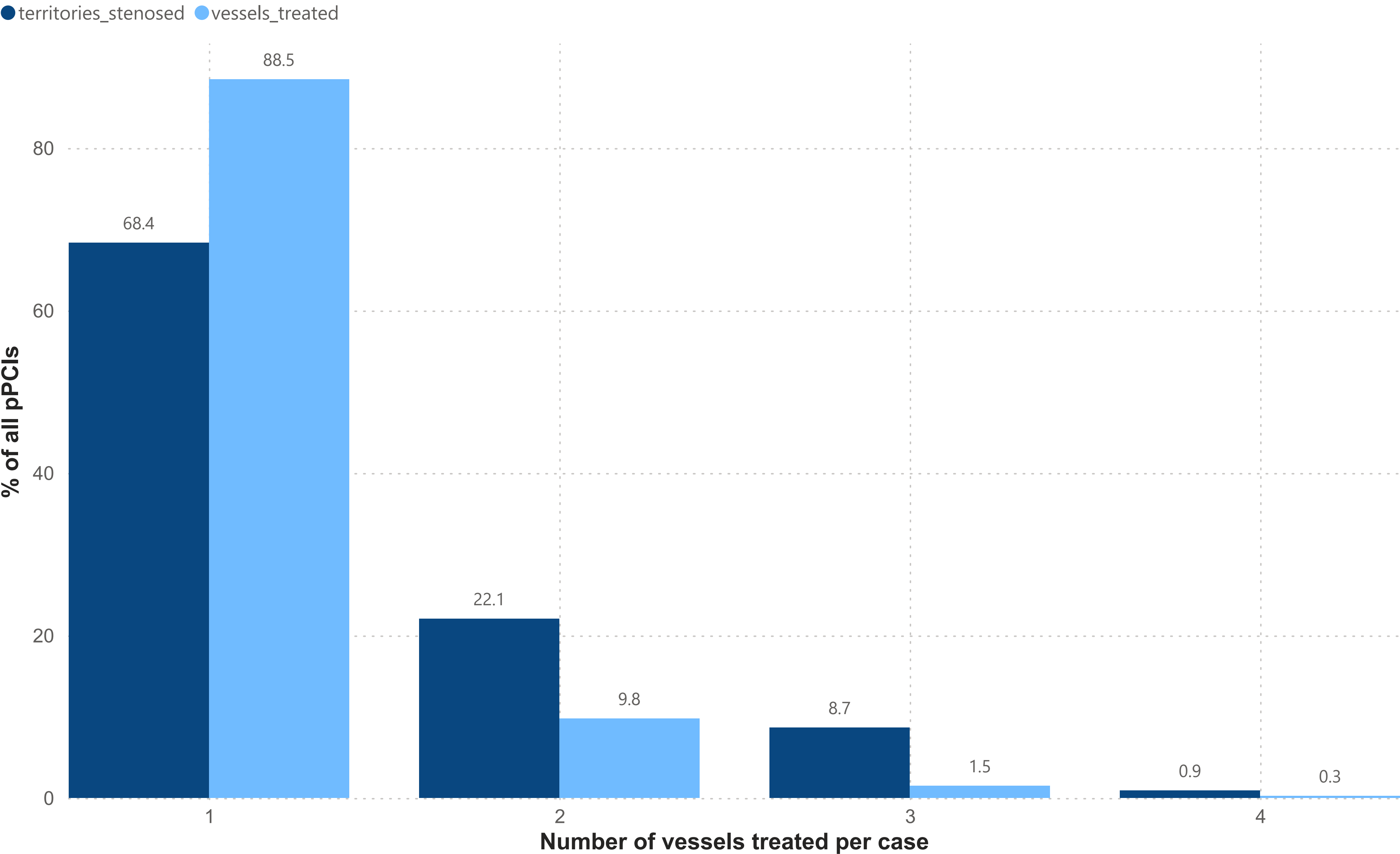
As % of all PCI activity

Financial Year Beginning 2018 2019 2020 2021 2022



Primary PCI

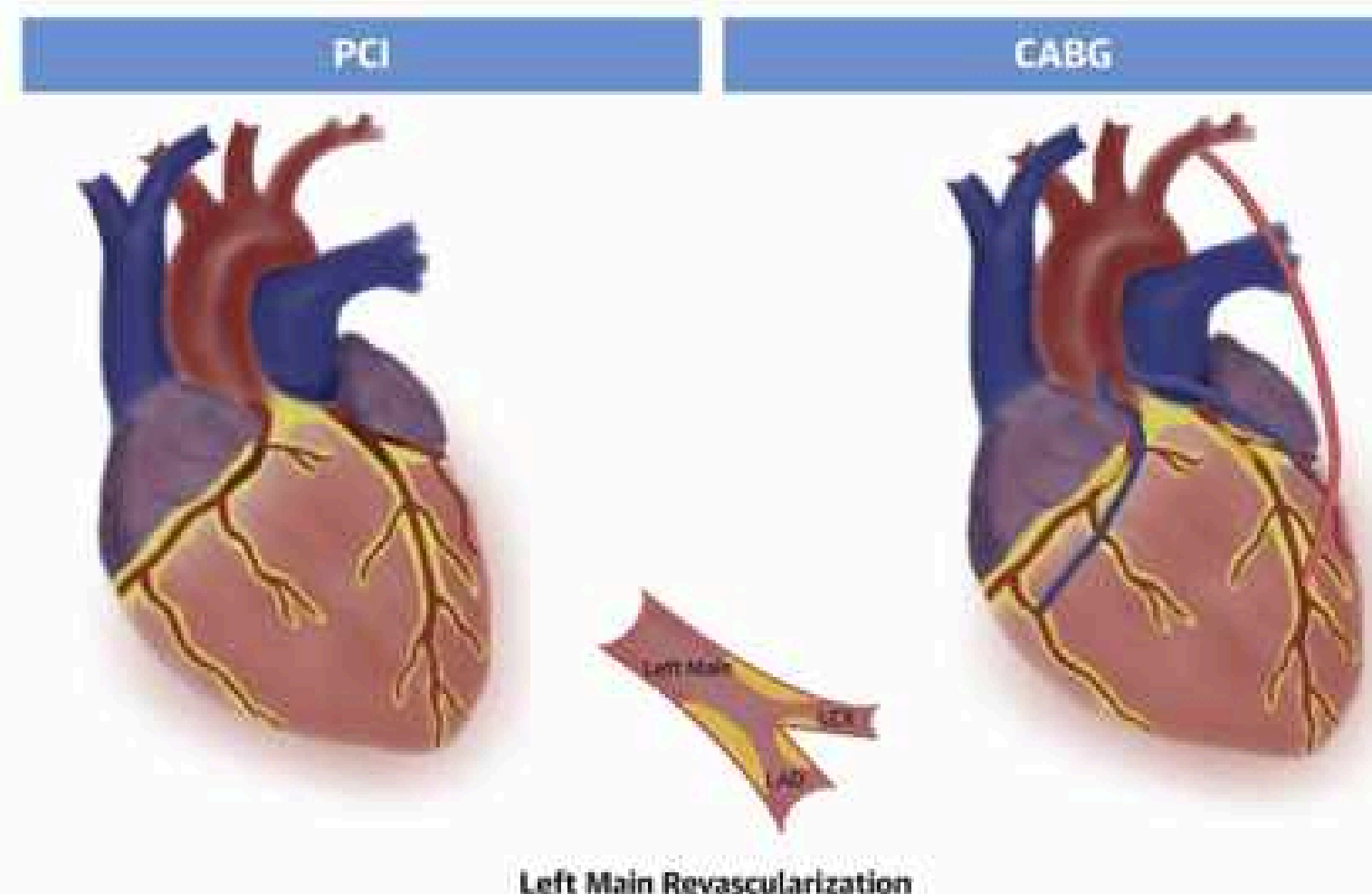
Multi-vessel Rx





Left main

CENTRAL ILLUSTRATION: Key Summary of Issues for Left Main Revascularization



Left Main Revascularization

What is Known?	What is Unknown?
PCI versus CABG • Have comparable risks for overall mortality and the composite of death, MI, or stroke in patients with low to intermediate anatomical complexity Advantage of CABG • Lower risk of repeat revascularization • More CR especially in high anatomical complexity • Less spontaneous MI Advantage of PCI • Less invasive and shorter hospitalization • Early mental and physical recovery • Lower risk of short-term morbidity	PCI versus CABG • Long-term treatment effect of CABG vs. state-of-the-art PCI • Long-term comparative clinical outcomes between CABG and PCI in a specific population (patient with diabetes, HFrEF, distal LMCA bifurcation disease) • Threshold for reasonable IR Left main PCI • Optimal stent strategy for distal LMCA bifurcation disease • Optimal antithrombotic strategy following complex PCI, especially in Asian patients

Park S, et al. JACC: Asia. 2022;2(2):119-138.

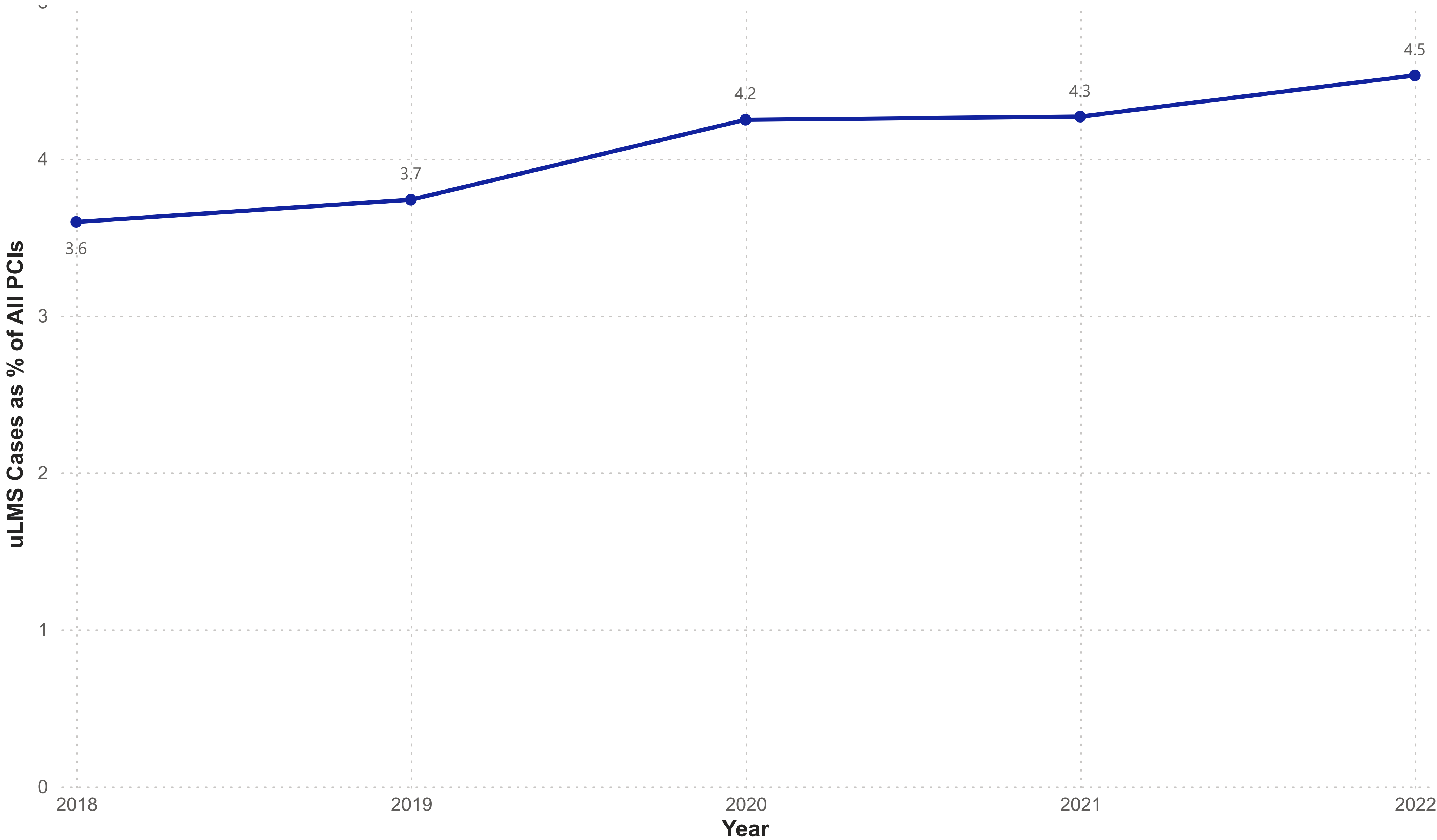


Data Extract
10-11-2023



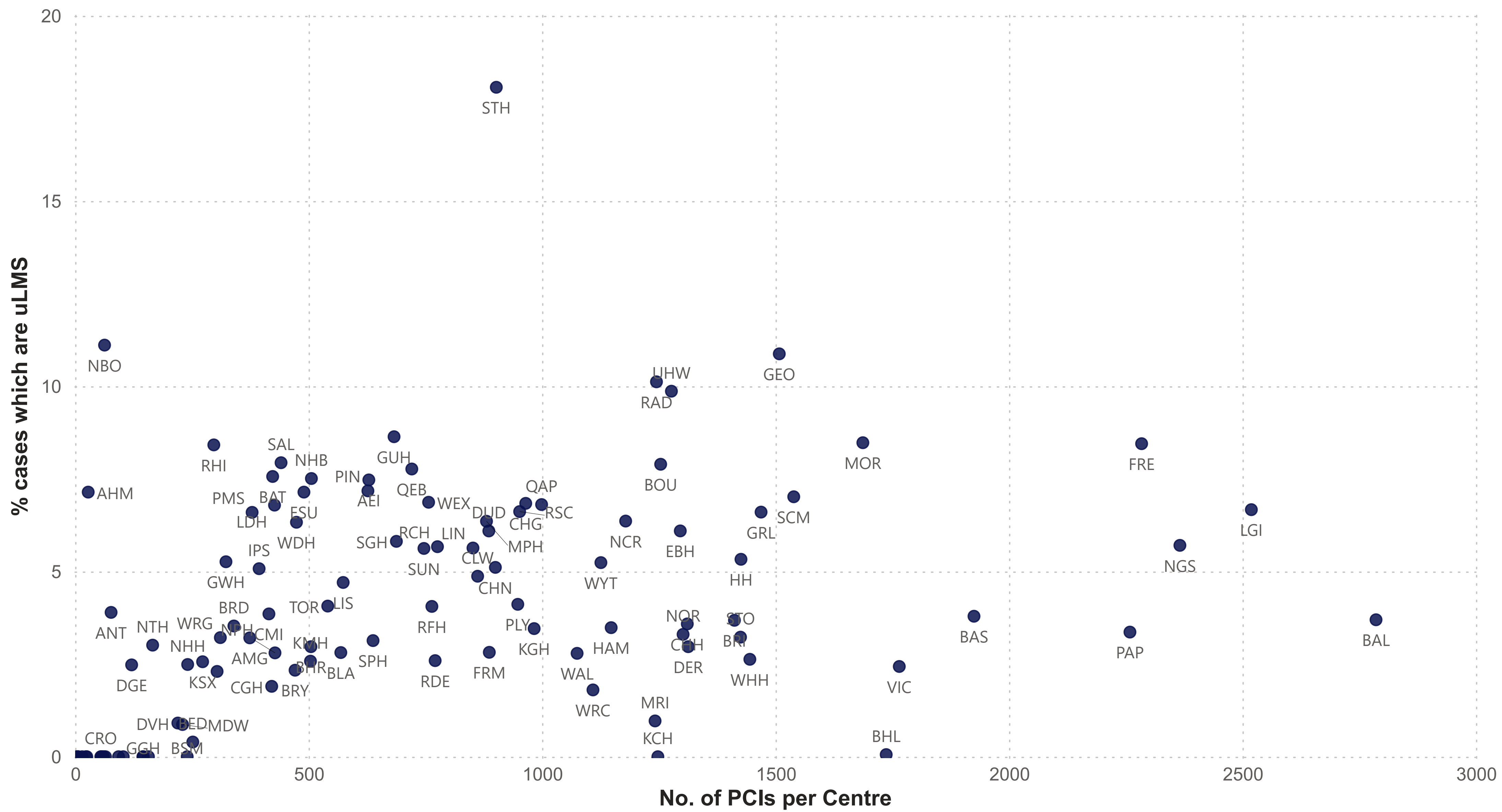
2022-23 Data
Mamas Mamas

Unprotected LMS



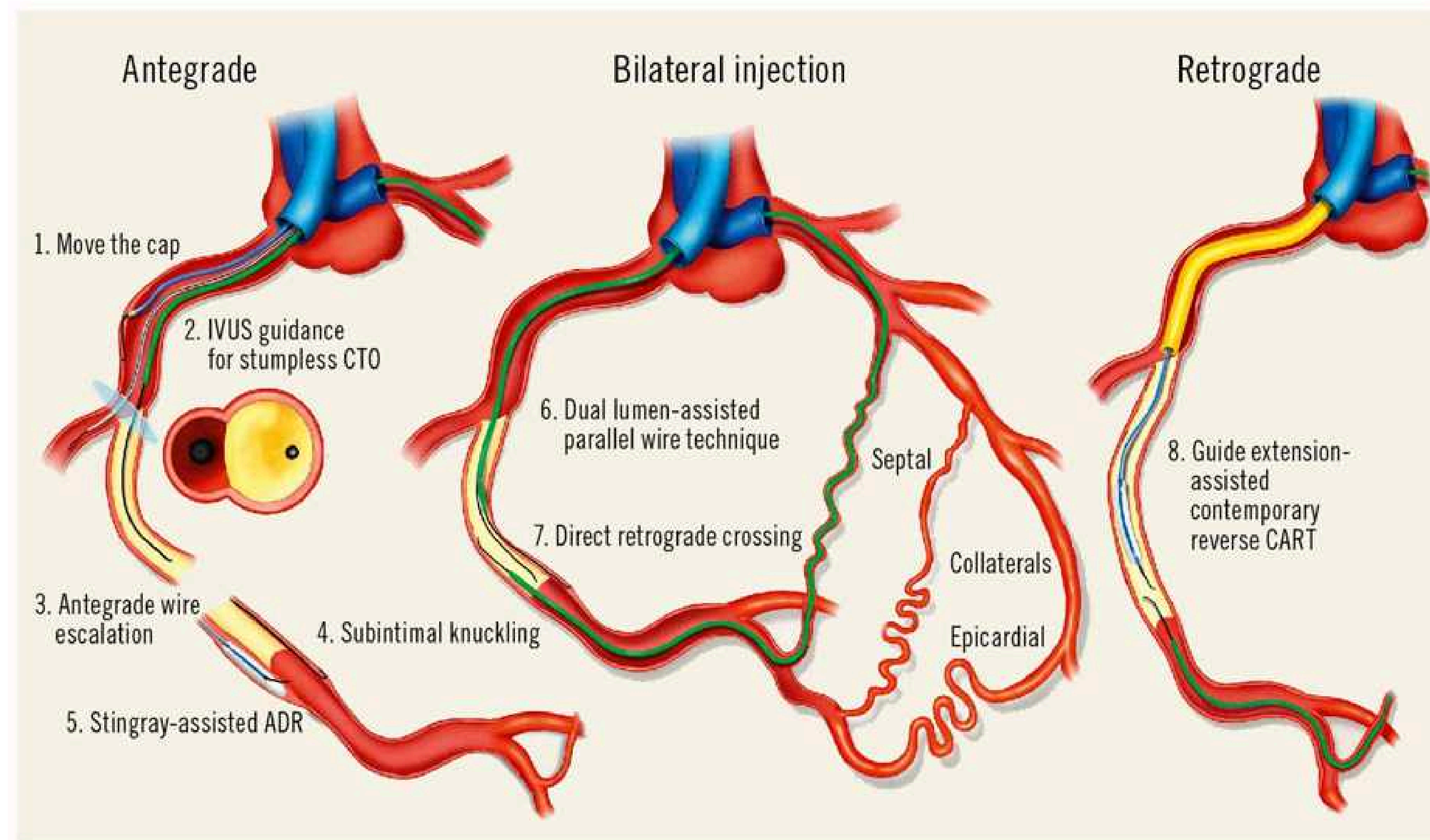
Primary PCI

By Centre





Chronic total occlusion





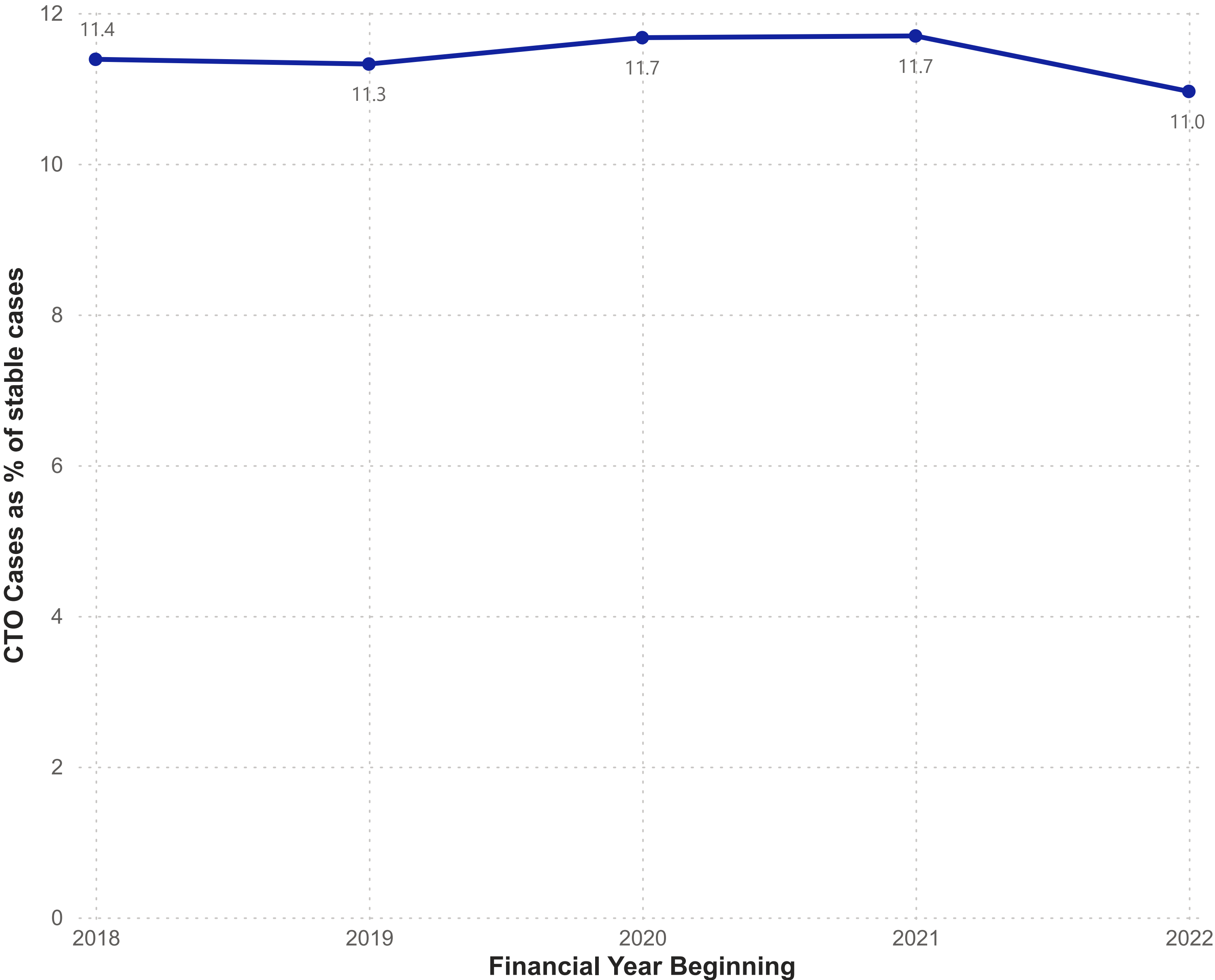
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

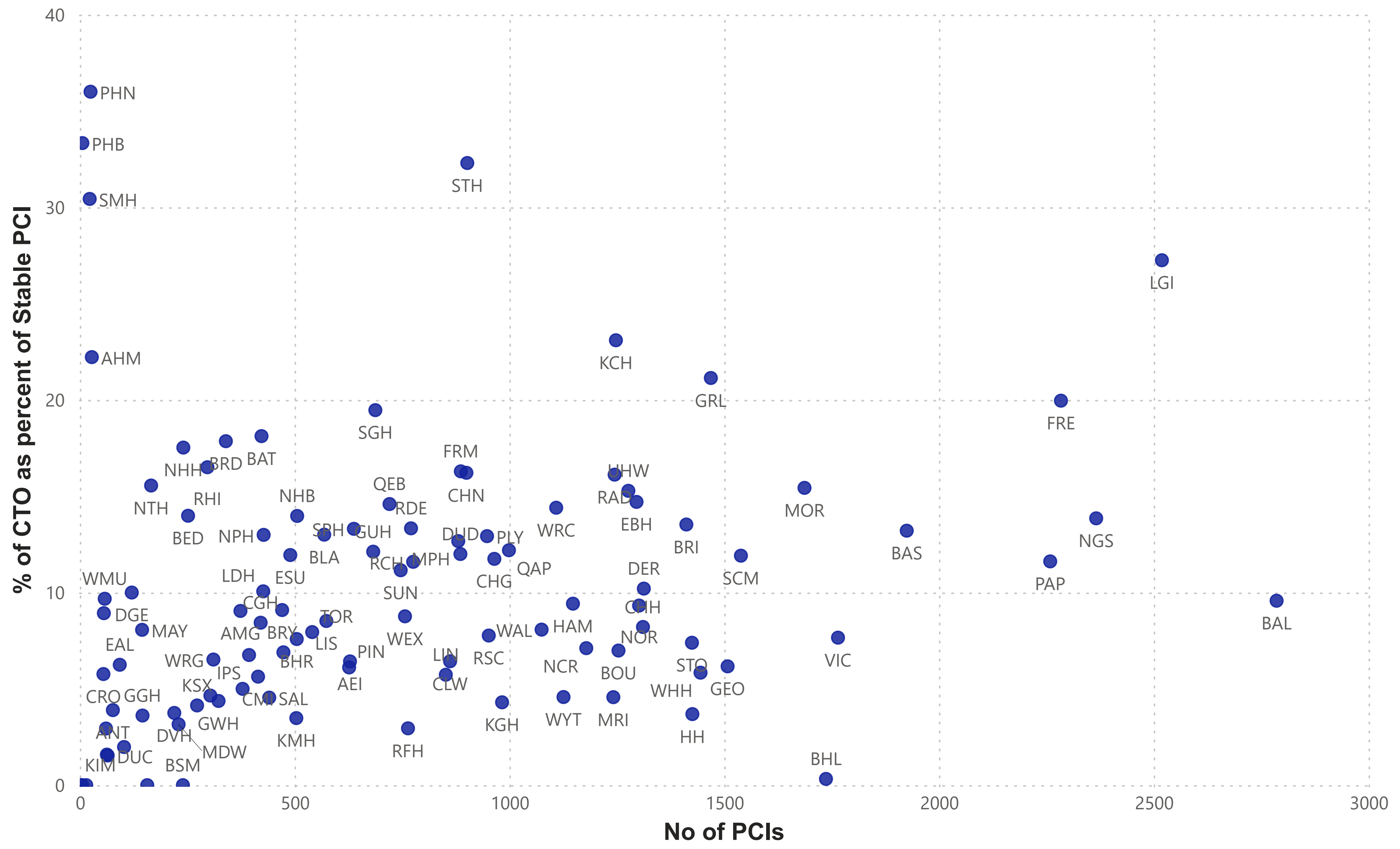
Chronic total occlusion

Stable only



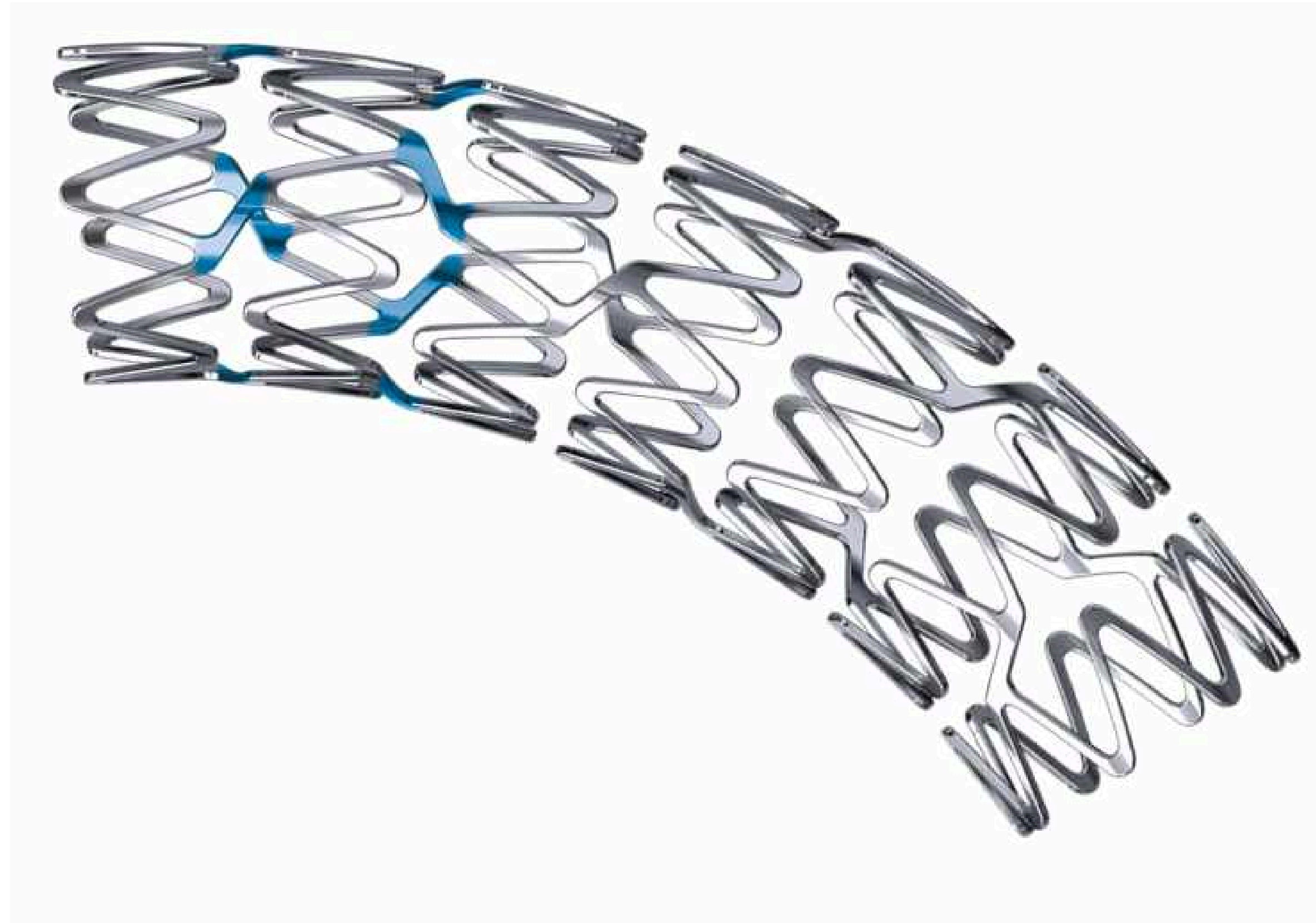
Chronic total occlusion

Stable only





Procedures using stents



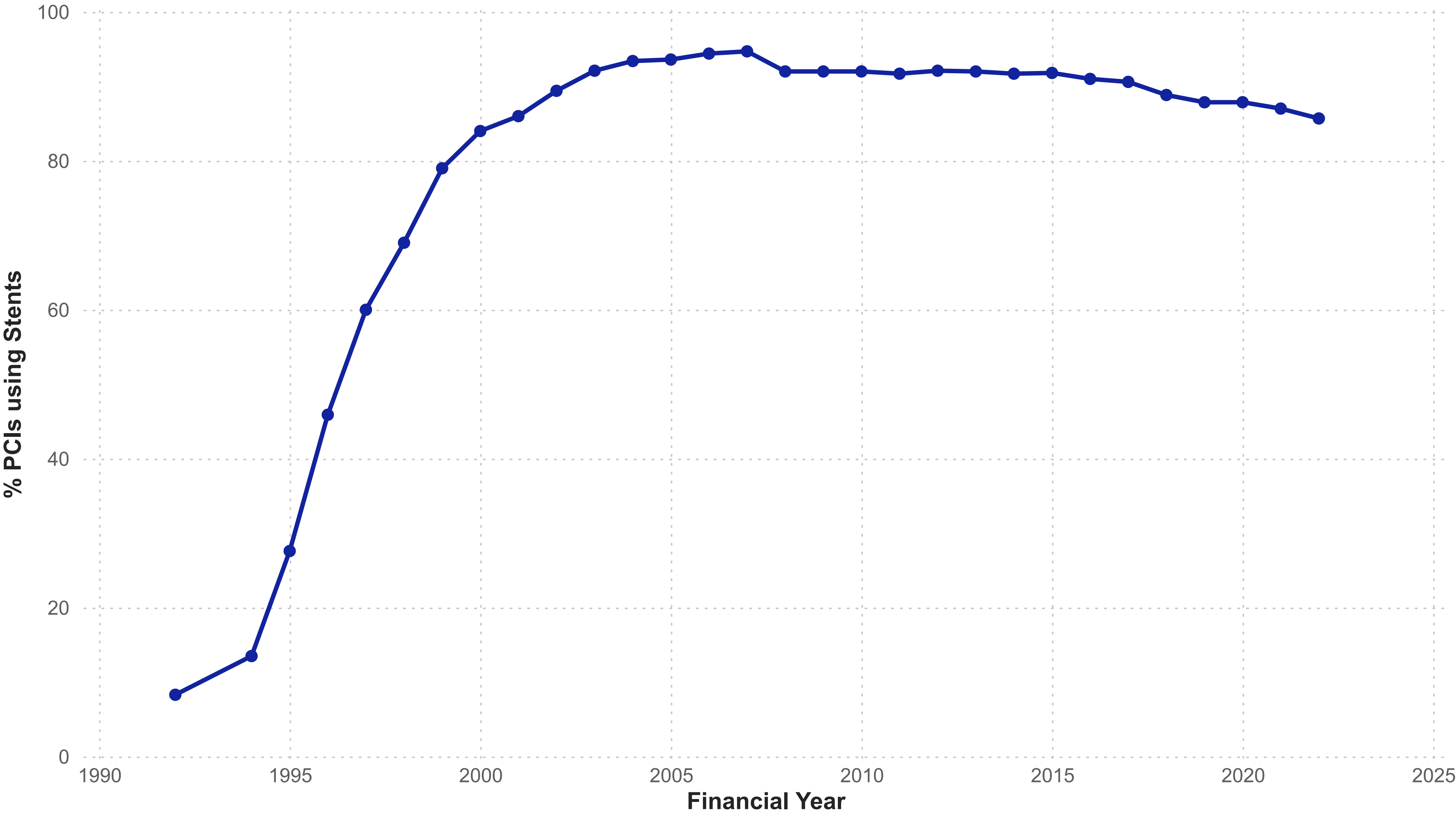


Data Extract
10-11-2023

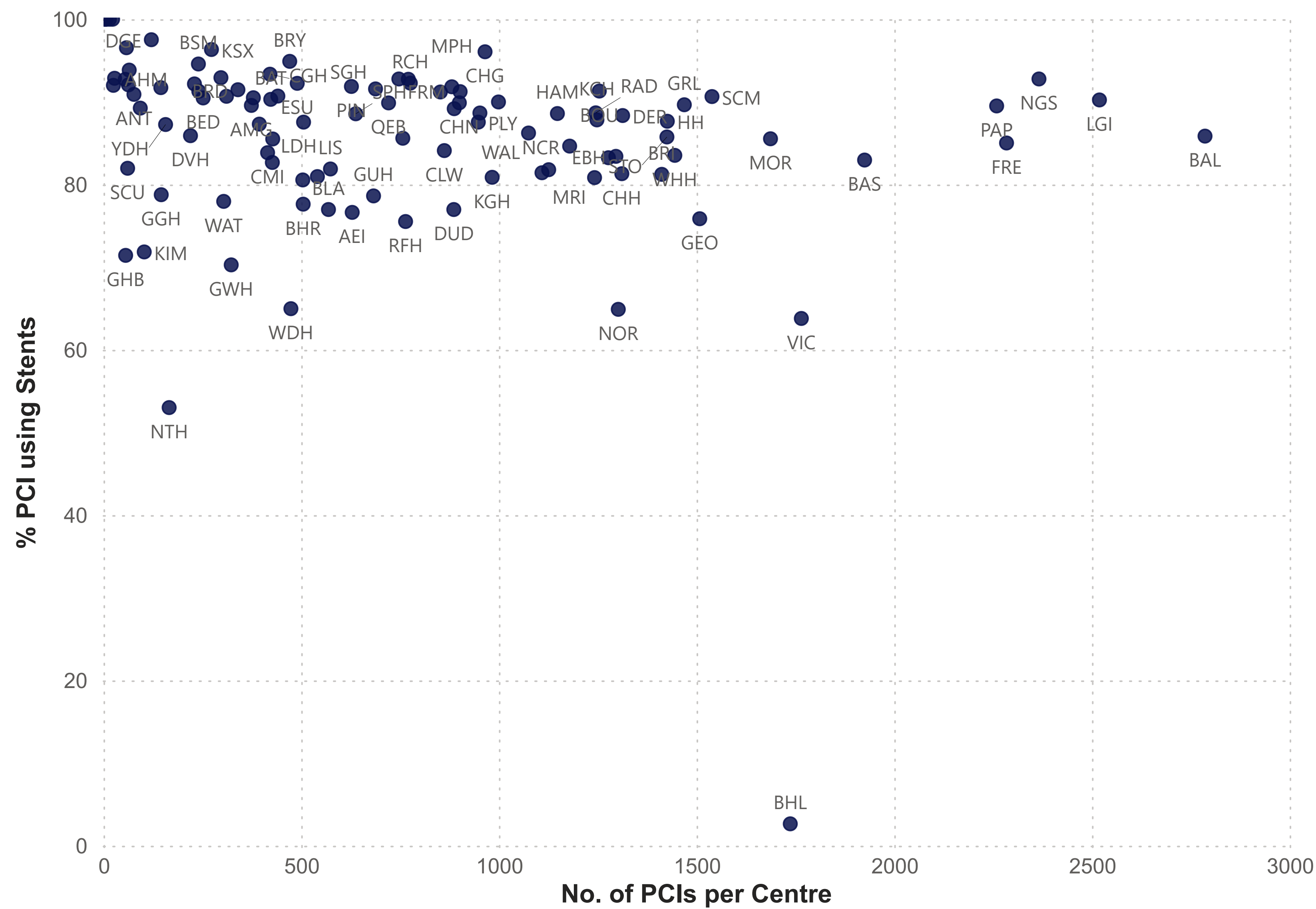


2022-23 Data
Mamas Mamas

Procedures using Stents

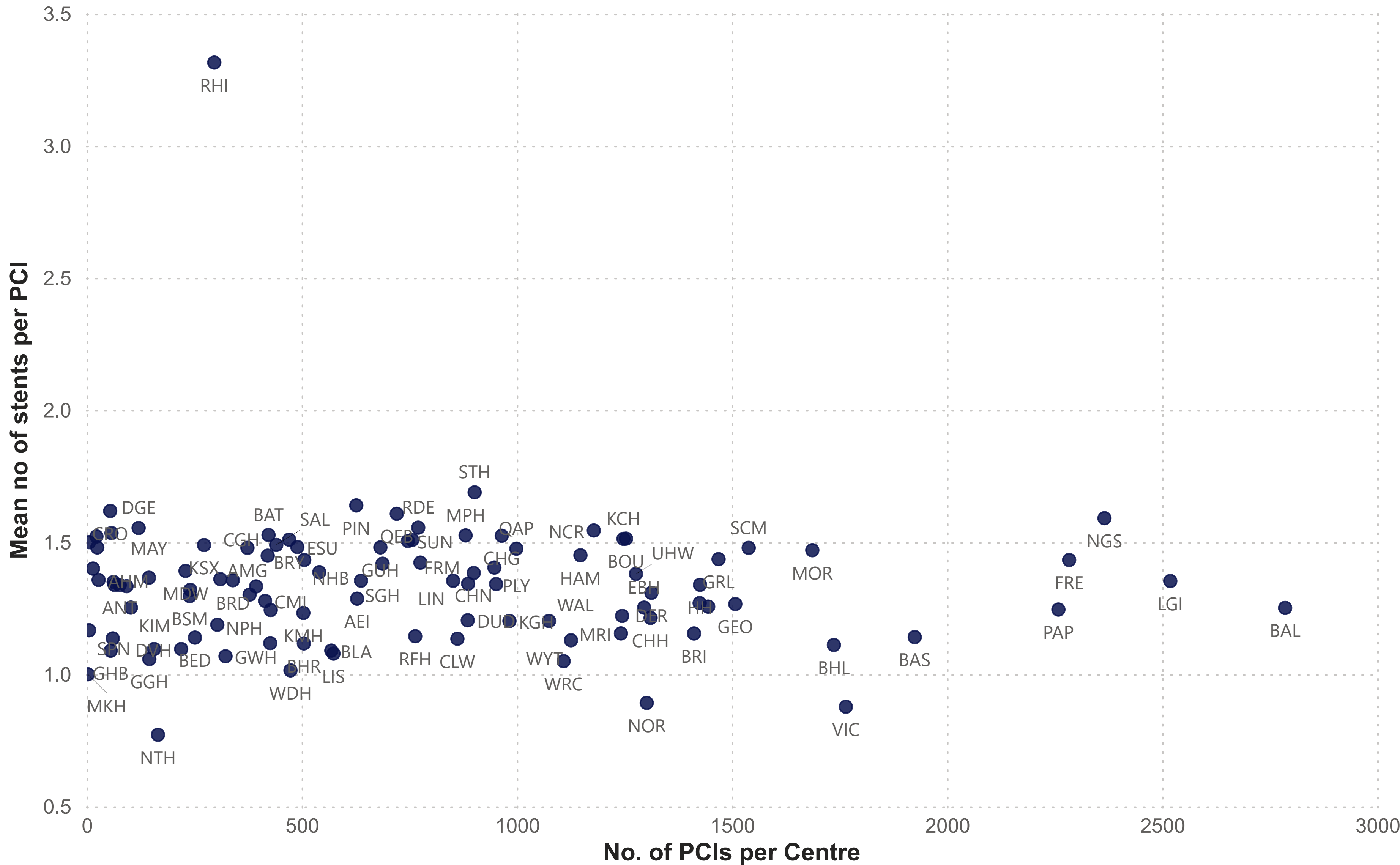


Procedures using Stents

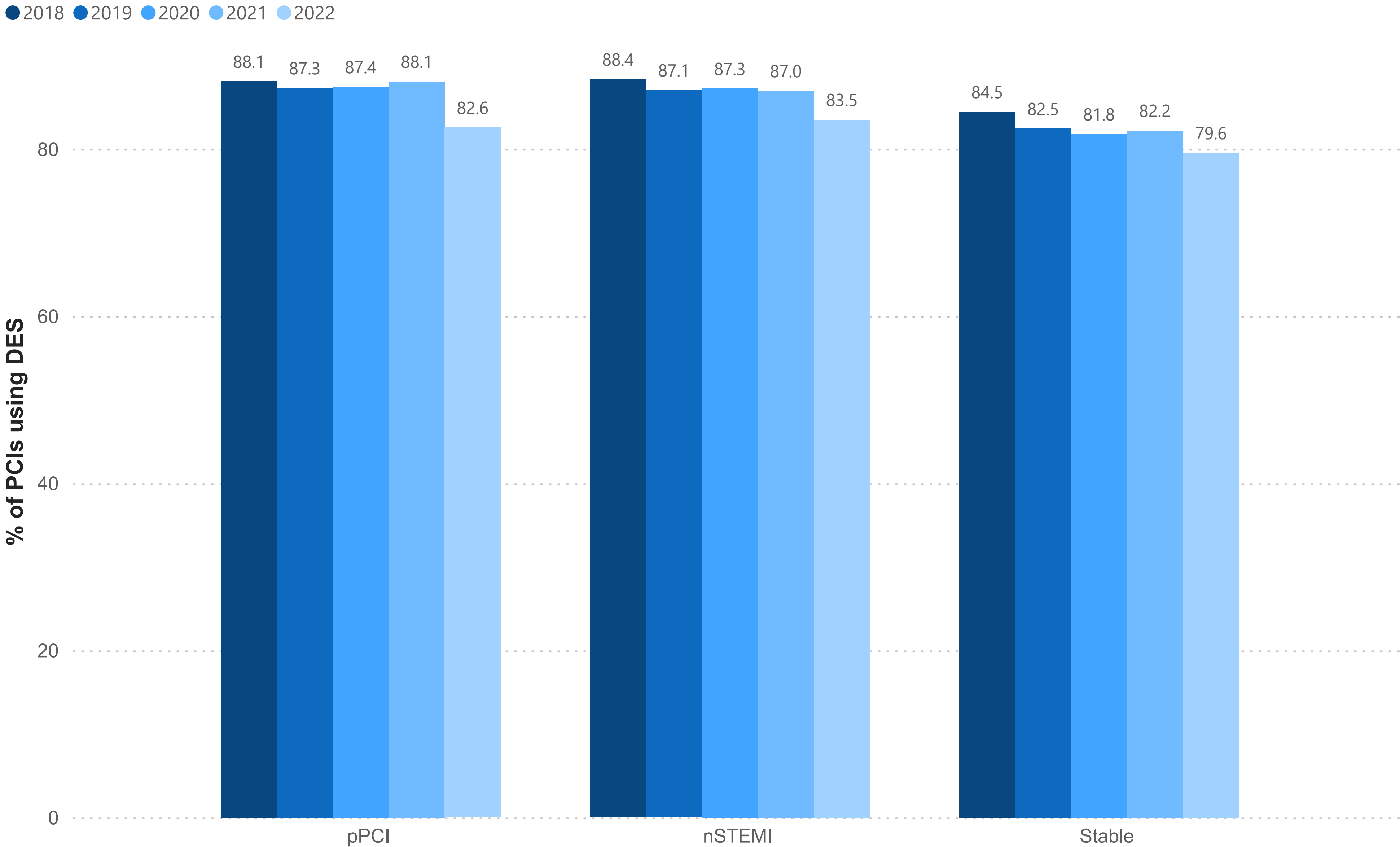


Mean stents per case

By centre



DES use by syndrome





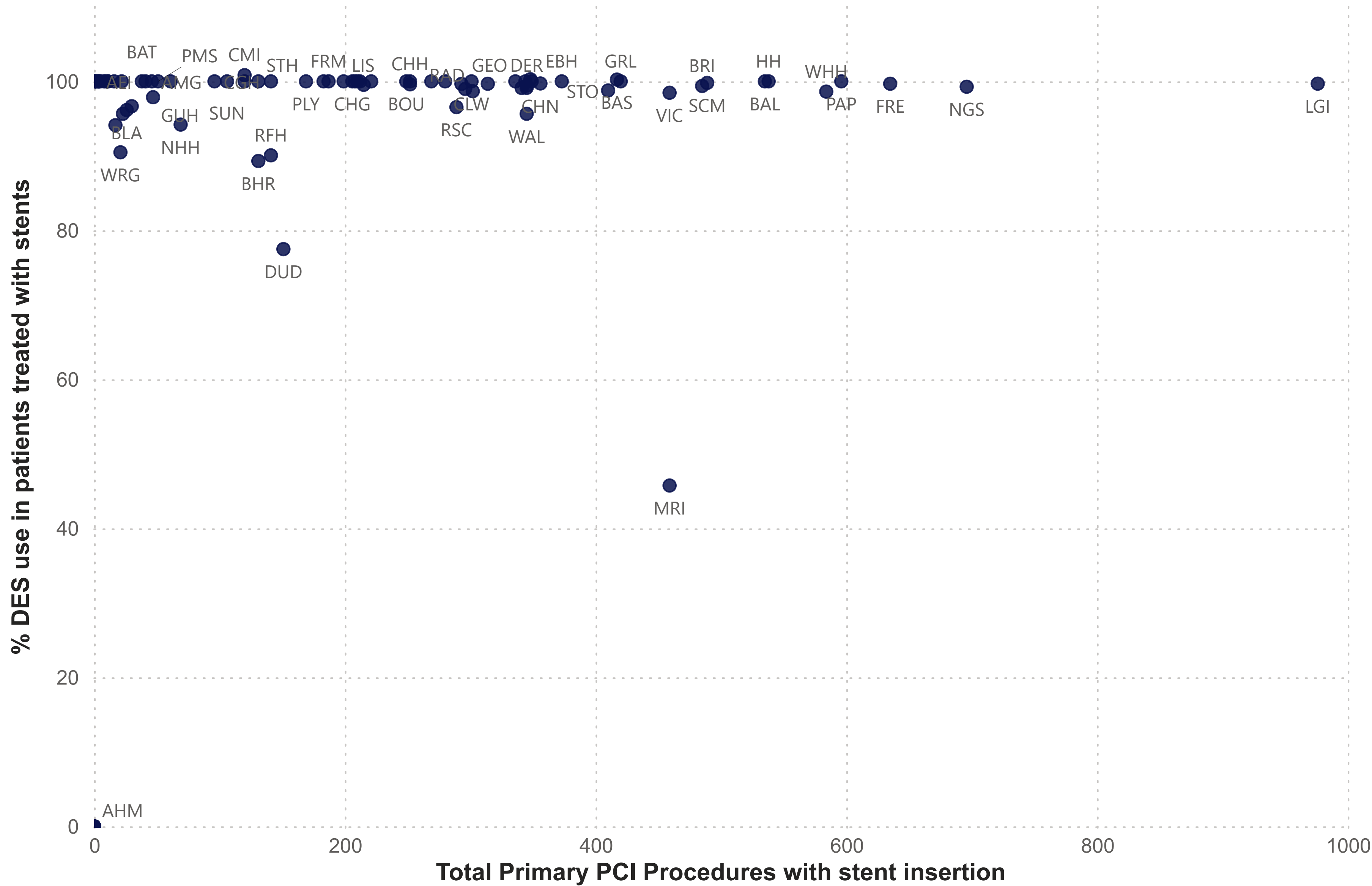
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

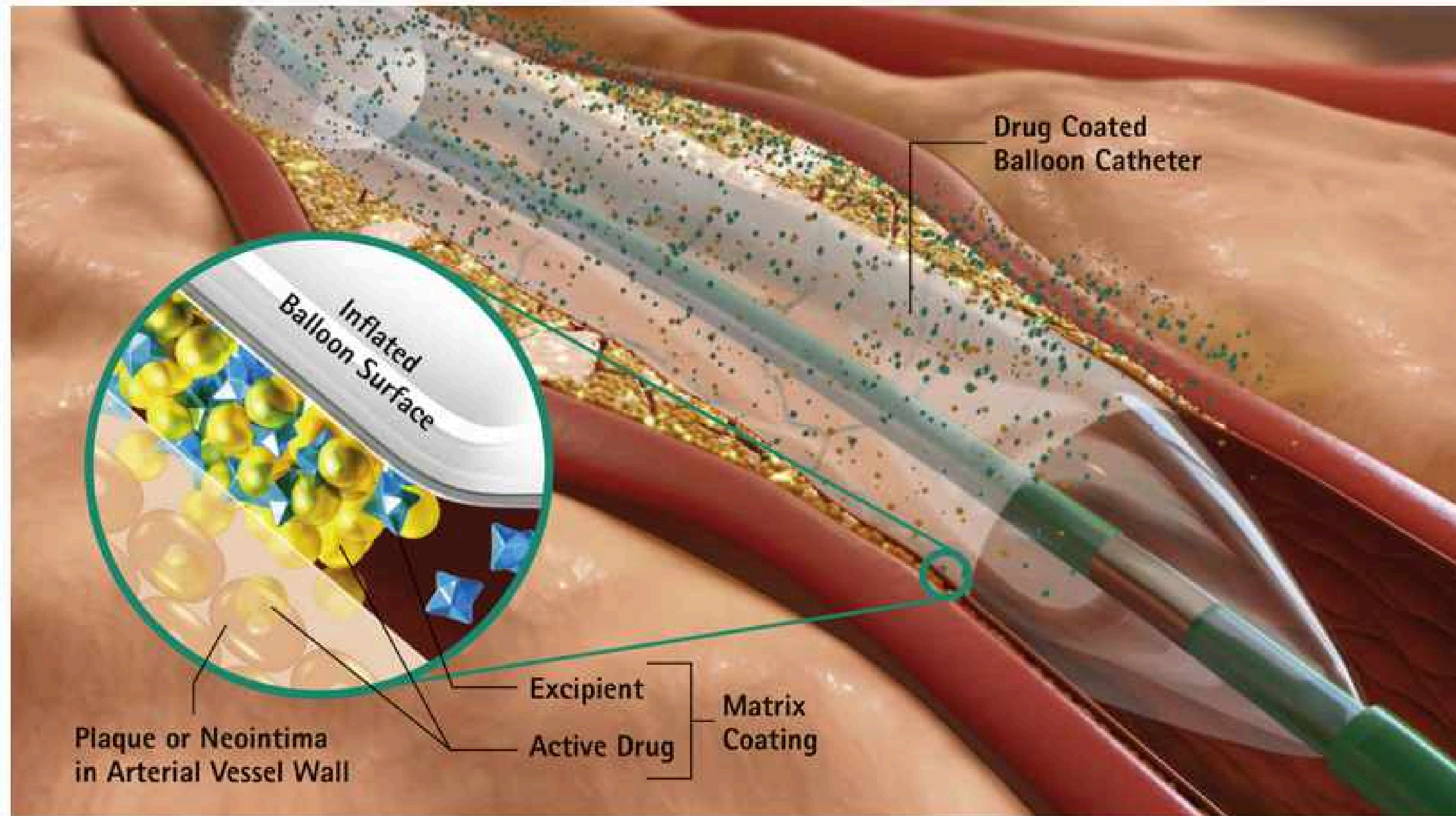
Primary PCI

If stent implanted - % DES





Drug Eluting Balloon use





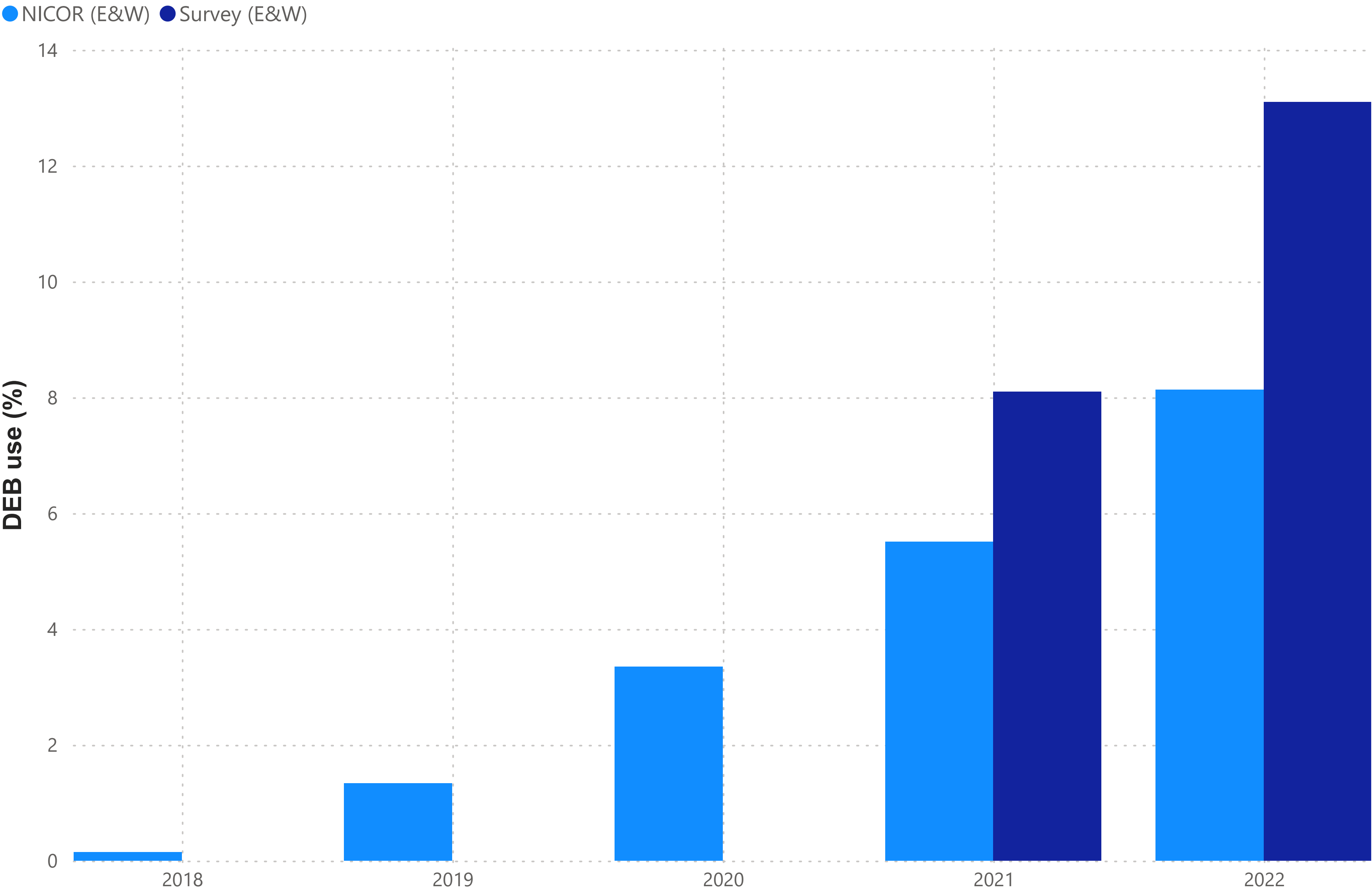
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

Drug Eluting Balloon use

Dataset vs Survey



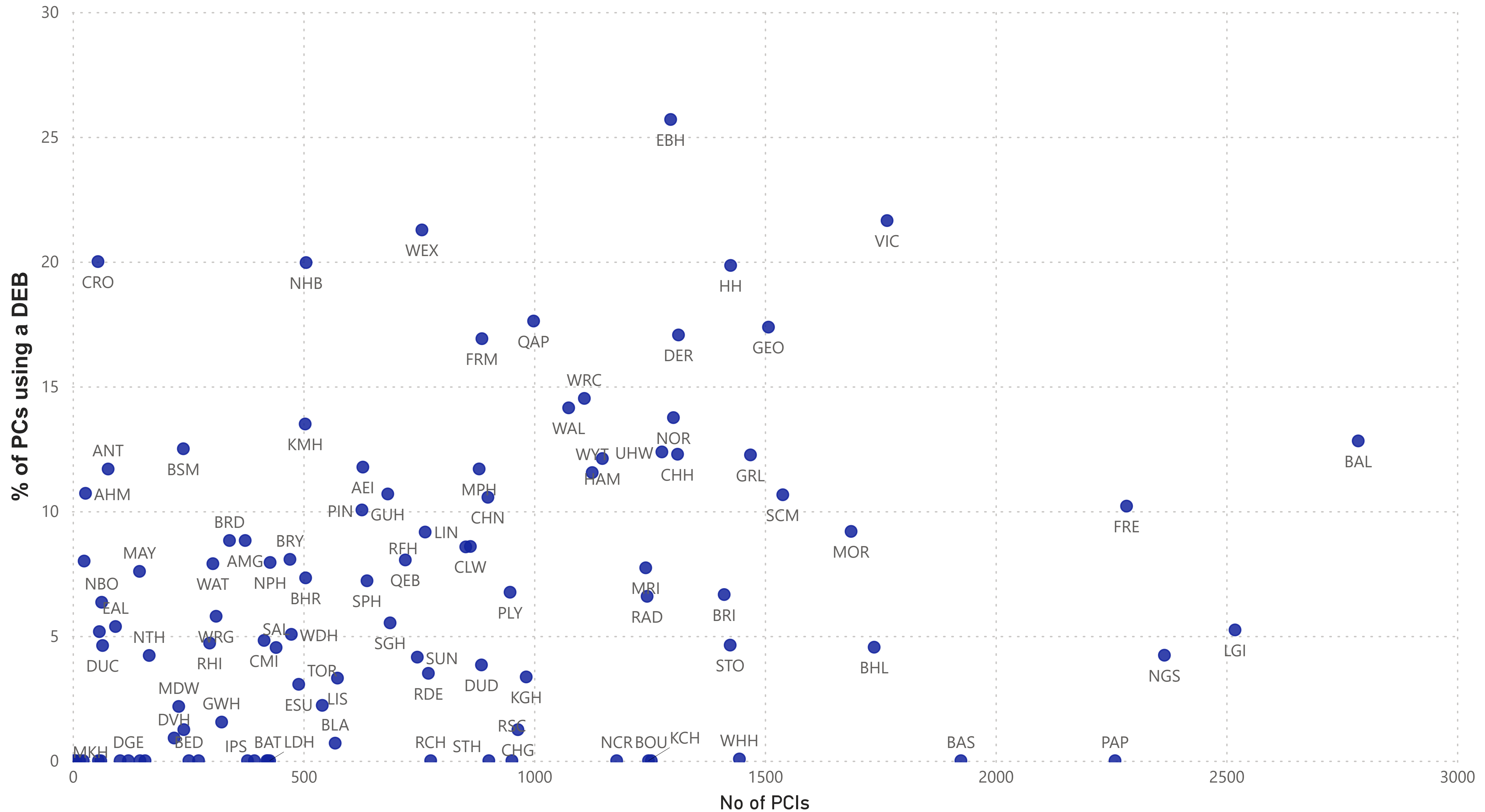


Drug Eluting Balloon data capture in dataset

3.20 Procedural device(s) used 14. Drug Eluting balloon

Drug Eluting Balloon use

Dataset





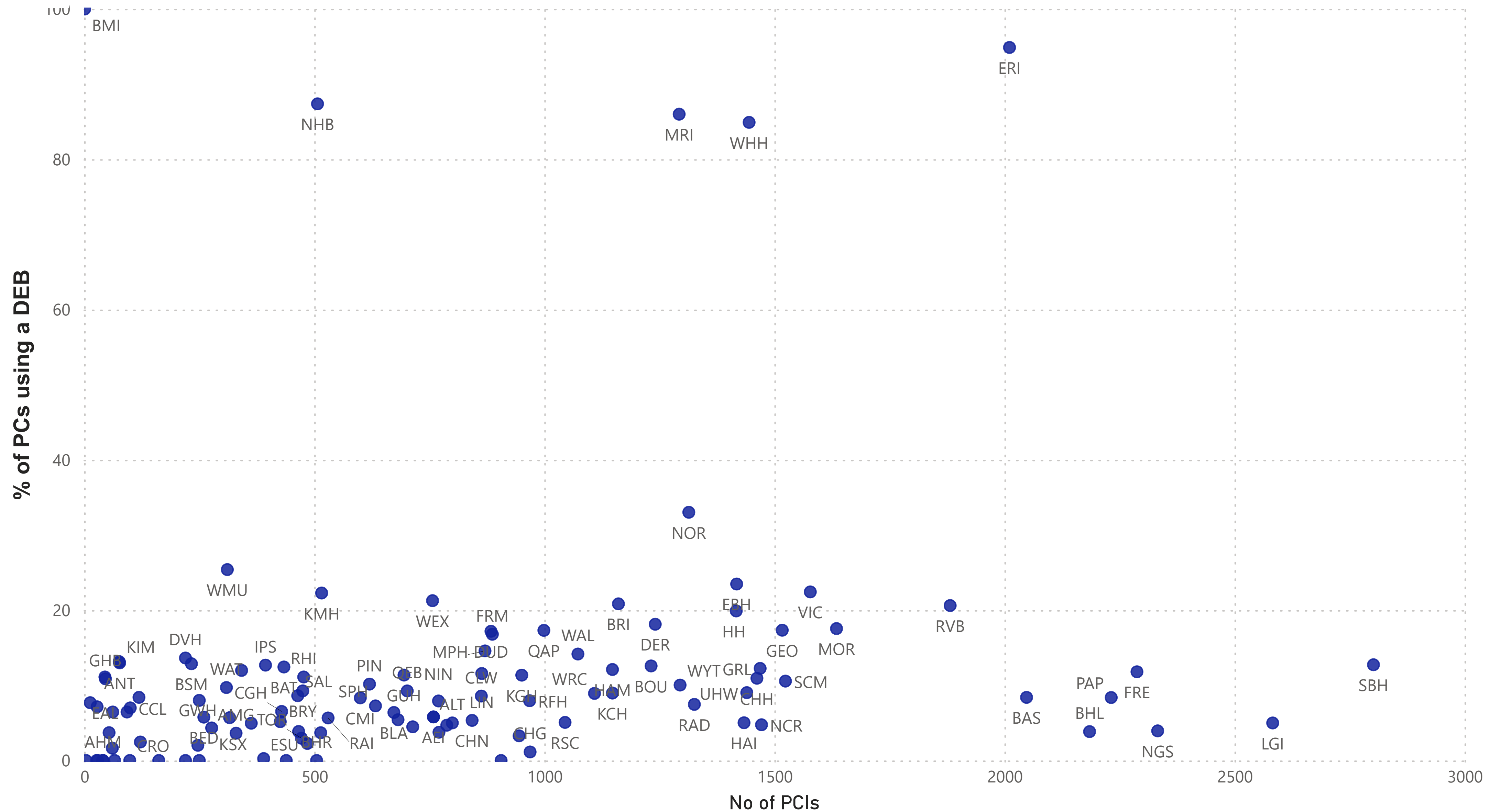
Survey



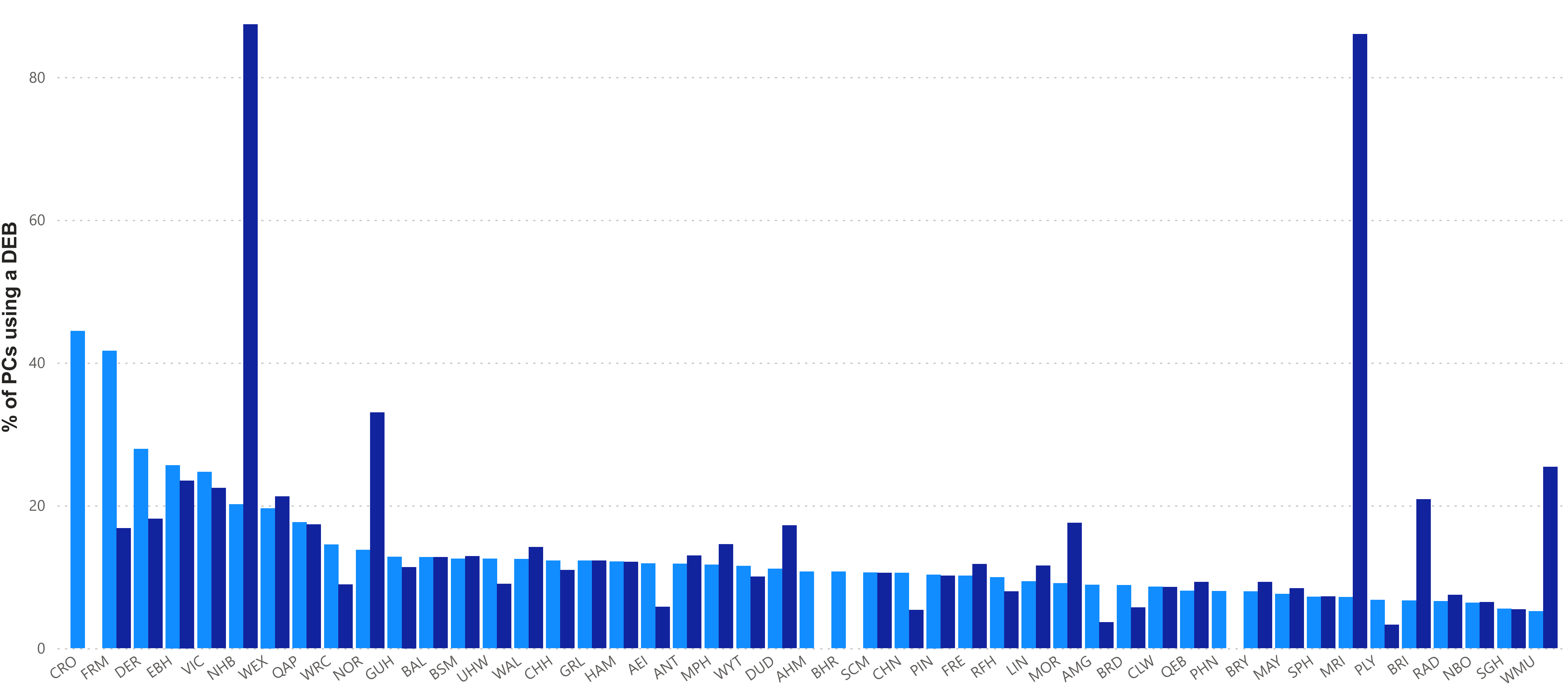
2022-23 Data
Mamas Mamas

Drug Eluting Balloon use

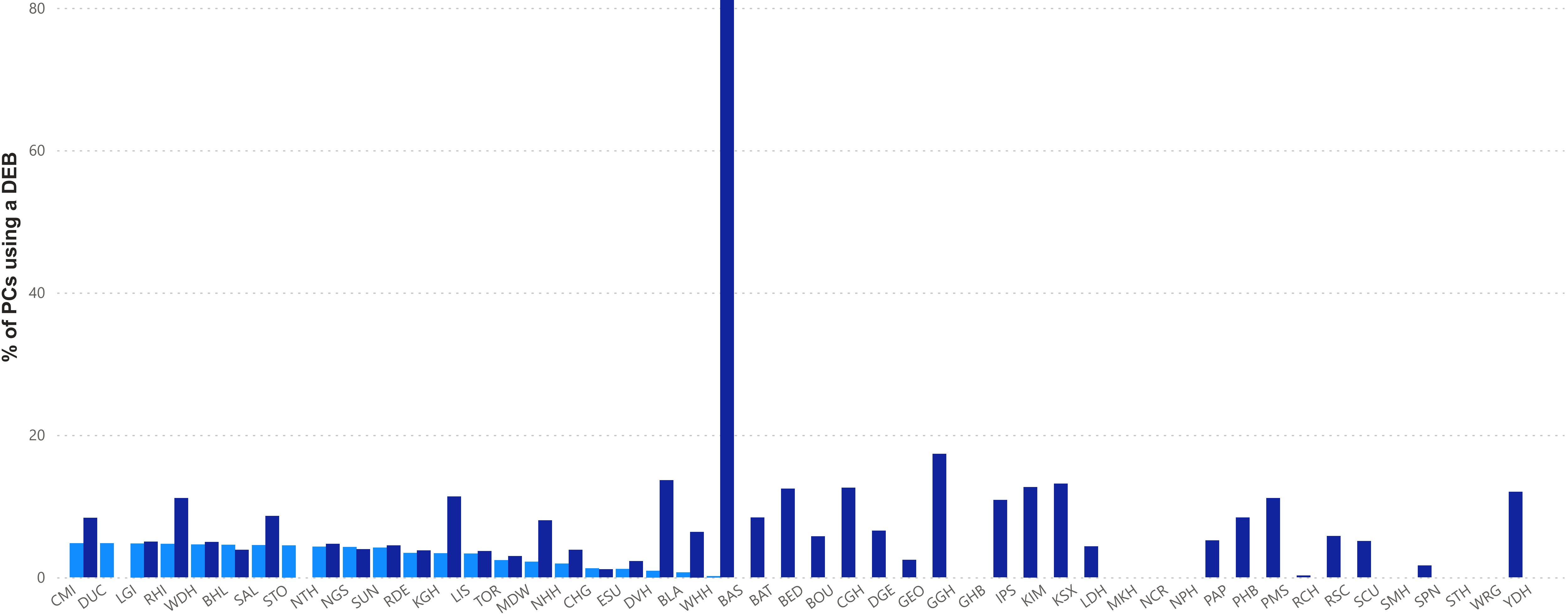
Survey



● Dataset ● Survey



Dataset Survey





Data Extract
10-11-2023

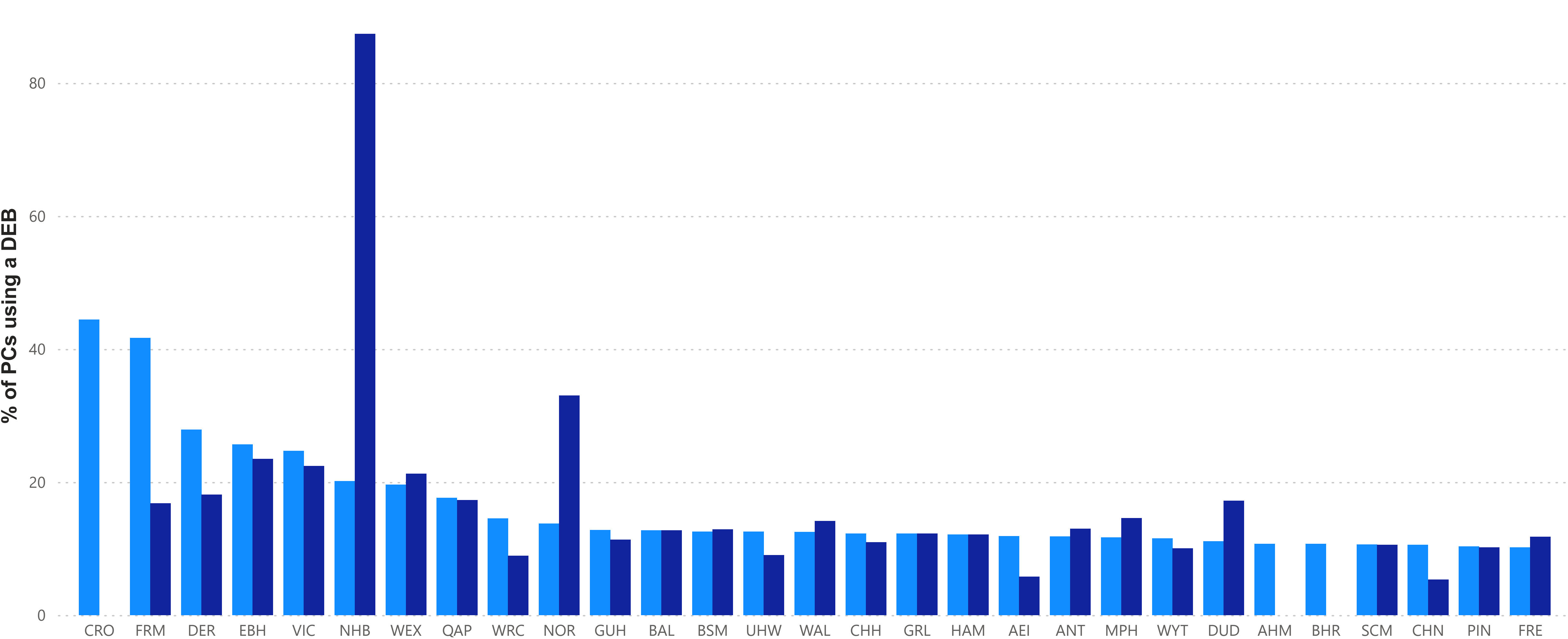


2022-23 Data
Mamas Mamas

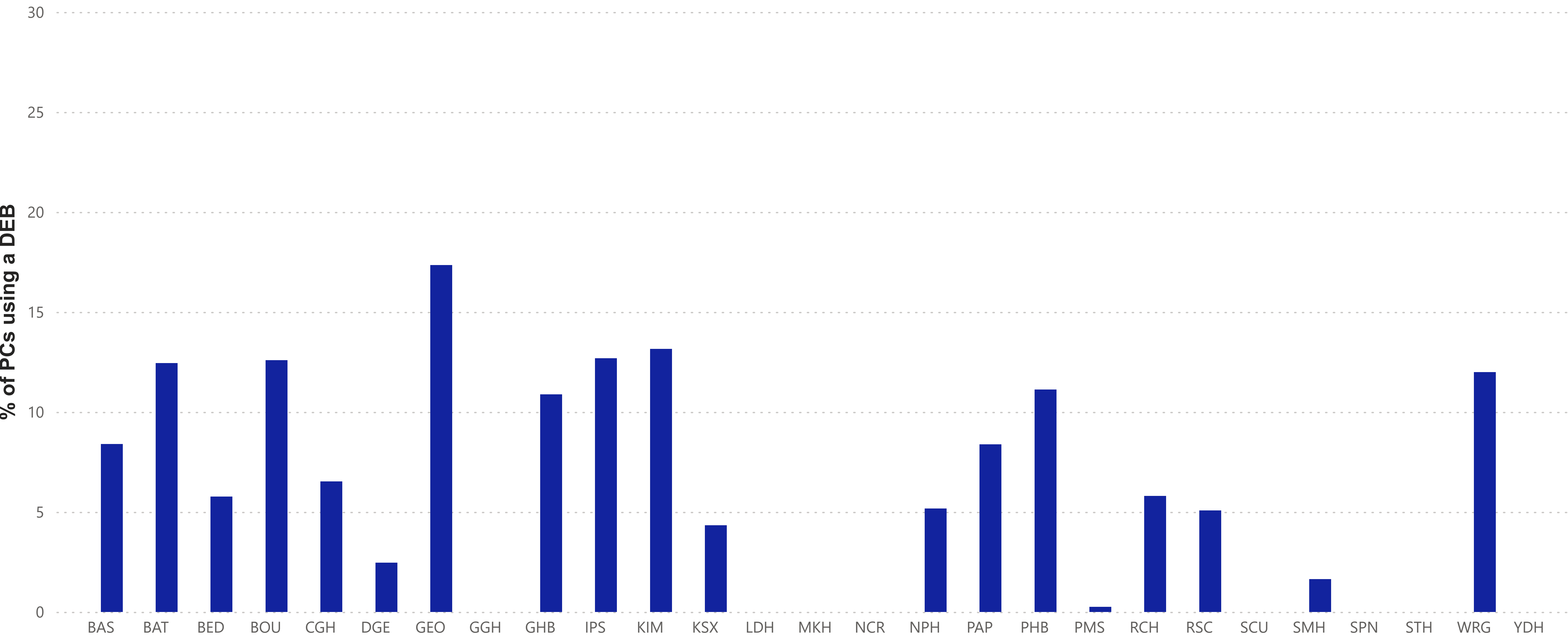
Drug Eluting Balloon use

DEB use (Dataset) > 10%

Dataset Survey



● Dataset ● Survey



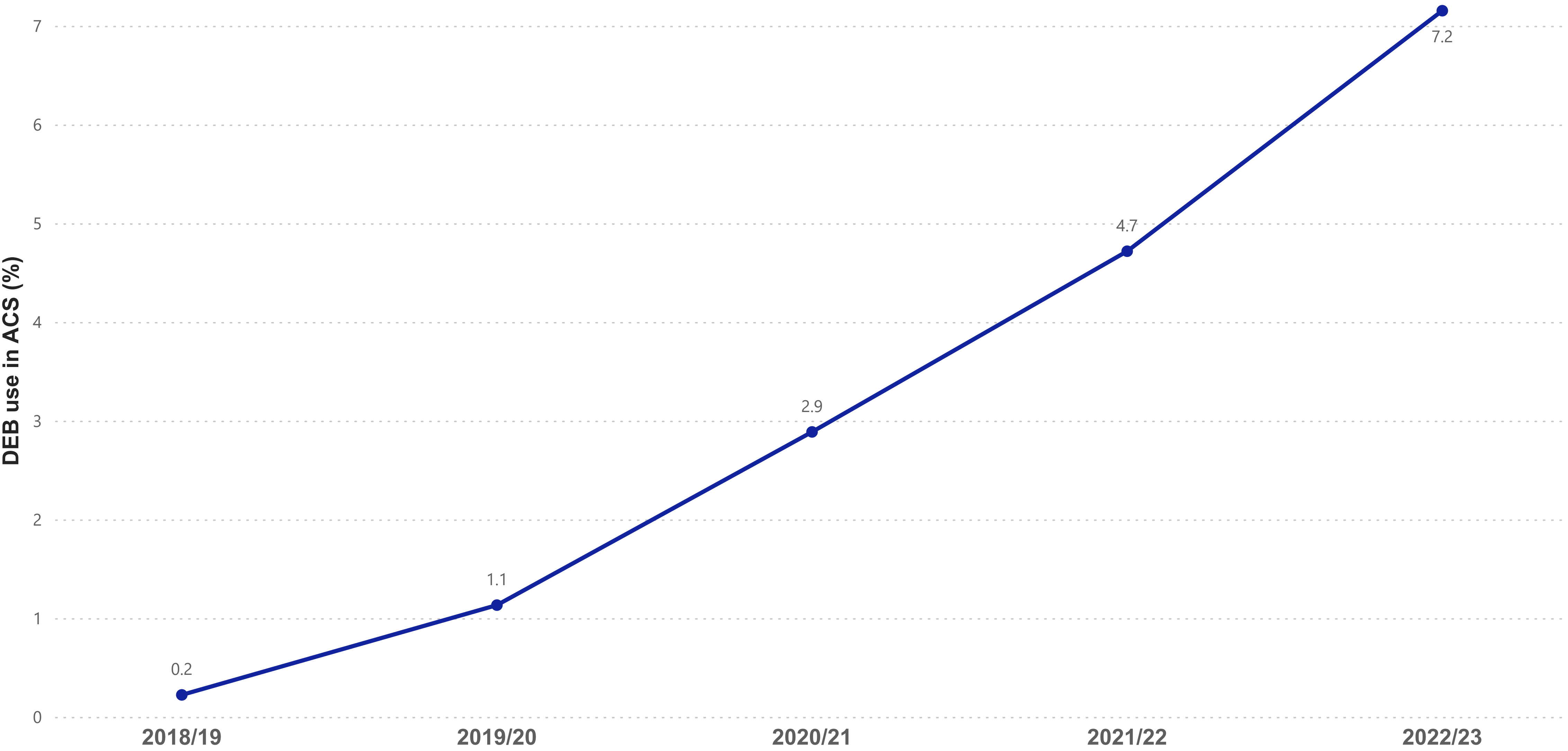


Data Extract
10-11-2023

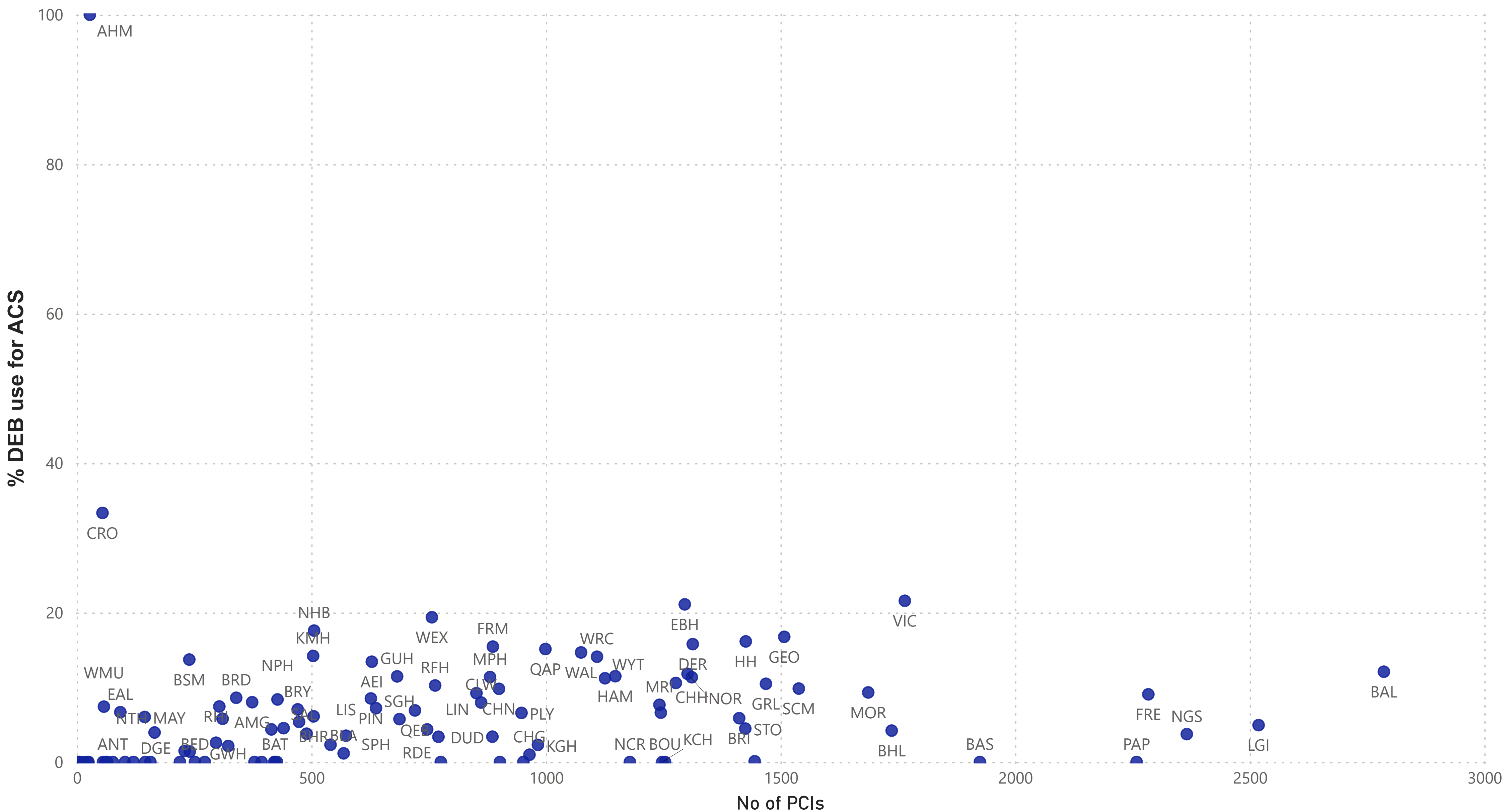


2022-23 Data
Mamas Mamas

DEB use for ACS



DEB use for ACS



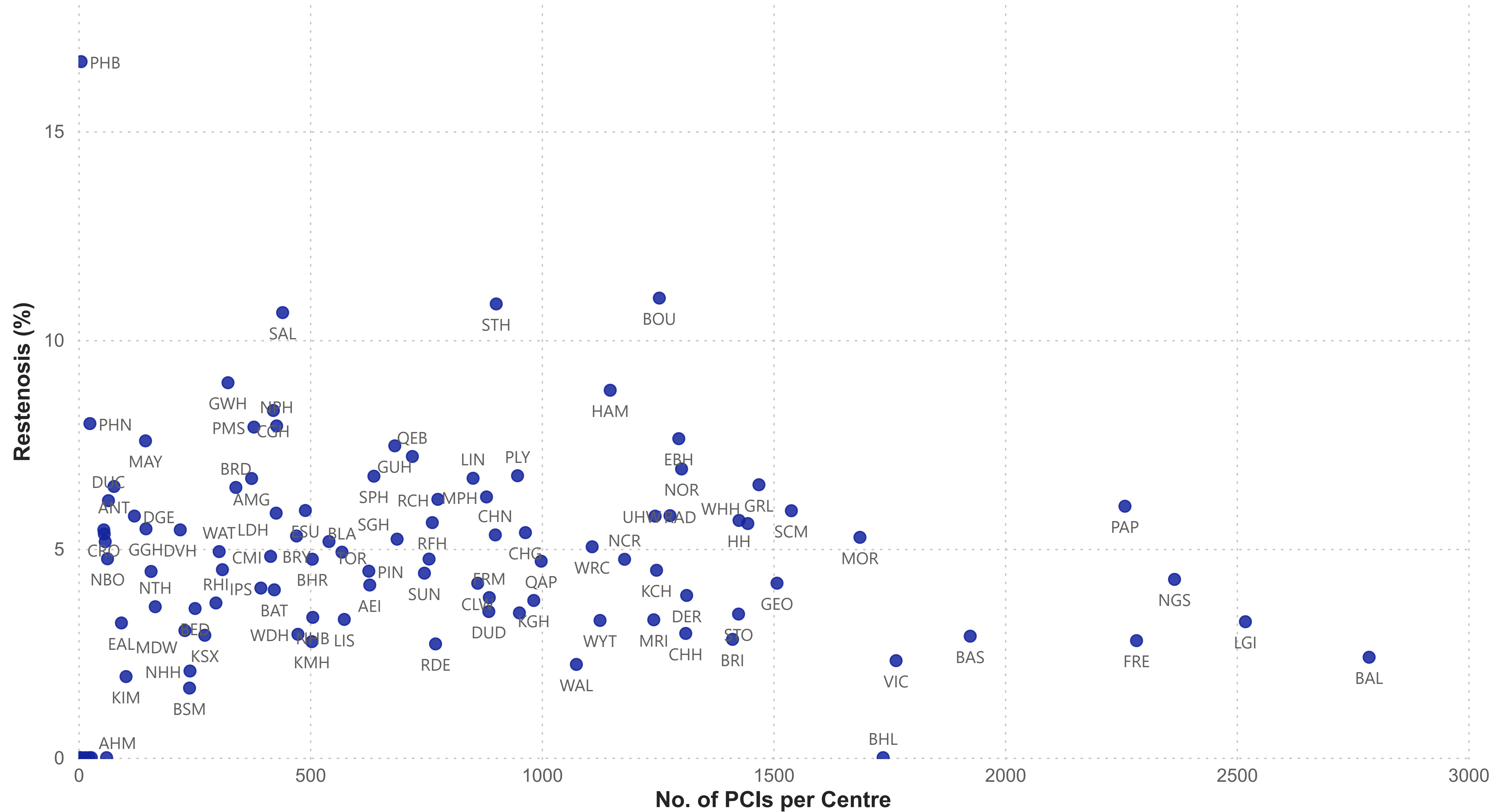


DEB use for restenosis

ESC Guidelines on Myocardial Revascularization 2018

Restenosis		
DES are recommended for the treatment of in-stent restenosis of BMS or DES. ^{373,375,378,379}	I	A
Drug-coated balloons are recommended for the treatment of in-stent restenosis of BMS or DES. ^{373,375,378,379}	I	A
In patients with recurrent episodes of diffuse in-stent restenosis, CABG should be considered by the Heart Team over a new PCI attempt.	IIa	C
IVUS and/or OCT should be considered to detect stent-related mechanical problems leading to restenosis.	IIa	C

Restenosis



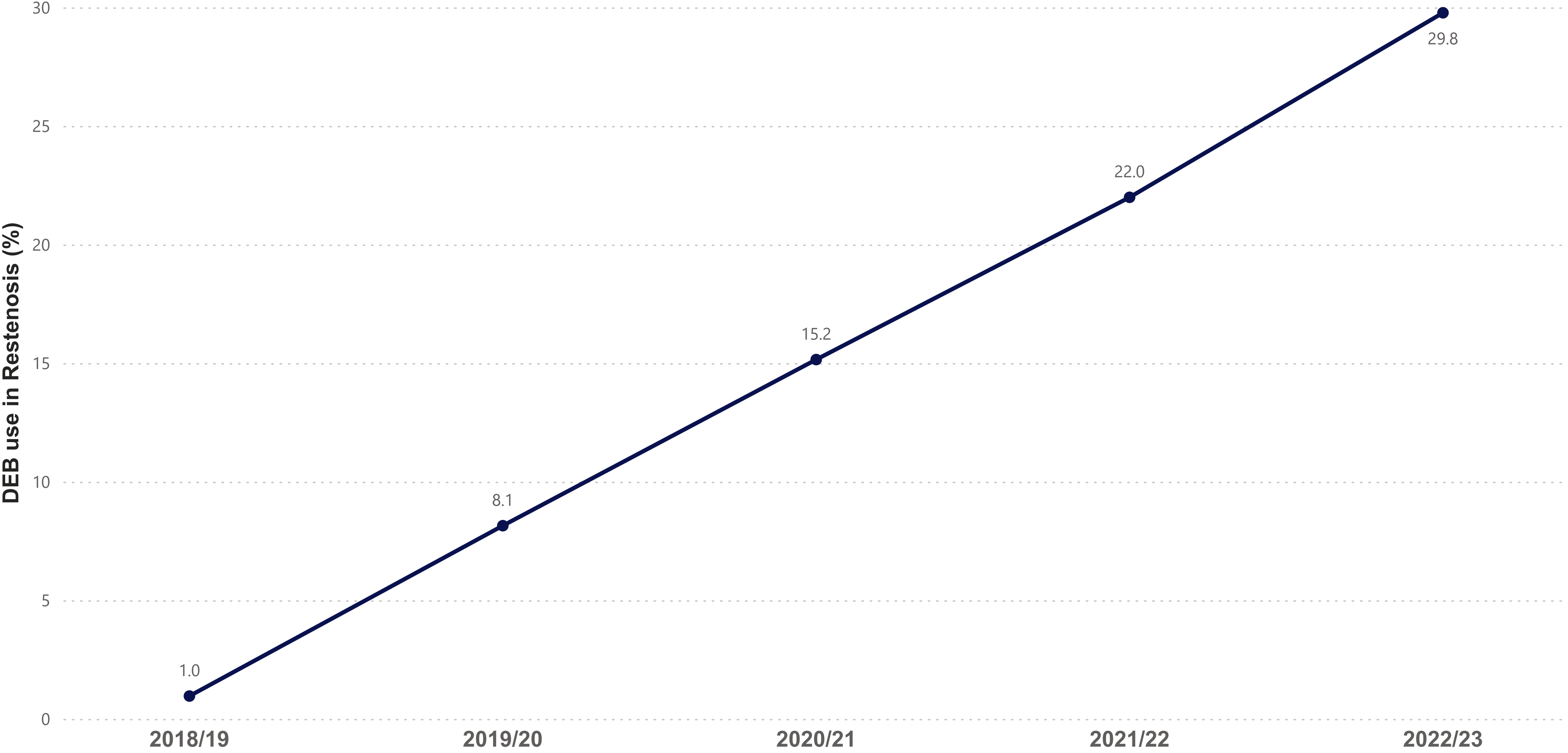


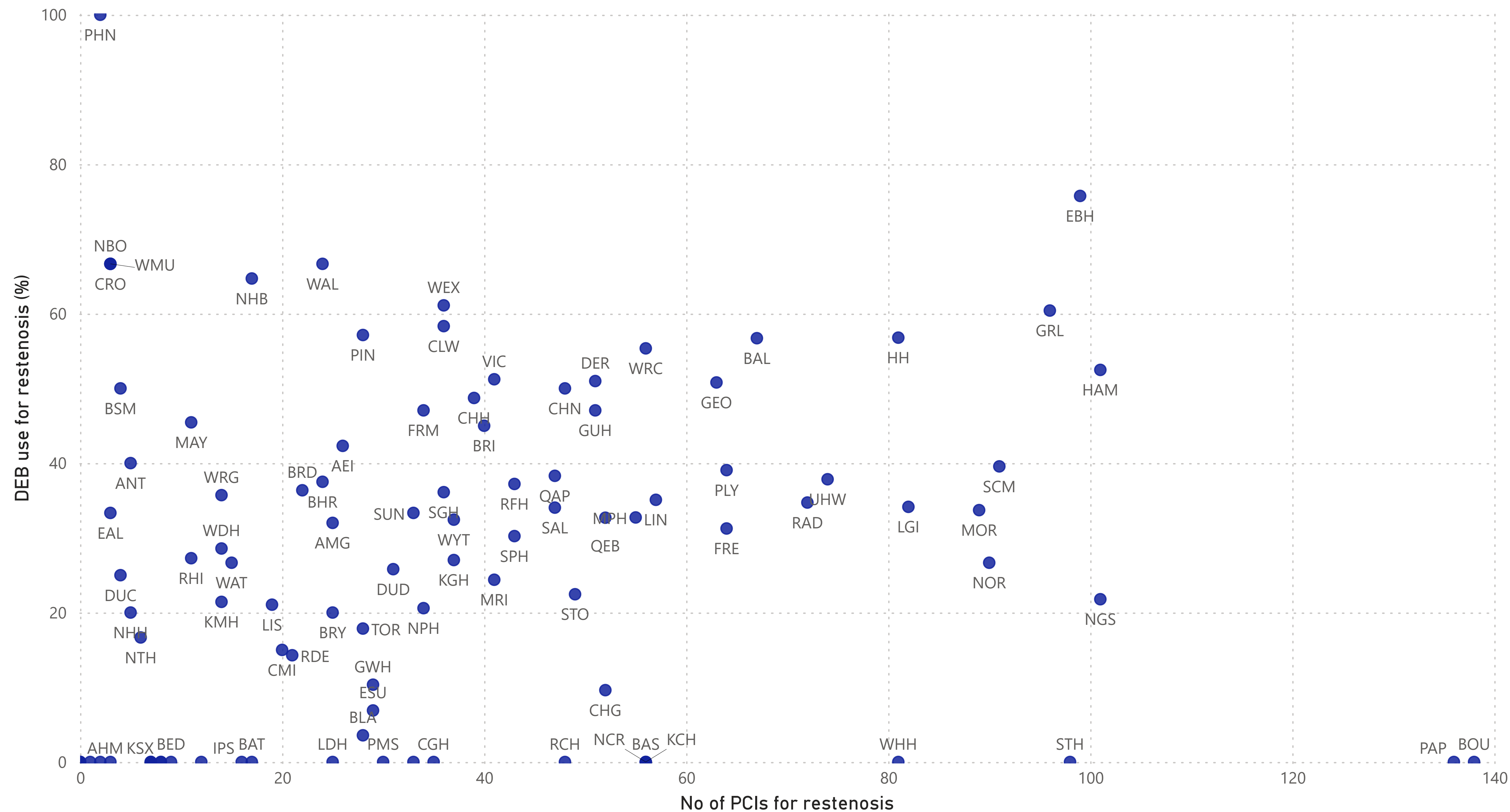
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

DEB use for Restenosis







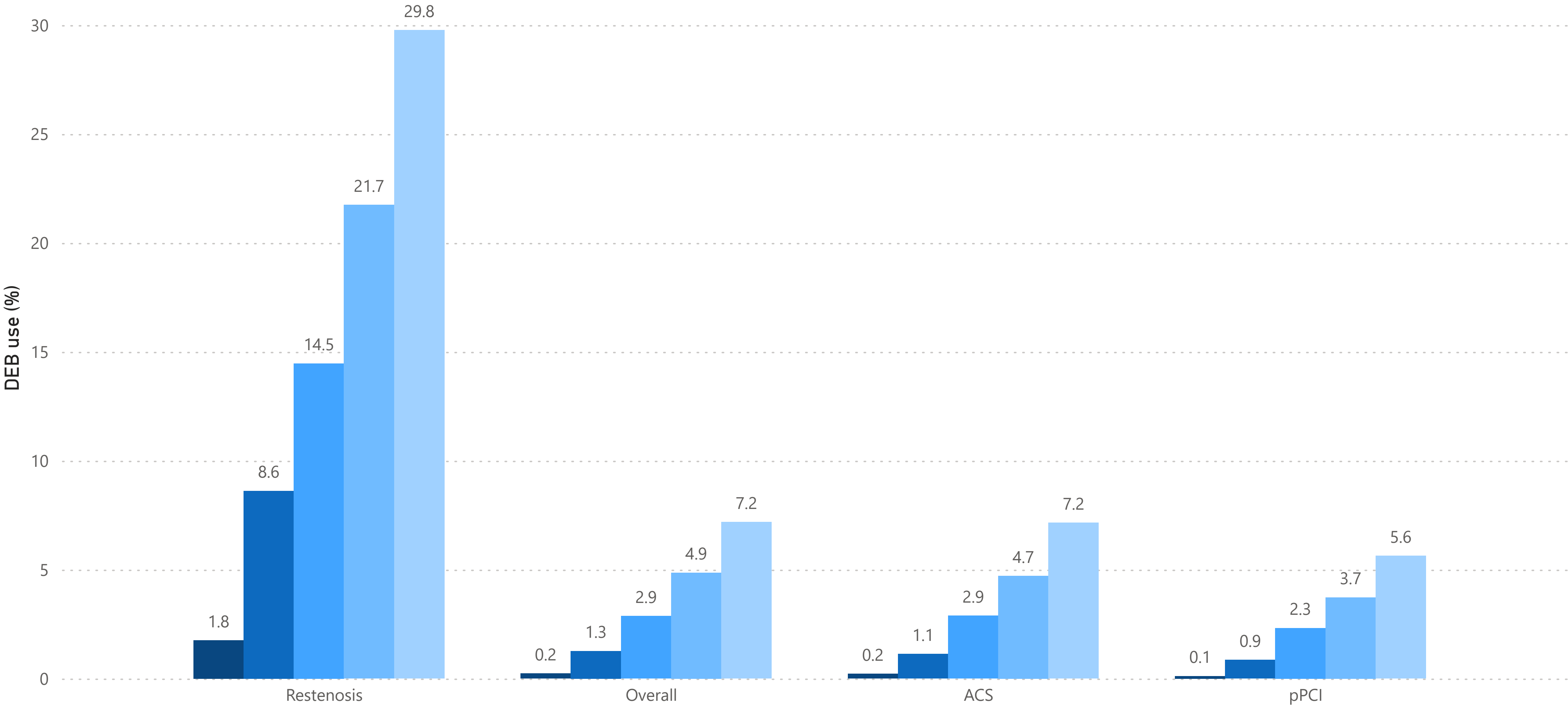
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

DEB use by indication

financial_year ● 2018/19 ● 2019/20 ● 2020/21 ● 2021/22 ● 2022/23



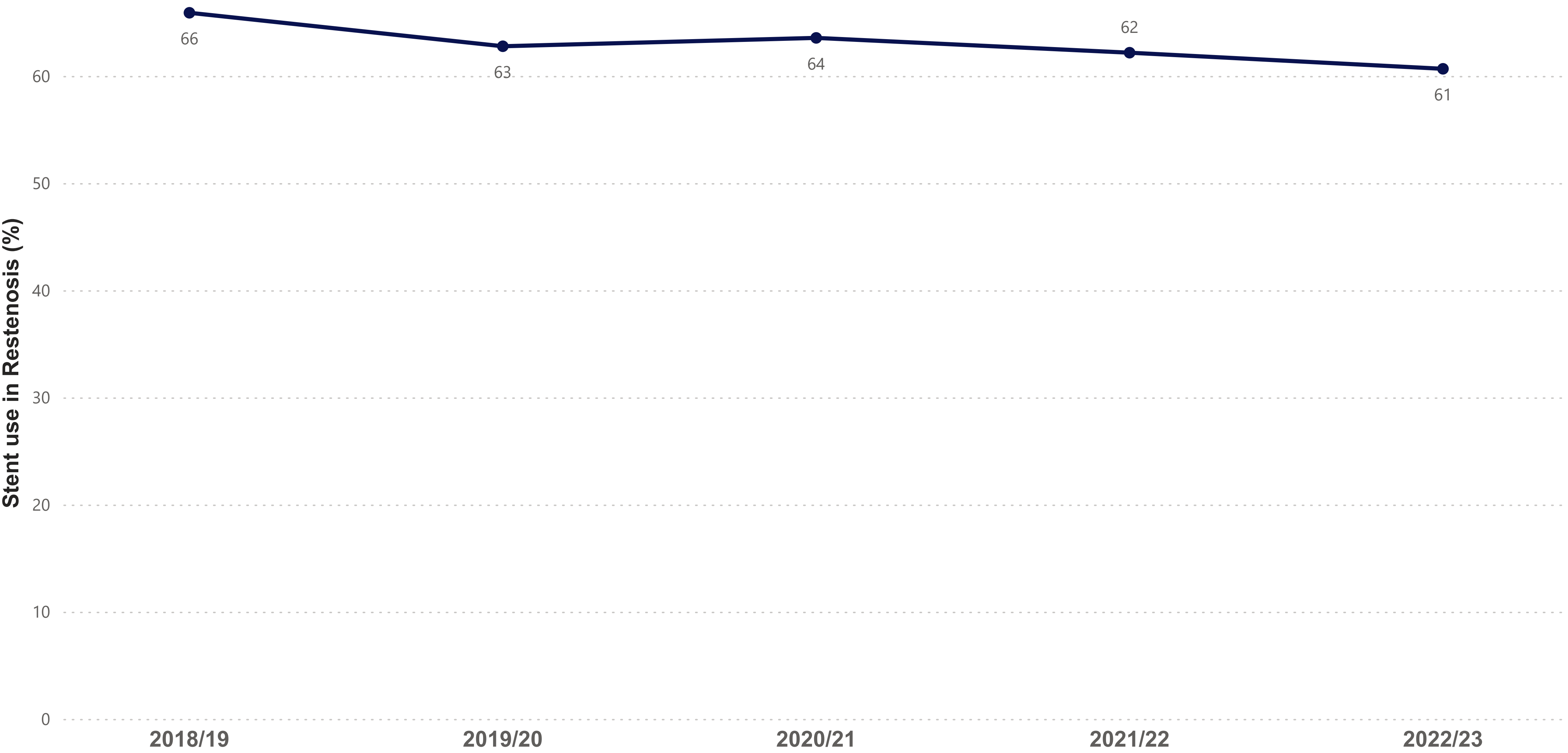


Data Extract
10-11-2023

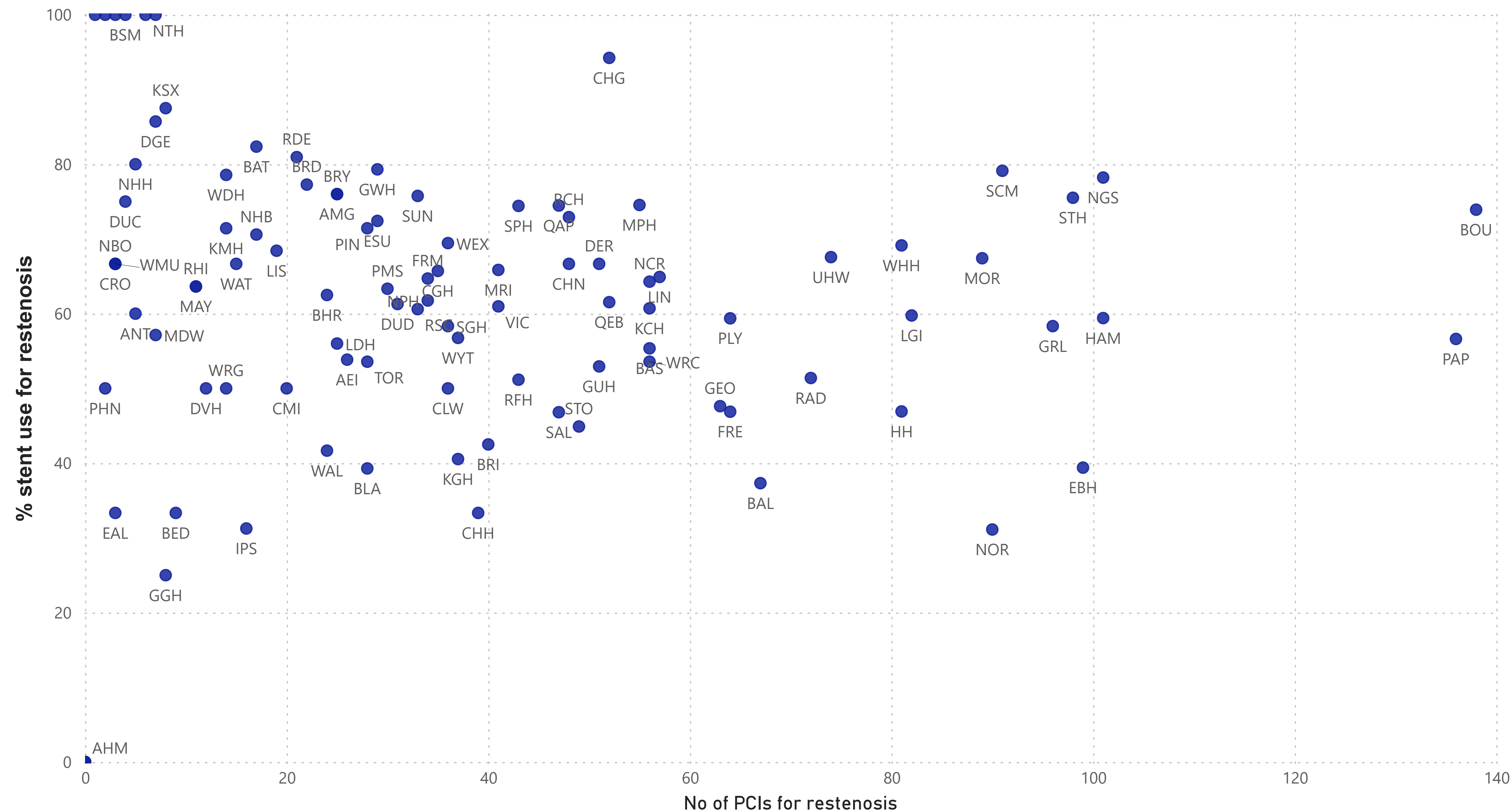


2022-23 Data
Mamas Mamas

Stent use for Restenosis



Stent use for Restenosis





Pharmacological Therapy





ESC

European Society
of Cardiology

European Heart Journal (2023) 44, 3720–3826

<https://doi.org/10.1093/eurheartj/ehad191>

ESC GUIDELINES

2023 ESC Guidelines for the management of acute coronary syndromes

Developed by the task force on the management of acute coronary
syndromes of the European Society of Cardiology (ESC)

Recommendations	Class ^a	Level ^b
GP IIb/IIIa receptor antagonists should be considered if there is evidence of no-reflow or a thrombotic complication during PCI.	IIa	C
Pre-treatment with a GP IIb/IIIa receptor antagonist is not recommended. ²⁹²	III	A



Data Extract
10-11-2023

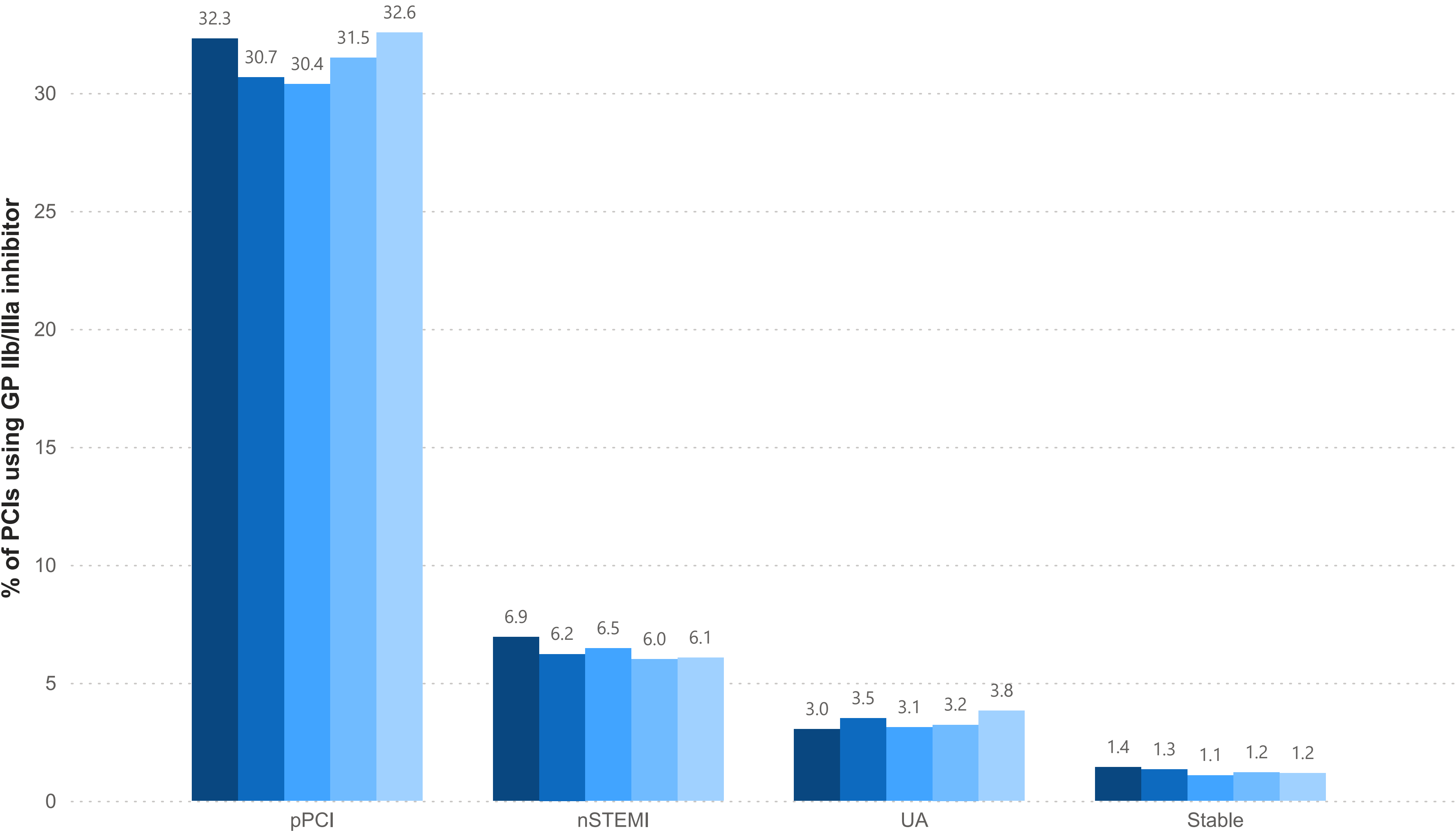


2022-23 Data
Mamas Mamas

GP IIb/IIIa Antagonist

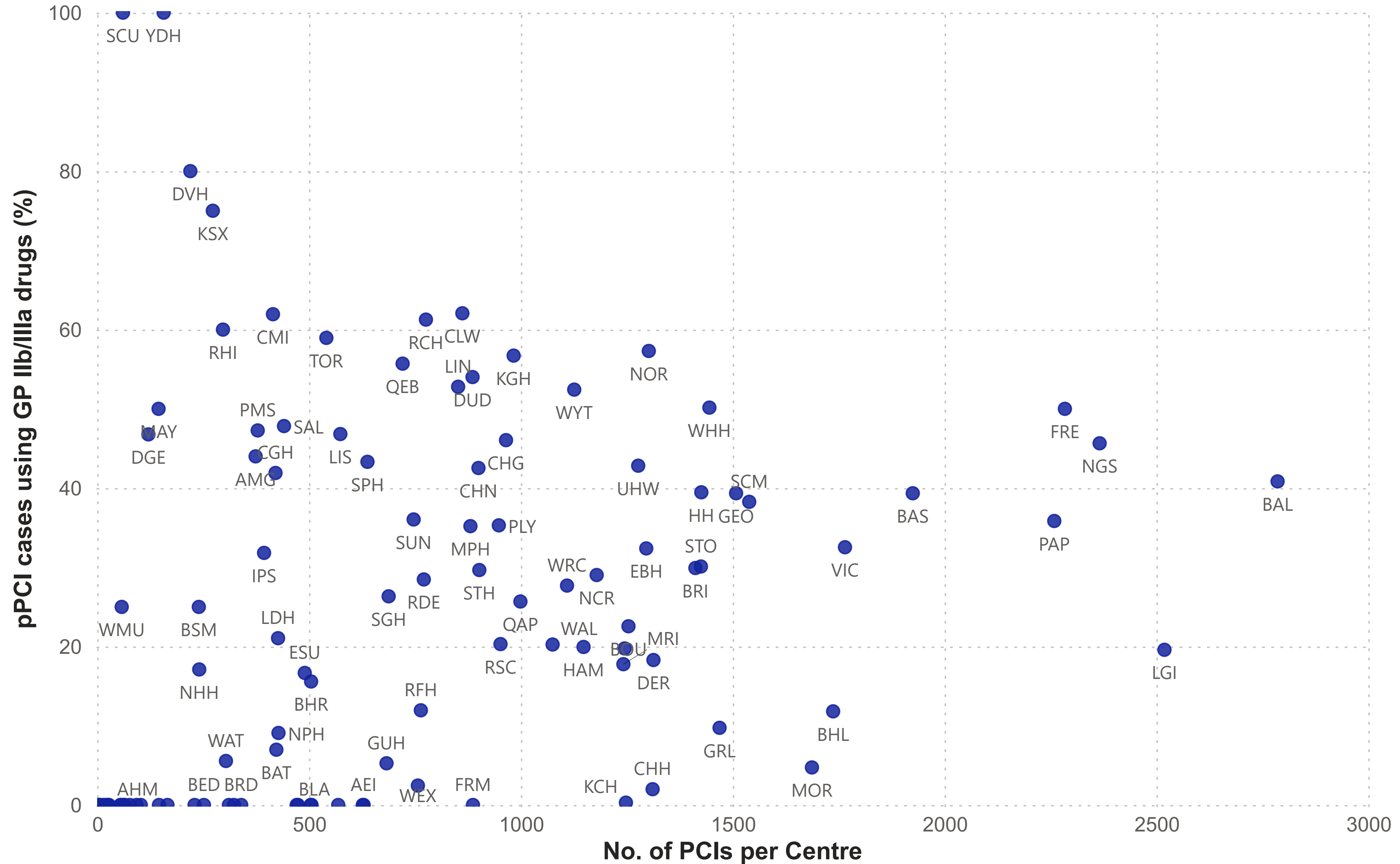
Use by Syndrome

2018/19 2019/20 2020/21 2021/22 2022/23



GP IIb/IIIa Antagonist

Use in pPCI vs activity per Centre





Antiplatelet therapy





2023 ESC Guidelines for the management of acute coronary syndromes

Developed by the task force on the management of acute coronary
syndromes of the European Society of Cardiology (ESC)

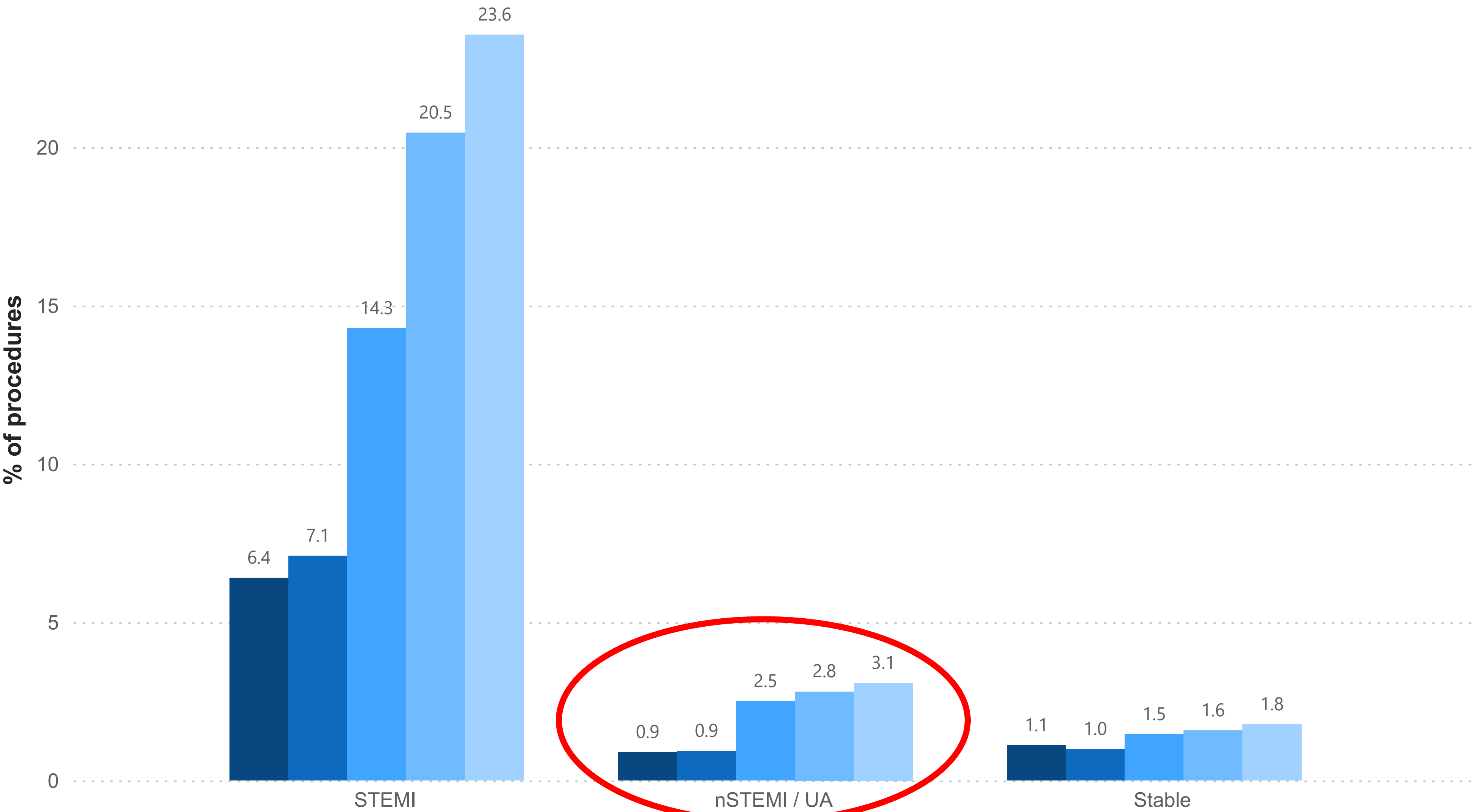
Recommendations	Class ^a	Level ^b
Antiplatelet therapy		
Prasugrel is recommended in P2Y ₁₂ receptor inhibitor-naïve patients proceeding to PCI (60 mg LD, 10 mg o.d. MD, 5 mg o.d. MD for patients aged ≥75 years or with a body weight <60 kg). ²³⁹	I	B
Ticagrelor is recommended irrespective of the treatment strategy (invasive or conservative) (180 mg LD, 90 mg b.i.d. MD). ²³⁸	I	B
Clopidogrel (300–600 mg LD, 75 mg o.d. MD) is recommended when prasugrel or ticagrelor are not available, cannot be tolerated, or are contraindicated. ^{263,289}	I	C
Prasugrel should be considered in preference to ticagrelor for ACS patients who proceed to PCI. ^{244,290}	IIa	B

Prasugrel

Use by indication for PCI

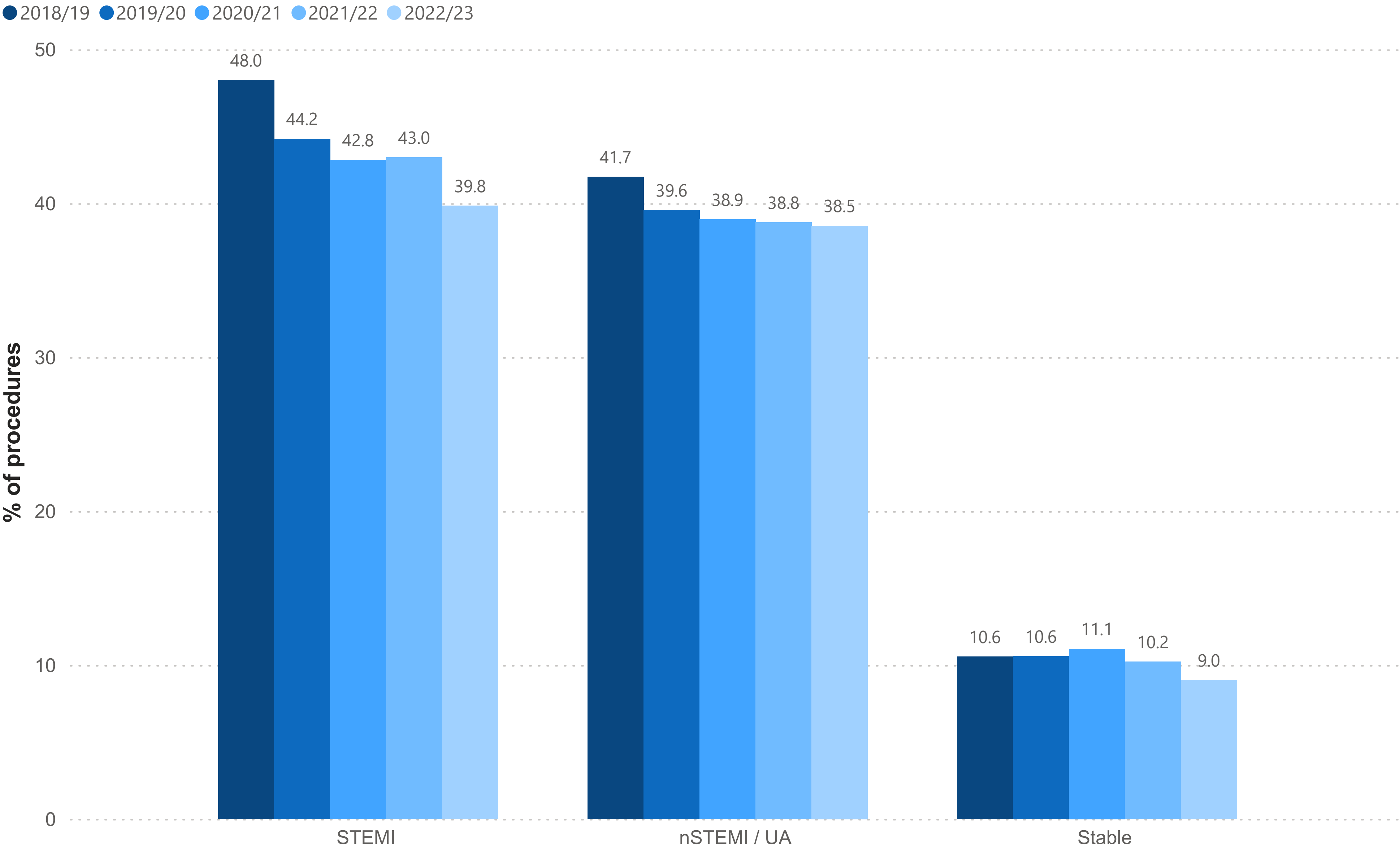
Prasugrel use by indication

● 2018/19 ● 2019/20 ● 2020/21 ● 2021/22 ● 2022/23



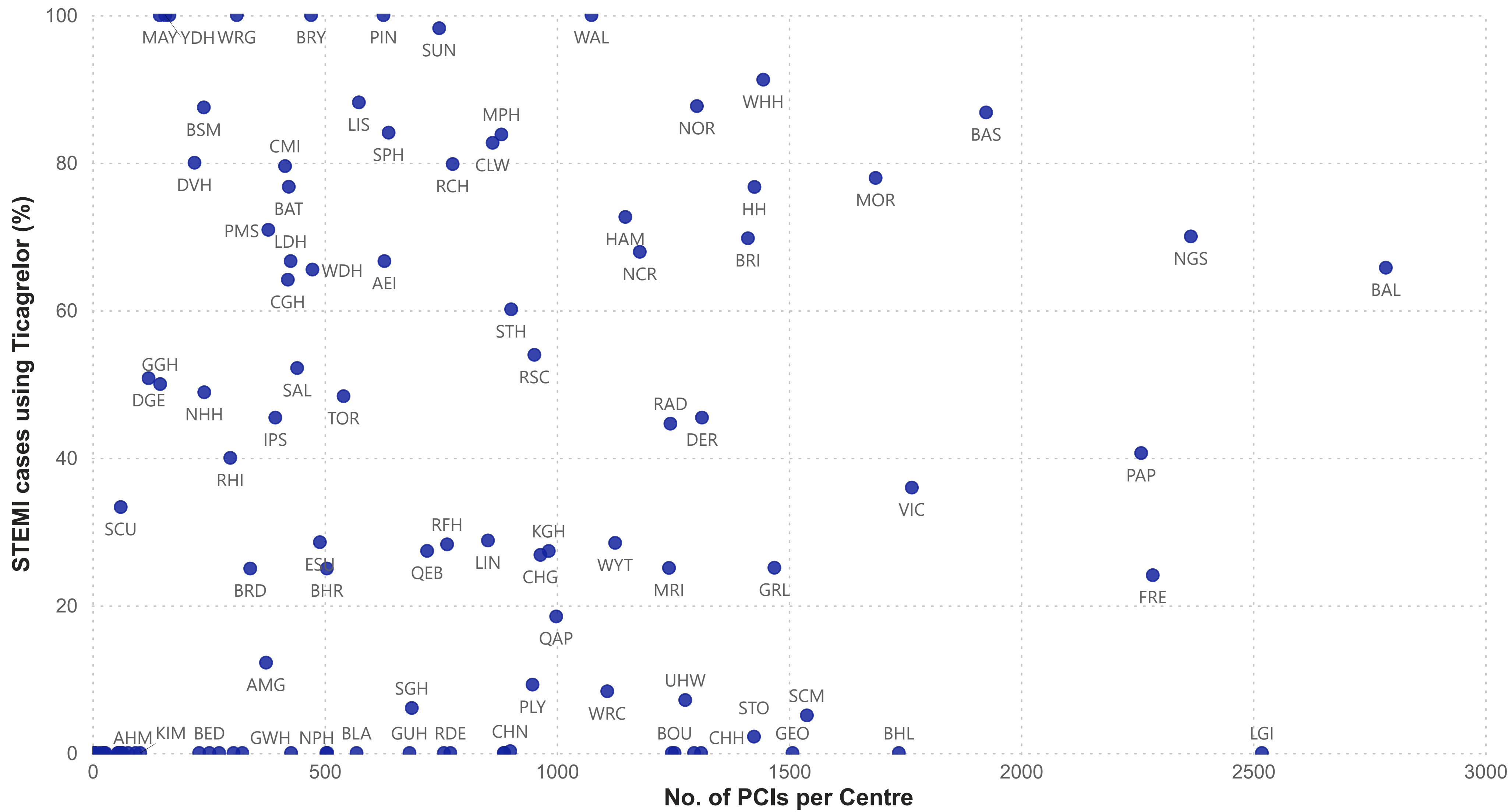
Ticagrelor

Use by indication for PCI



Ticagrelor

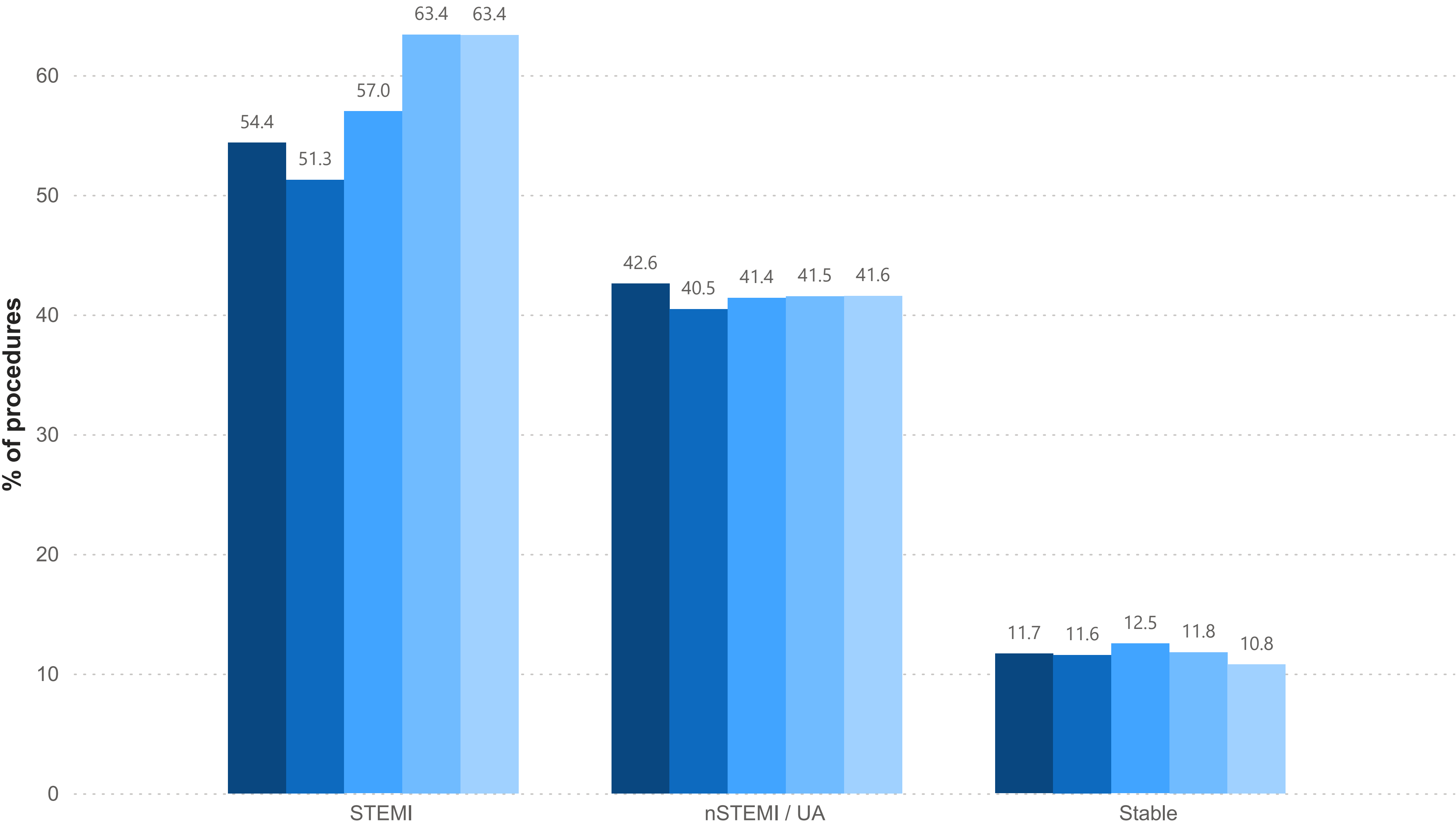
Use in PCI for STEMI vs activity per Centre



Ticagrelor or Prasugrel

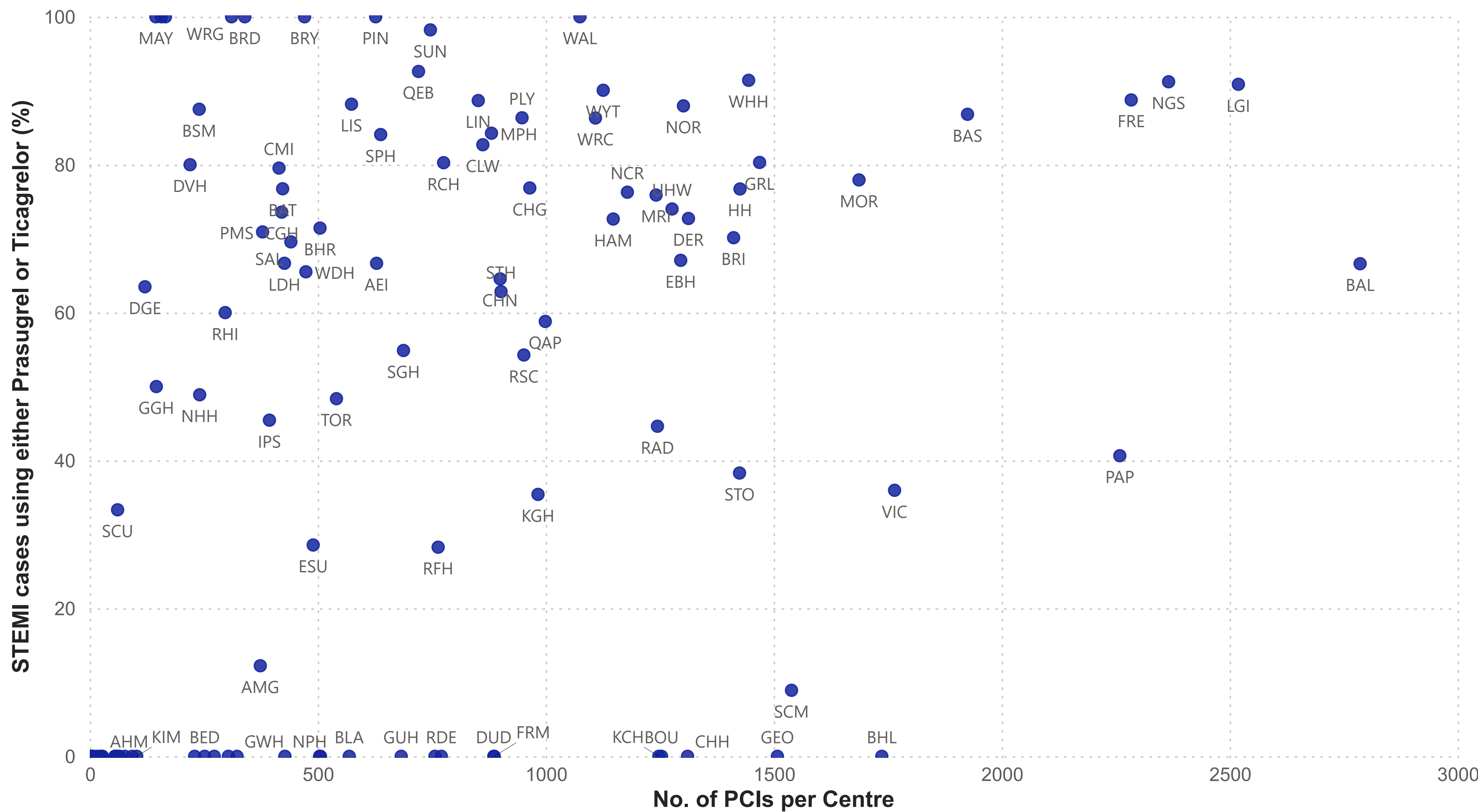
Use by indication for PCI

● 2018/19 ● 2019/20 ● 2020/21 ● 2021/22 ● 2022/23



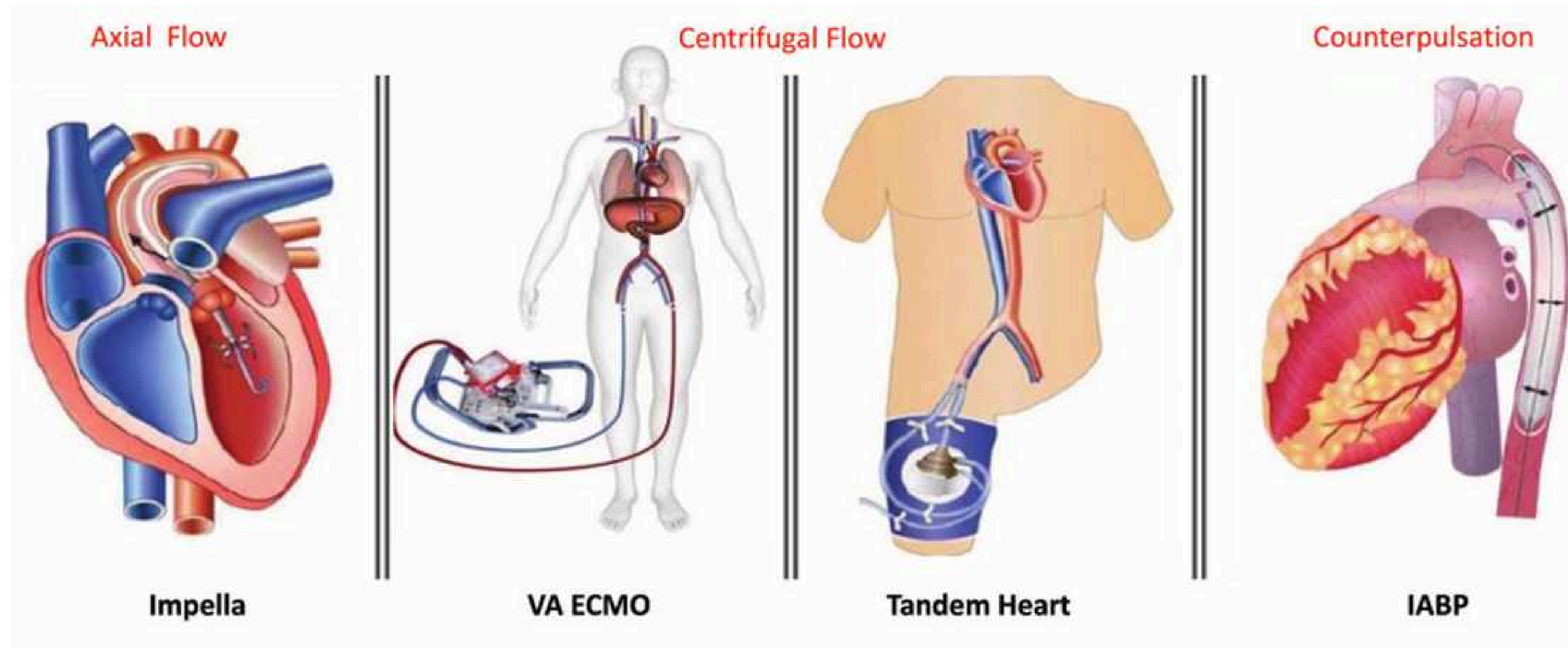
Ticagrelor or Prasugrel

Use in PCI for STEMI vs activity per Centre





LV support / Shock





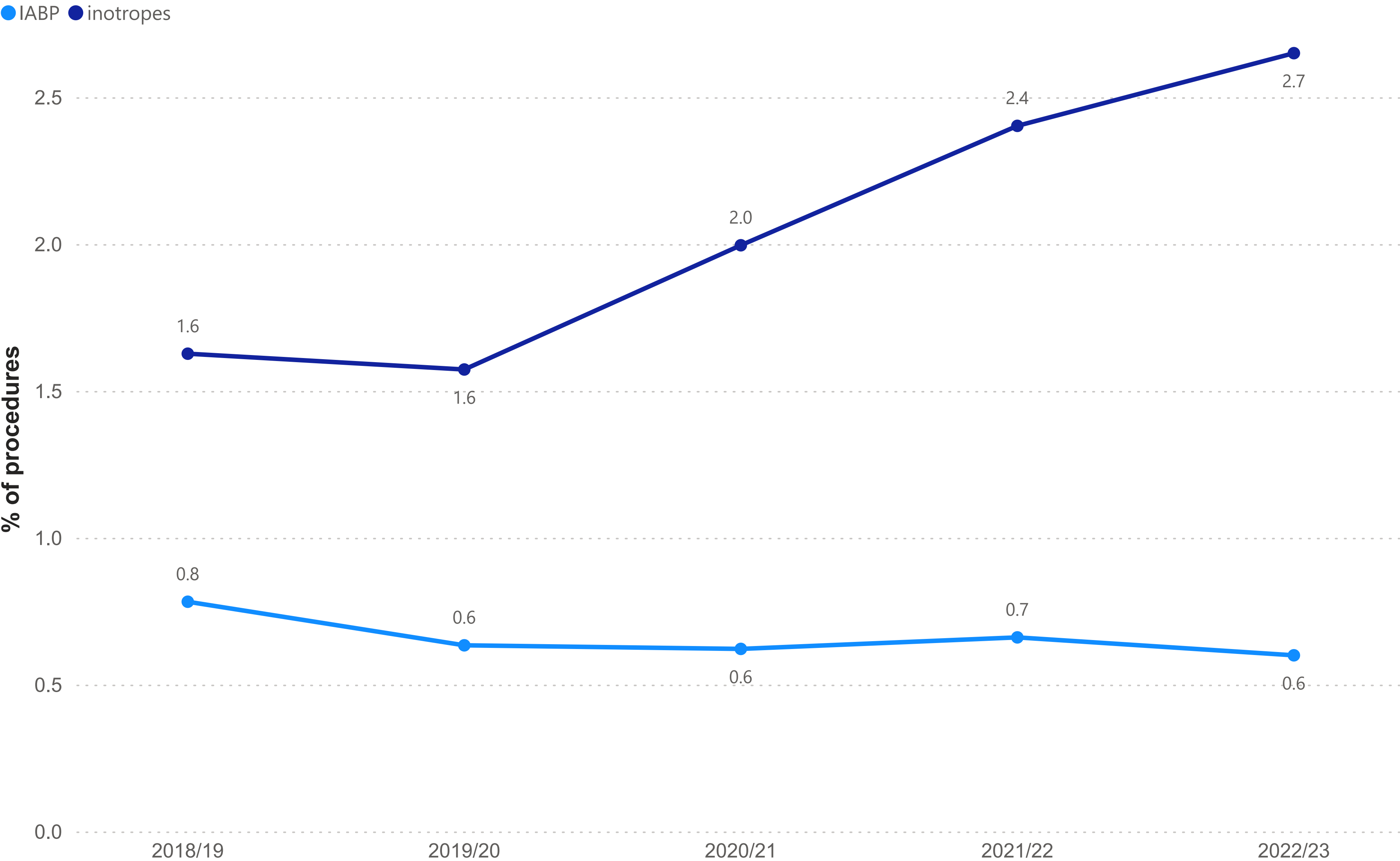
Data Extract
10-11-2023

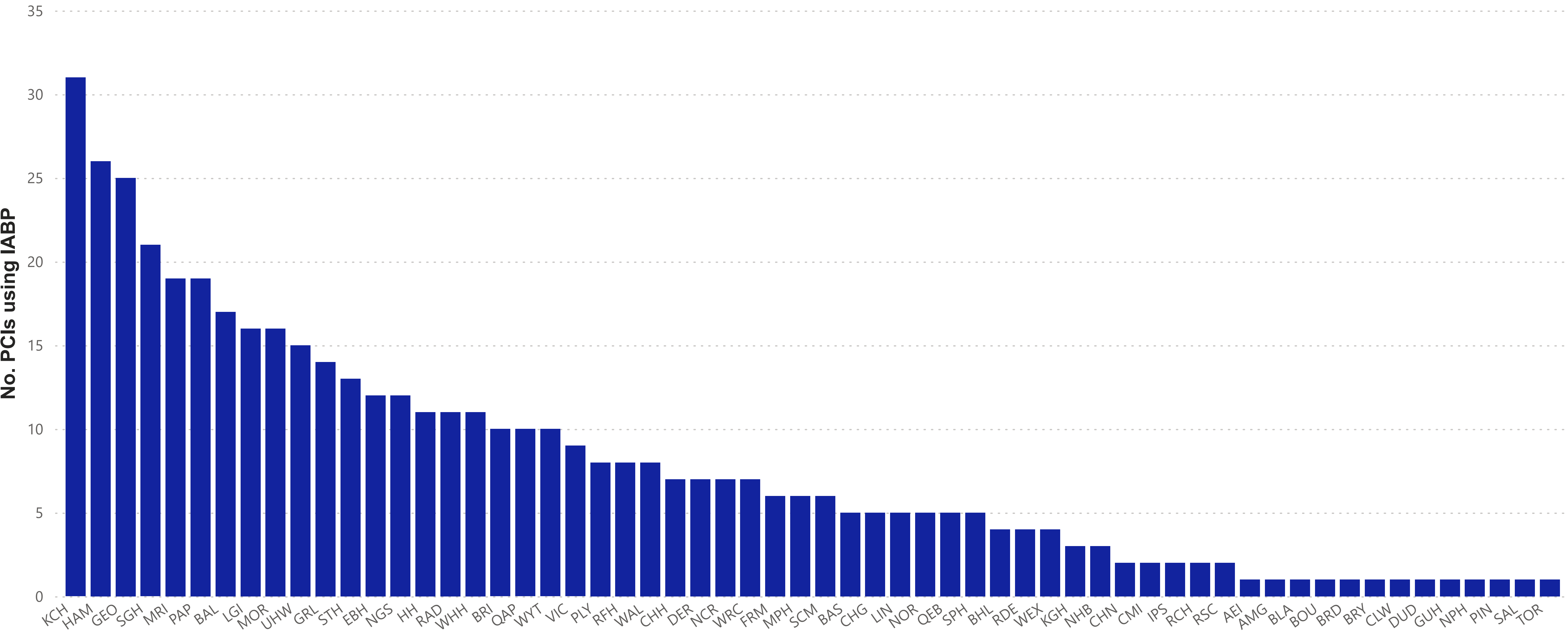


2022-23 Data
Mamas Mamas

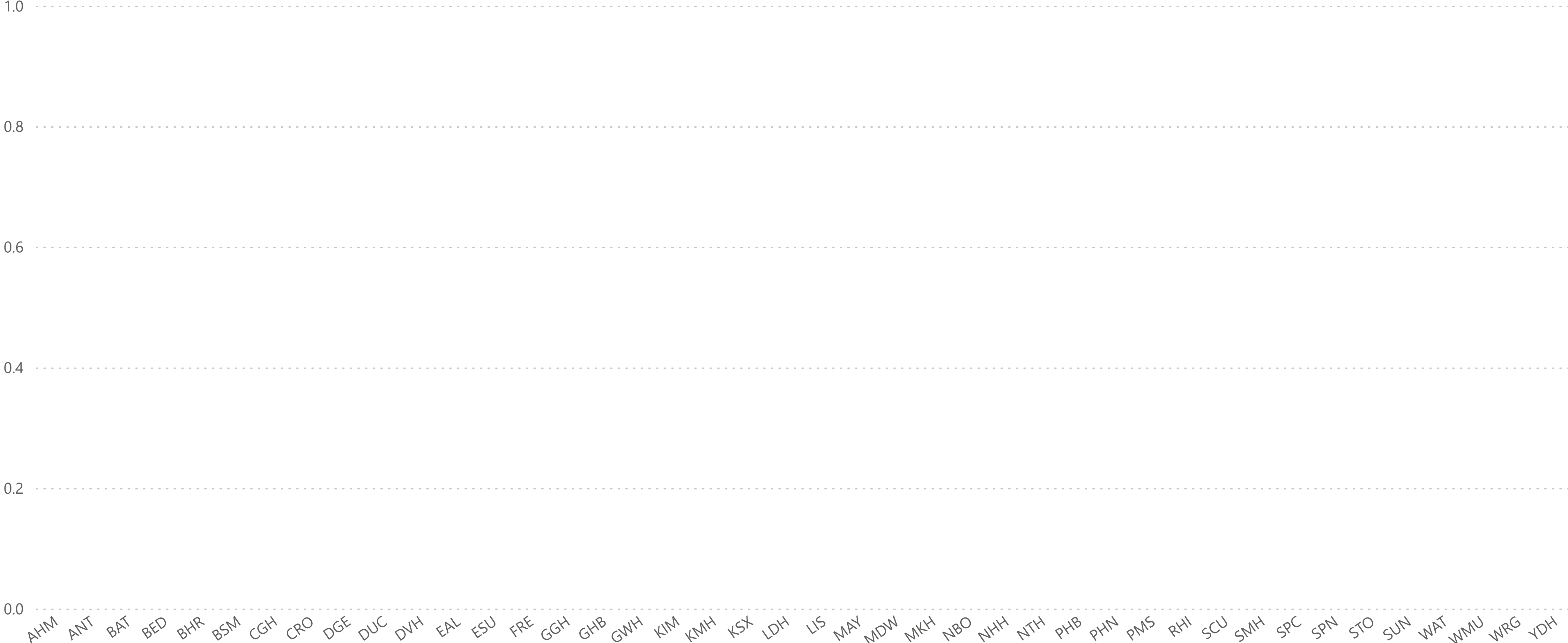
LV support

Inotropes and IABP





No. PCIs using IABP





Data Extract
10-11-2023

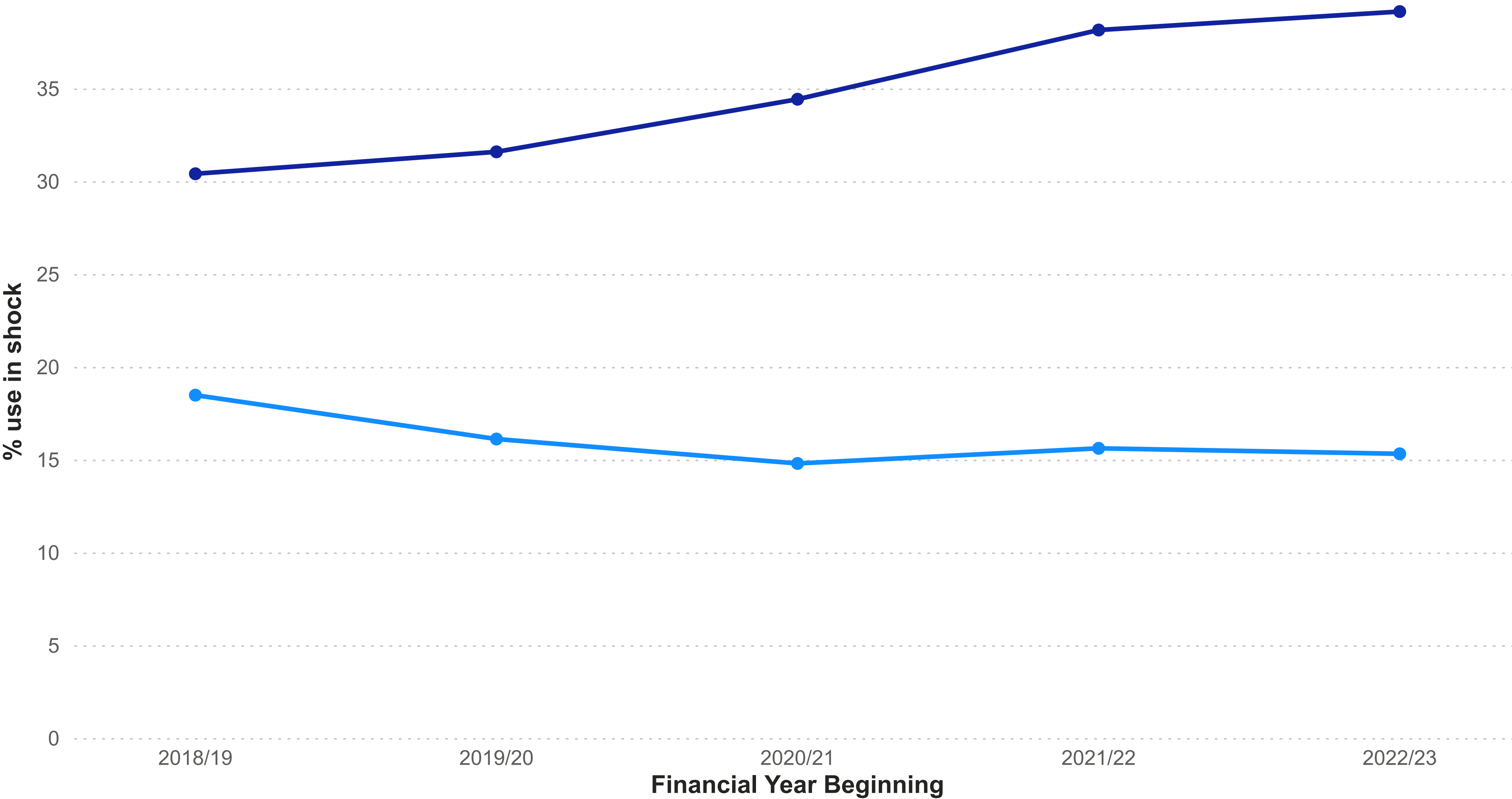


2022-23 Data
Mamas Mamas

Shock cases

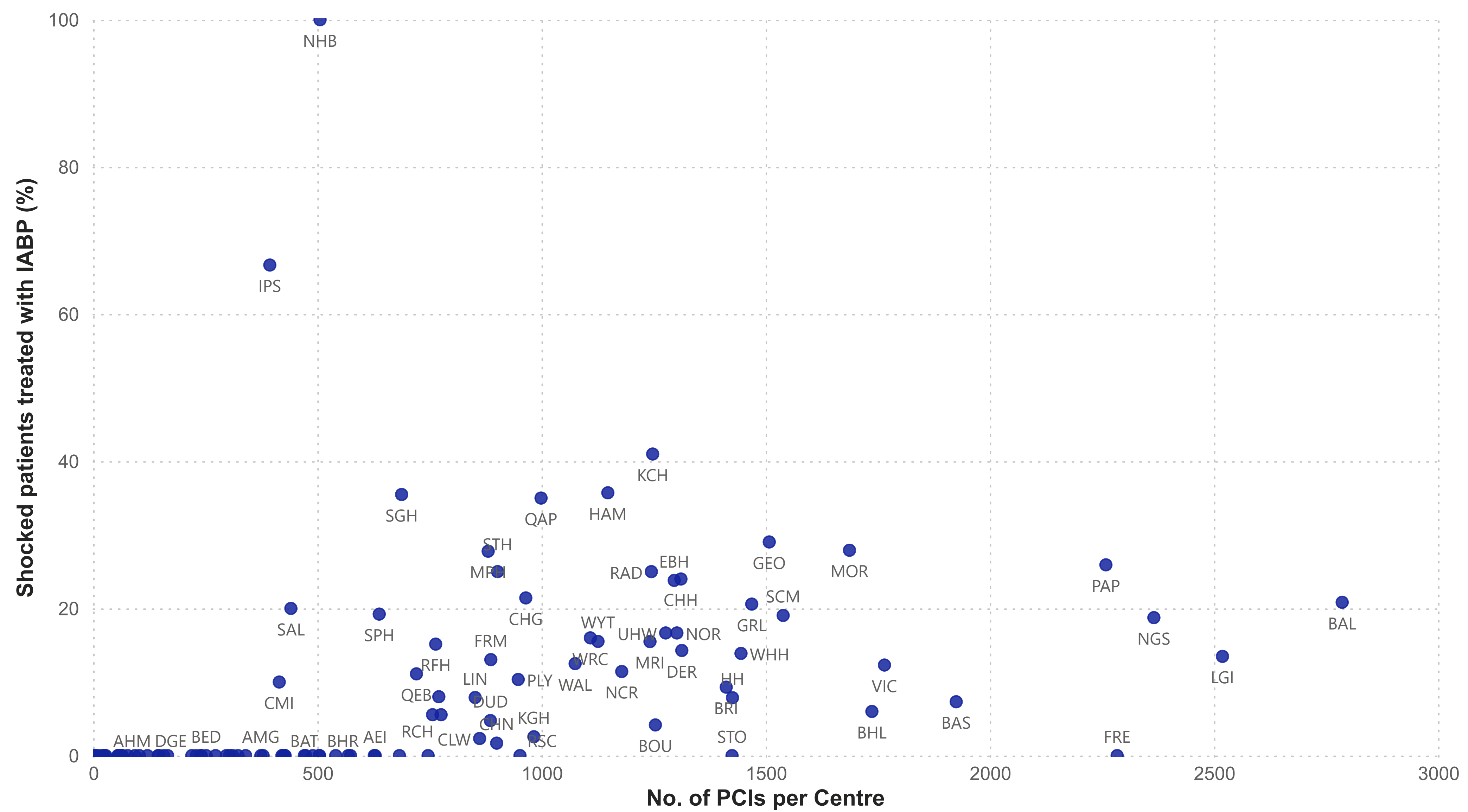
Treated with IABP support

IABP Inotropes

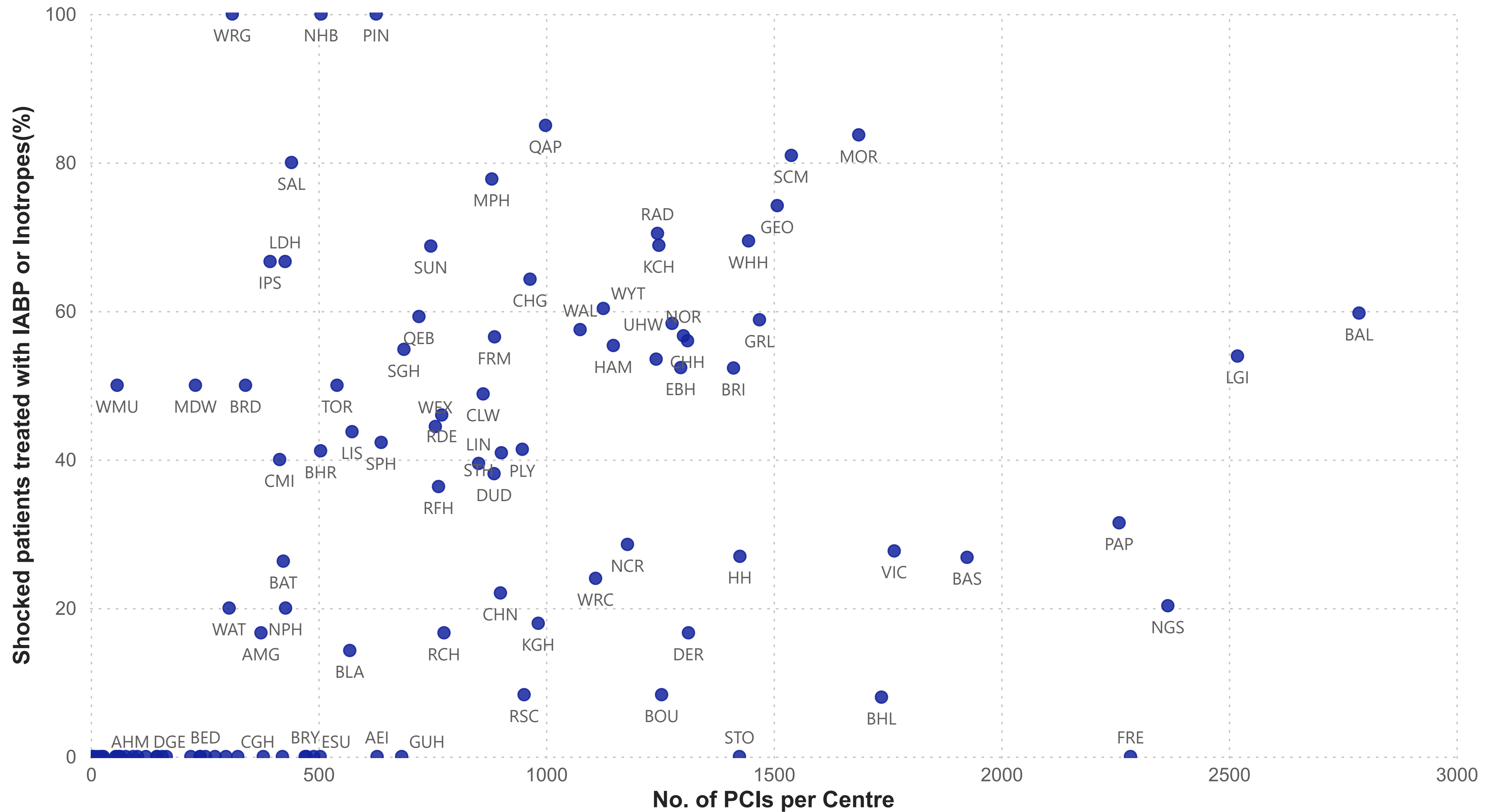


Shock cases

Treated with IABP support



Treated with IABP or Inotropes





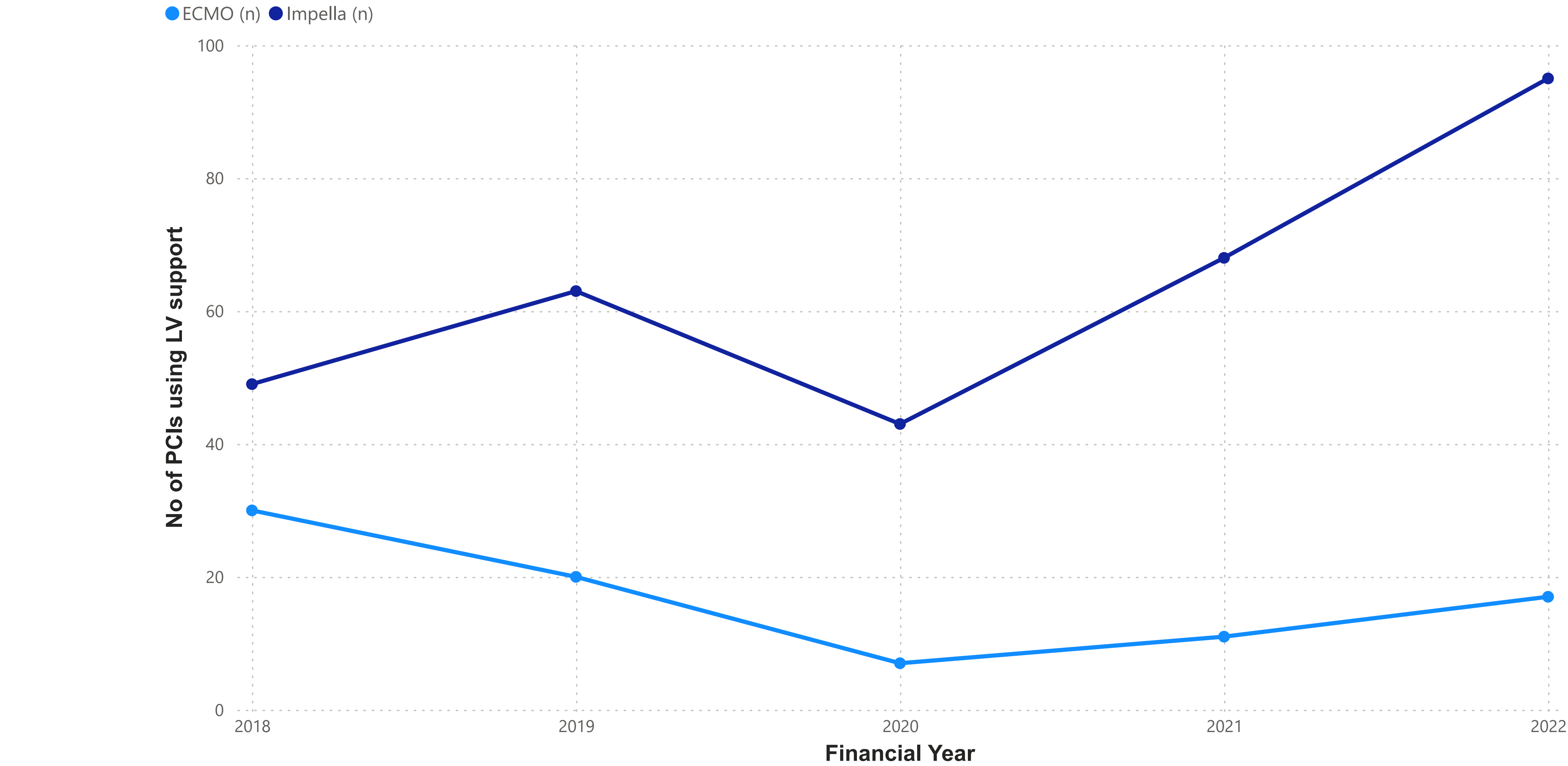
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

LV support

Other options





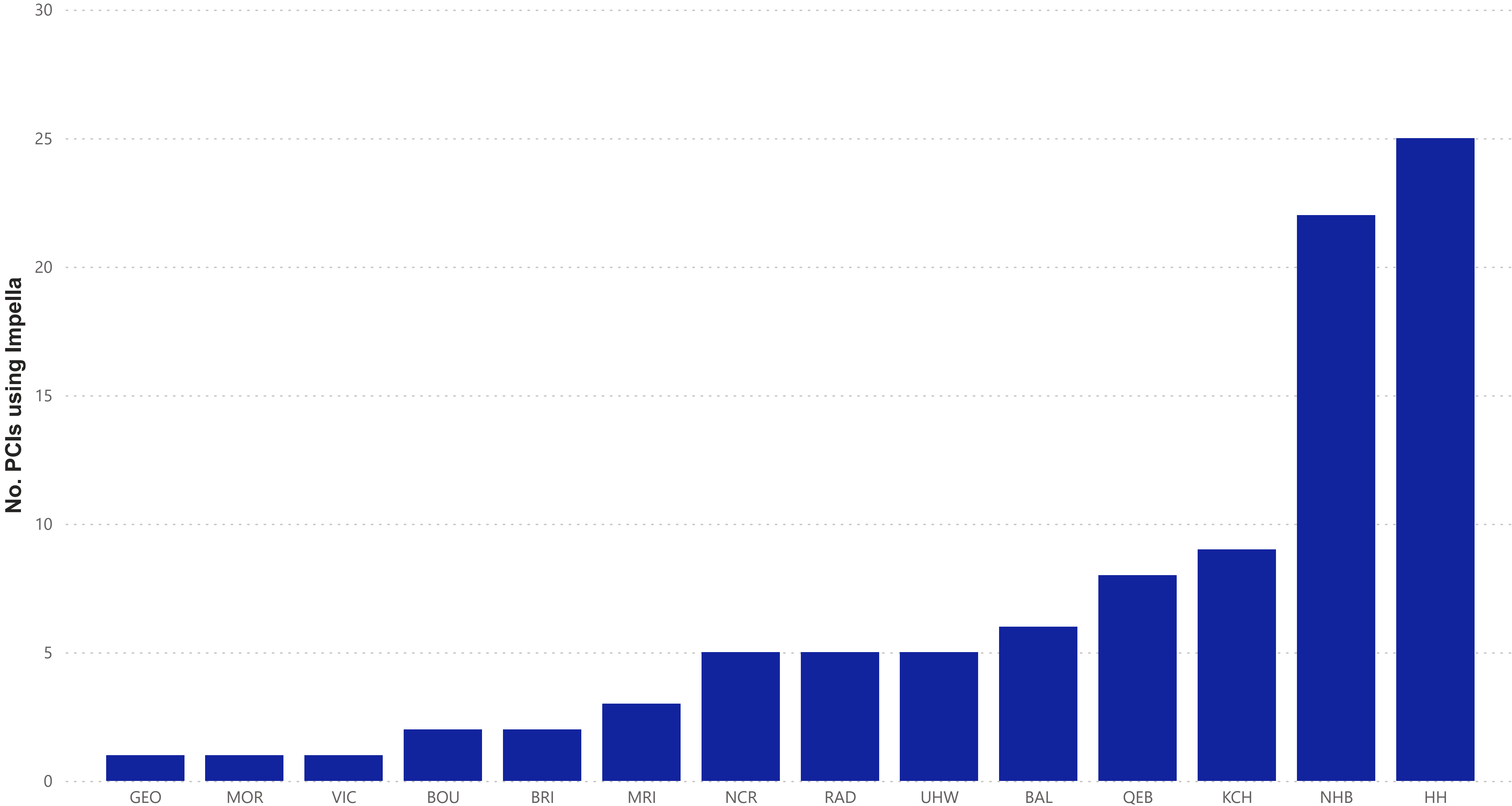
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

LV support

Impella





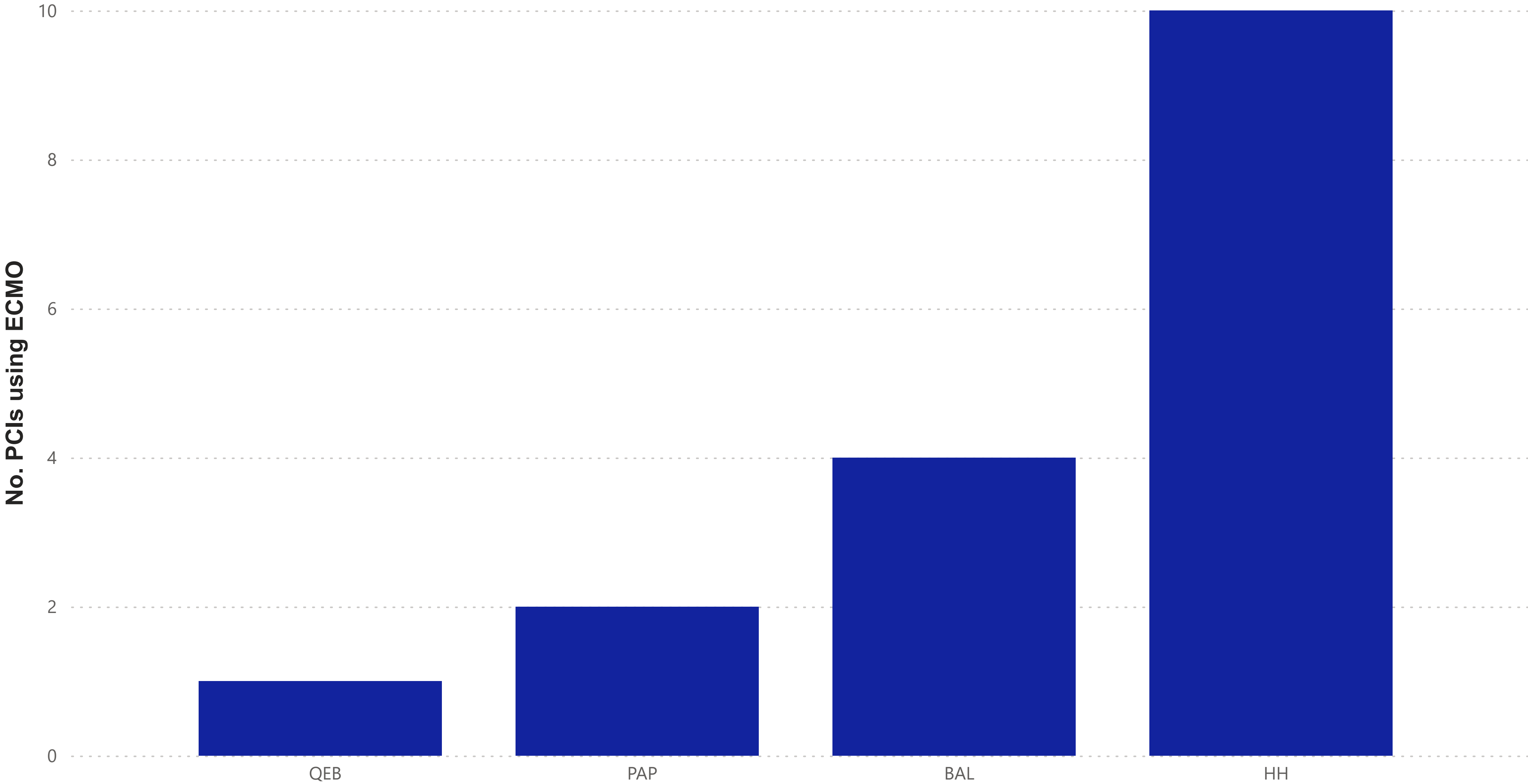
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

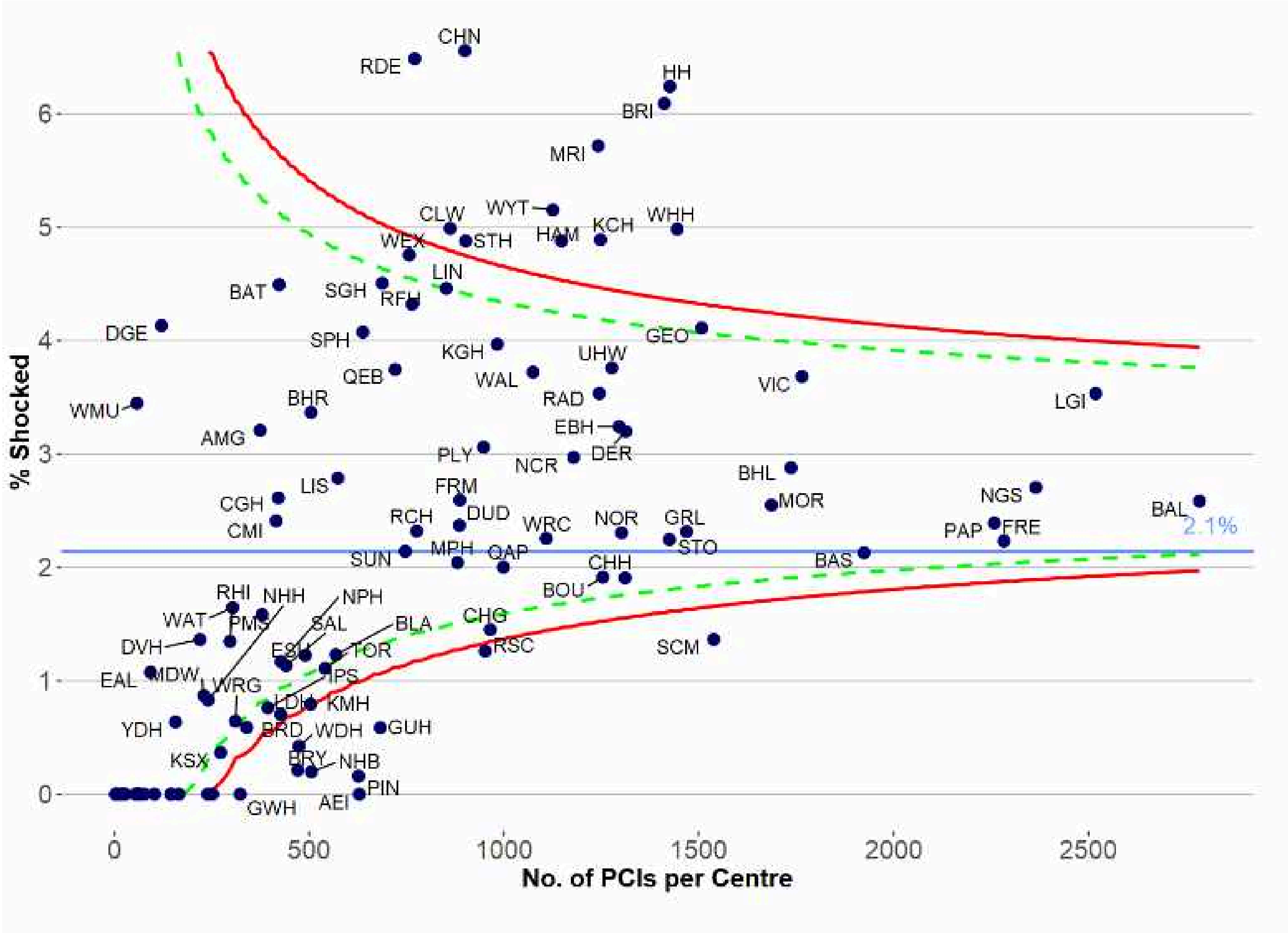
LV support

ECMO



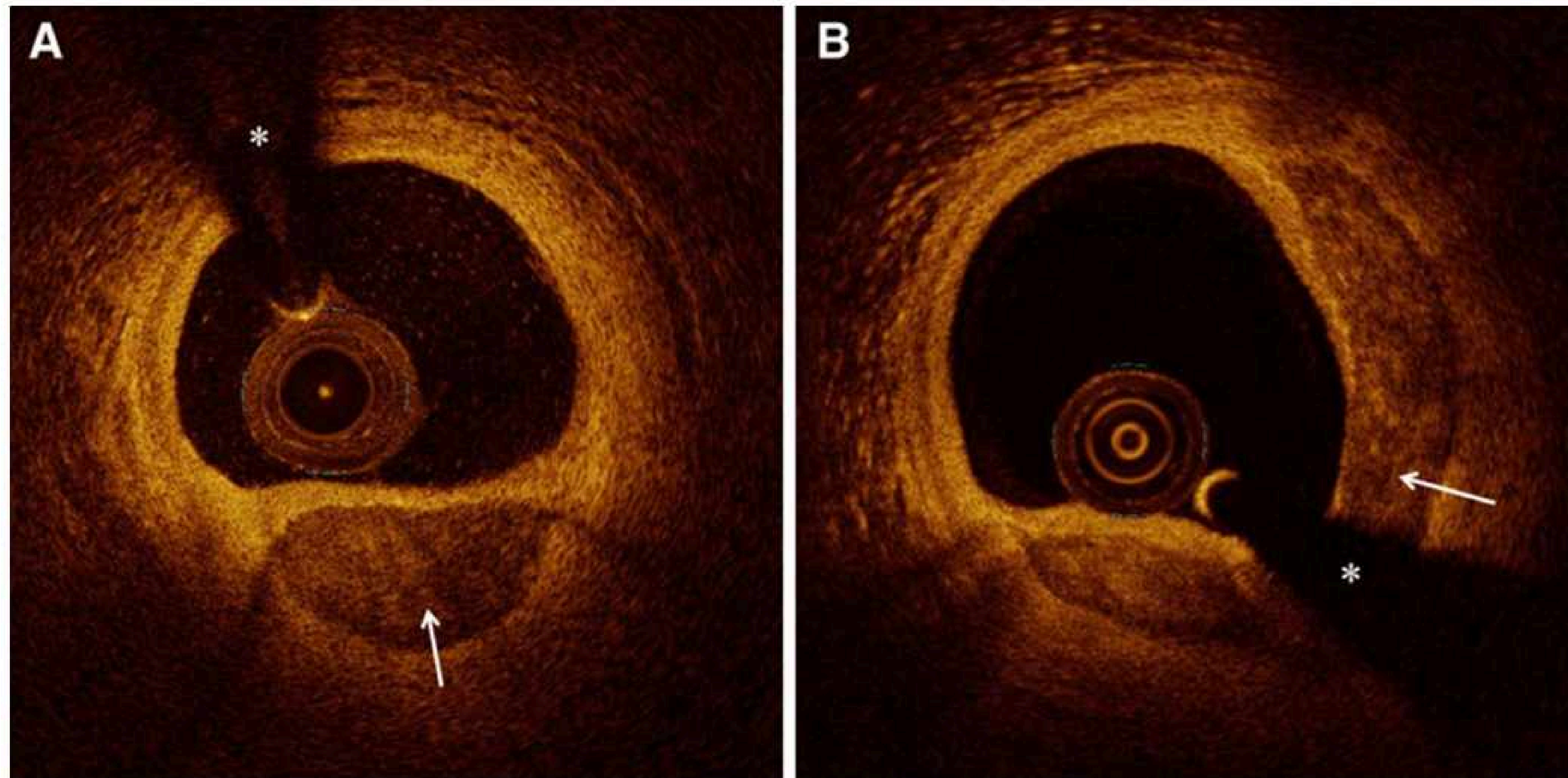
Cardiogenic Shock

% cases with shock by PCI unit





Calcium management





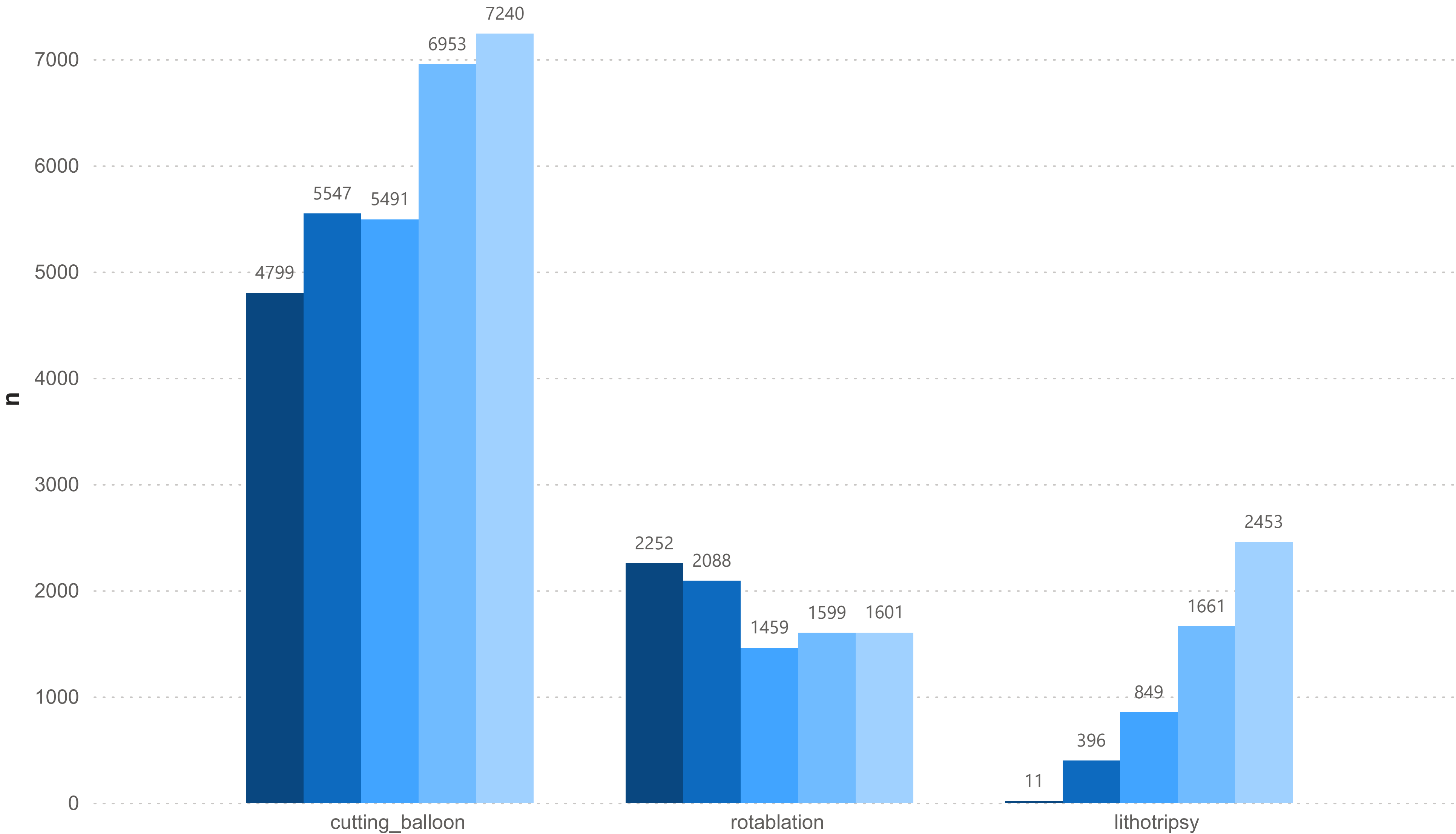
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

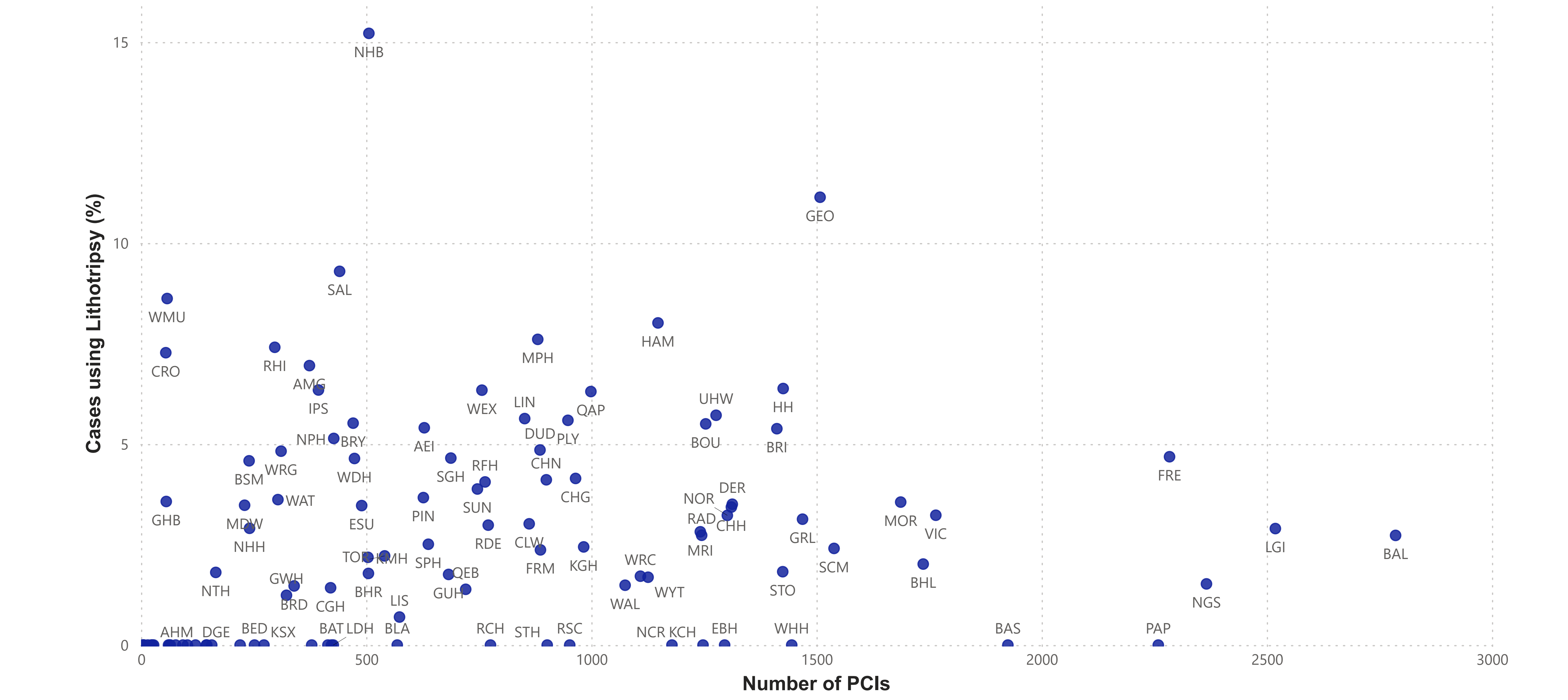
Calcium Management

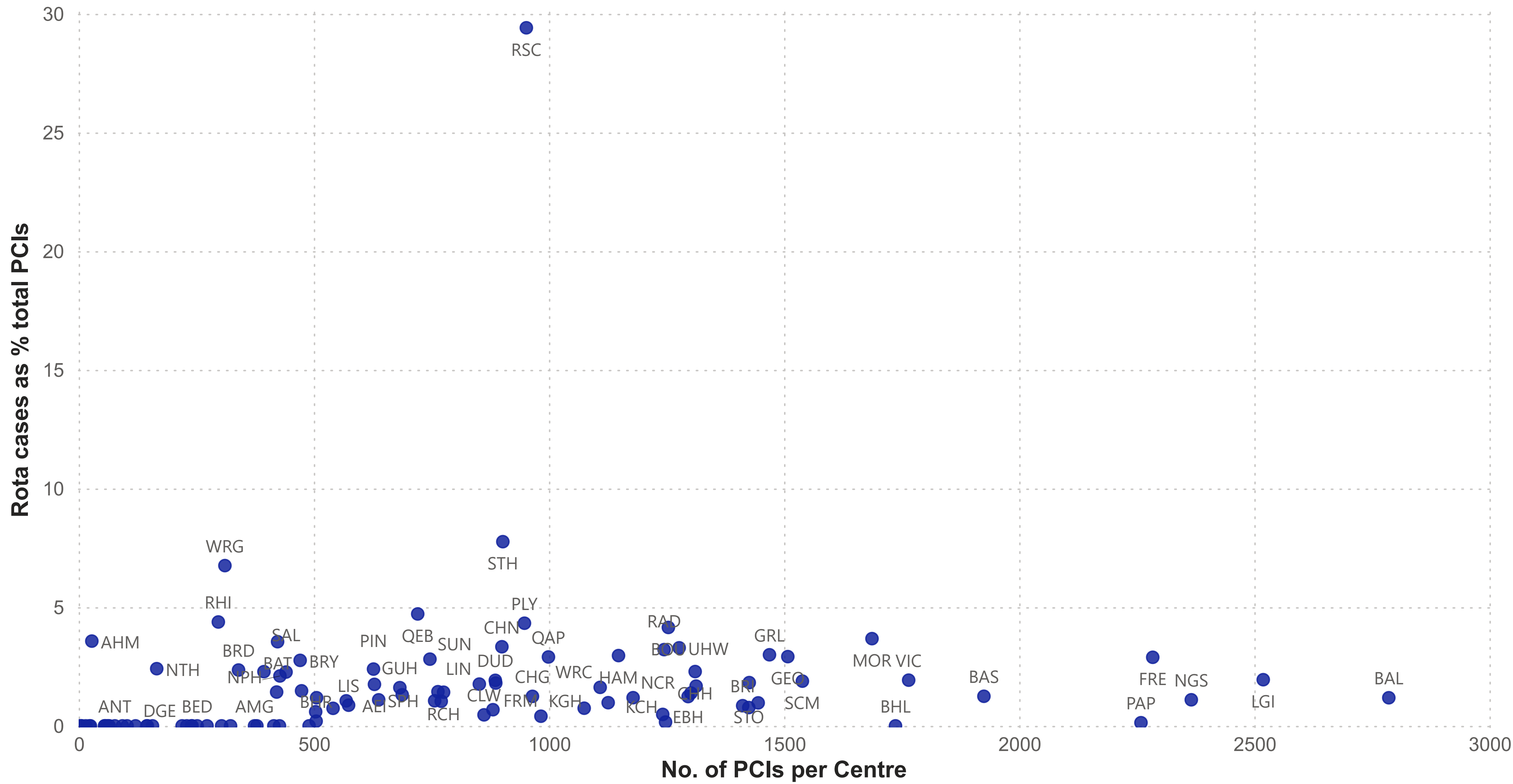
● 2018/19 ● 2019/20 ● 2020/21 ● 2021/22 ● 2022/23

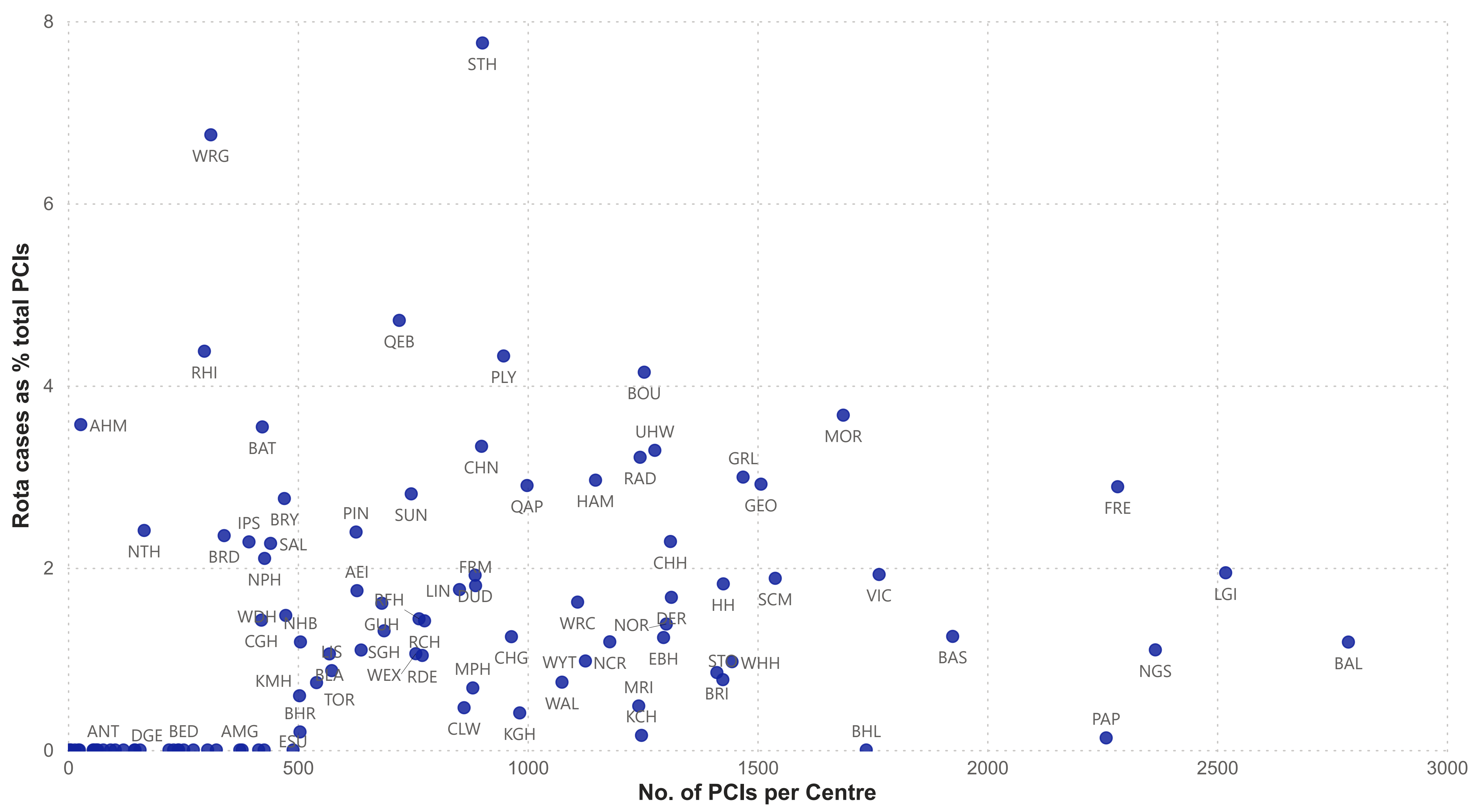


Lithotripsy

By Centre

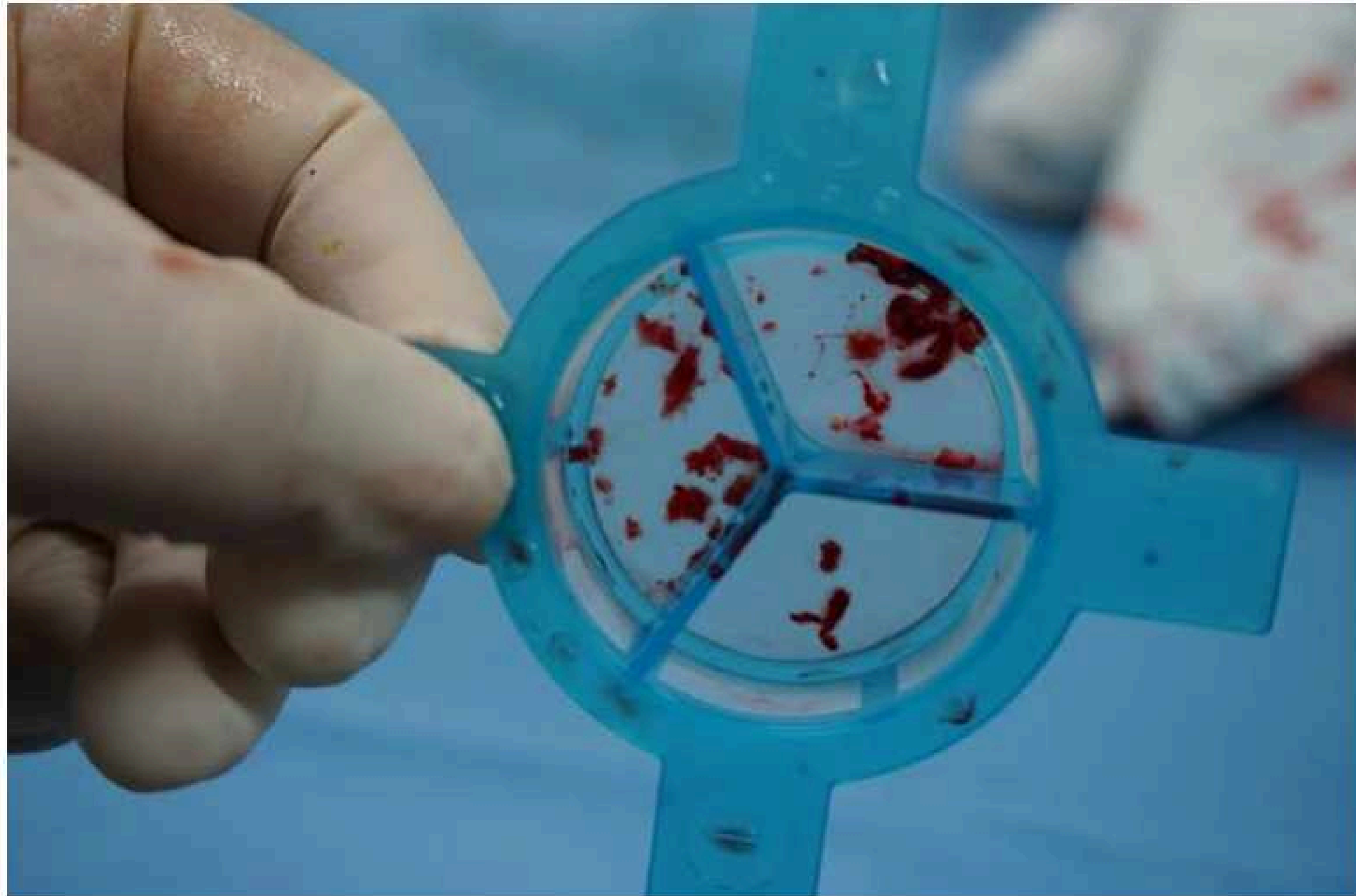




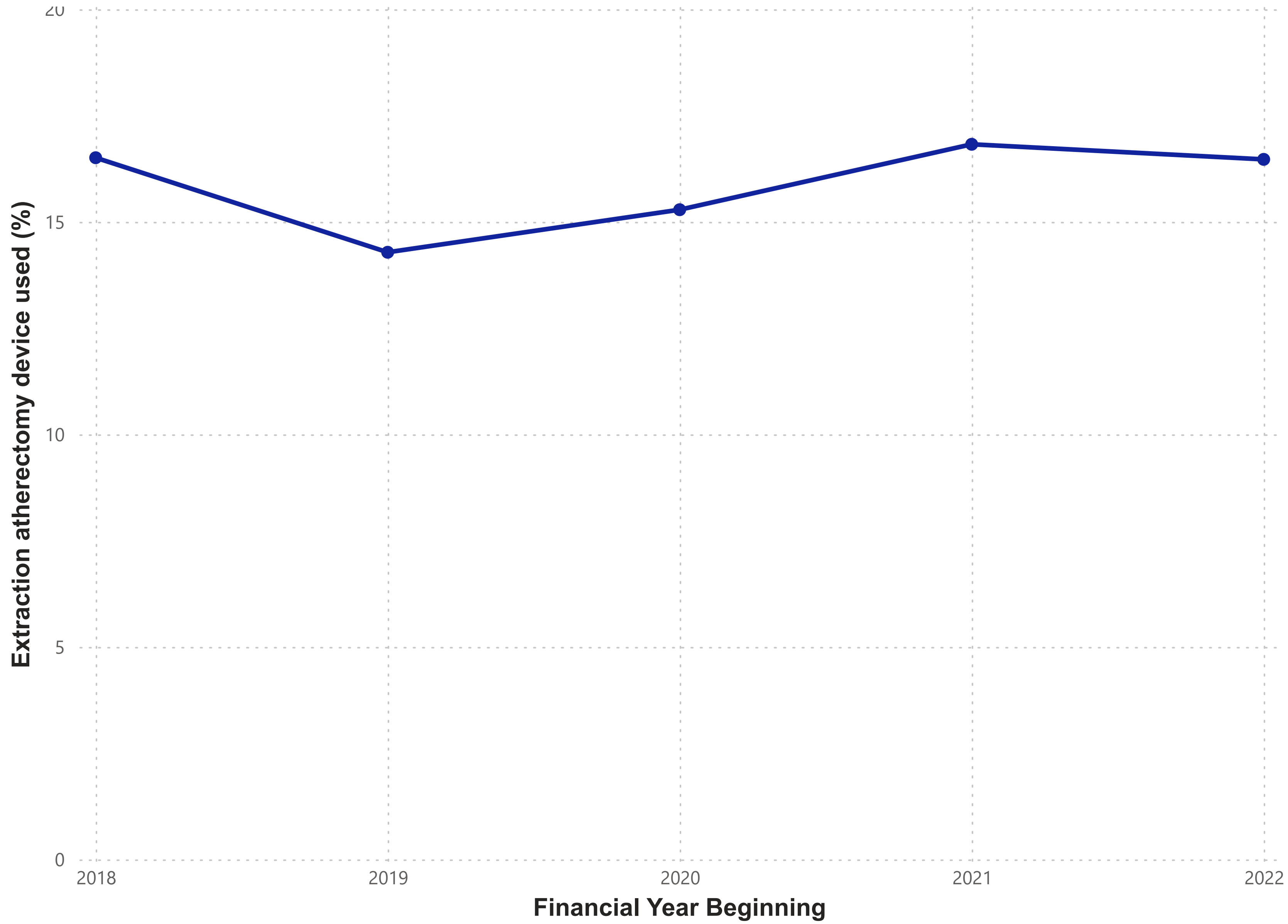




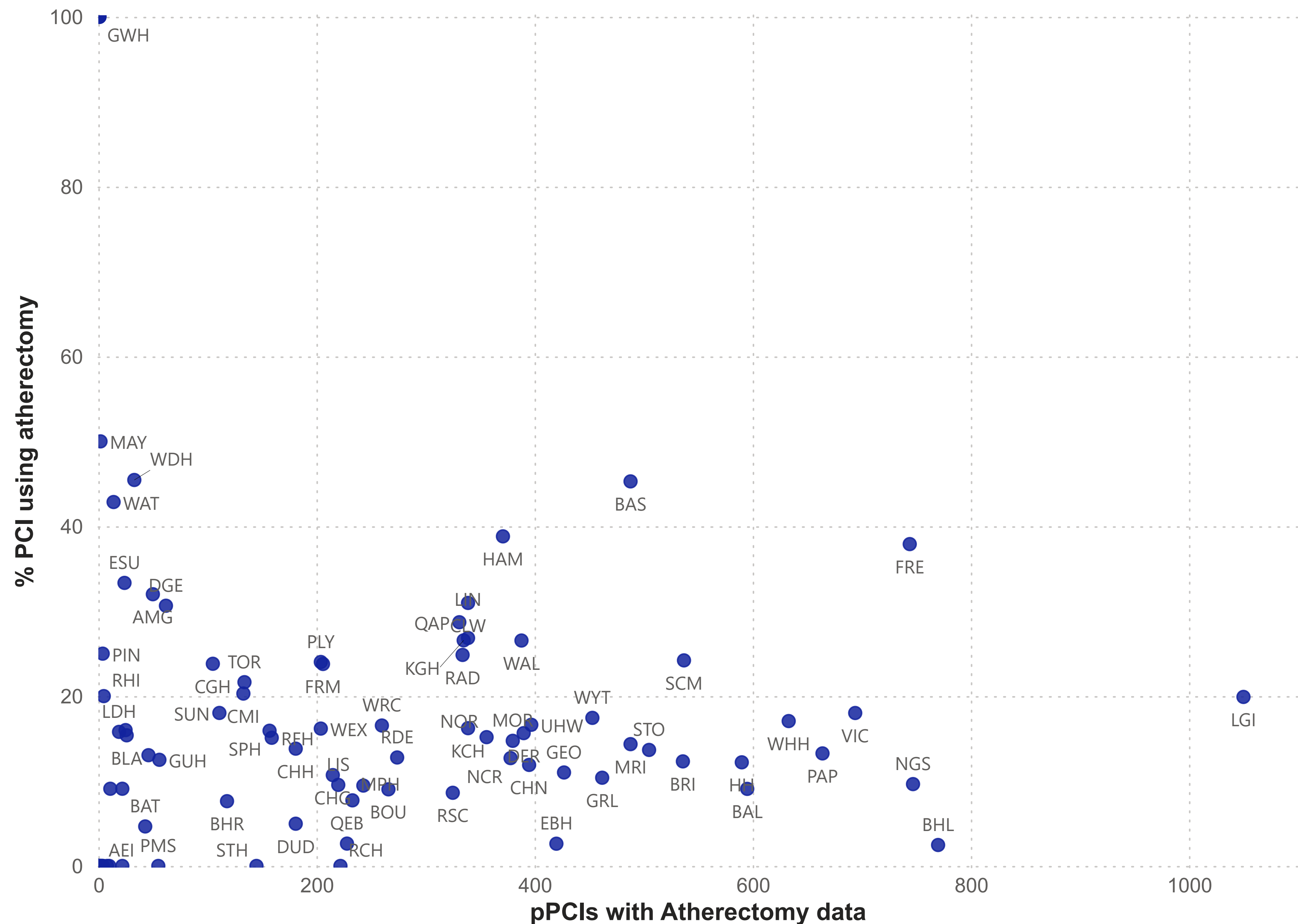
Thrombectomy



Thrombectomy in PPCI

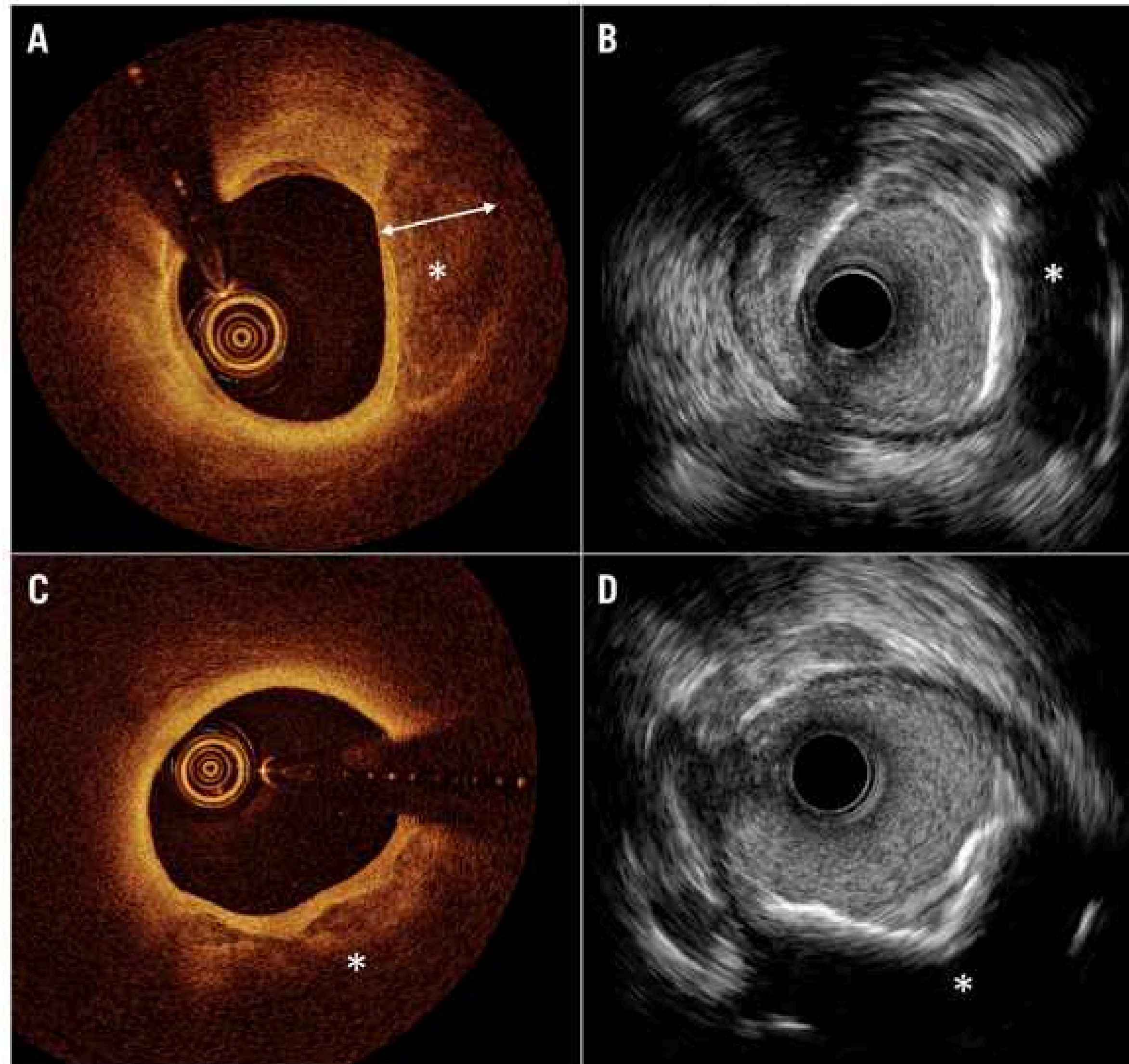


Thrombectomy in PPCI





Intracoronary imaging / physiology





Survey

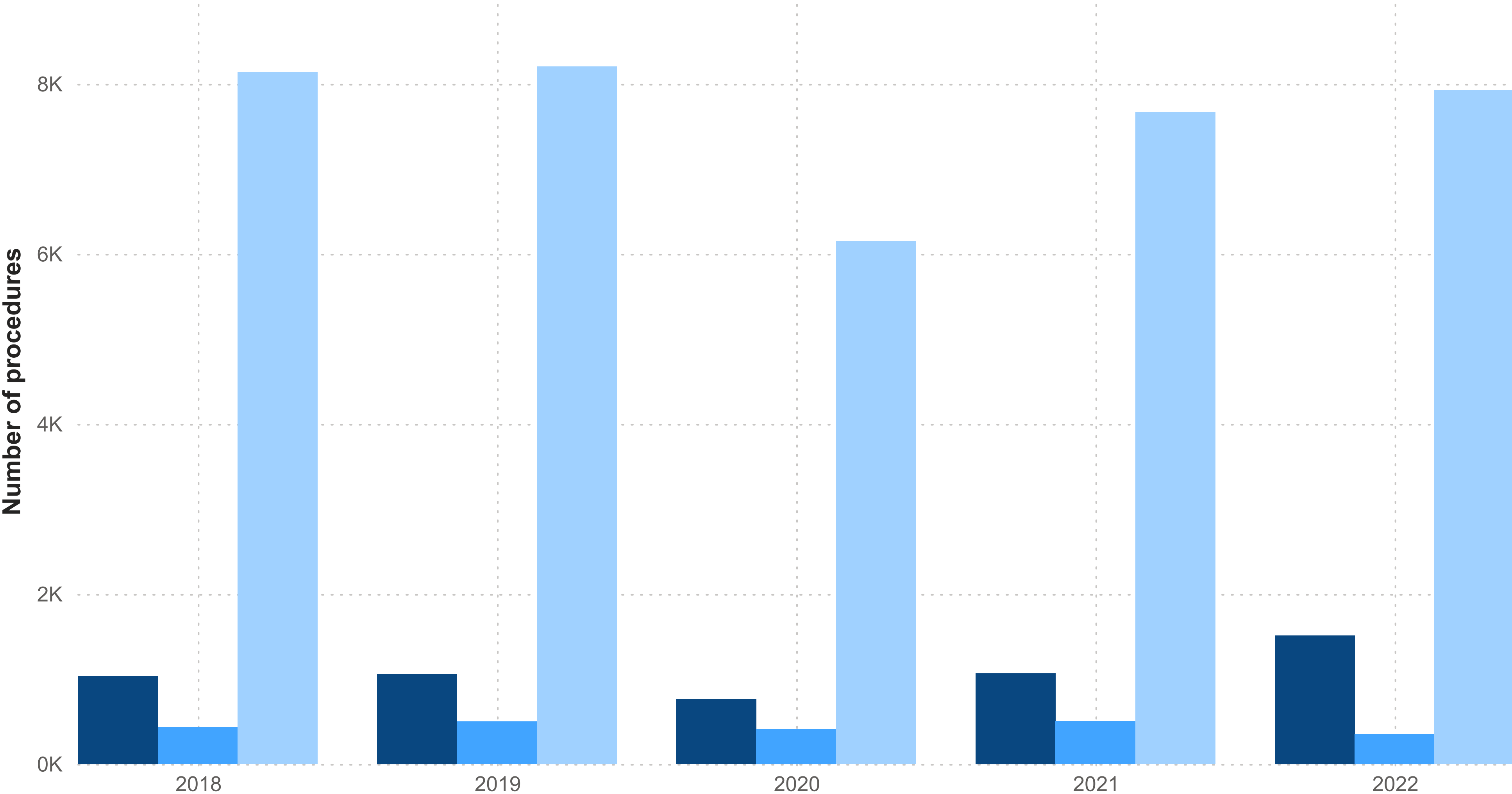


2022-23 Data
Mamas Mamas

Intracoronary imaging / physiology

Diagnostic Only

IVUS OCT pressure_wire





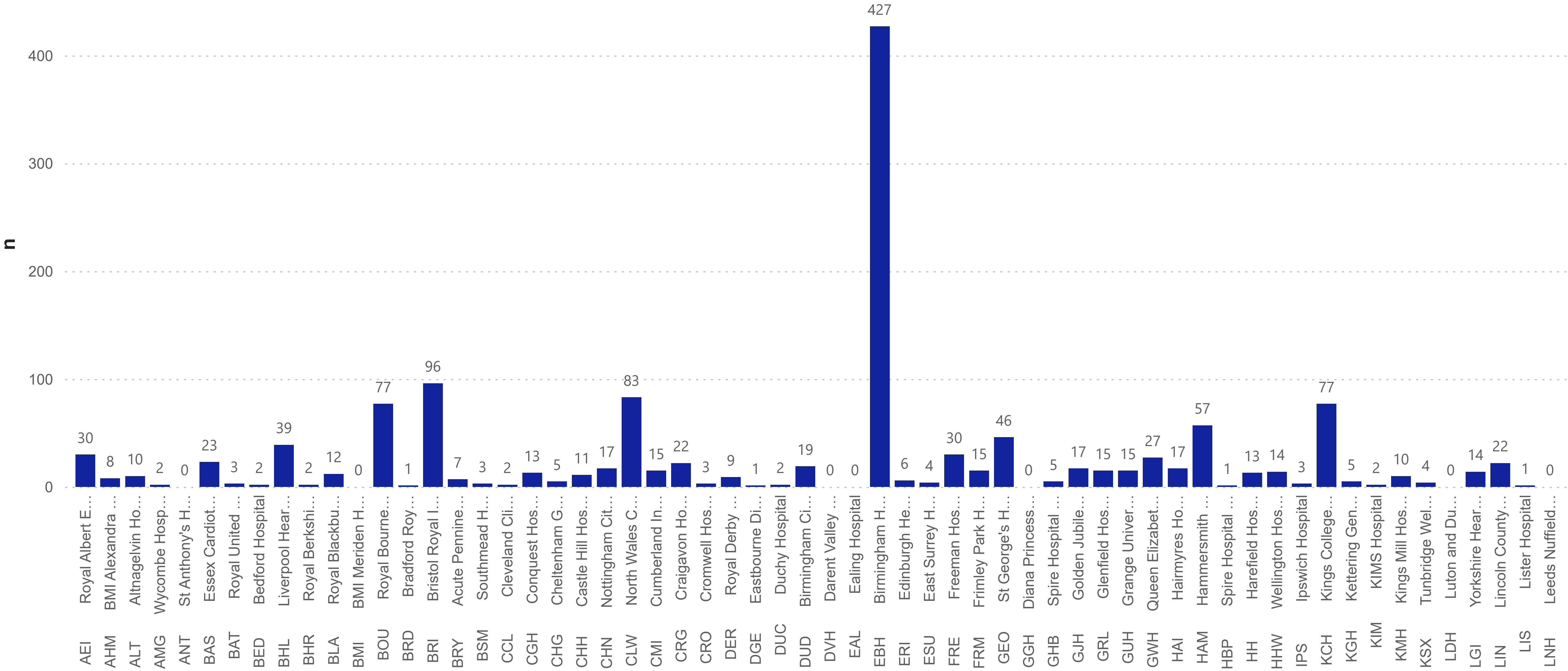
Survey



2022-23 Data
Mamas Mamas

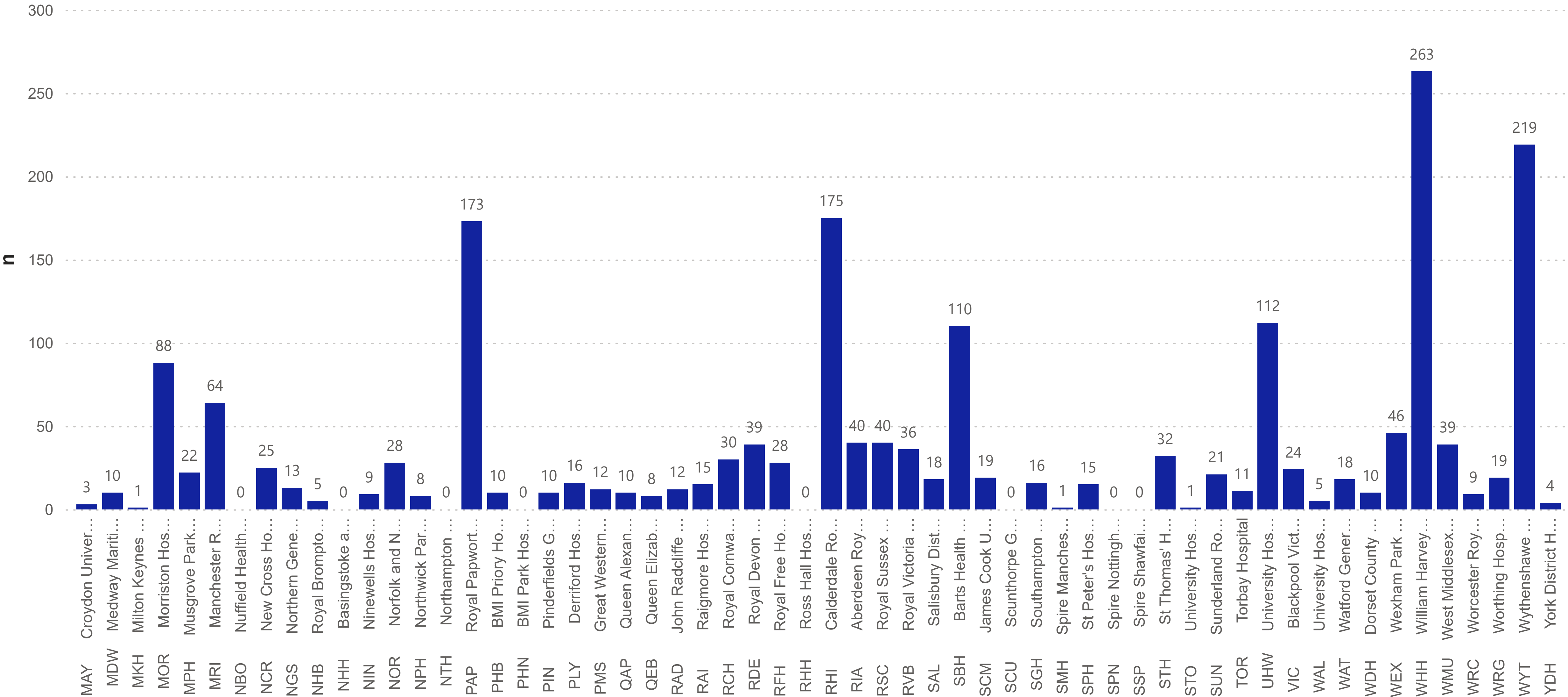
Intravascular Ultrasound

Diagnostic Only studies (A to L)



Intravascular Ultrasound

Diagnostic Only studies (M to Y)





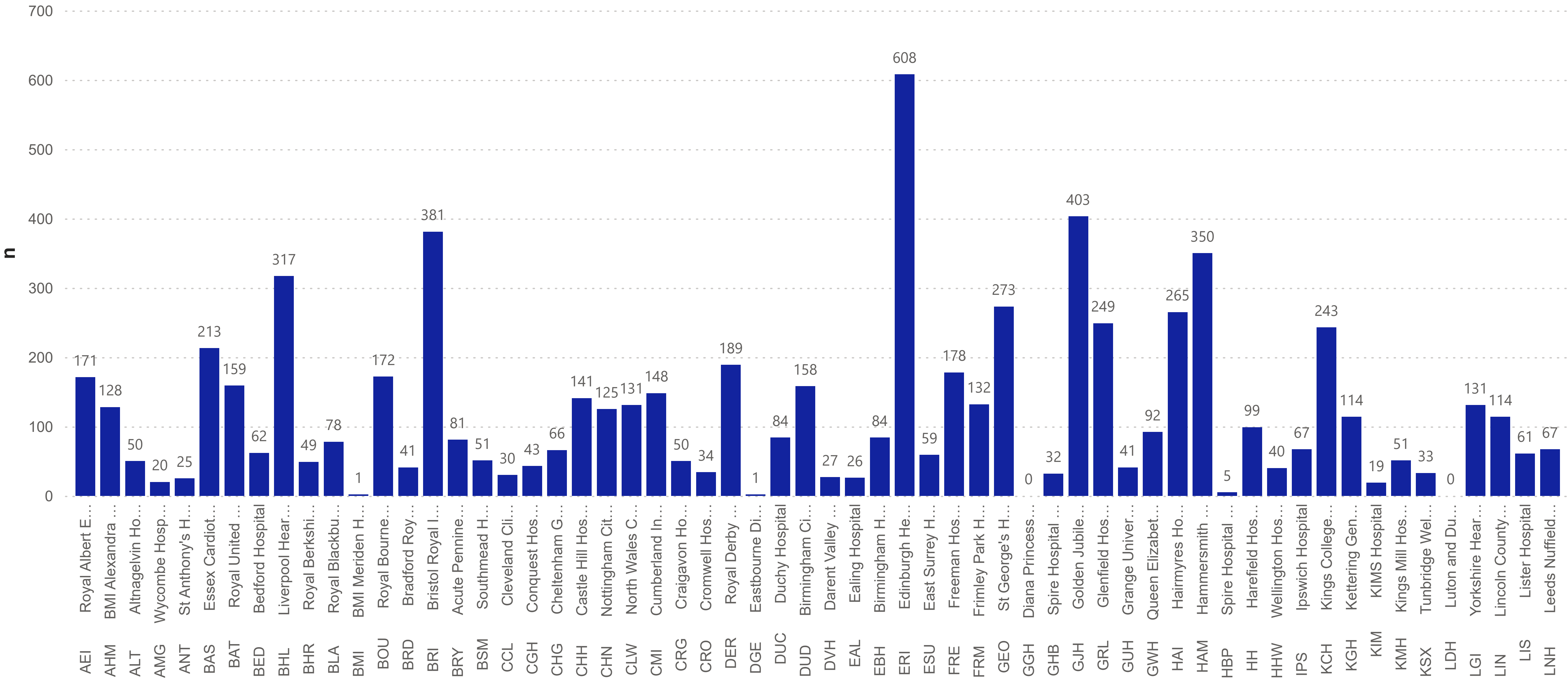
Survey



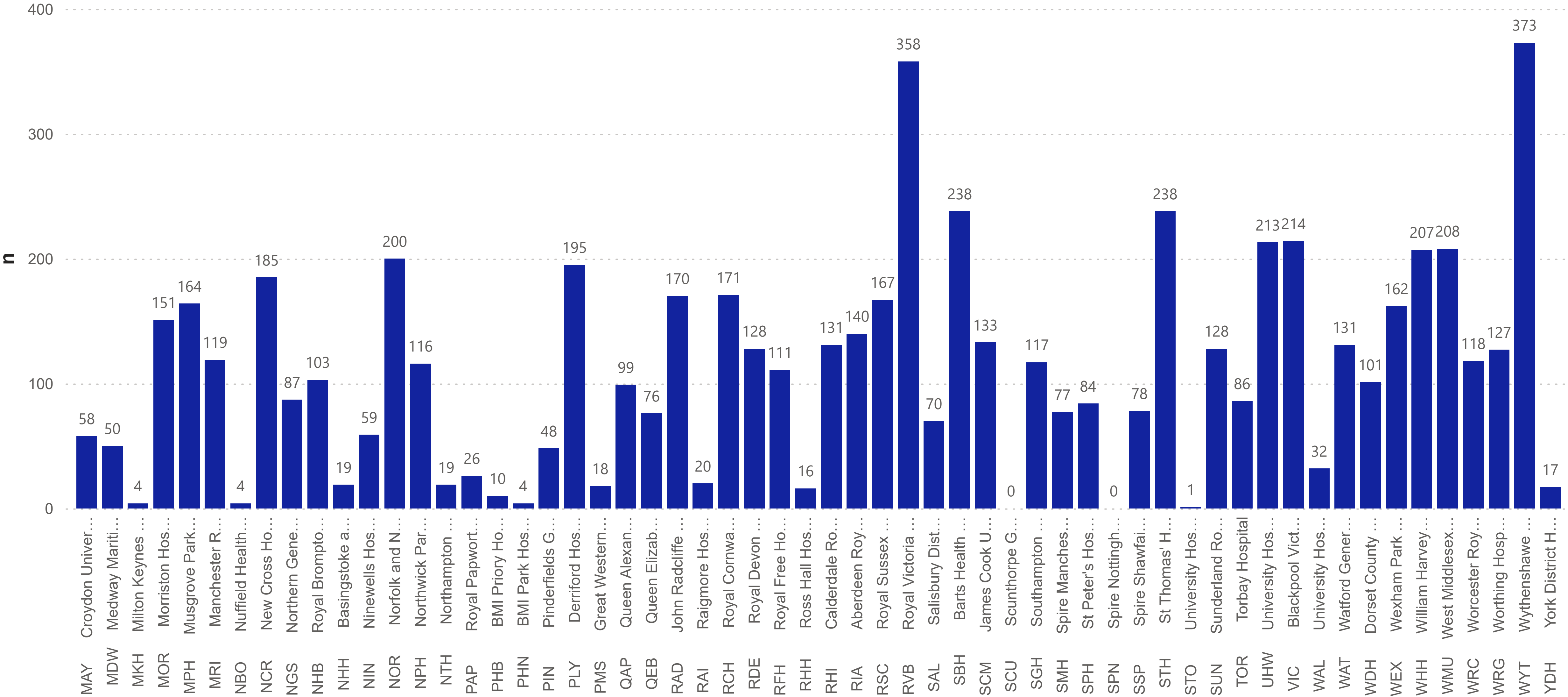
2022-23 Data
Mamas Mamas

FFR, iFR, CFR, dPR, RFR etc

Diagnostic Only studies (A to L)



Diagnostic Only studies (M to Y)





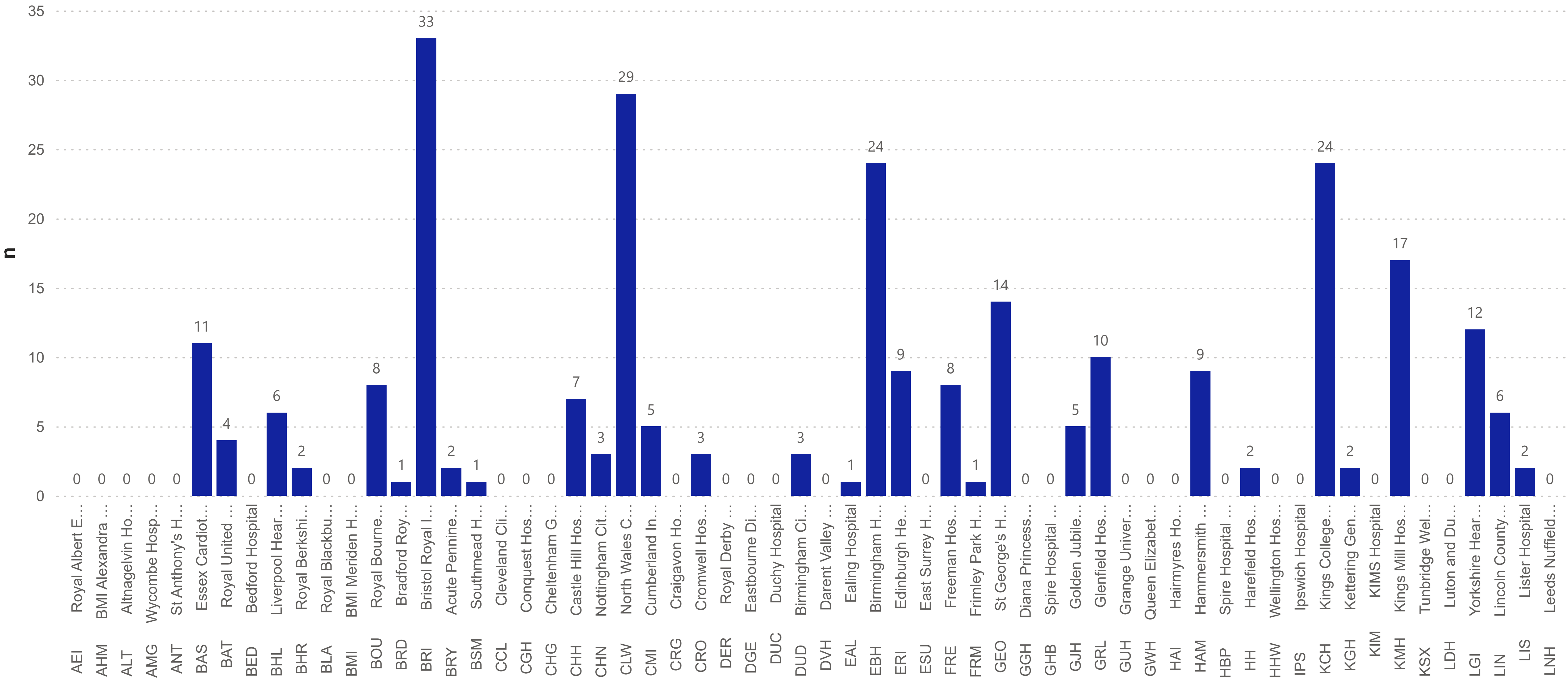
Survey

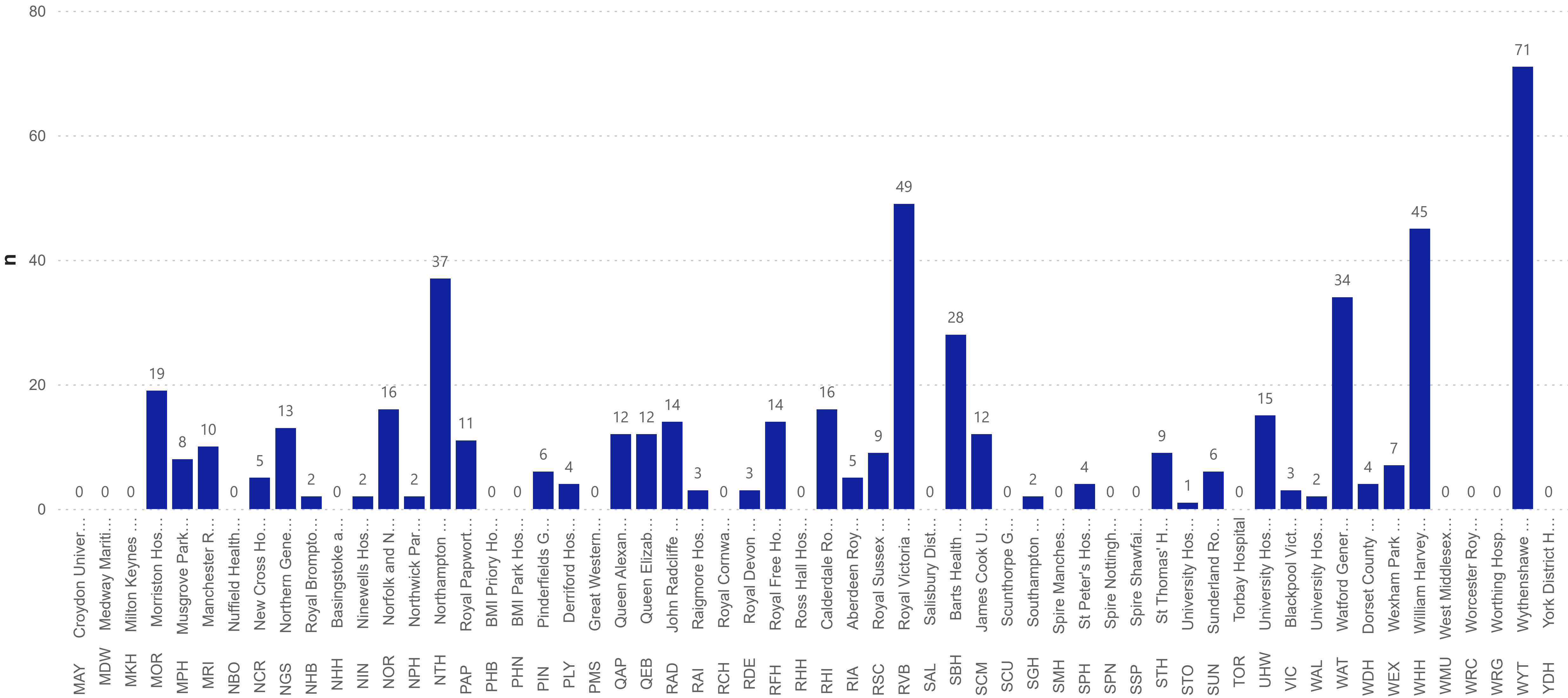


2022-23 Data
Mamas Mamas

Swept Laser Imaging (OCT, OFDI)

Diagnostic Only studies (A to L)







Data Extract
10-11-2023

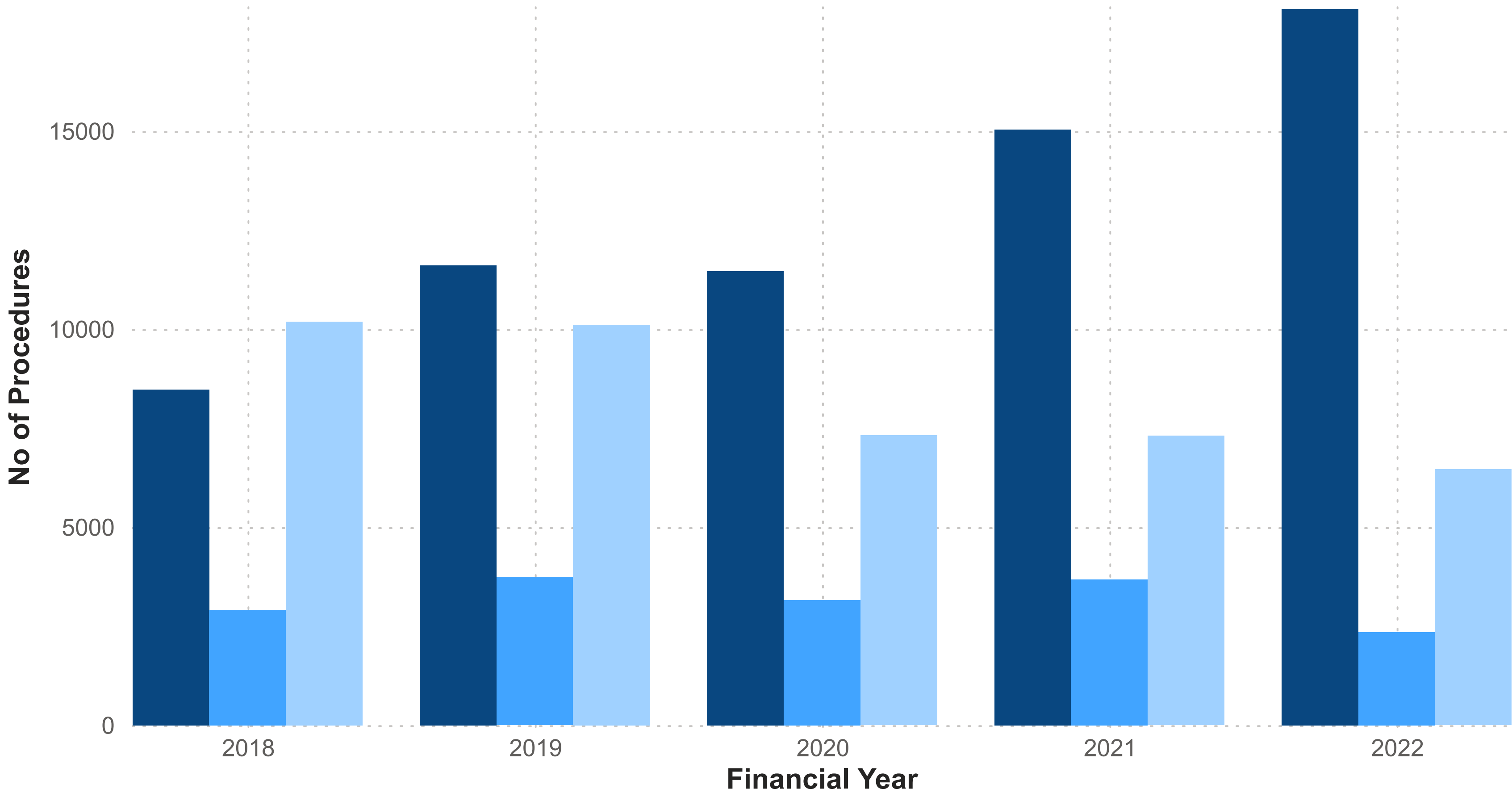


2022-23 Data
Mamas Mamas

Additional Interventional Coronary Techniques

During PCI

● IVUS ● OCT ● Pressure Wire





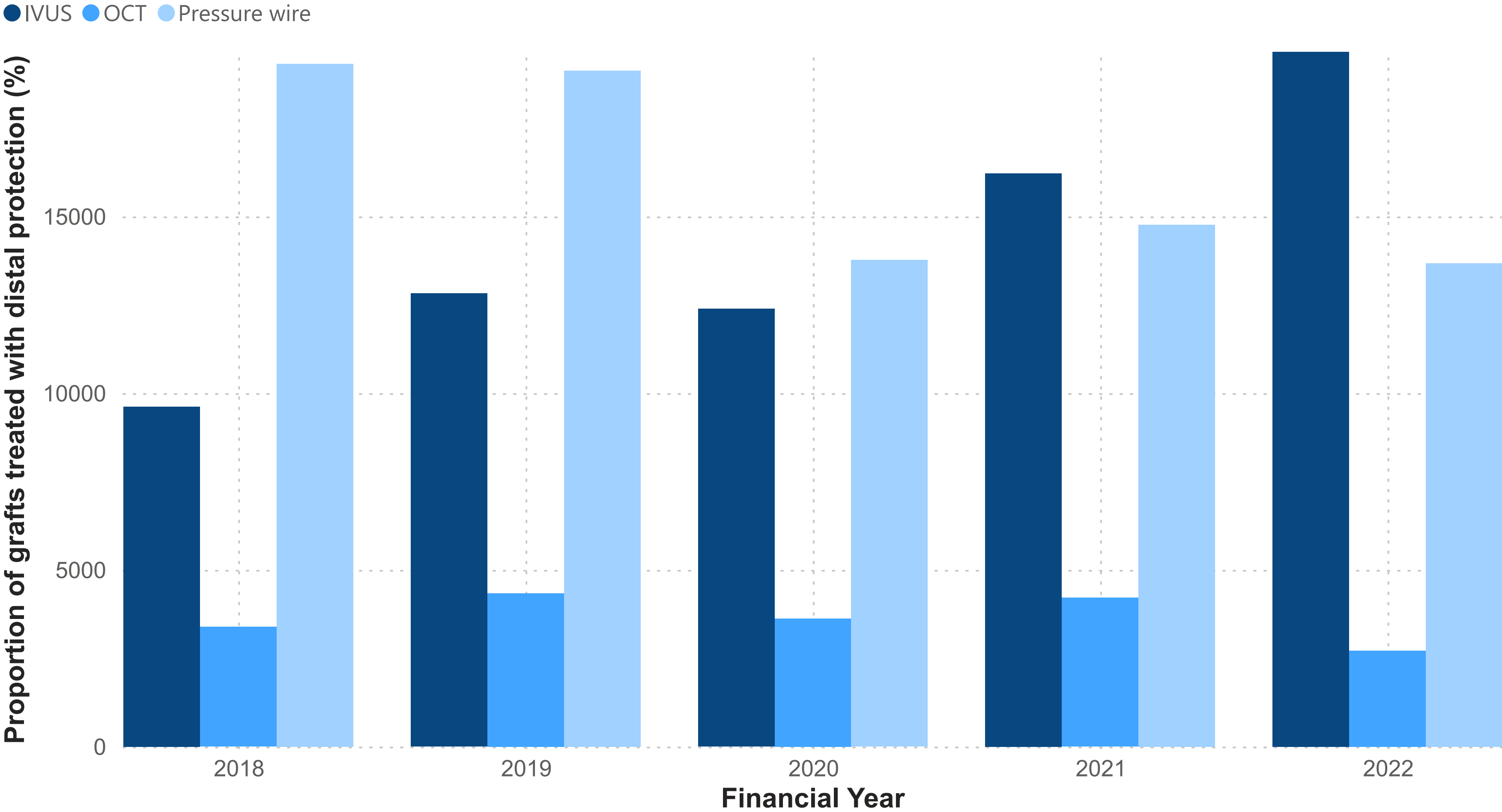
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

Additional Interventional Coronary Techniques

Diagnostic only and During PCI





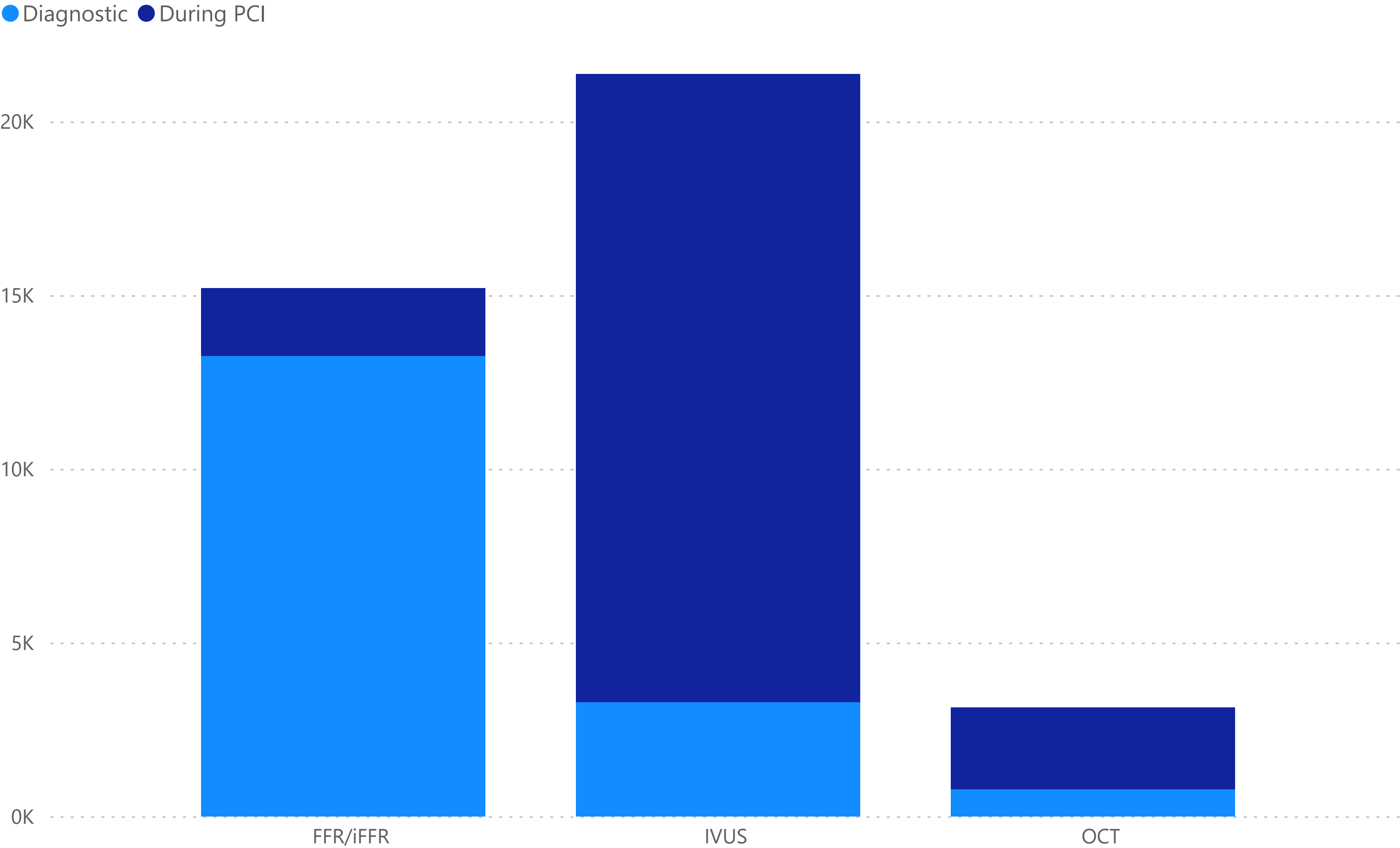
Data Extract
10-11-2023



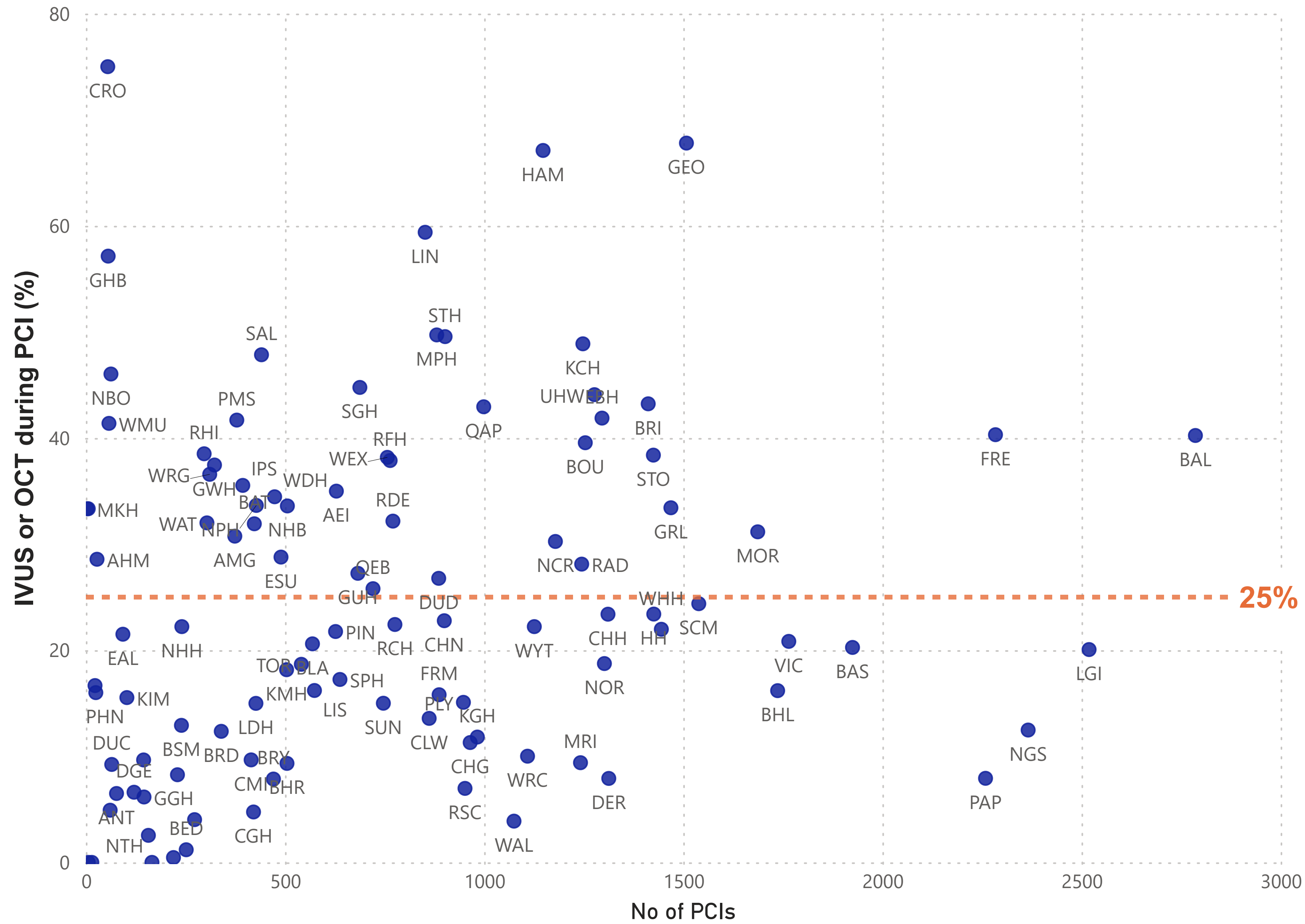
2022-23 Data
Mamas Mamas

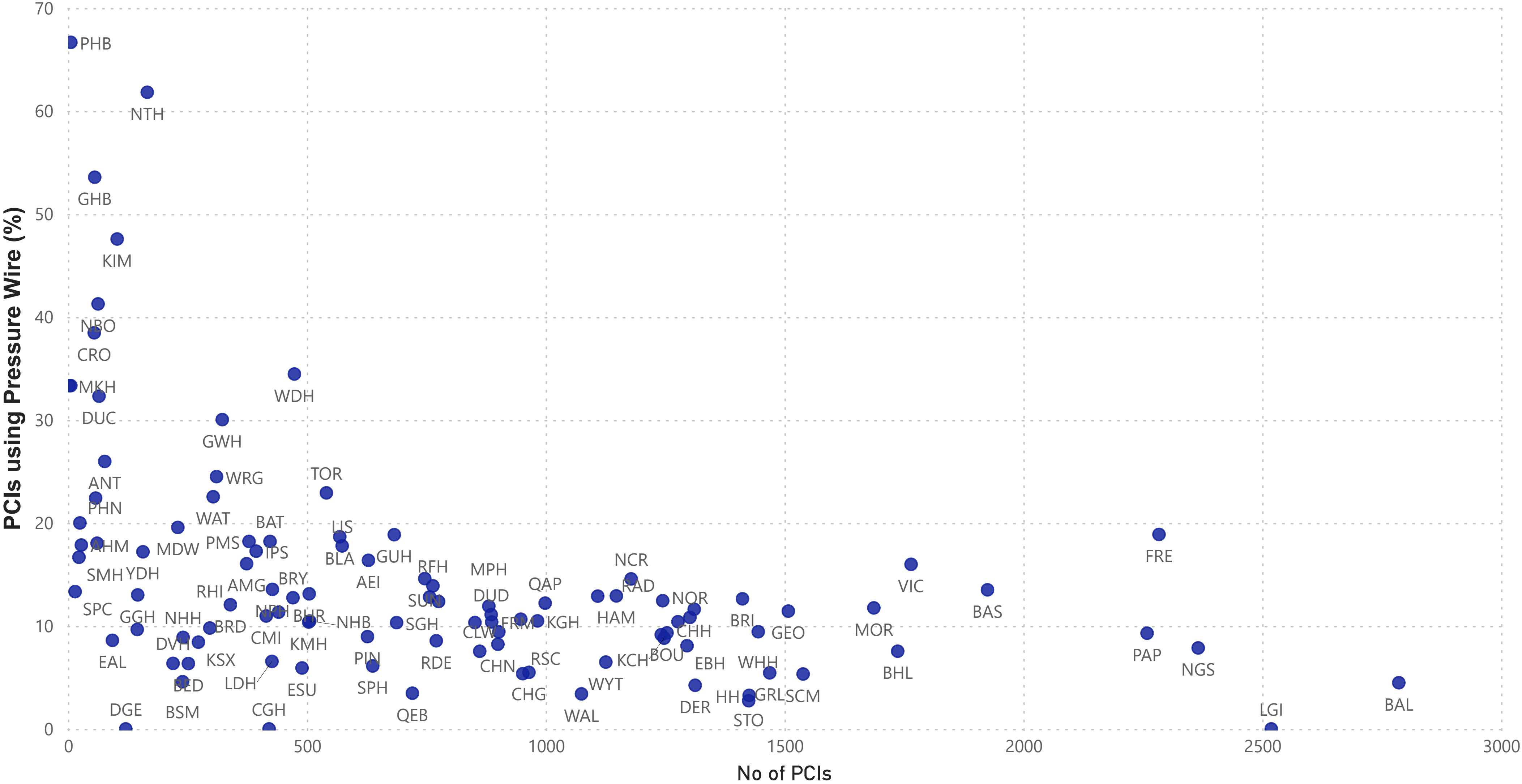
Additional Interventional Coronary Techniques

Diagnostic only and During PCI



Data Extract
10-11-2023







Left Main imaging



European Heart Journal (2019) 40, 87–165
doi:10.1093/eurheartj/ehy394

ESC/EACTS GUIDELINES

2018 ESC/EACTS Guidelines on myocardial revascularization

The Task Force on myocardial revascularization of the European Society of Cardiology (ESC) and European Association for Cardio-Thoracic Surgery (EACTS)

Developed with the special contribution of the European Association for Percutaneous Cardiovascular Interventions (EAPCI)

Recommendations on intravascular imaging for procedural optimization

Recommendations	Class ^a	Level ^b
IVUS or OCT should be considered in selected patients to optimize stent implantation. ^{603,612,651–653}	Ia	B
IVUS should be considered to optimize treatment of unprotected left main lesions. ³⁵	Ia	B

© ESC 2018

ACC/AHA/SCAI CLINICAL PRACTICE GUIDELINE

2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

10.3. Use of Intravascular Imaging

Recommendations for Use of Intravascular Imaging
Referenced studies that support the recommendations are summarized in Online Data Supplement 25.

COR	LOE	Recommendations
2a	B-R	1. In patients undergoing coronary stent implantation, IVUS can be useful for procedural guidance, particularly in cases of left main or complex coronary artery stenting, to reduce ischemic events. ^{1–10}
2a	B-R	2. In patients undergoing coronary stent implantation, OCT is a reasonable alternative to IVUS for procedural guidance, except in ostial left main disease. ^{11–13}



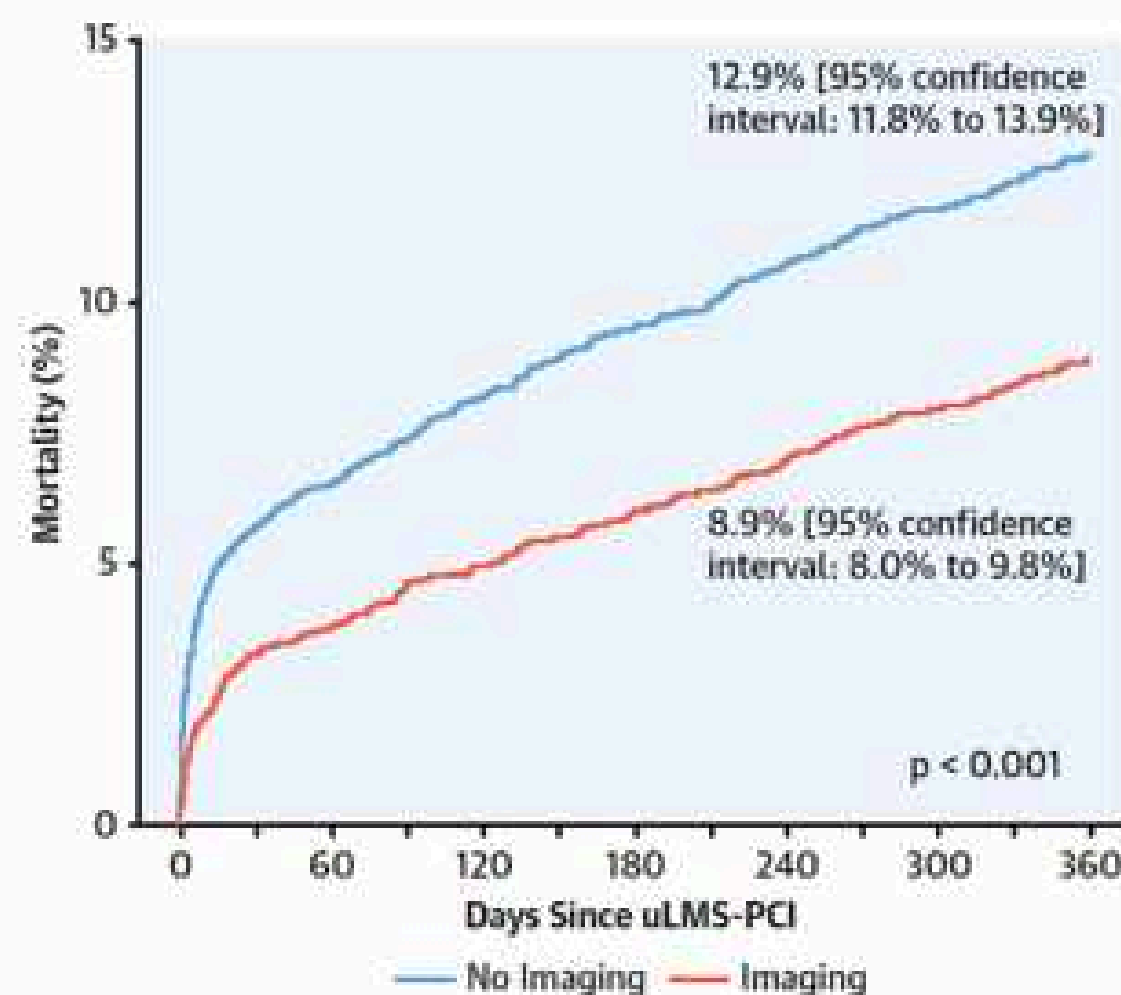
Left Main imaging

Intravascular Imaging and 12-Month Mortality After Unprotected Left Main Stem PCI

An Analysis From the British Cardiovascular Intervention Society Database

Tim Kinnaird, MD,^{1,2} Thomas Johnson, PhD,³ Richard Anderson, MD,² Sean Gallagher, MD,⁴ Alex Sirker, PhD,⁵ Peter Ludman, MD,⁶ Mark de Belder, MD,⁷ Samuel Copt, PhD,⁸ Keith Oldroyd, MD,¹ Adrian Banning, MD,¹ Mamas Mamas, DPhil,^{1,2} Nick Curzen, PhD⁹

CENTRAL ILLUSTRATION Survival by Intravascular Imaging Use After uLMS PCI in England and Wales From 2007 to 2014



Kinnaird, T. et al. J Am Coll Cardiol Interv. 2020;13(3):346-57.

Kaplan-Meier curves of 12-month survival when intravascular imaging was used compared with when imaging was not used to guide unprotected left main stem percutaneous coronary intervention in England and Wales from 2007 to 2014. This illustrates a significant association between improved survival and imaging use during unprotected left main stem percutaneous coronary intervention.

THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Intravascular Imaging–Guided or Angiography–Guided Complex PCI

J. M. Lee, R. H. Chin, Y. B. Song, J. Y. Lee, S. J. Lee, S. Y. Lee, S. M. Kim, R. H. Yun, J. Y. Cho, C. J. Kim, H. S. Ahn, C. W. Nam, H. J. Yoon, Y. H. Park, W. S. Lee, J. O. Jeong, P. S. Song, J. H. Doh, S. H. Jo, C. H. Yoon, M. G. Kang, J. S. Koh, K. Y. Lee, Y. H. Lim, Y. H. Cho, J. M. Cho, W. J. Jang, K. J. Chun, D. Hong, T. K. Park, J. H. Yang, S. H. Choi, H. C. Gwon, and J. Y. Hahn, for the RENOVATE-COMPLEX-PCI Investigators^a

Subgroup	Intravascular Imaging–Guided PCI no. of events/total no. of patients (cumulative incidence, %)	Angiography–Guided PCI no. of events/total no. of patients (cumulative incidence, %)	Hazard Ratio (95% CI)
Overall	76/1092 (7.7)	60/547 (12.3)	0.64 (0.45–0.89)
Type of imaging devices			
Intravascular ultrasonography	59/800 (8.0)	60/547 (12.3)	0.66 (0.46–0.95)
Optical coherence tomography	15/278 (5.8)	60/547 (12.3)	0.47 (0.27–0.83)
Type of complex coronary lesions			
True bifurcation	23/233 (10.3)	13/126 (11.8)	0.97 (0.49–1.93)
Unprotected left main coronary artery disease	9/138 (6.8)	11/54 (25)	0.31 (0.13–0.76)
Multivessel PCI involving ≥2 major coronary arteries	36/409 (9.5)	22/213 (11.7)	0.84 (0.50–1.44)
Lesion necessitating use of ≥3 stents	16/208 (8.1)	6/97 (6)	1.24 (0.49–3.18)
Lesion with in-stent restenosis	22/158 (15.6)	12/78 (17)	0.90 (0.45–1.82)
Severely calcified lesion	11/157 (7.3)	11/74 (17)	0.46 (0.20–1.06)
Ostial lesions of major coronary artery	8/182 (4.4)	9/69 (16)	0.33 (0.13–0.85)
Initial presentation			
Stable ischemic heart disease	25/532 (5.8)	27/275 (10.4)	0.46 (0.27–0.80)
Acute coronary syndrome	51/560 (10.4)	33/272 (14.6)	0.74 (0.48–1.15)
Age			
<65 yr	36/517 (7.8)	23/238 (10.6)	0.72 (0.42–1.21)
≥65 yr	40/575 (7.4)	37/309 (13.6)	0.57 (0.36–0.88)
Sex			
Male	66/869 (8.3)	46/431 (11.7)	0.76 (0.48–1.02)
Female	10/223 (5.2)	14/116 (14.5)	0.35 (0.16–0.80)
Diabetes mellitus			
Yes	45/394 (12.9)	26/223 (12.3)	0.97 (0.60–1.57)
No	31/698 (4.7)	34/324 (12.2)	0.41 (0.25–0.67)
Chronic kidney disease			
Yes	22/203 (13.3)	19/93 (23)	0.51 (0.27–0.93)
No	54/889 (6.4)	41/454 (9.9)	0.66 (0.44–0.99)
Left ventricular ejection fraction			
<50%	22/210 (12.0)	12/84 (15)	0.72 (0.35–1.45)
≥50%	54/882 (6.7)	48/463 (11.8)	0.58 (0.39–0.85)



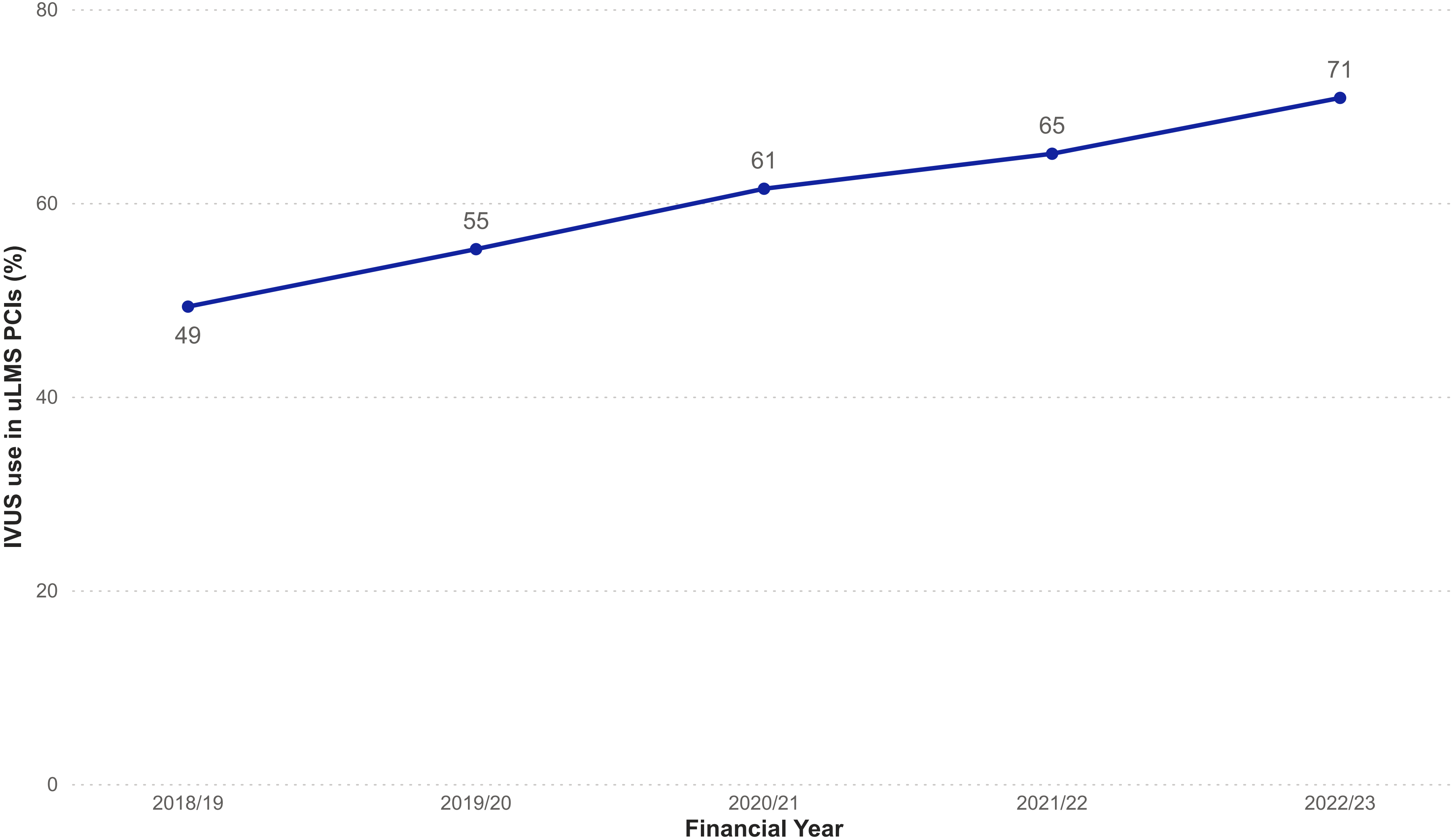
Data Extract
10-11-2023



2022-23 Data
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IVUS

In PCI to unprotected LMS





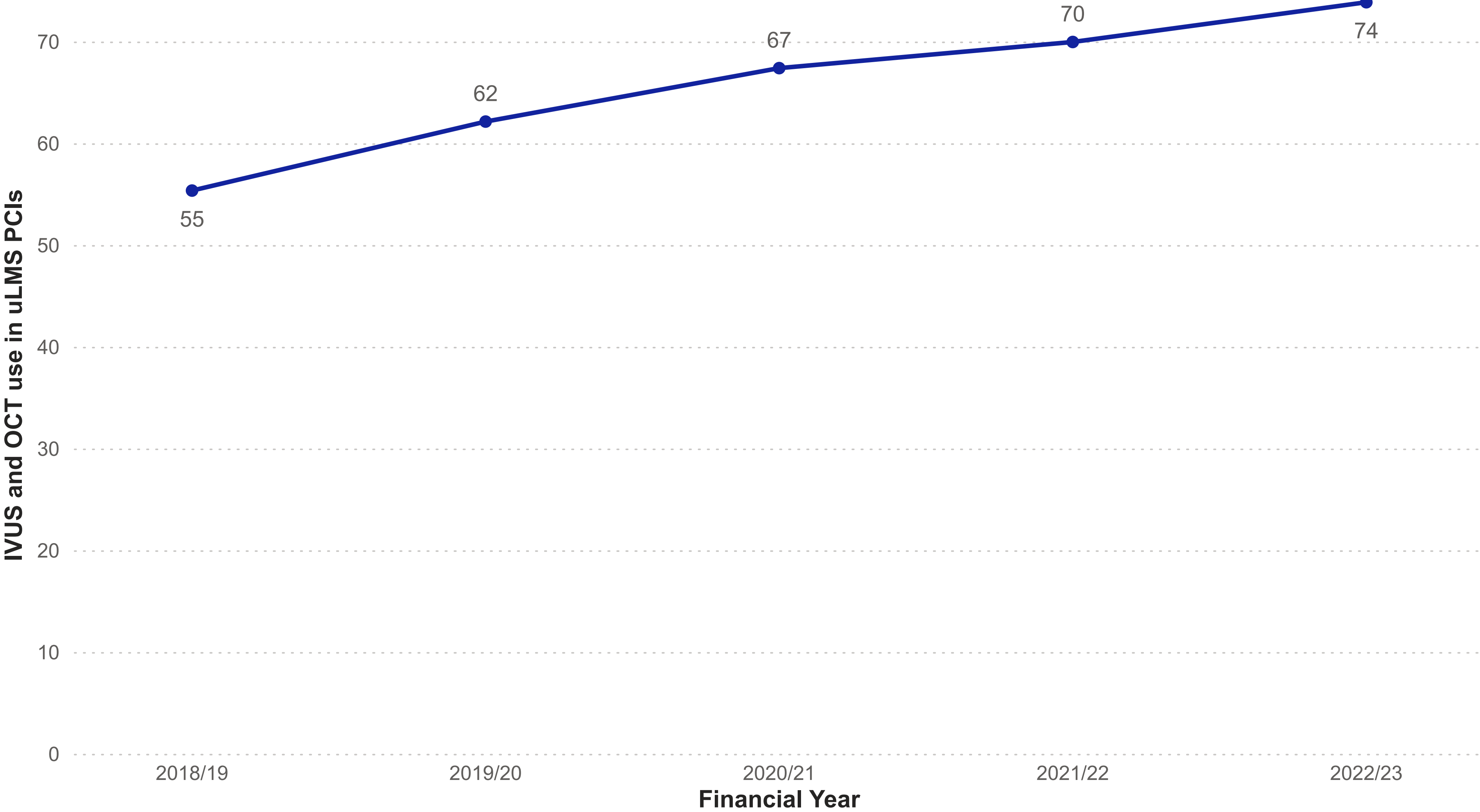
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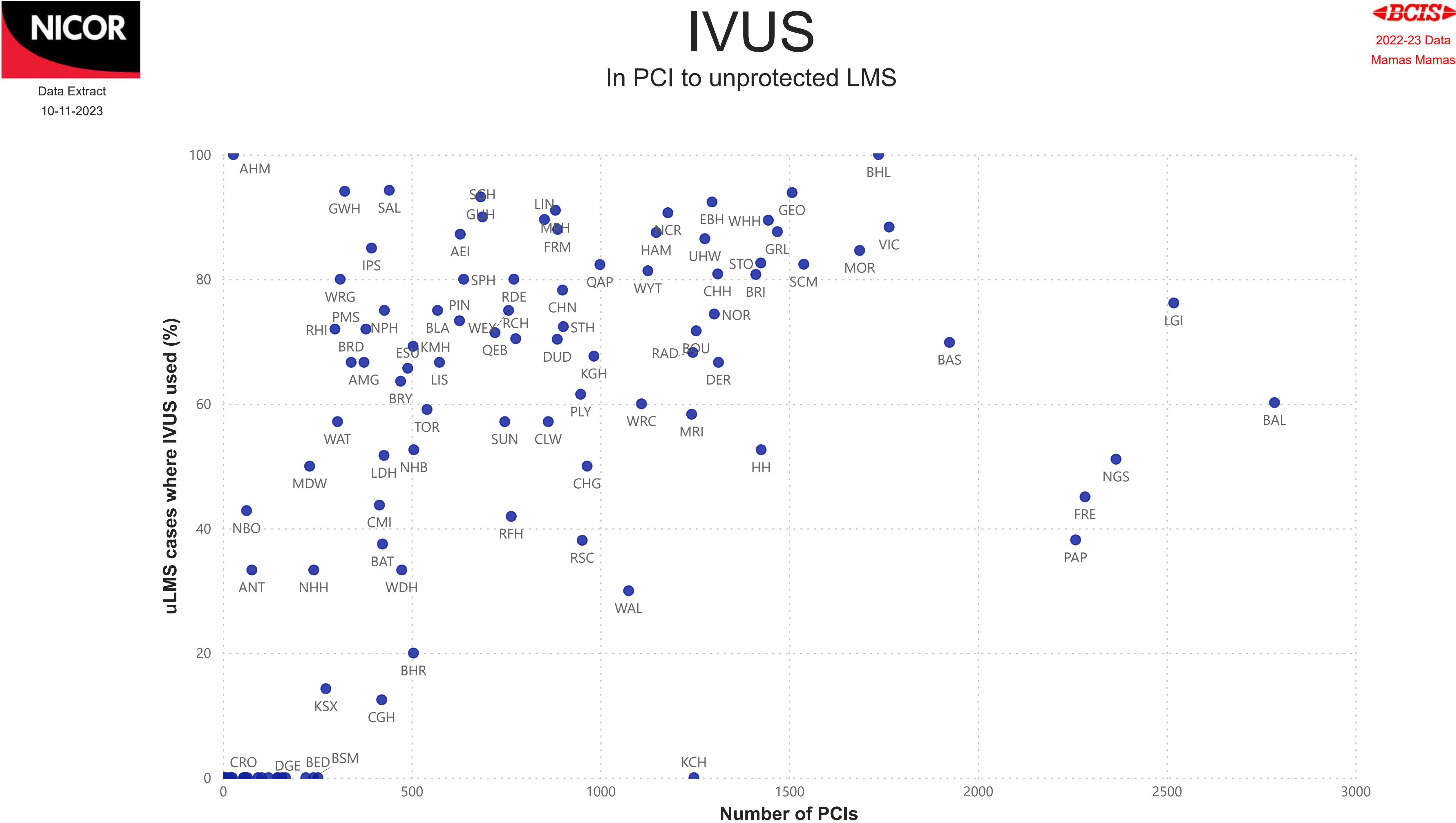


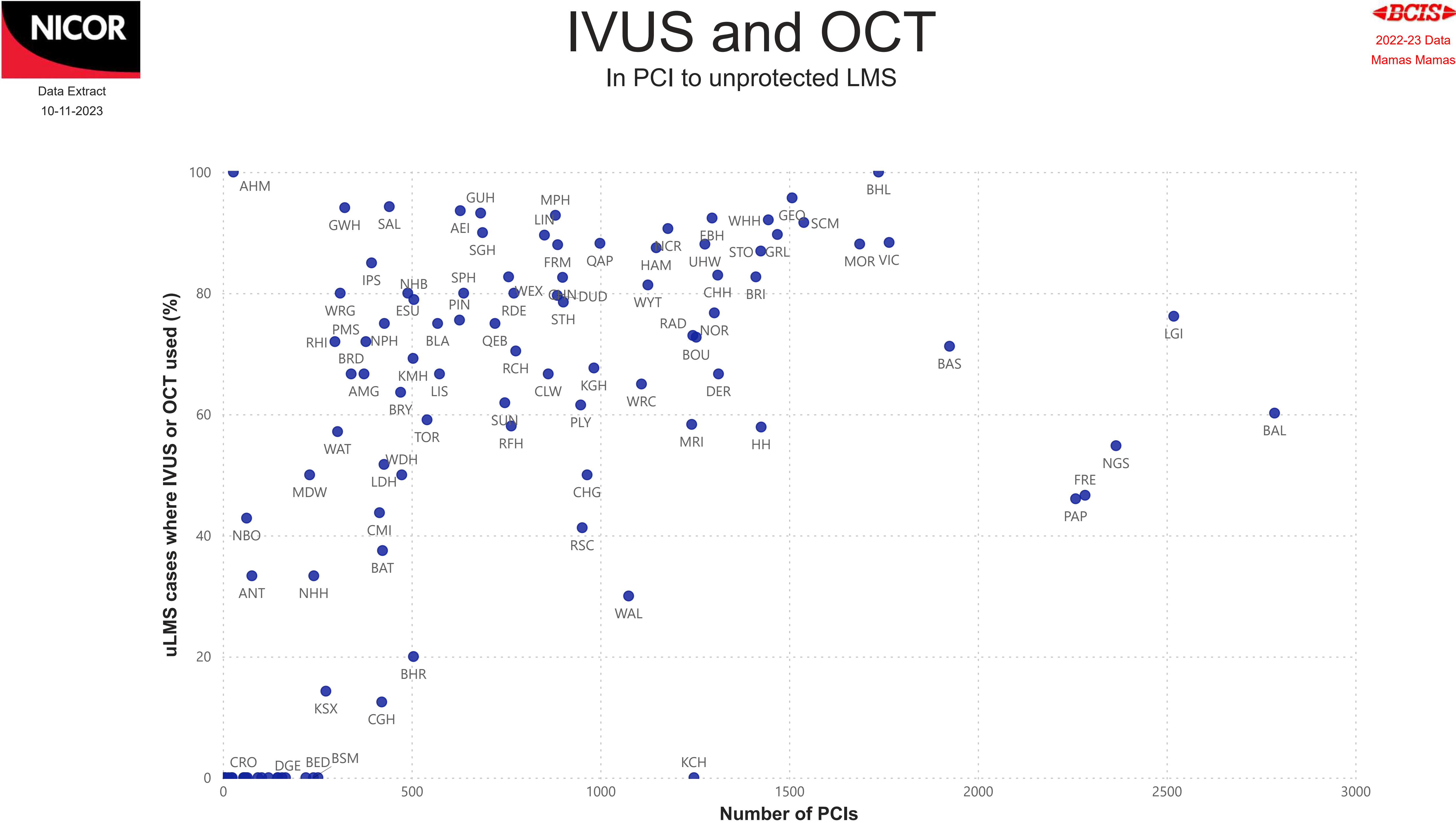
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Mamas Mamas

IVUS or OCT

In PCI to unprotected LMS









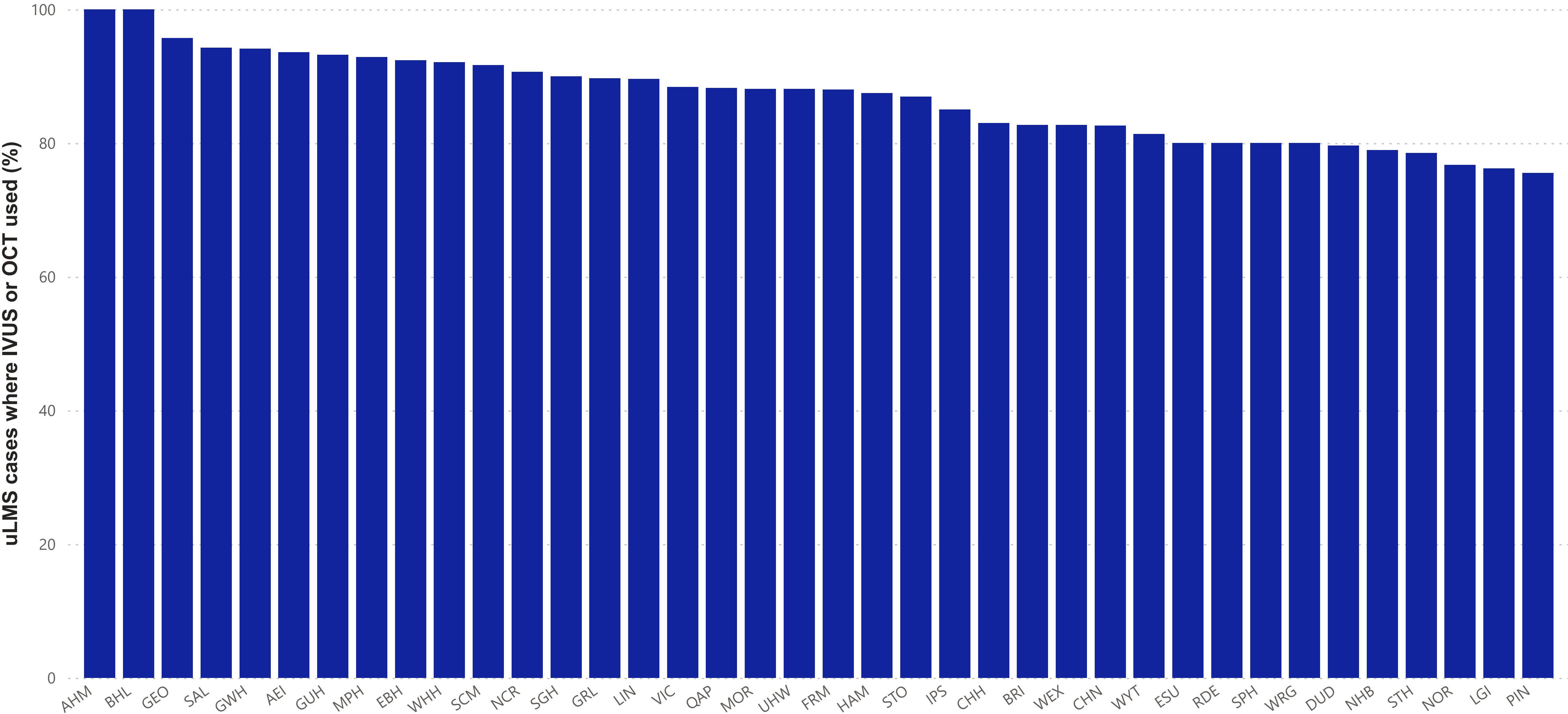
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IVUS or OCT

In PCI to unprotected LMS (>75%)





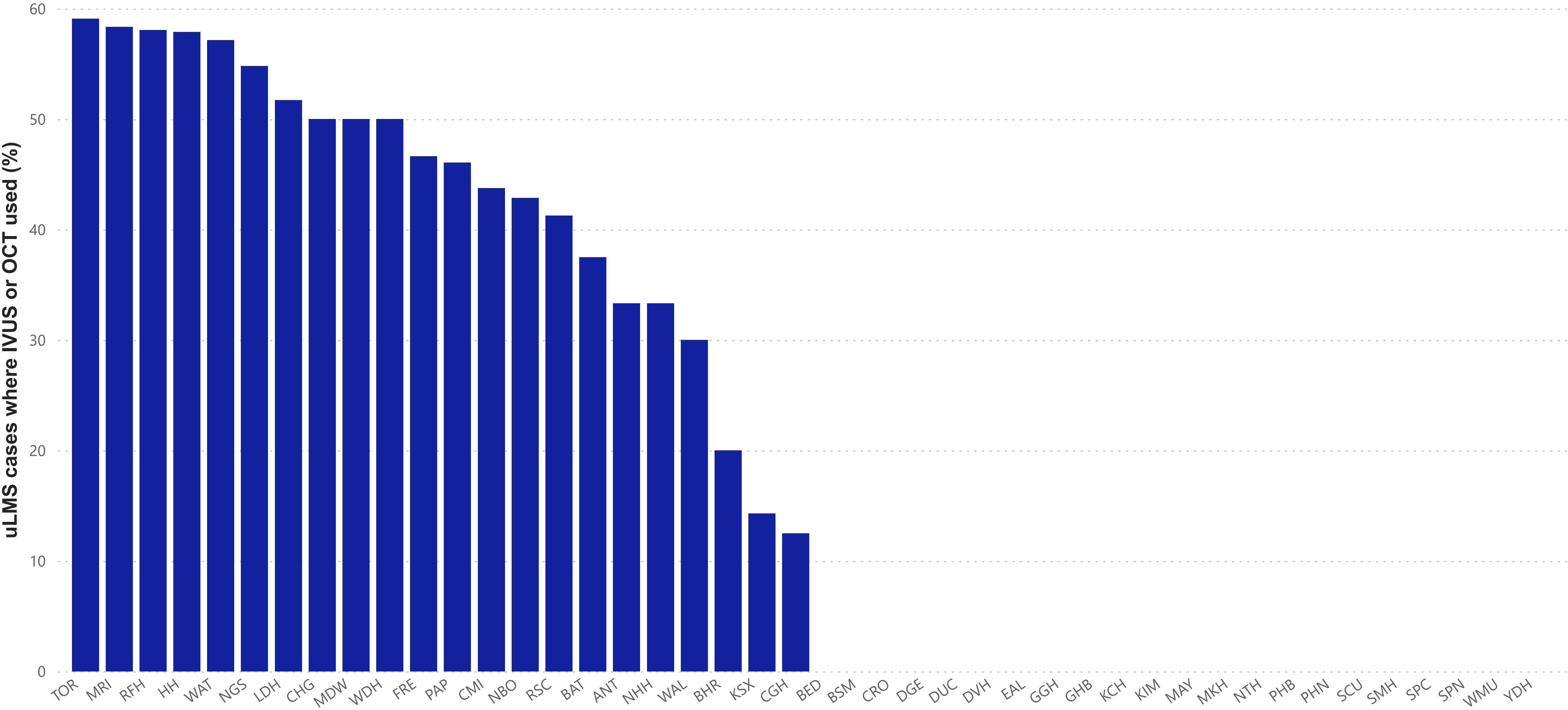
Data Extract
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IVUS or OCT

In PCI to unprotected LMS (<60%)





OPEN ACCESS



Check for updates

Intravascular imaging guided versus coronary angiography guided percutaneous coronary intervention: systematic review and meta-analysis

Safi U Khan,¹ Siddharth Agarwal,² Hassaan B Arshad,¹ Usman Ali Akbar,³ Mamas A Mamas,^{4,5} Shilpkumar Arora,⁶ Usman Baber,⁷ Sachin S Goel,¹ Neal S Kleiman,¹ Alpesh R Shah¹

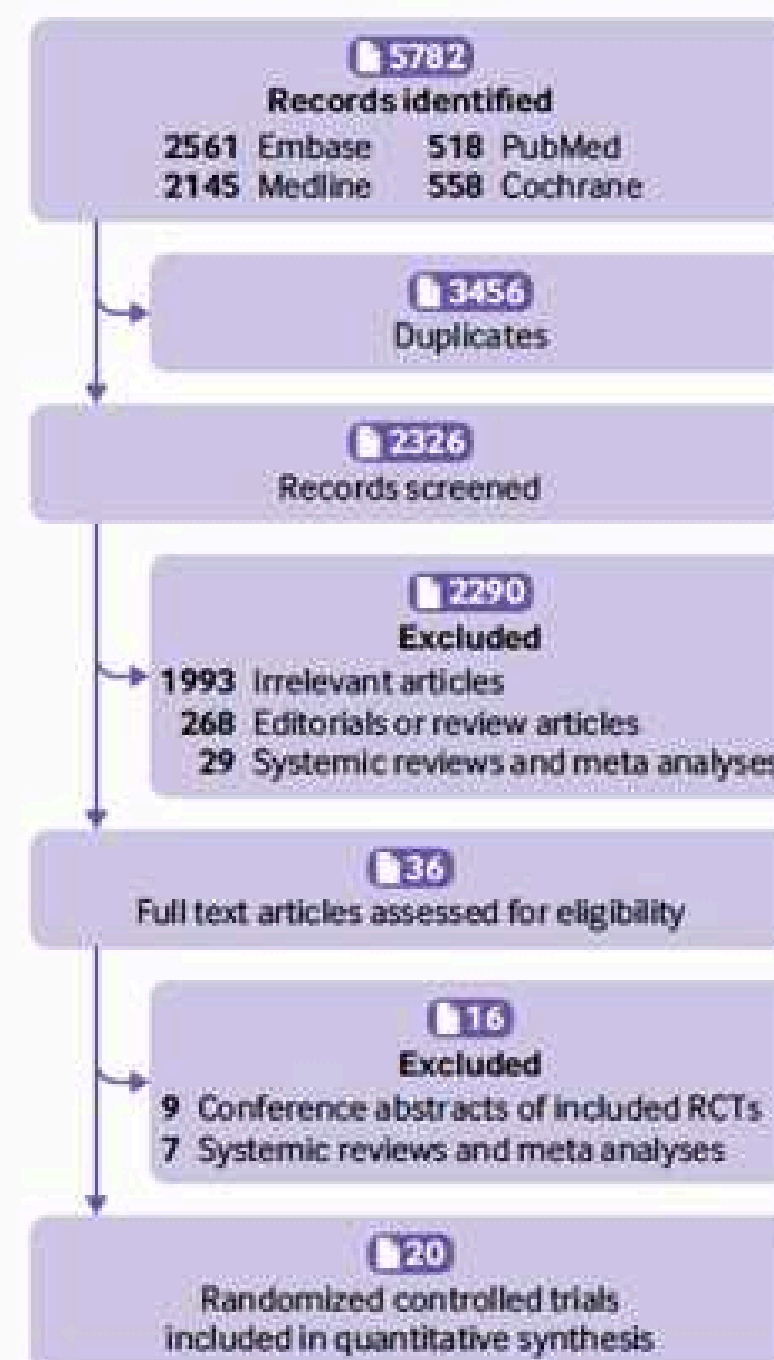


Fig 1 | Flowchart of study selection

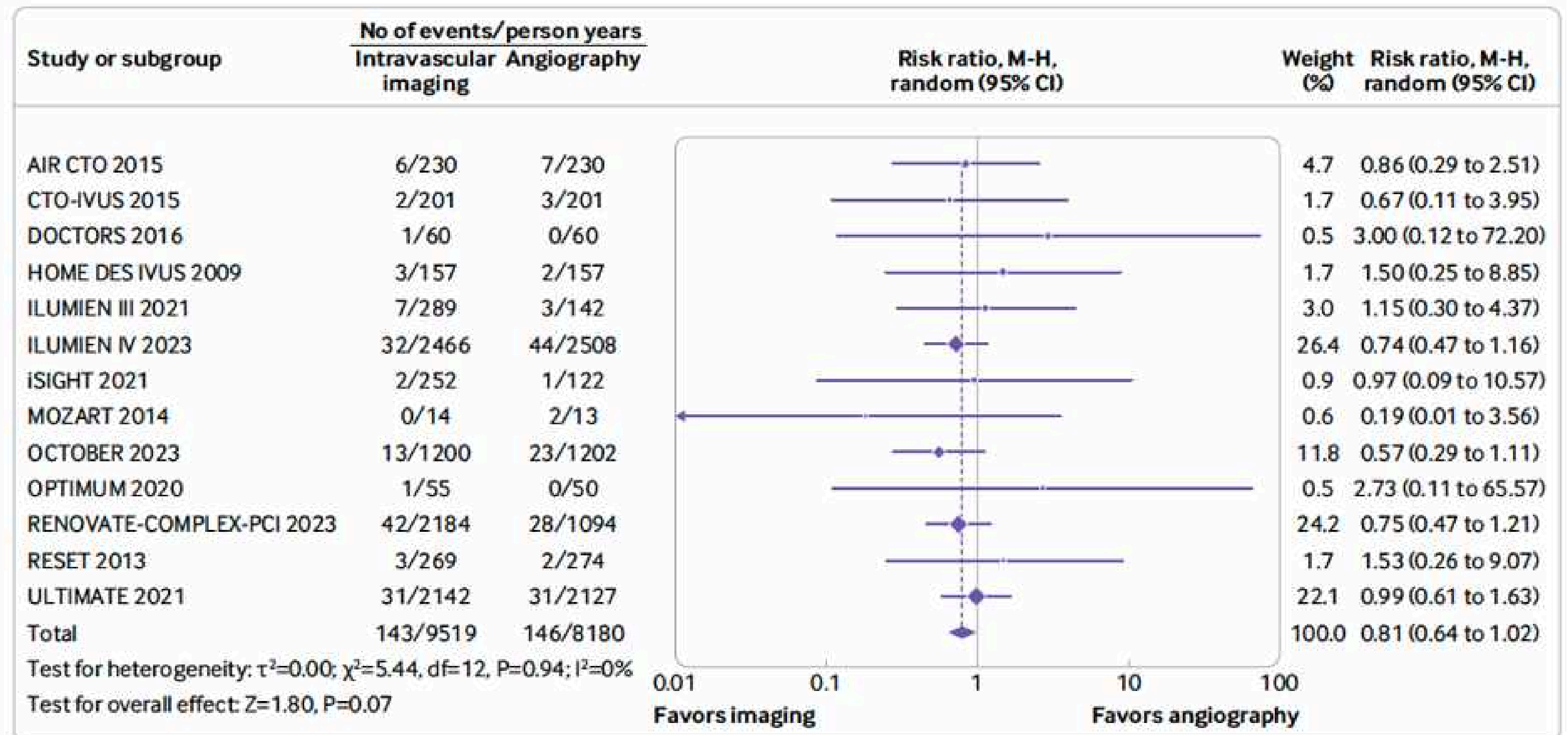


Fig 7 | Forest plot comparing intravascular imaging guided with coronary angiography guided percutaneous coronary intervention for all cause death. Data obtained from randomized controlled trials using random effect meta-analysis and expressed as risk ratio. CI=confidence interval; M-H=Mantel-Haenszel

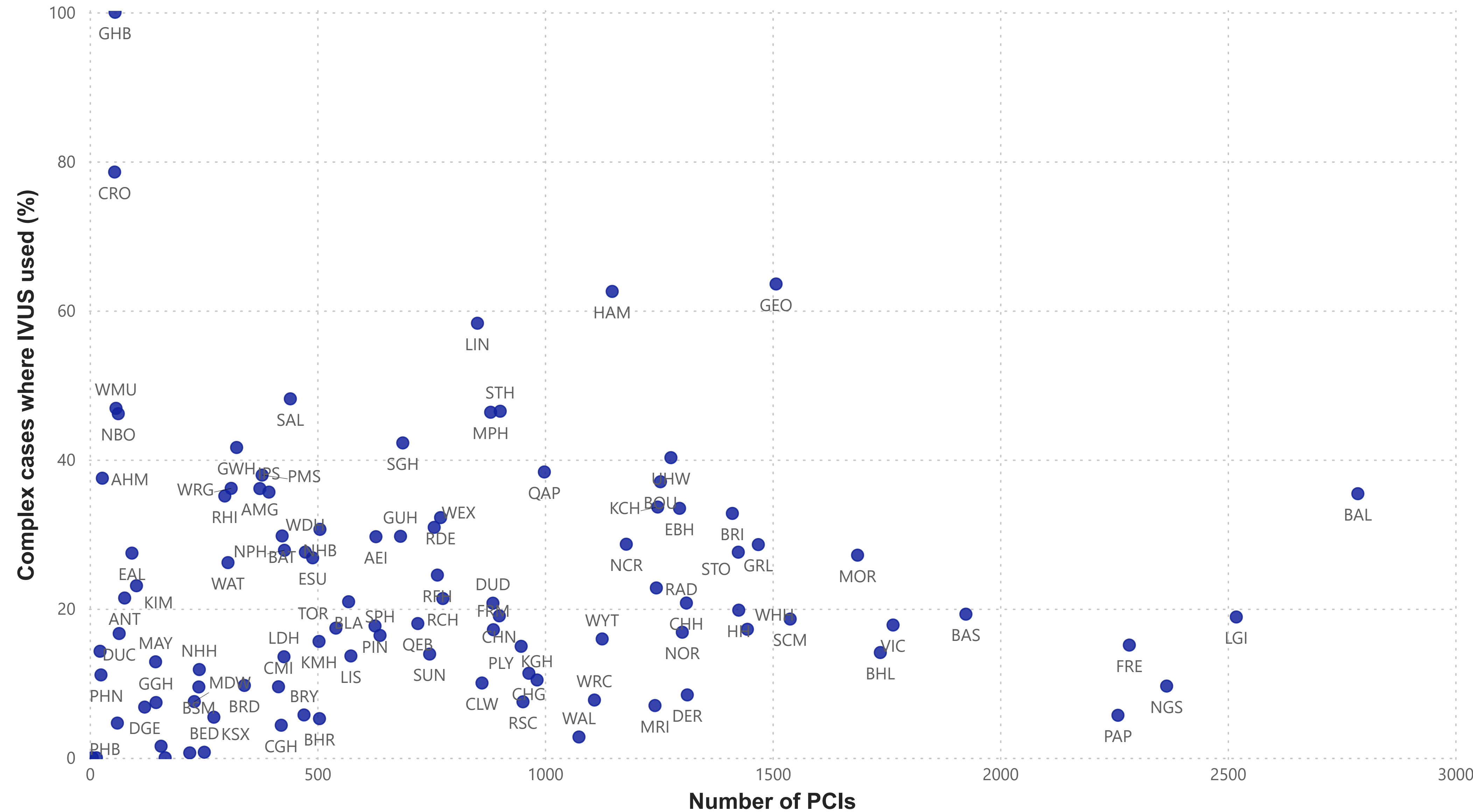


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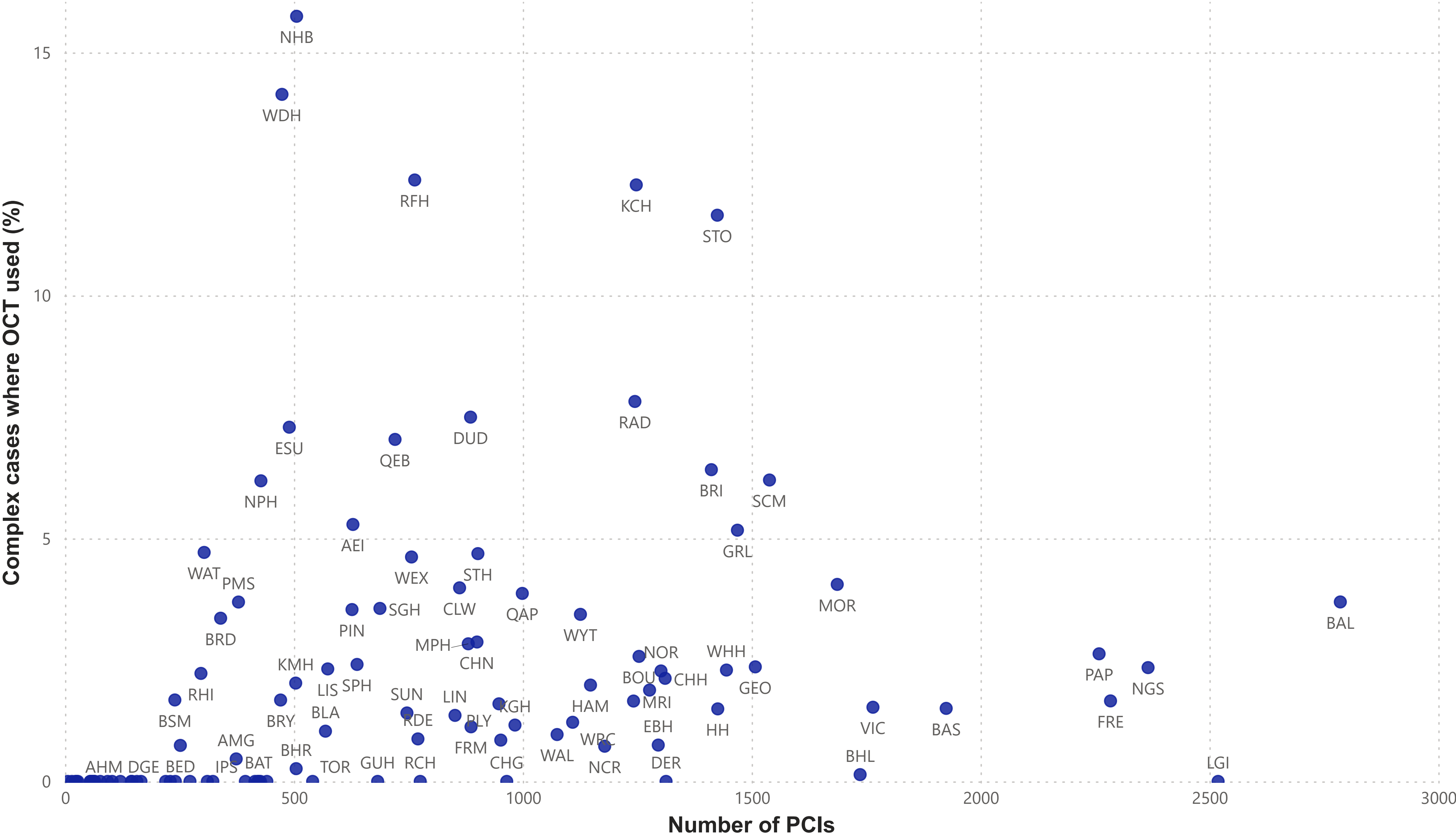


2022-23 Data
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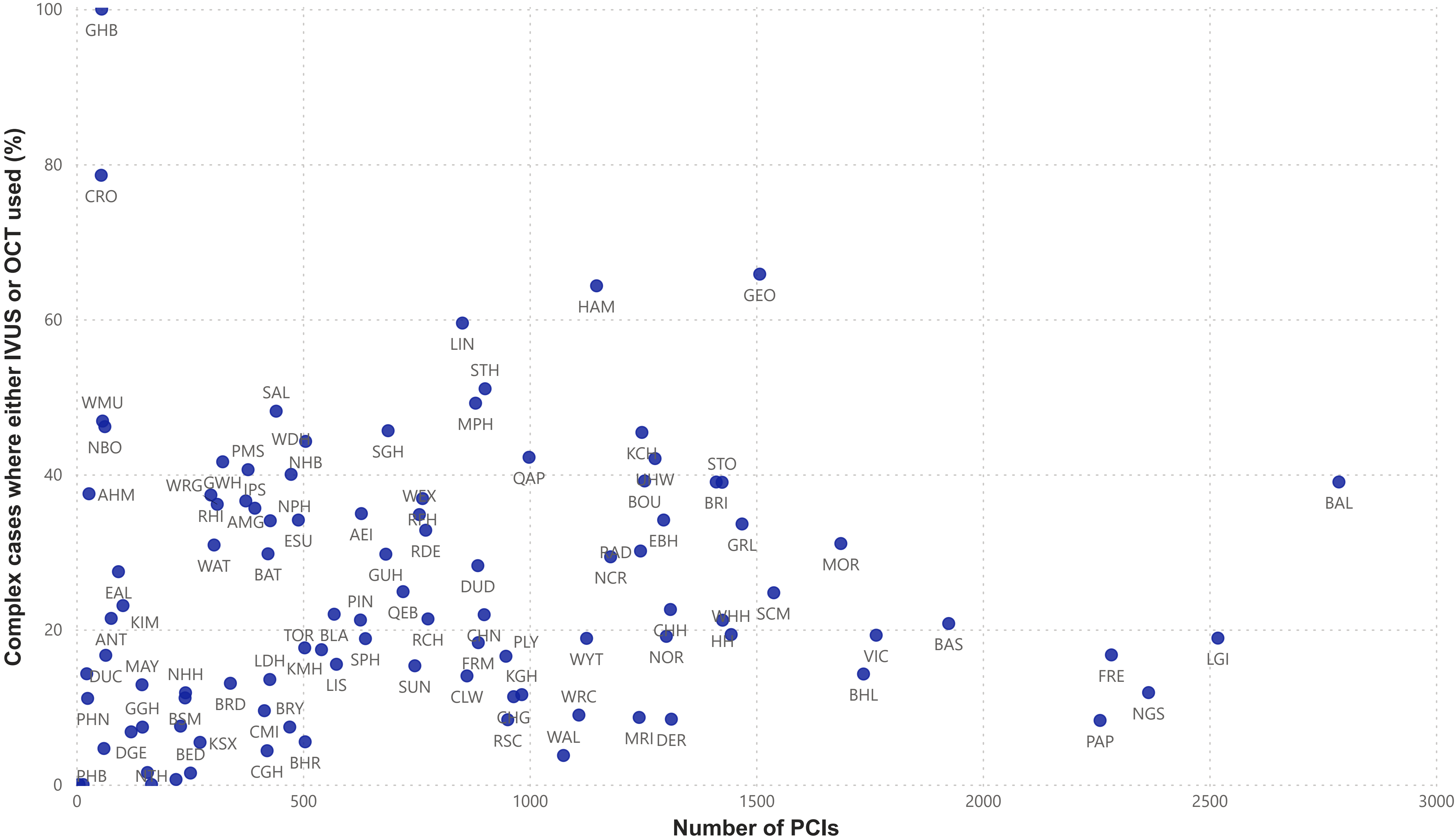
IVUS in complex cases



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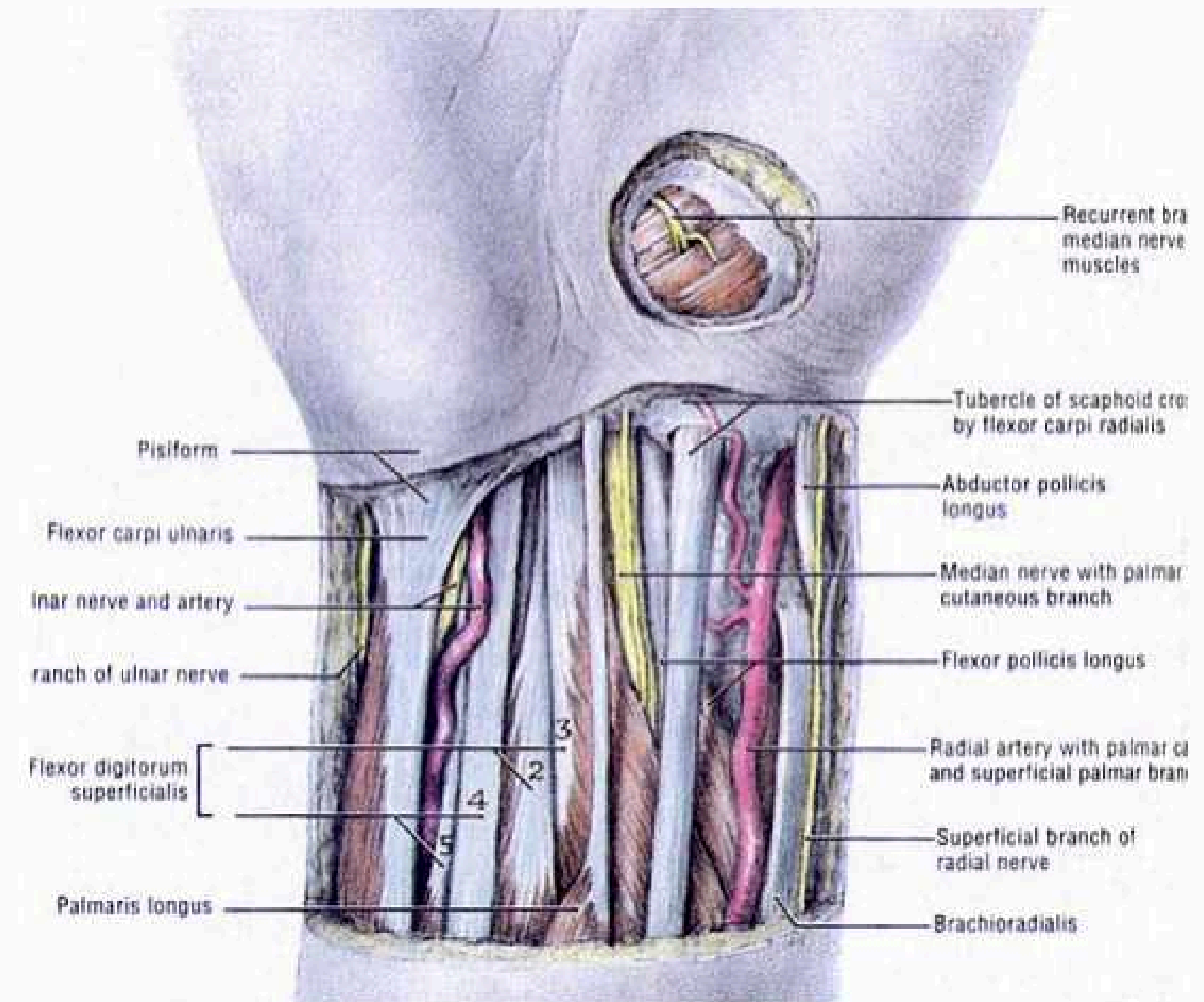
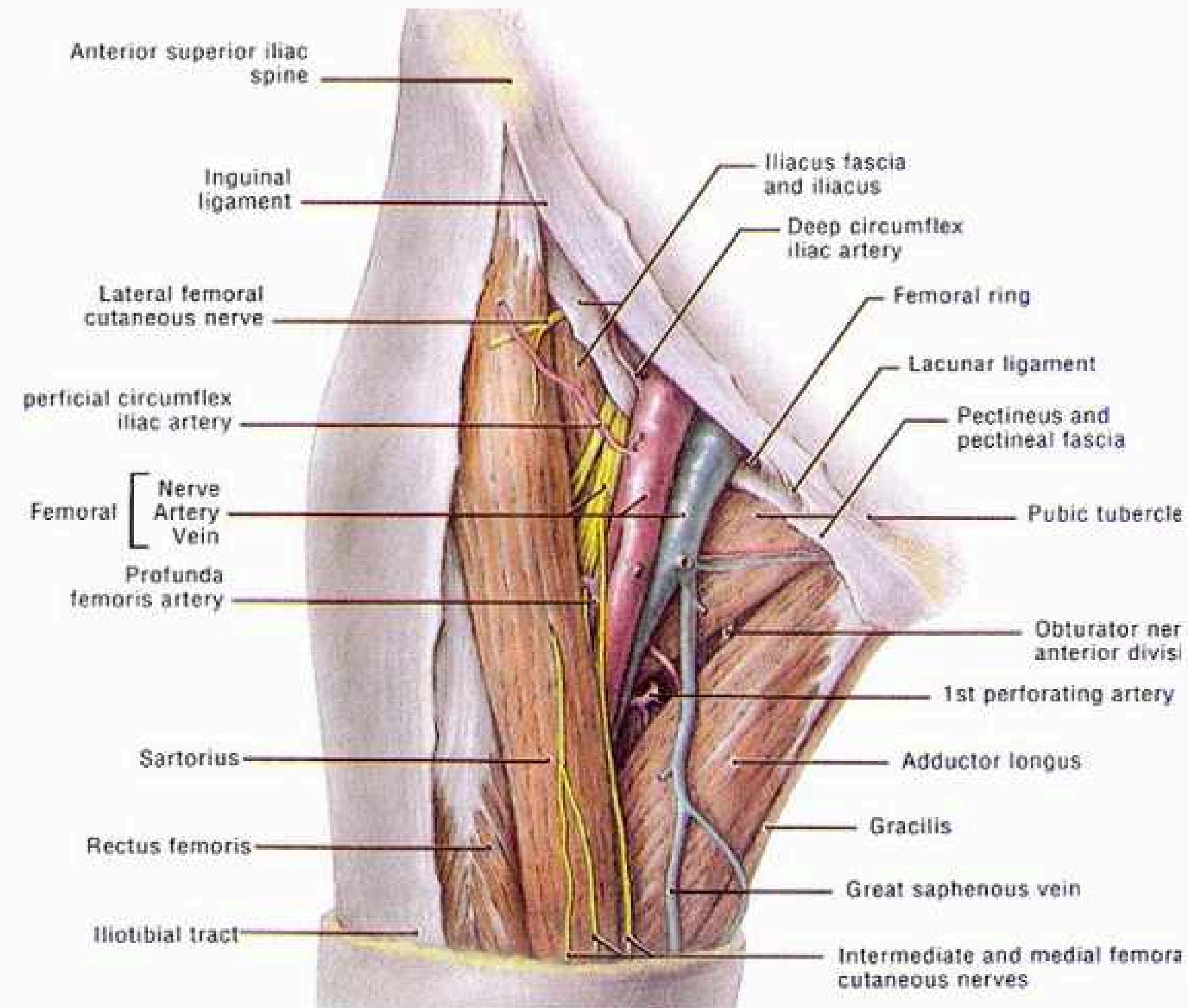


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Access site practice



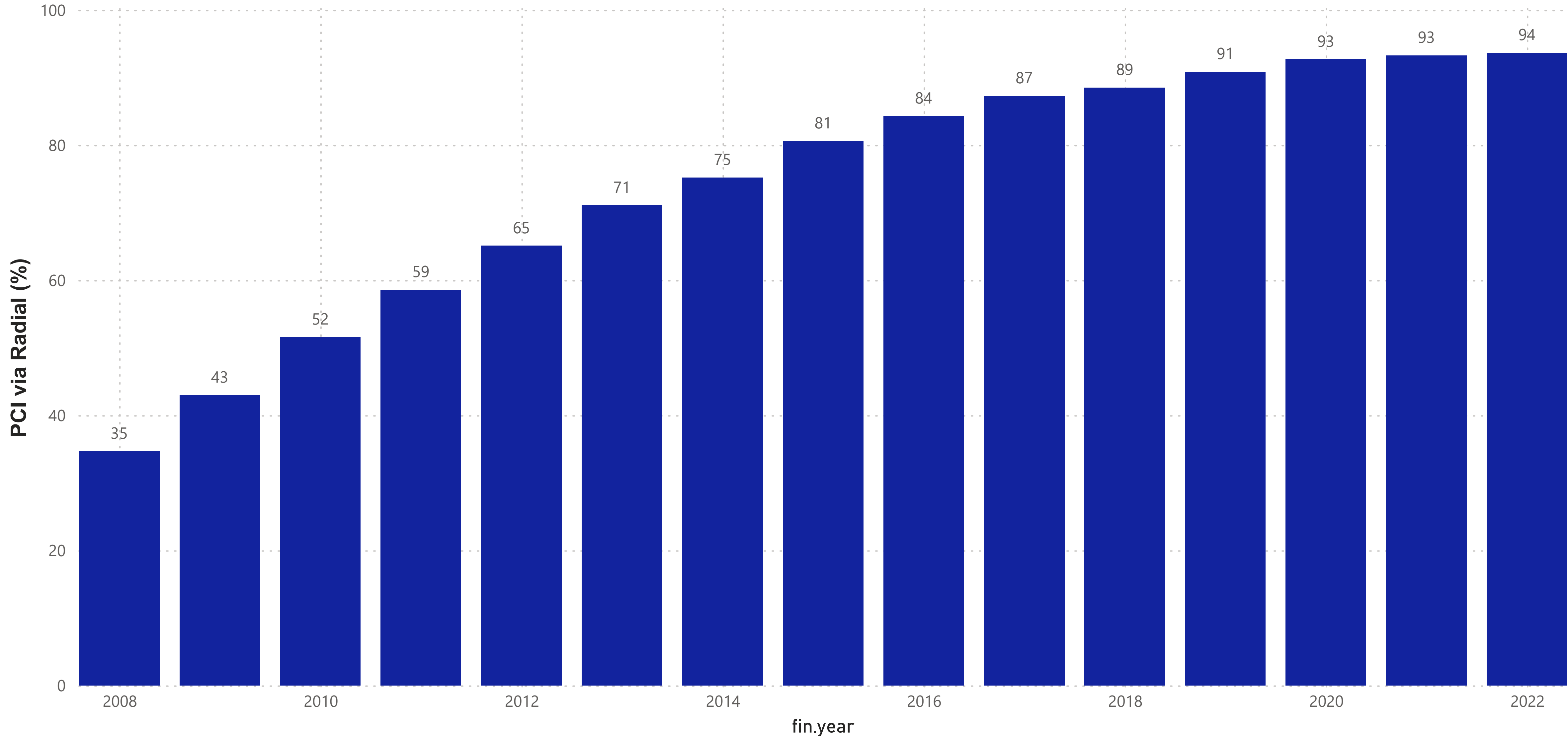


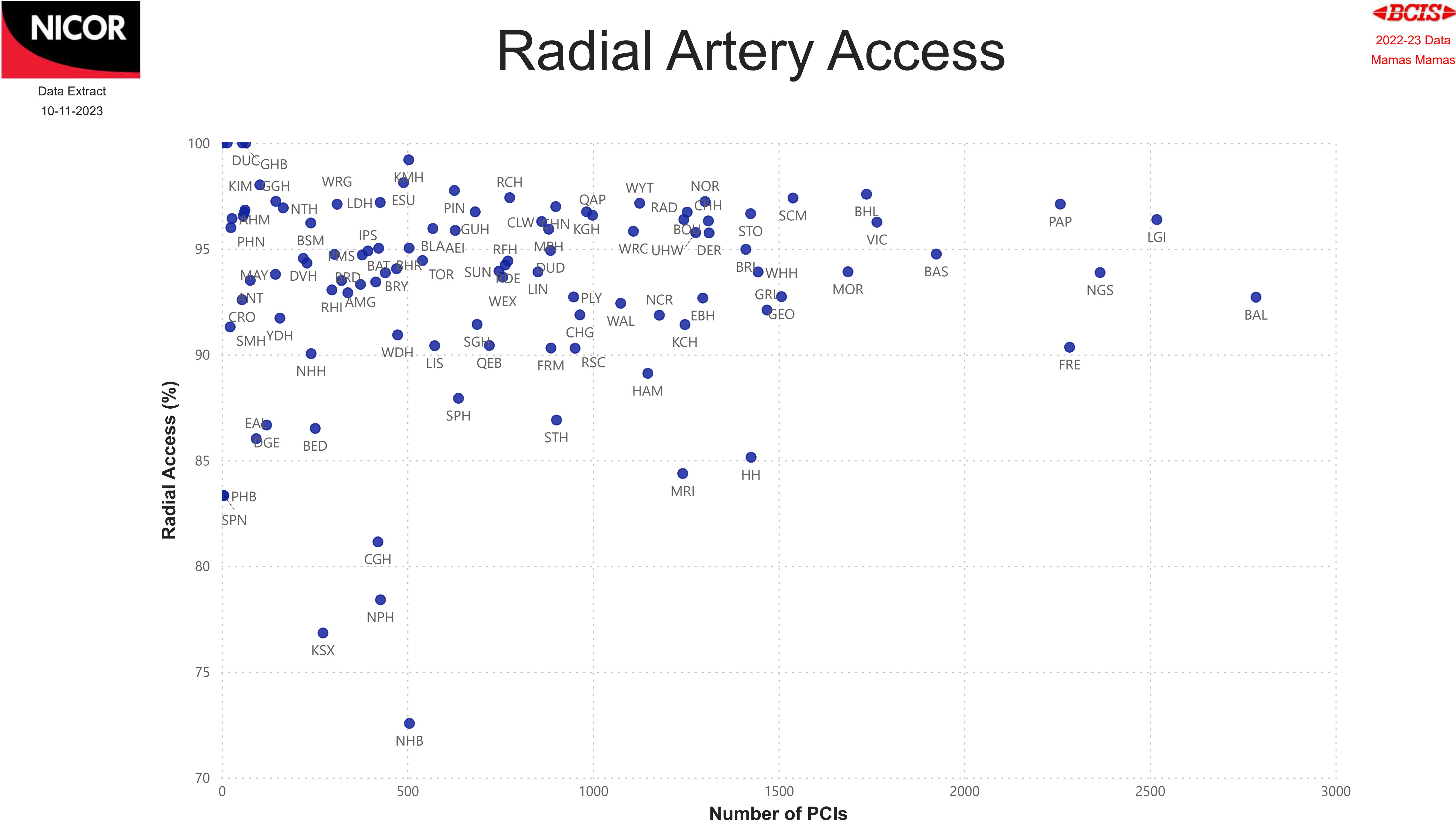
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2022-23 Data
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Radial Artery Access







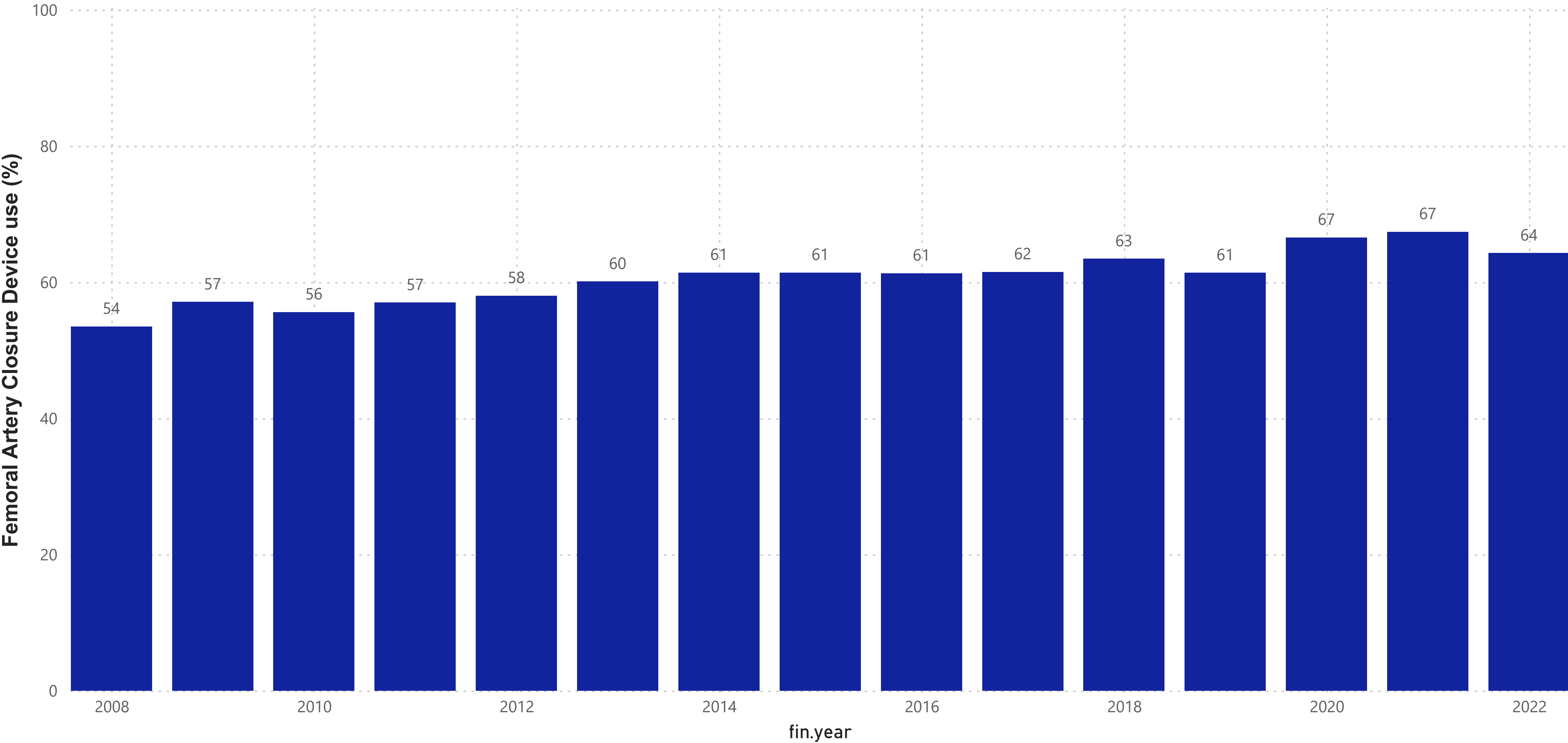
Data Extract
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2022-23 Data
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Femoral closure device use

% of FA PCIs





ACS - Timing





ACS - Timing

Recommendation Table 4 — Recommendations for re-perfusion therapy and timing of invasive strategy

Recommendations	Class ^a	Level ^b
Recommendations for reperfusion therapy for patients with STEMI		
A PPCI strategy is recommended over fibrinolysis if the anticipated time from diagnosis to PCI is <120 min. ^{52,218,219}	I	A
If timely PPCI (<120 min) cannot be performed in patients with a working diagnosis of STEMI, fibrinolytic therapy is recommended within 12 h of symptom onset in patients without contraindications. ^{176,183}	I	A



European Heart Journal (2023) 44, 3720–3826
<https://doi.org/10.1093/eurheartj/ehad191>

ESC GUIDELINES

2023 ESC Guidelines for the management of acute coronary syndromes

Developed by the task force on the management of acute coronary syndromes of the European Society of Cardiology (ESC)



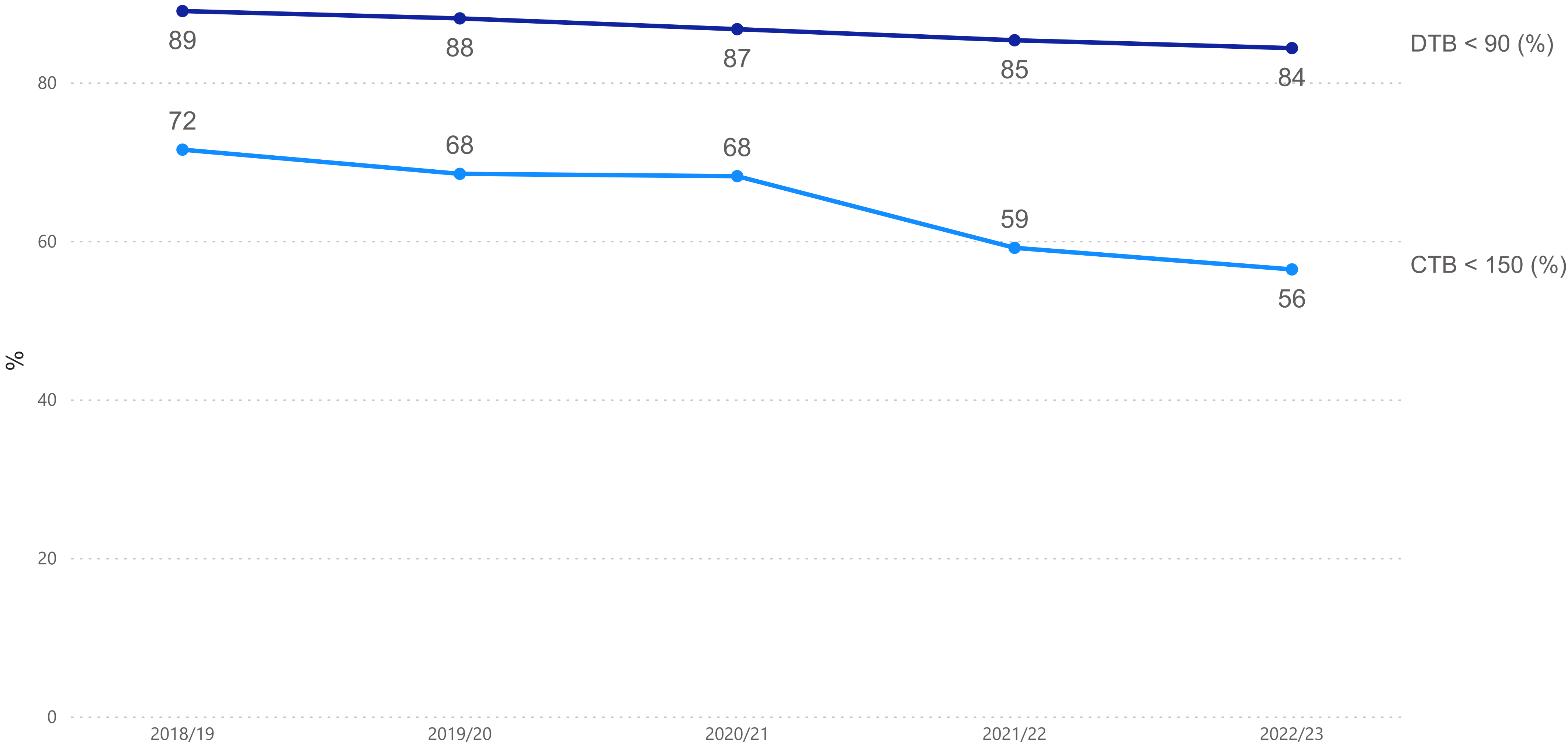
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2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Direct and IHT





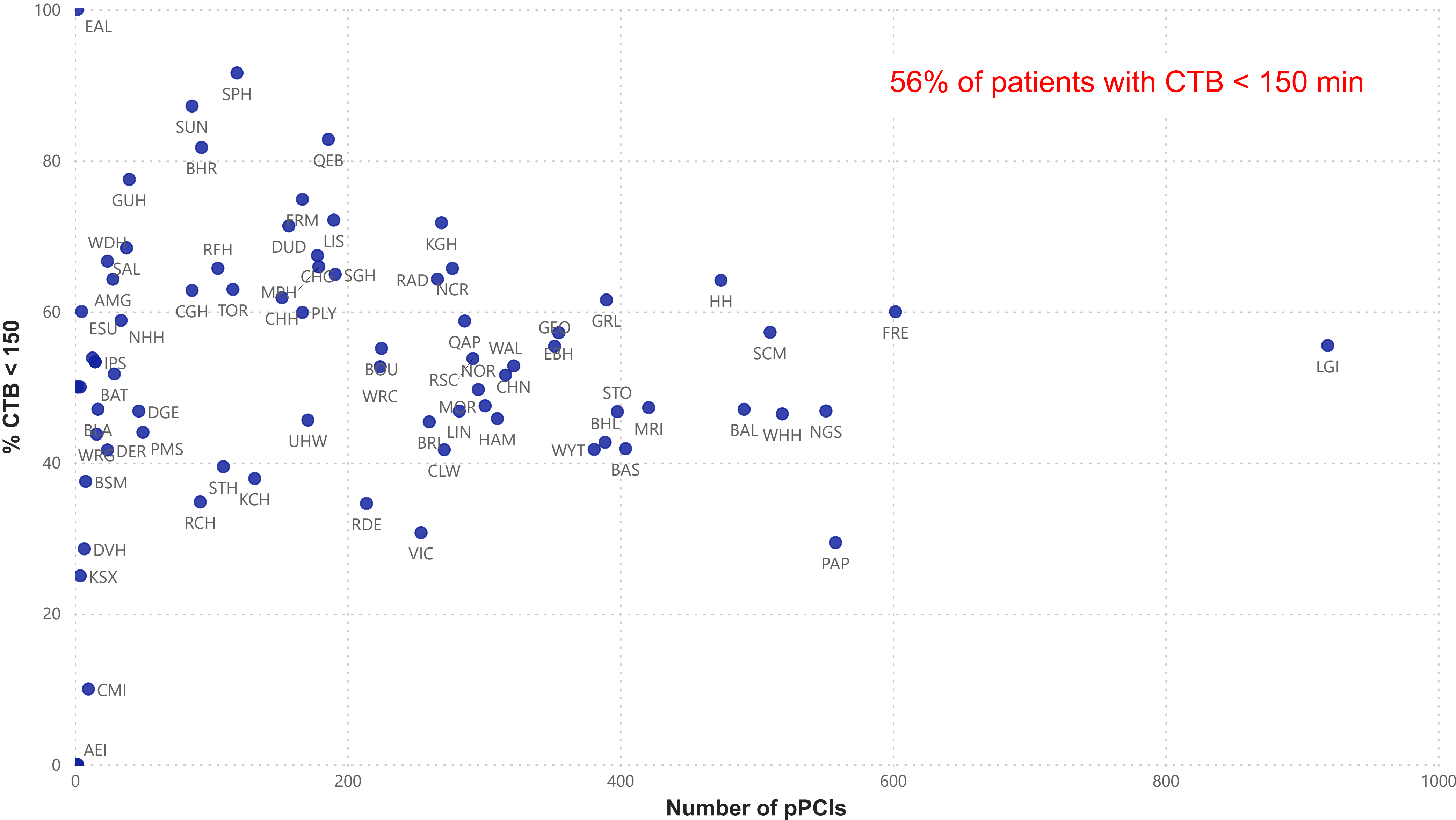
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2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Direct and IHT - Call to Balloon < 150 min





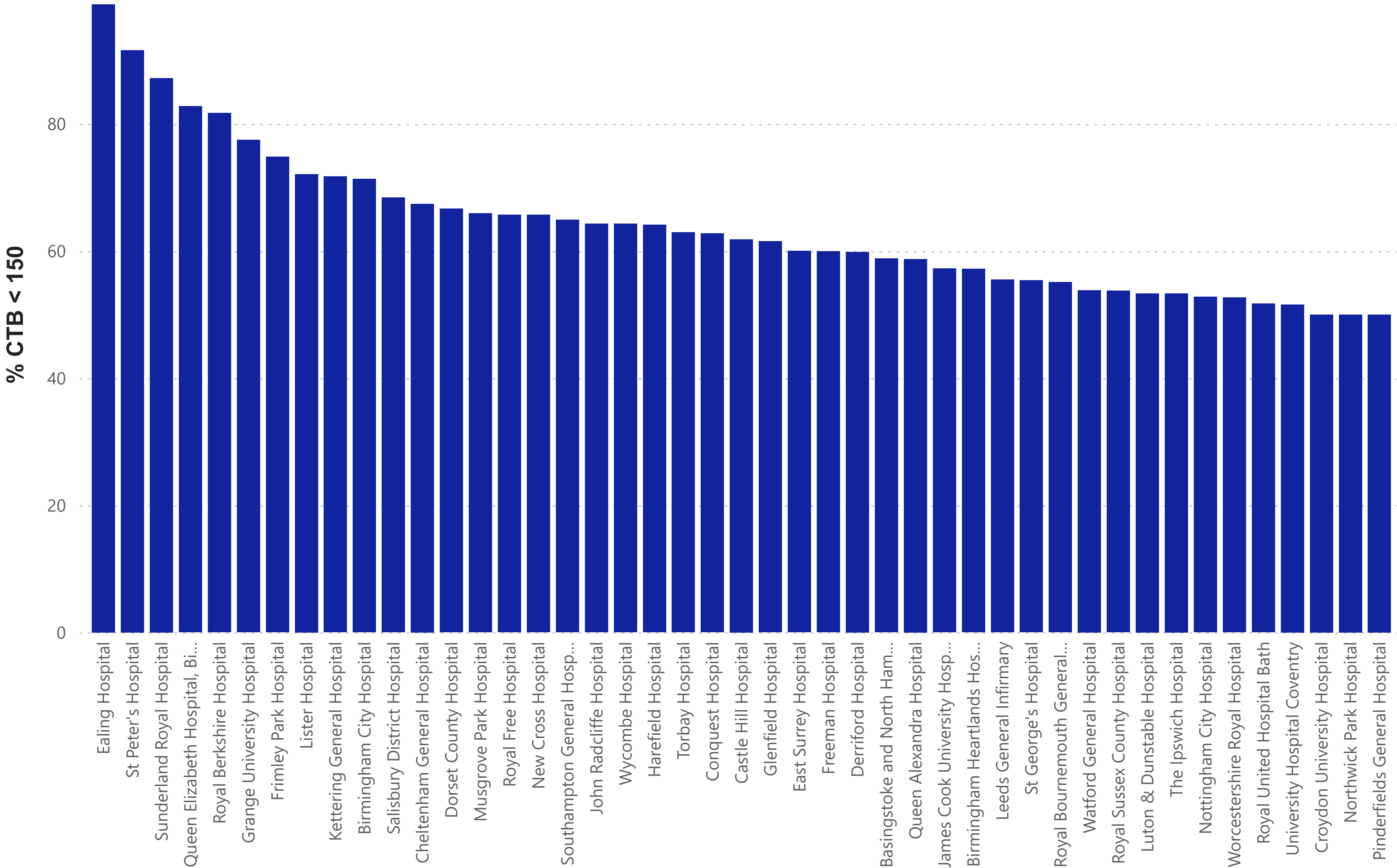
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2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Direct and IHT - Call to Balloon < 150 min (1 of 2)





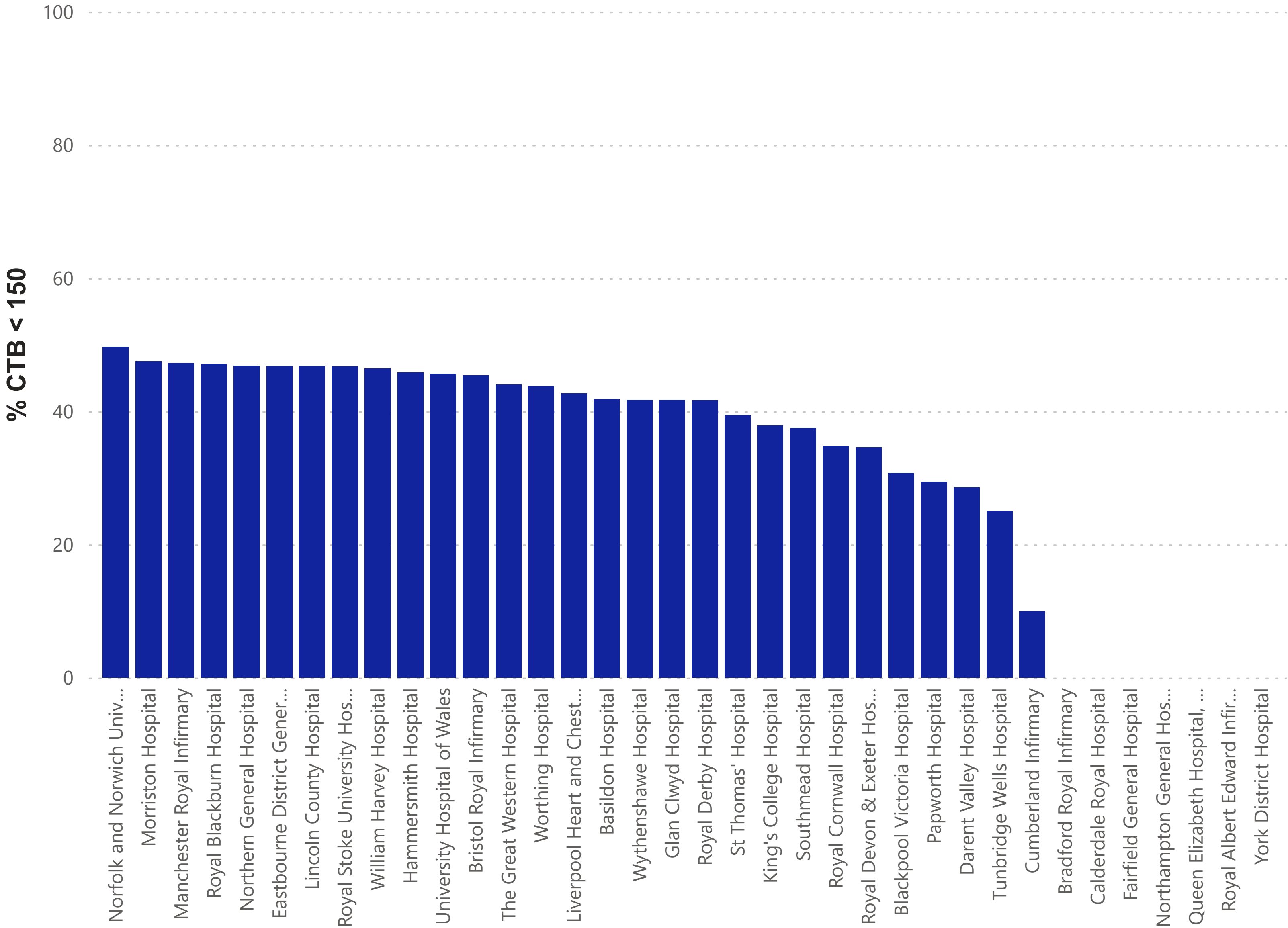
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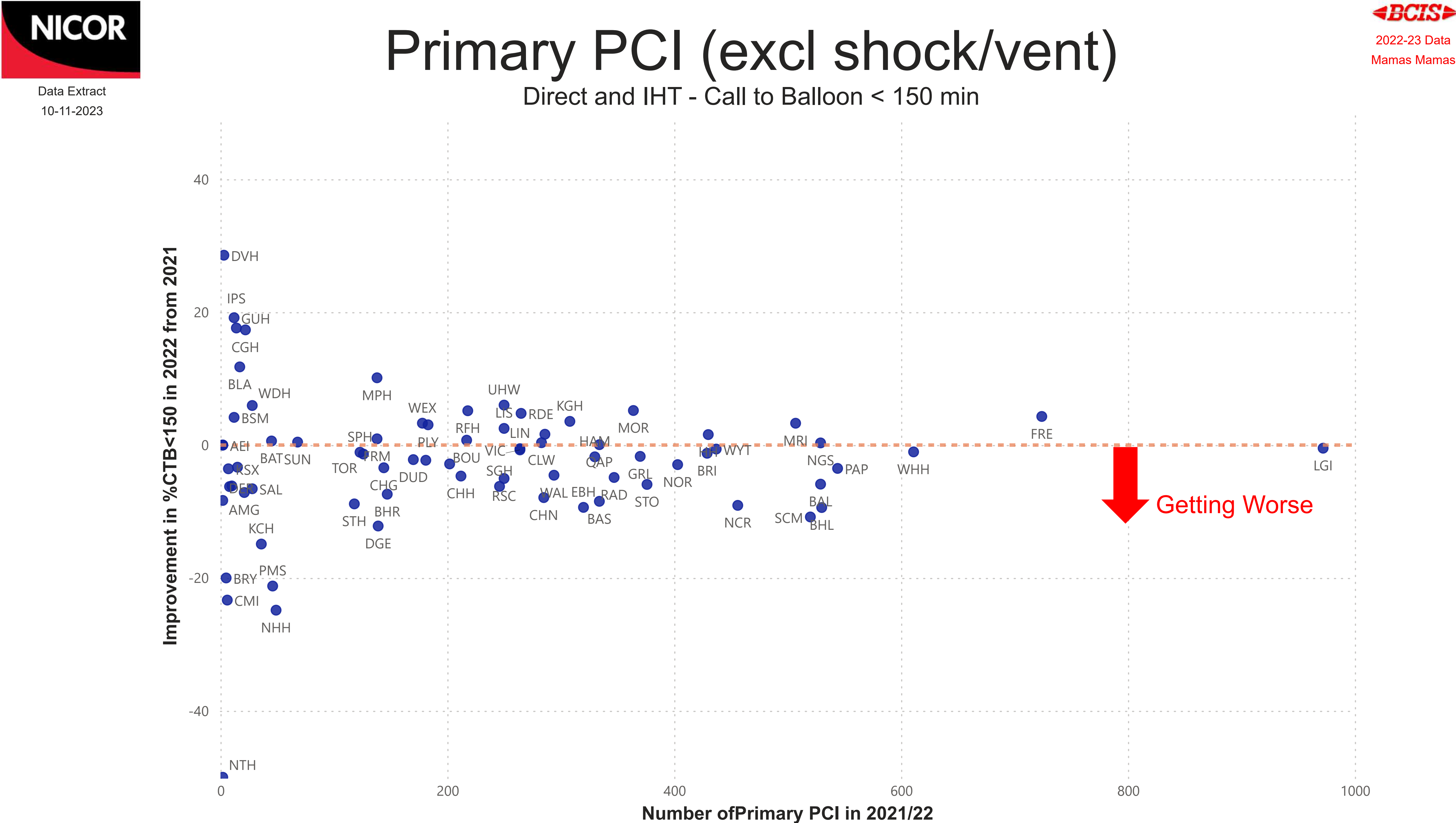


2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Direct and IHT - Call to Balloon < 150 min (2 of 2)







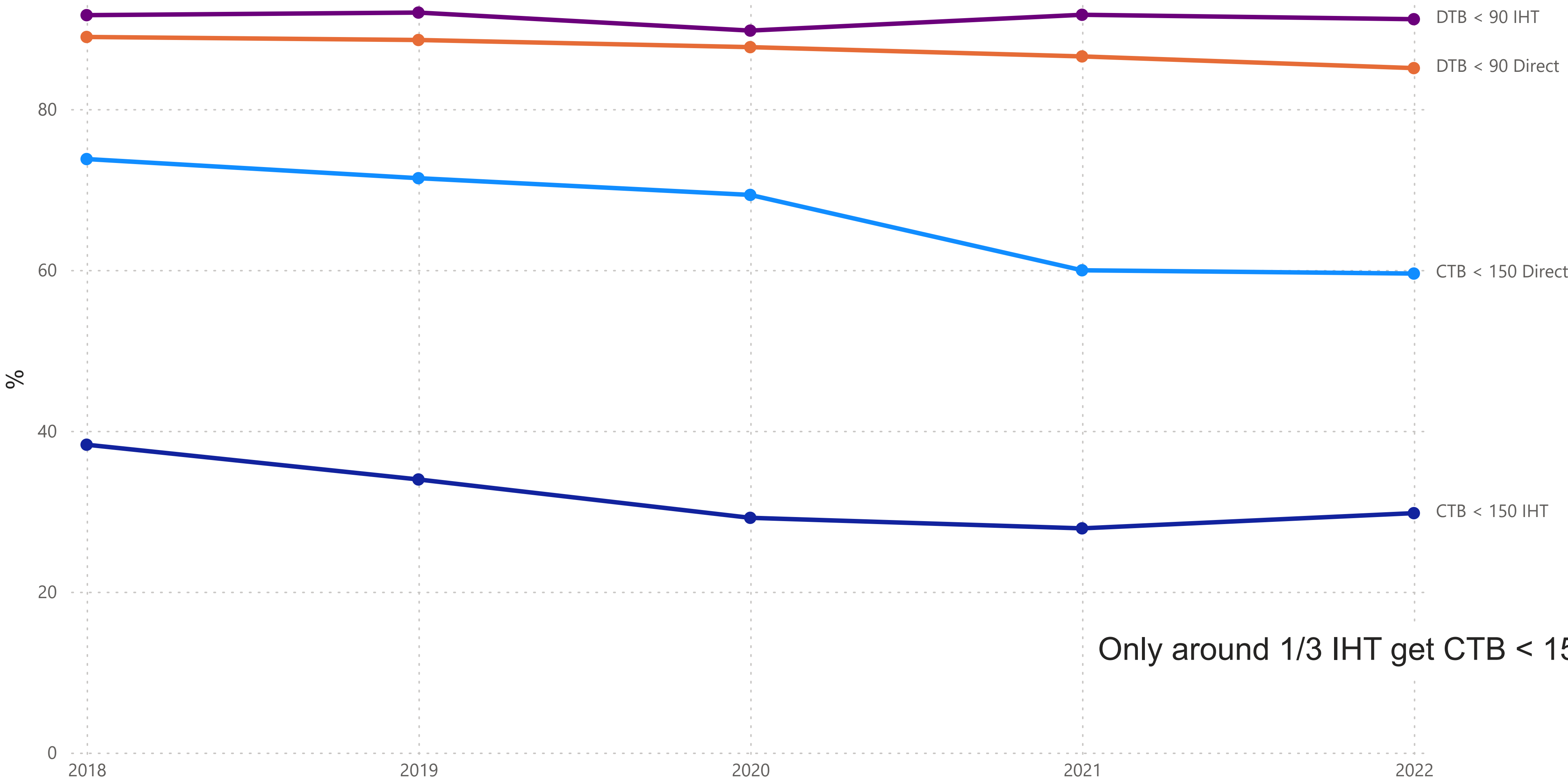
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2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Timeliness by admission route





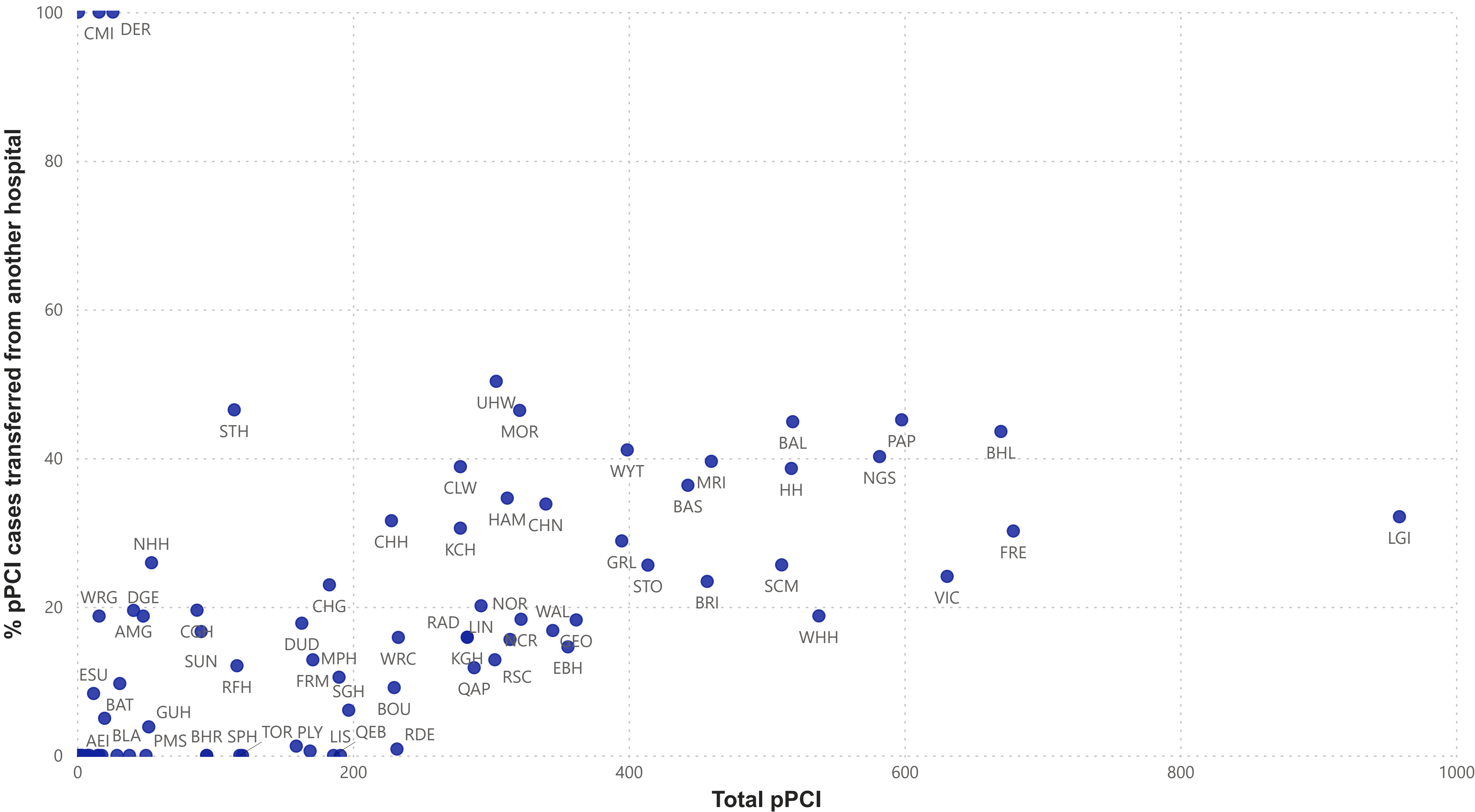
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2022-23 Data
Mamas Mamas

Primary PCI

% Transferred from another hospital





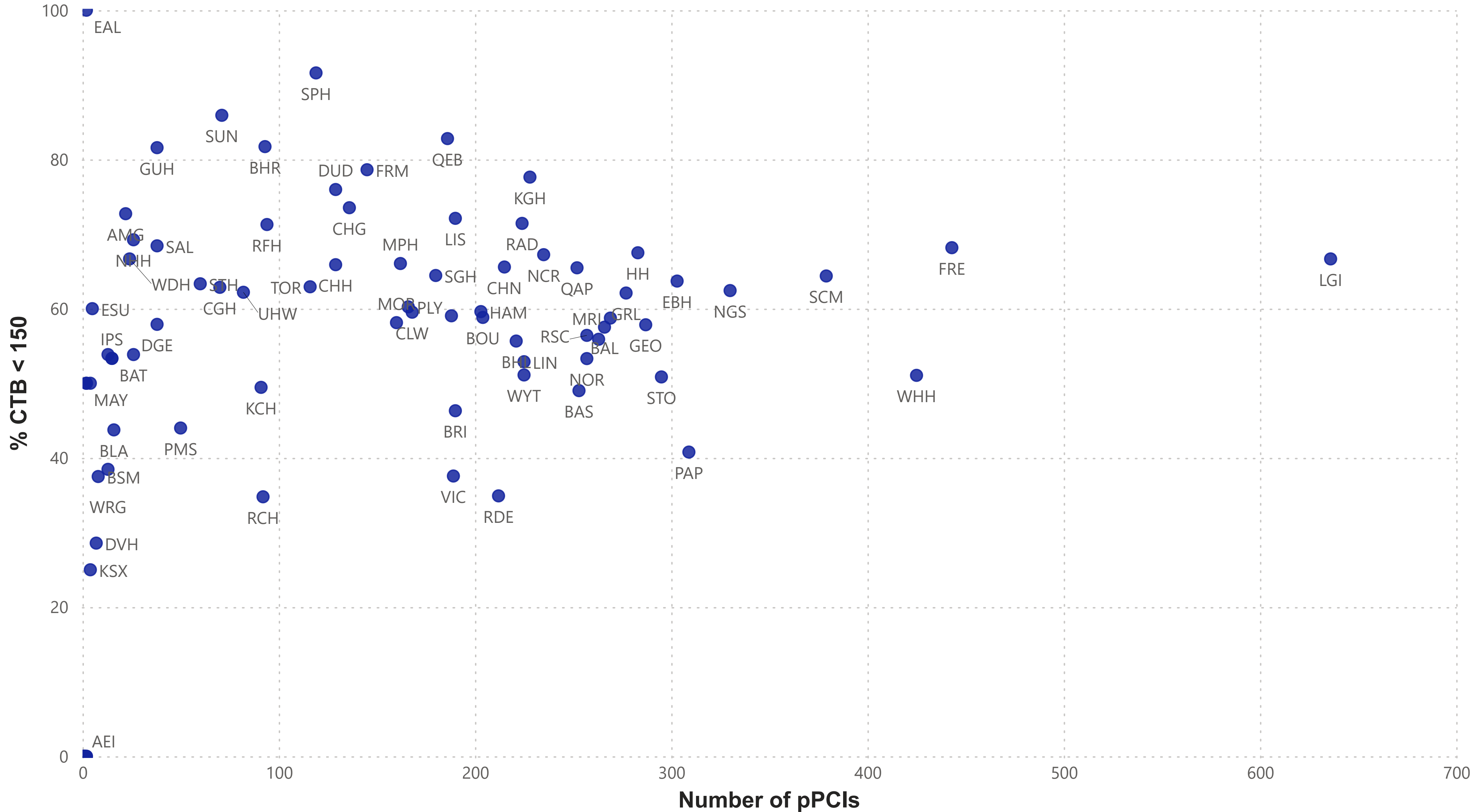
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2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Direct - Call to Balloon < 150 min





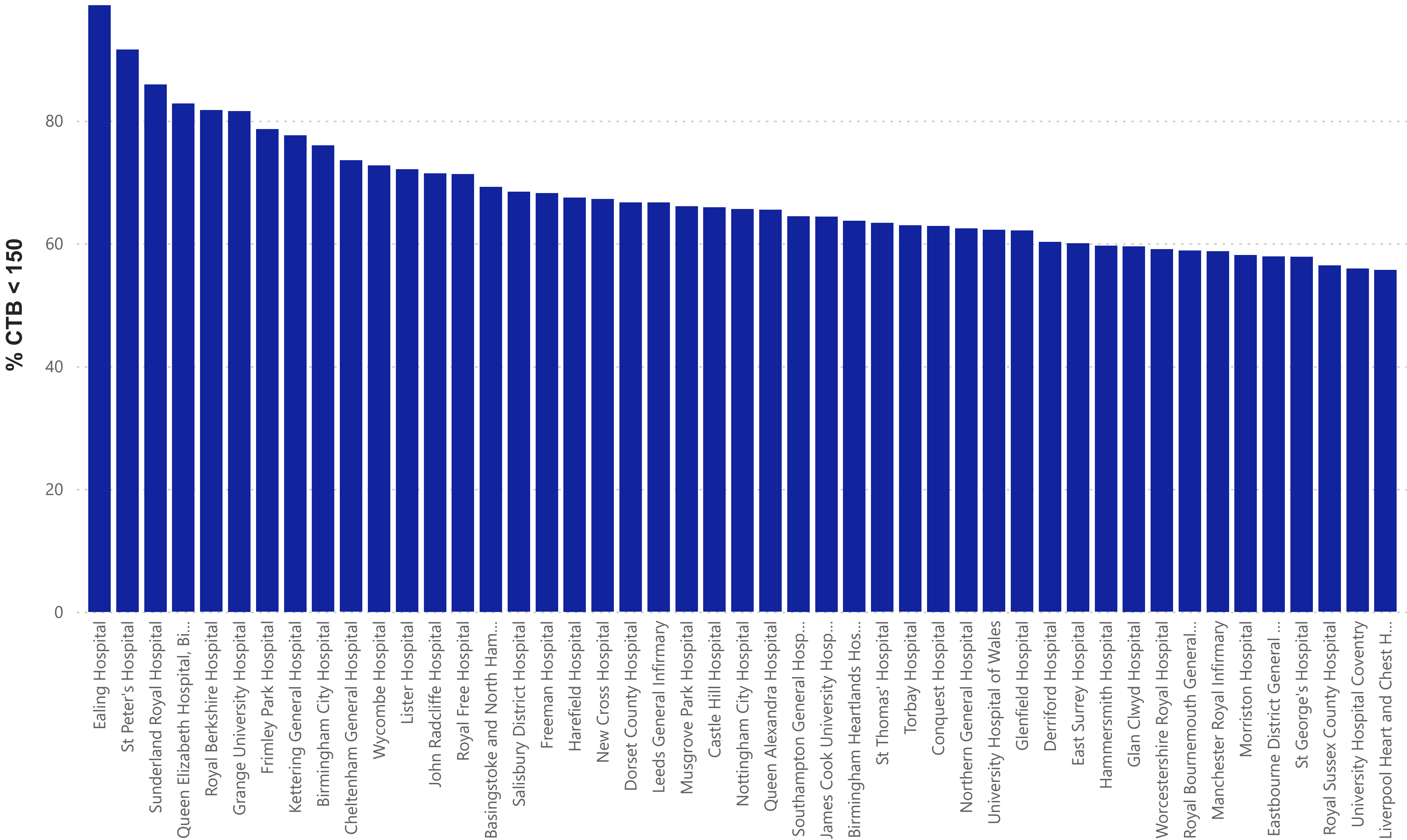
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2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Direct - Call to Balloon < 150 min





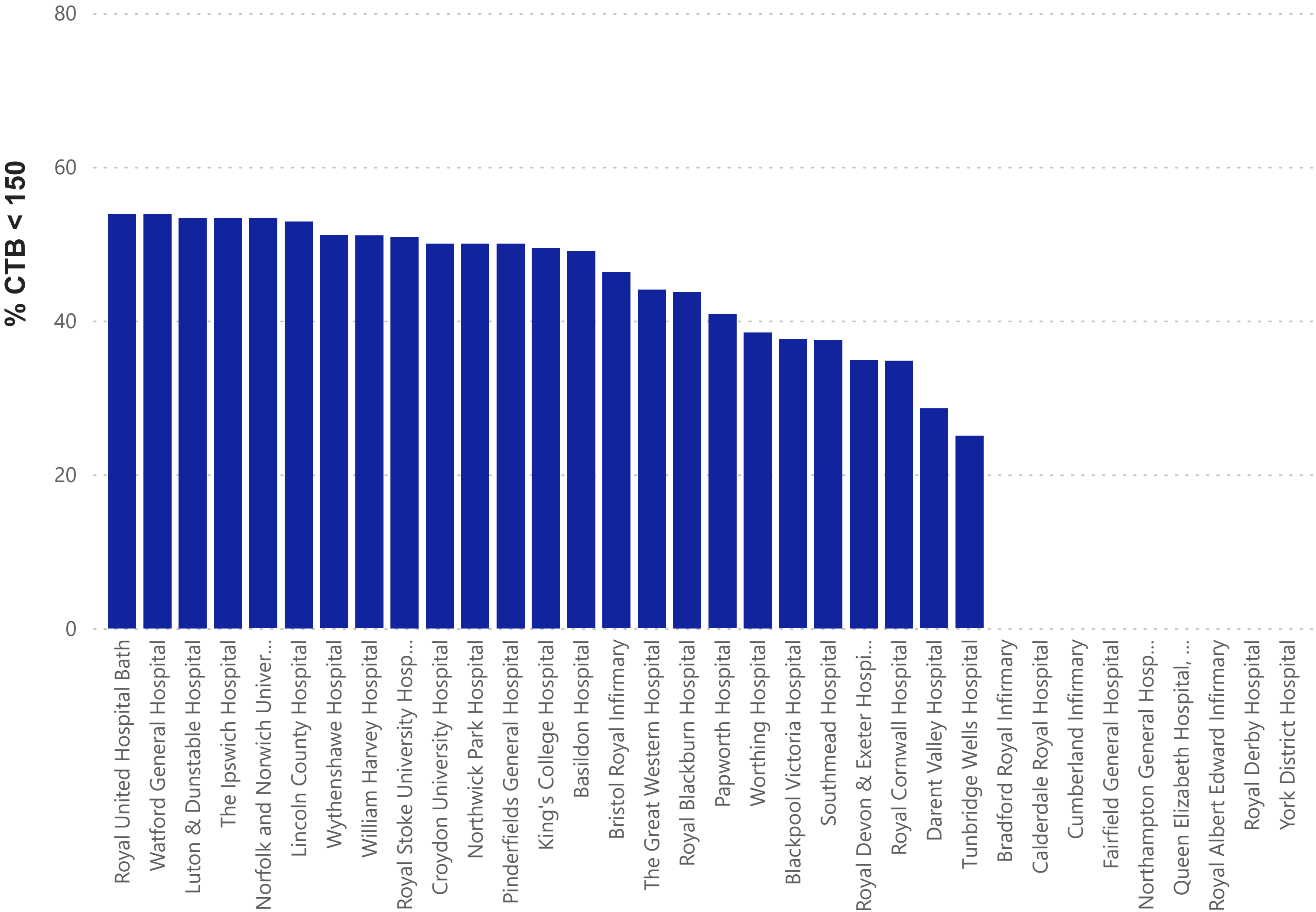
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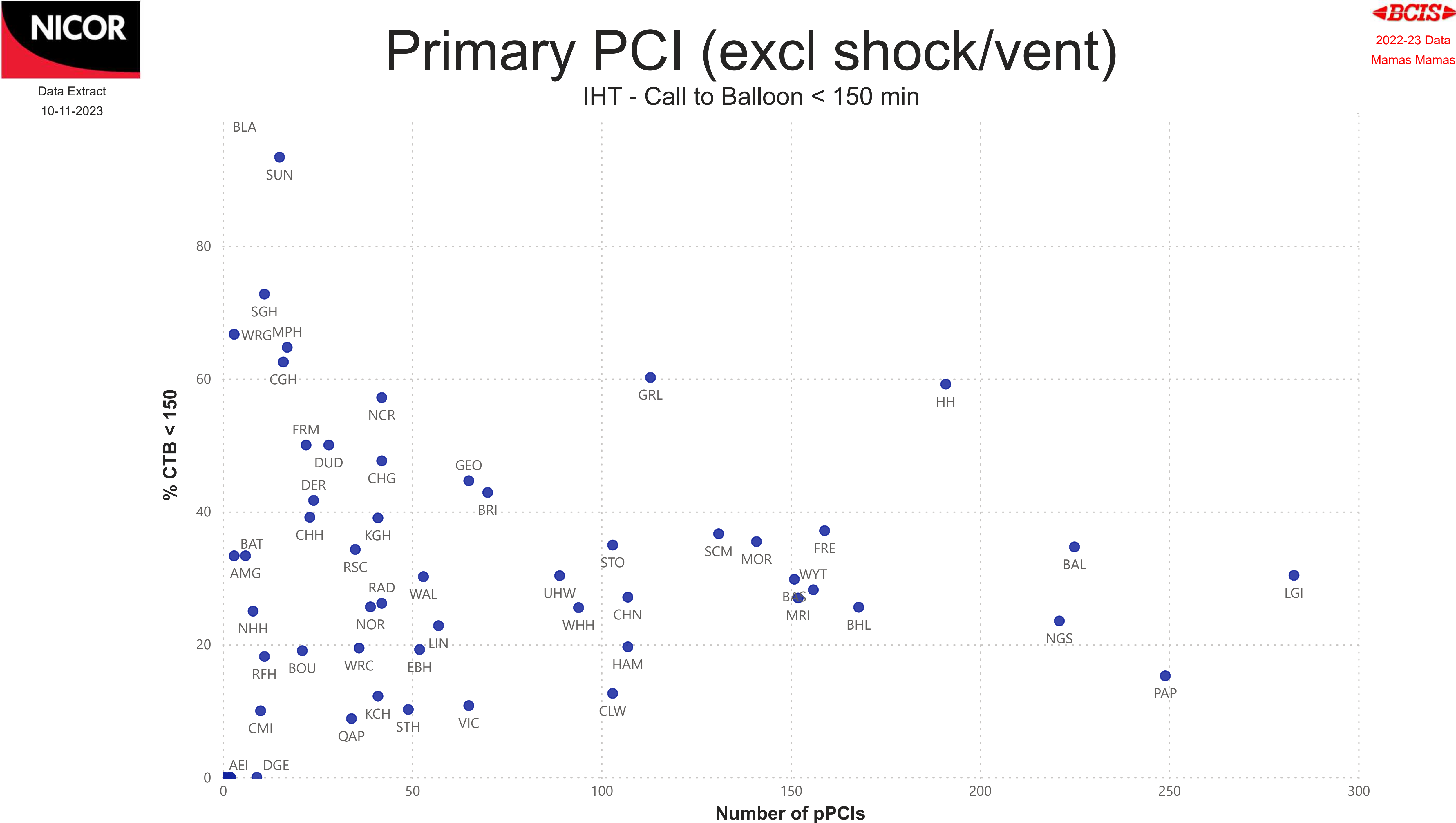


2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

Direct - Call to Balloon < 150 min







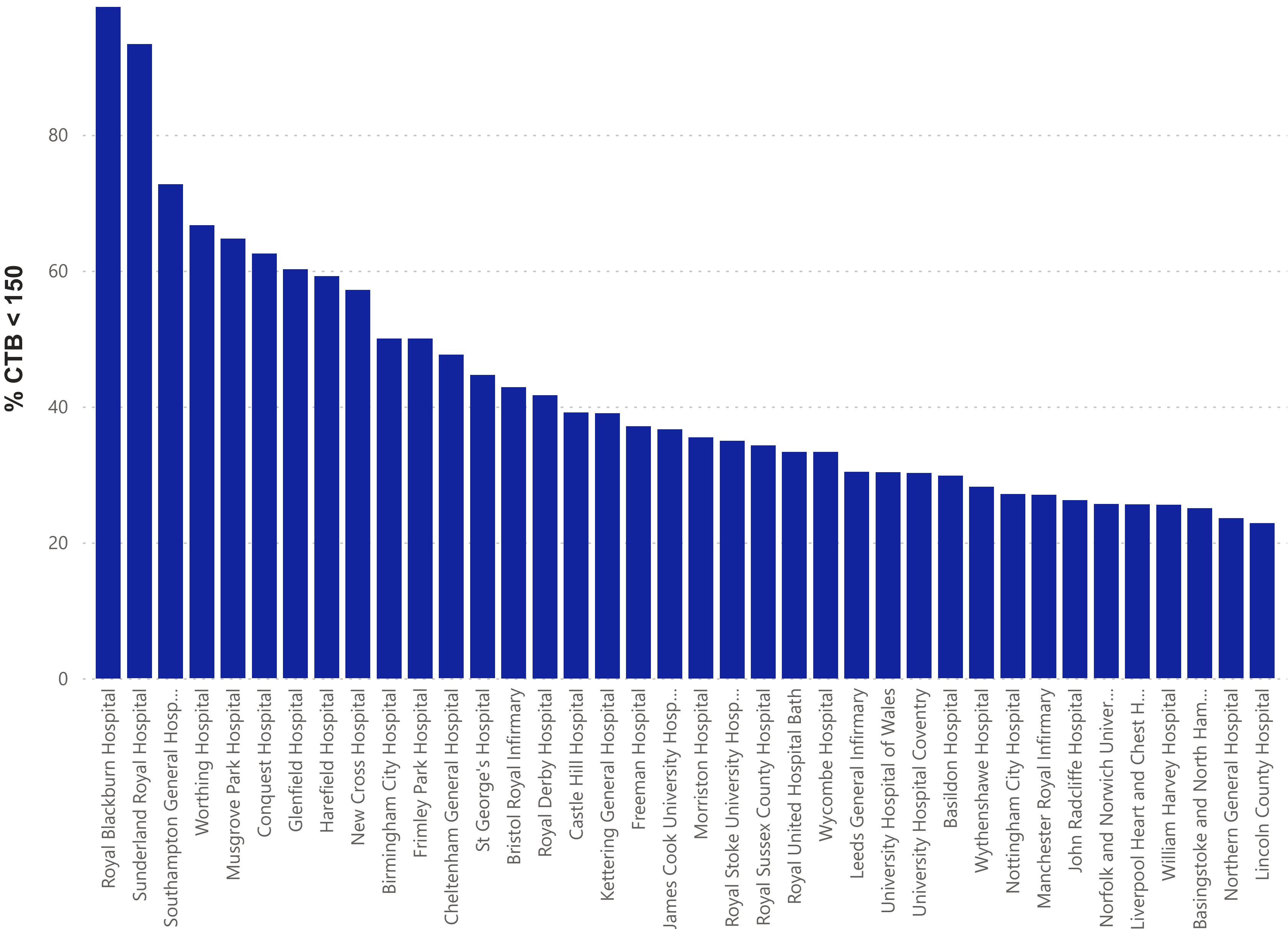
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2022-23 Data
Mamas Mamas

Primary PCI (excl shock/vent)

IHT - Call to Balloon < 150 min (1 of 2)





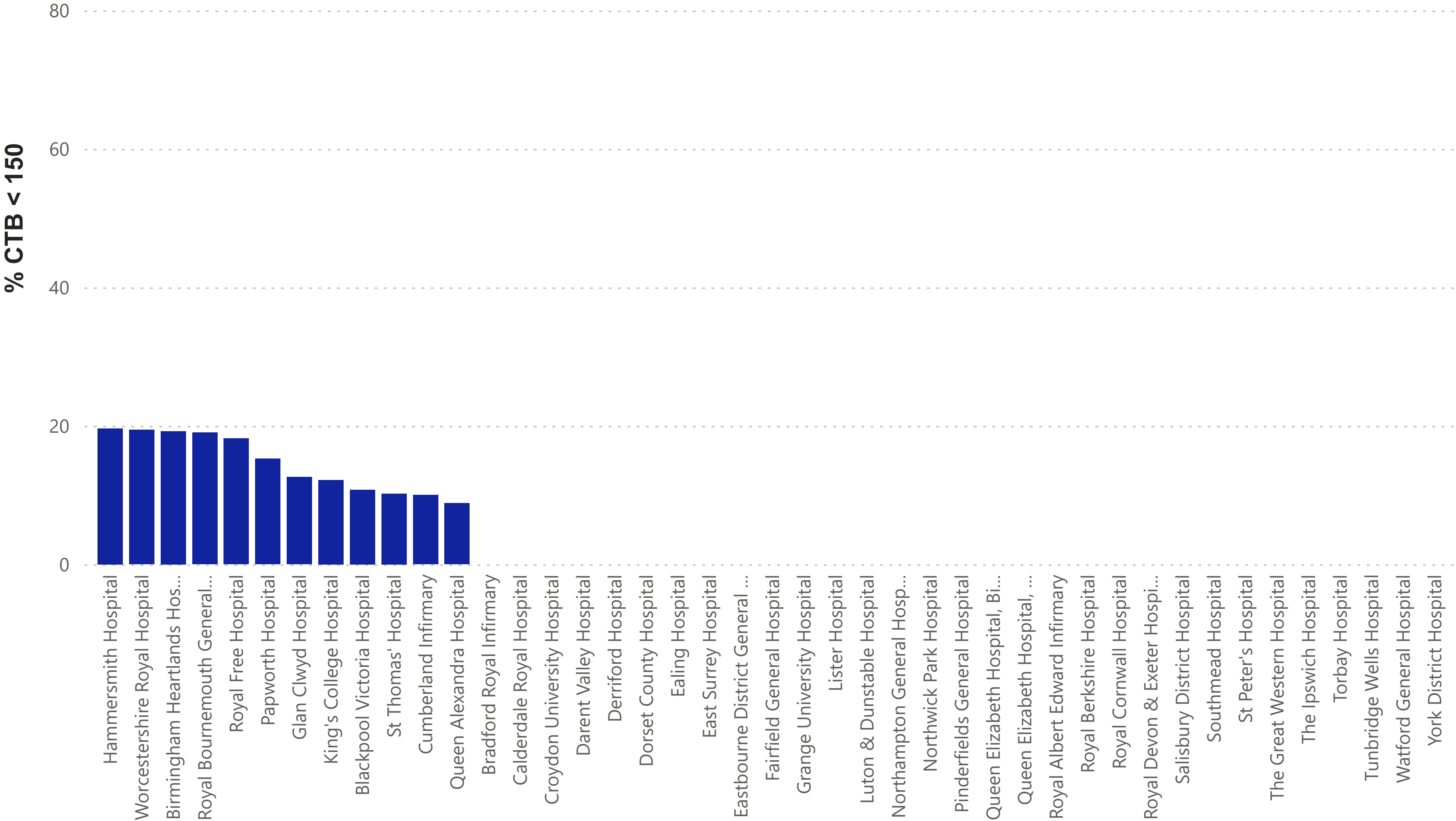
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2022-23 Data
Mamas Mamas

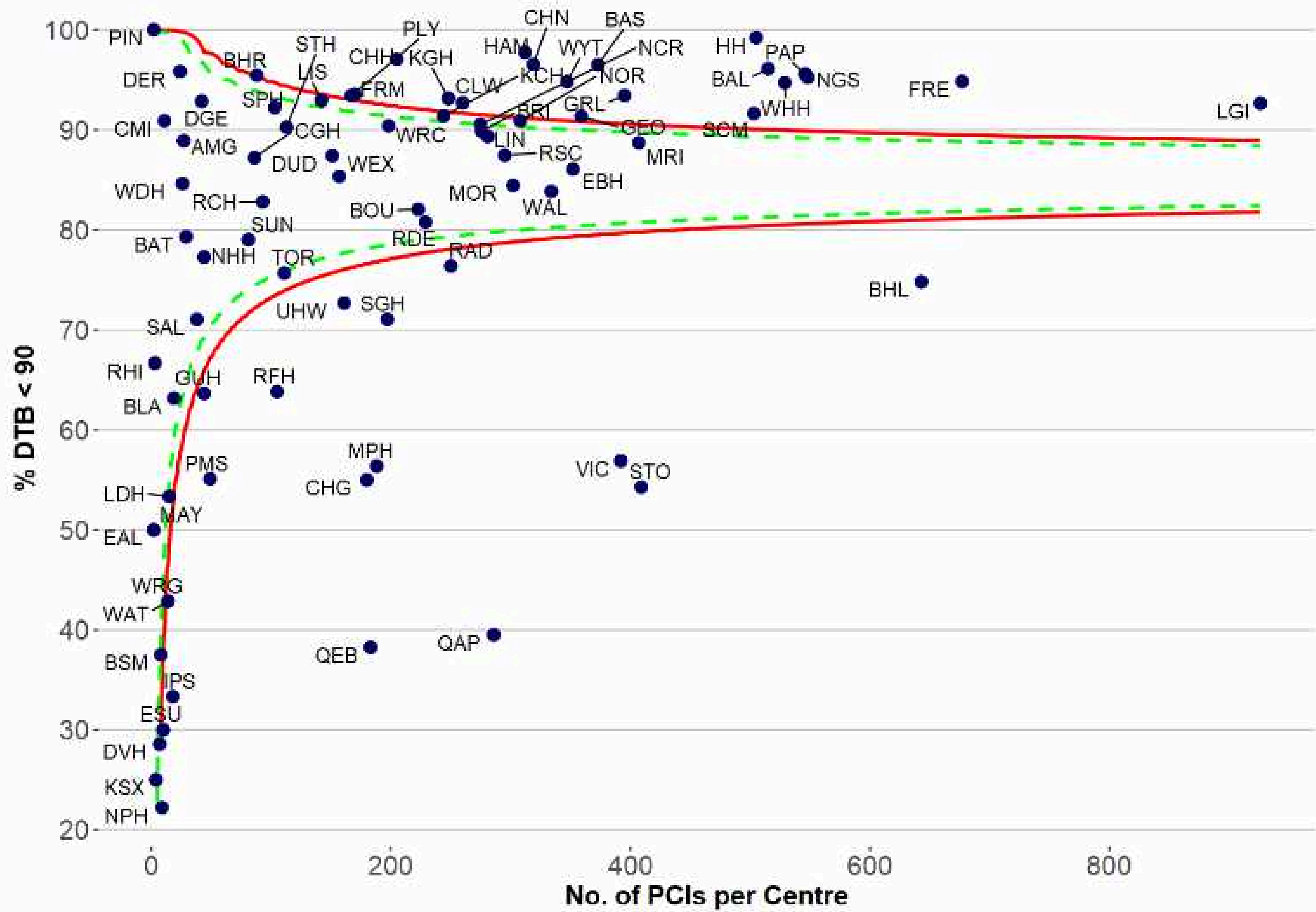
Primary PCI (excl shock/vent)

IHT - Call to Balloon < 150 min (2 of 2)



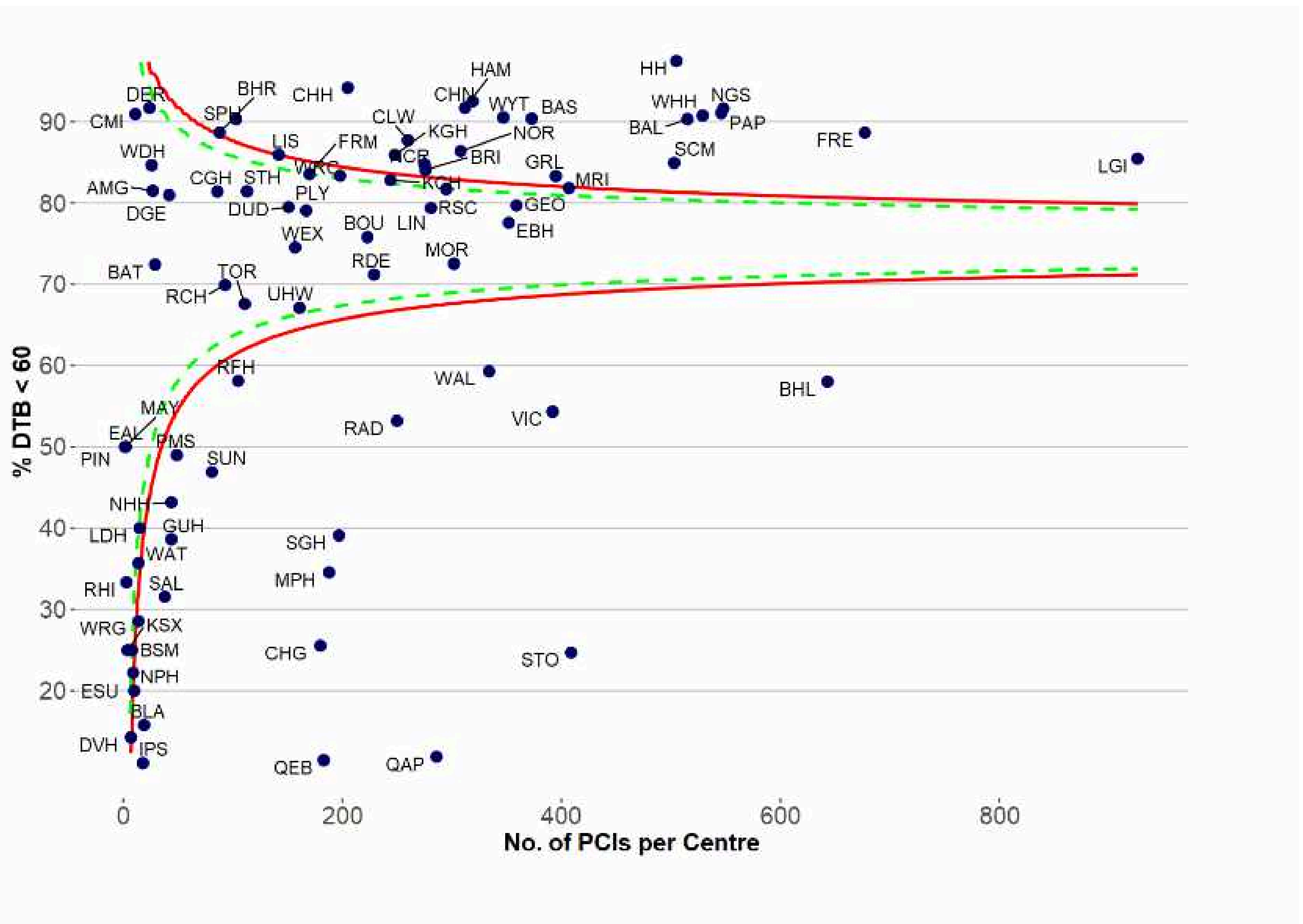
Primary PCI (excl shock/vent)

Direct and IHT - DTB < 90 min



Primary PCI (excl shock/vent)

Direct and IHT - DTB < 60 min





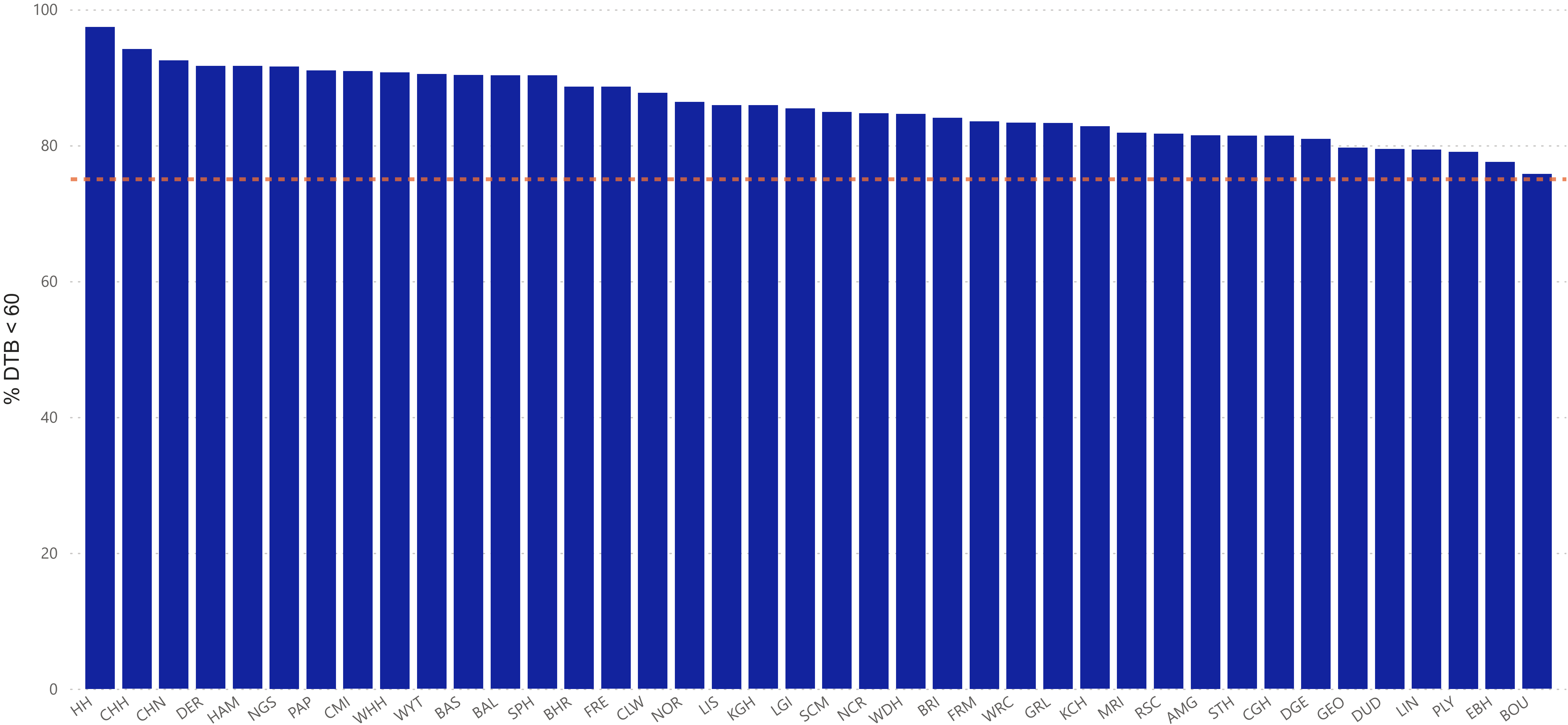
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2022-23 Data
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Primary PCI (excl shock/vent)

Direct and IHT - DTB < 60 min - Met target





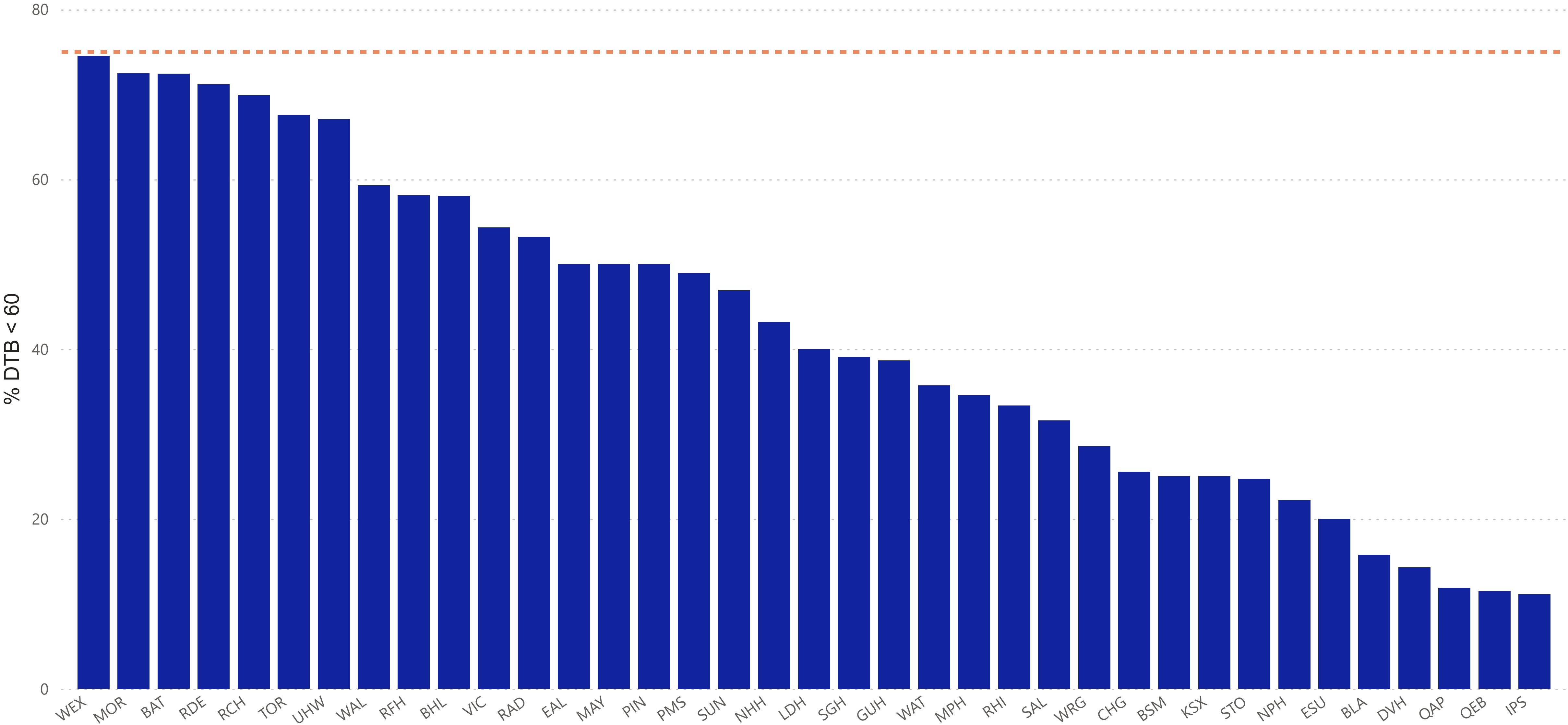
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2022-23 Data
Mamas Mamas

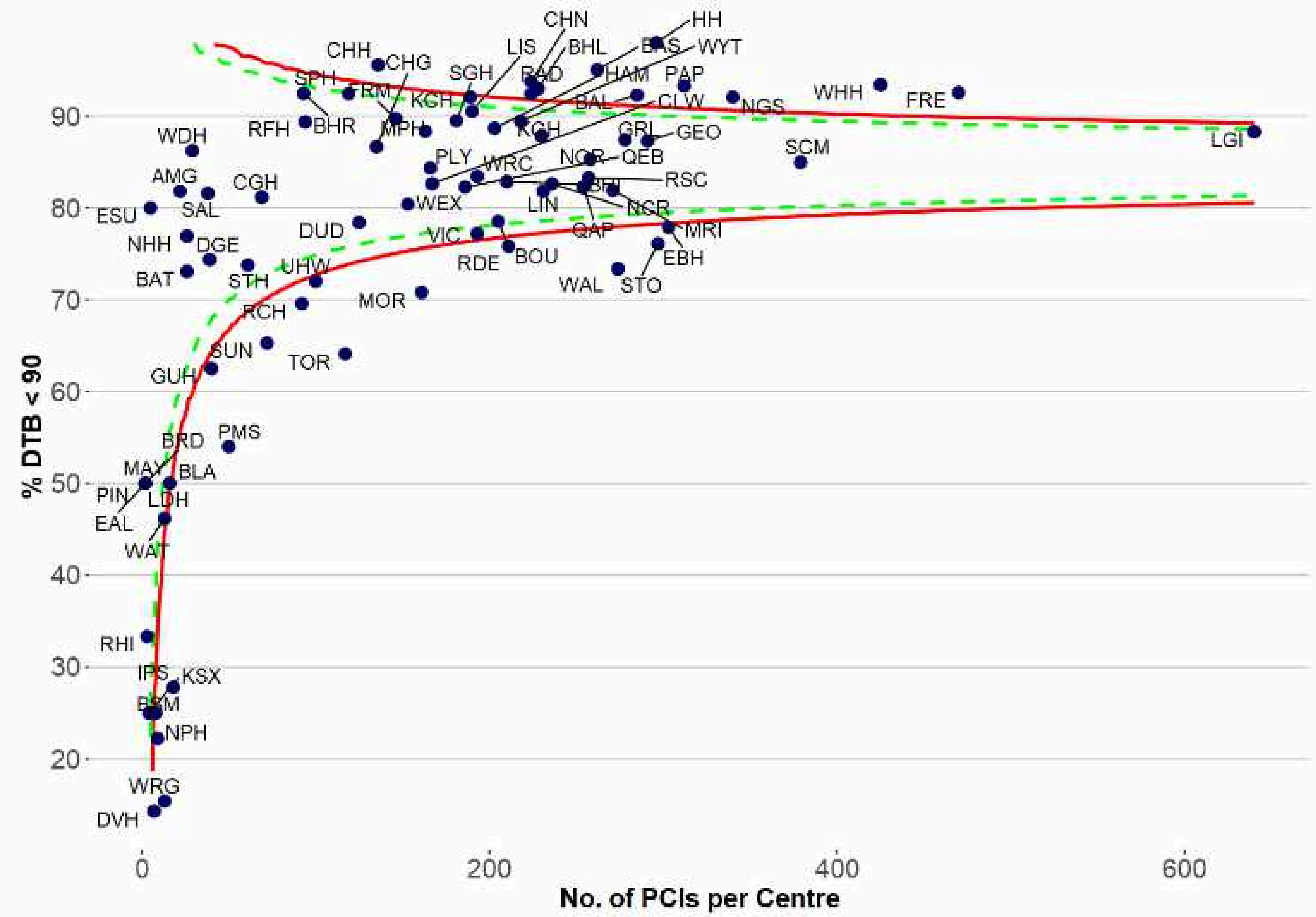
Primary PCI (excl shock/vent)

Direct and IHT - DTB < 60 min - Missed target



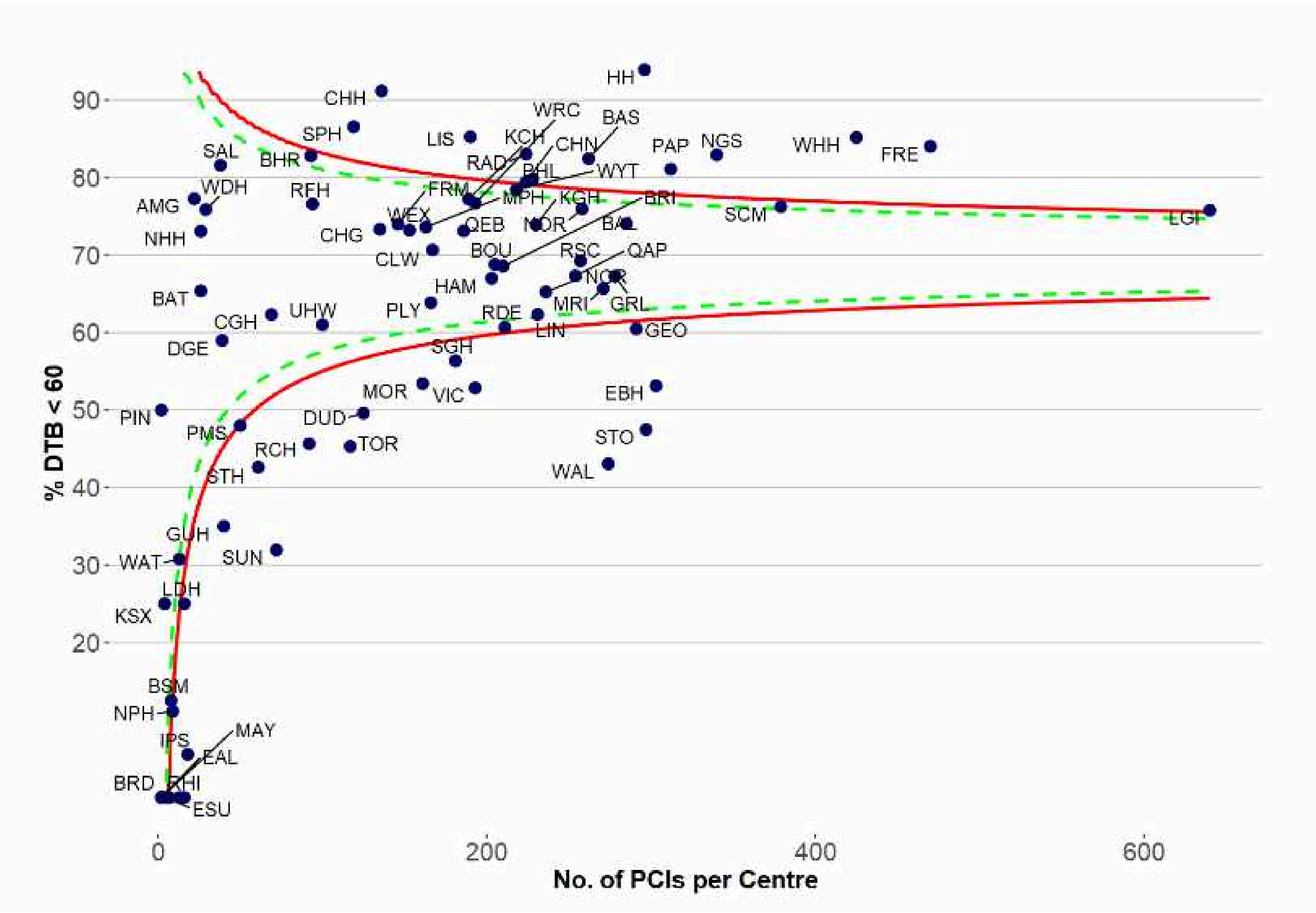
Primary PCI (excl shock/vent)

Direct only - DTB < 90 min



Primary PCI (excl shock/vent)

Direct only - DTB < 60 min





pPCI CTB Times (excl shock/vent)

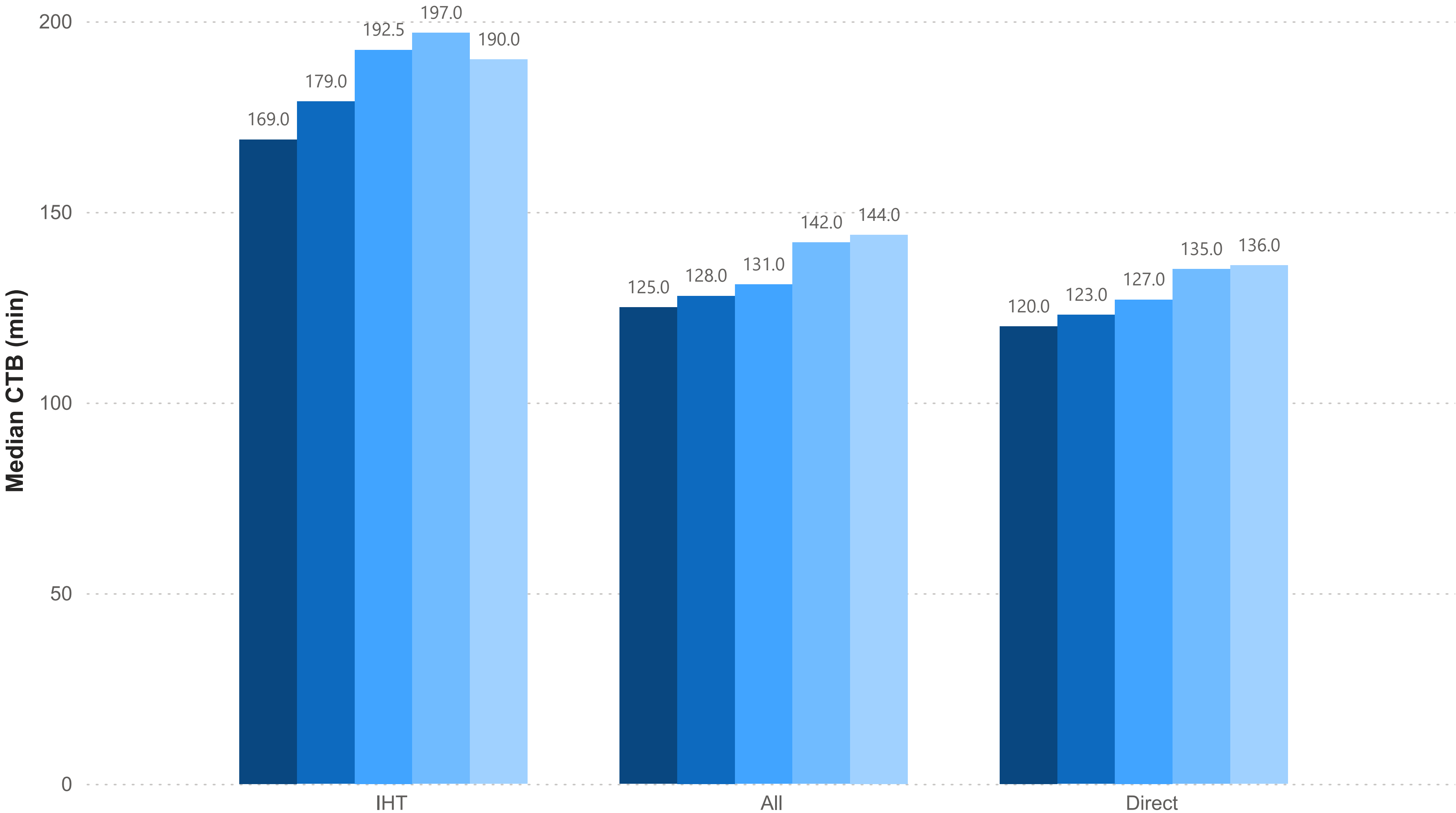
by admission route



2022-23 Data
Mamas Mamas

Data Extract
10-11-2023

2018 2019 2020 2021 2022





pPCI DTB Times (excl shock/vent)

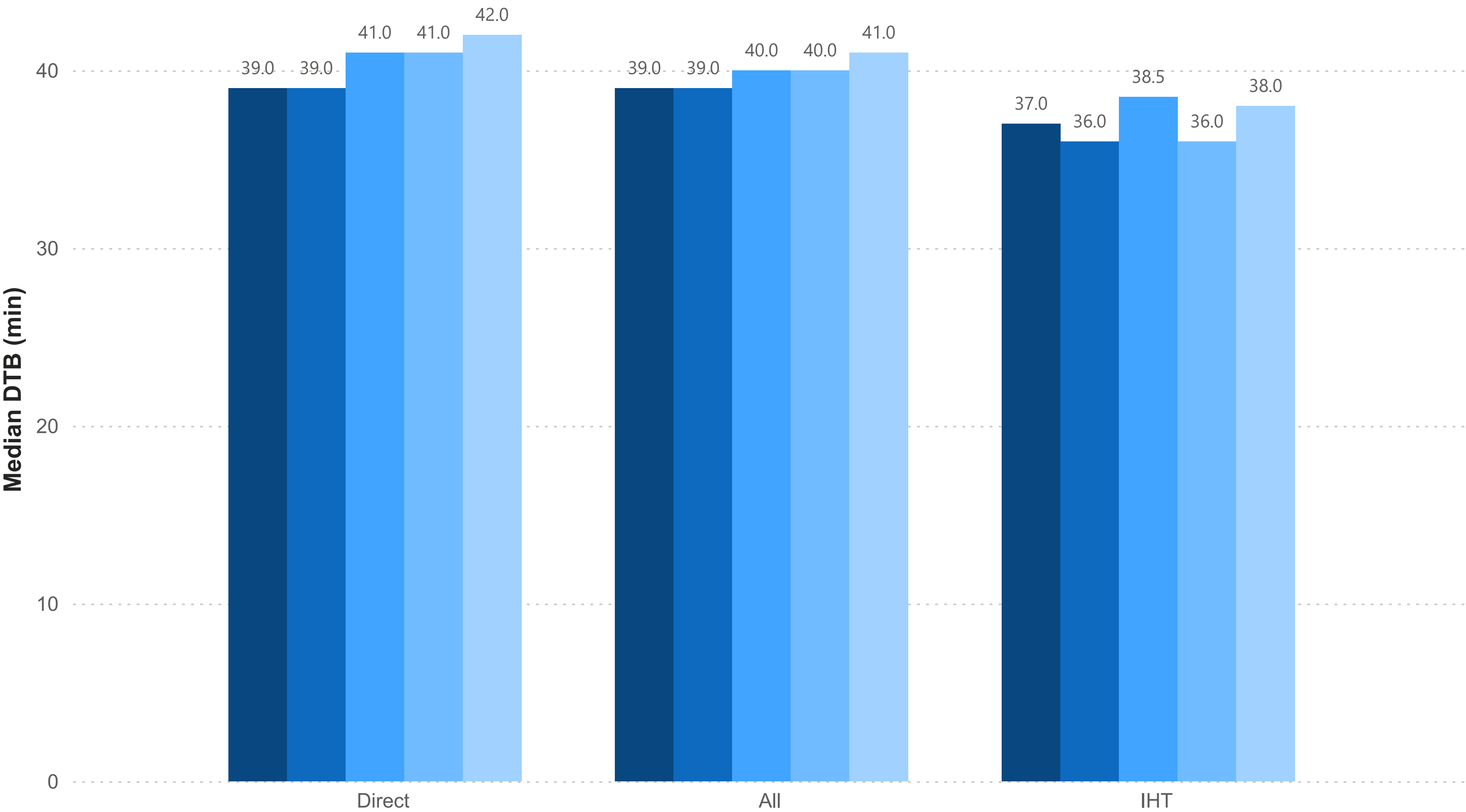
by admission route



2022-23 Data
Mamas Mamas

Data Extract
10-11-2023

2018 2019 2020 2021 2022





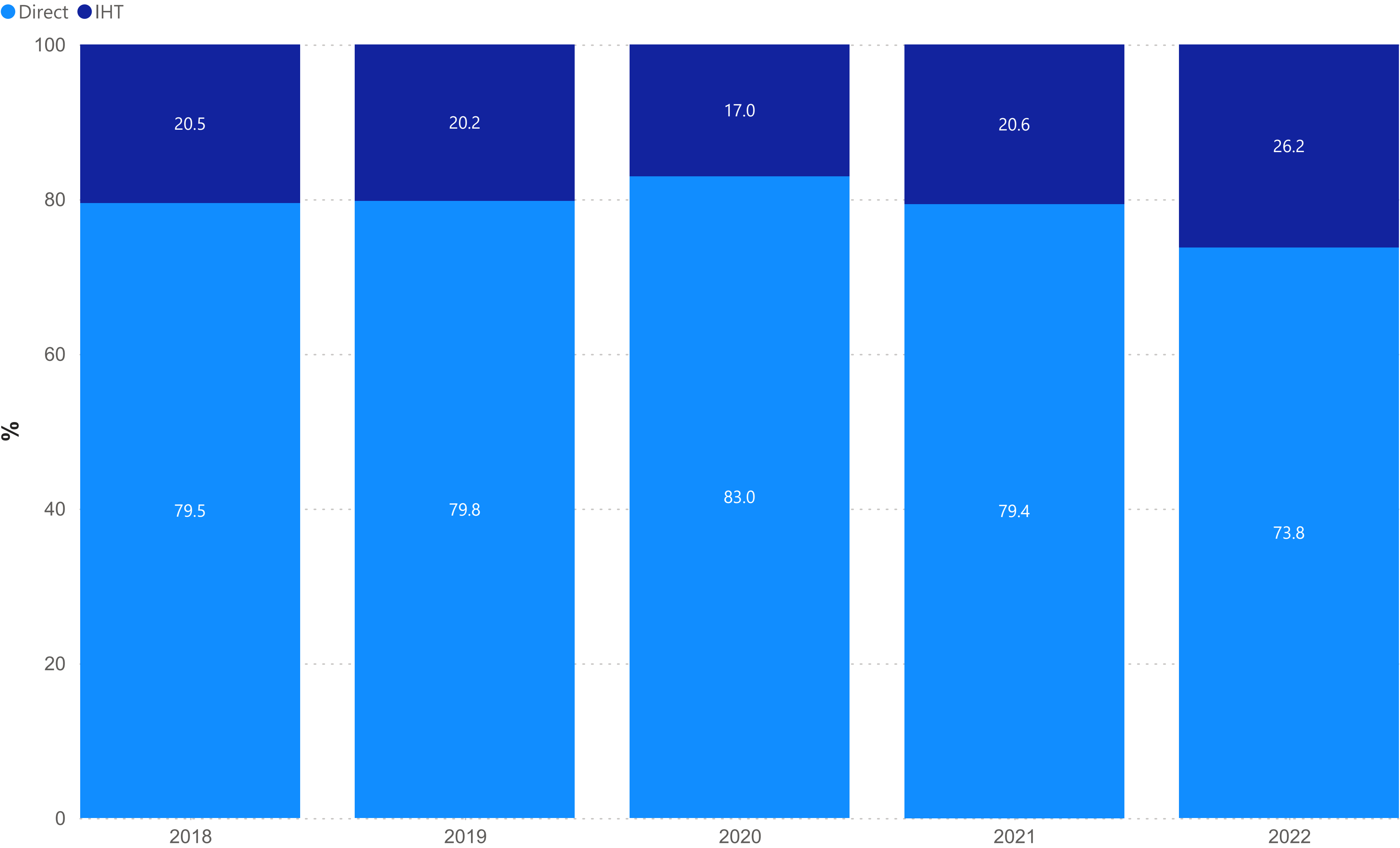
Data Extract
10-11-2023



2022-23 Data
Mamas Mamas

Primary PCI

Admission Routes





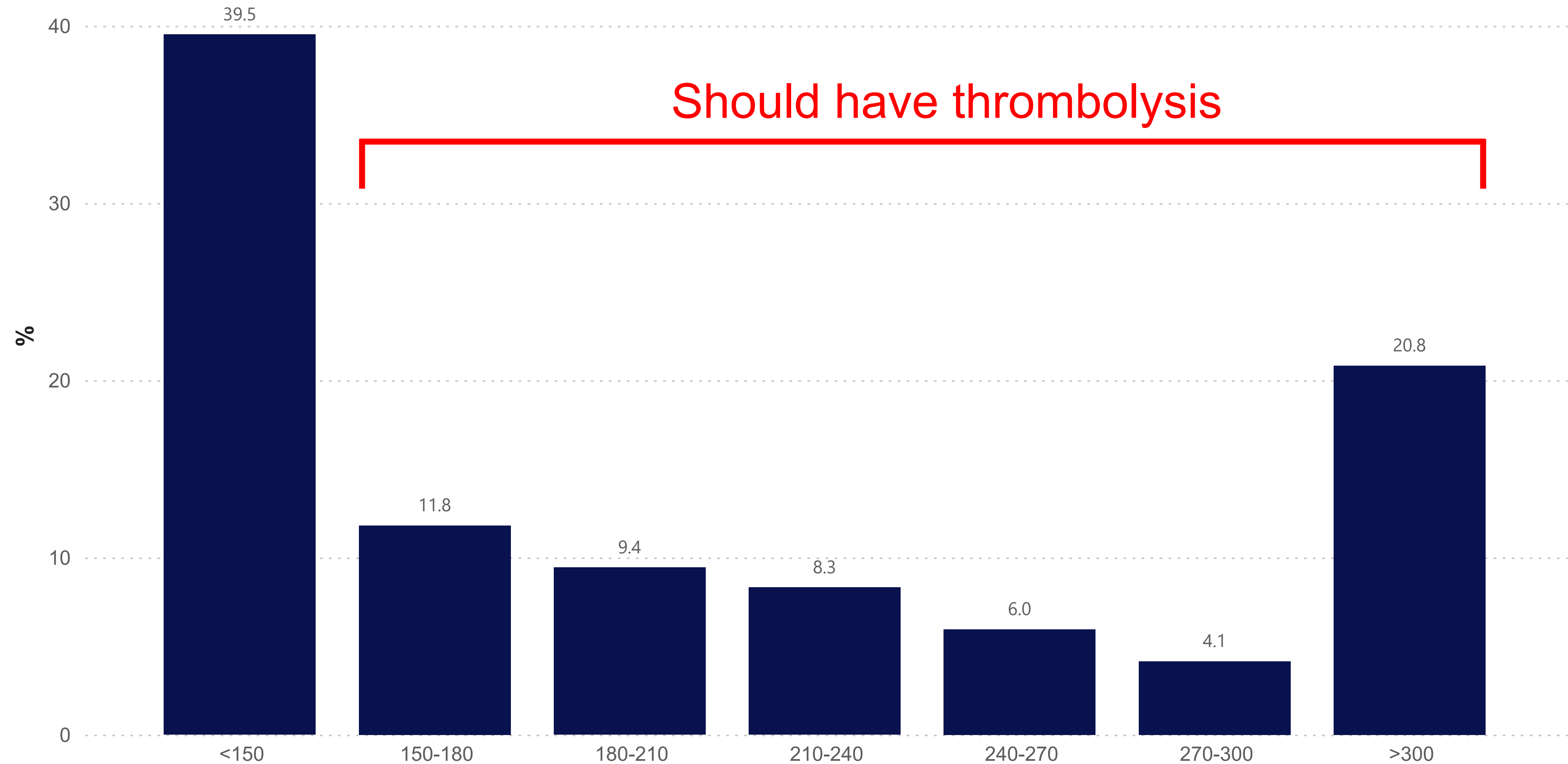
Data Extract
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2022-23 Data
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Primary PCI for IHT

CTB Breakdown



PPCI Self-presentation

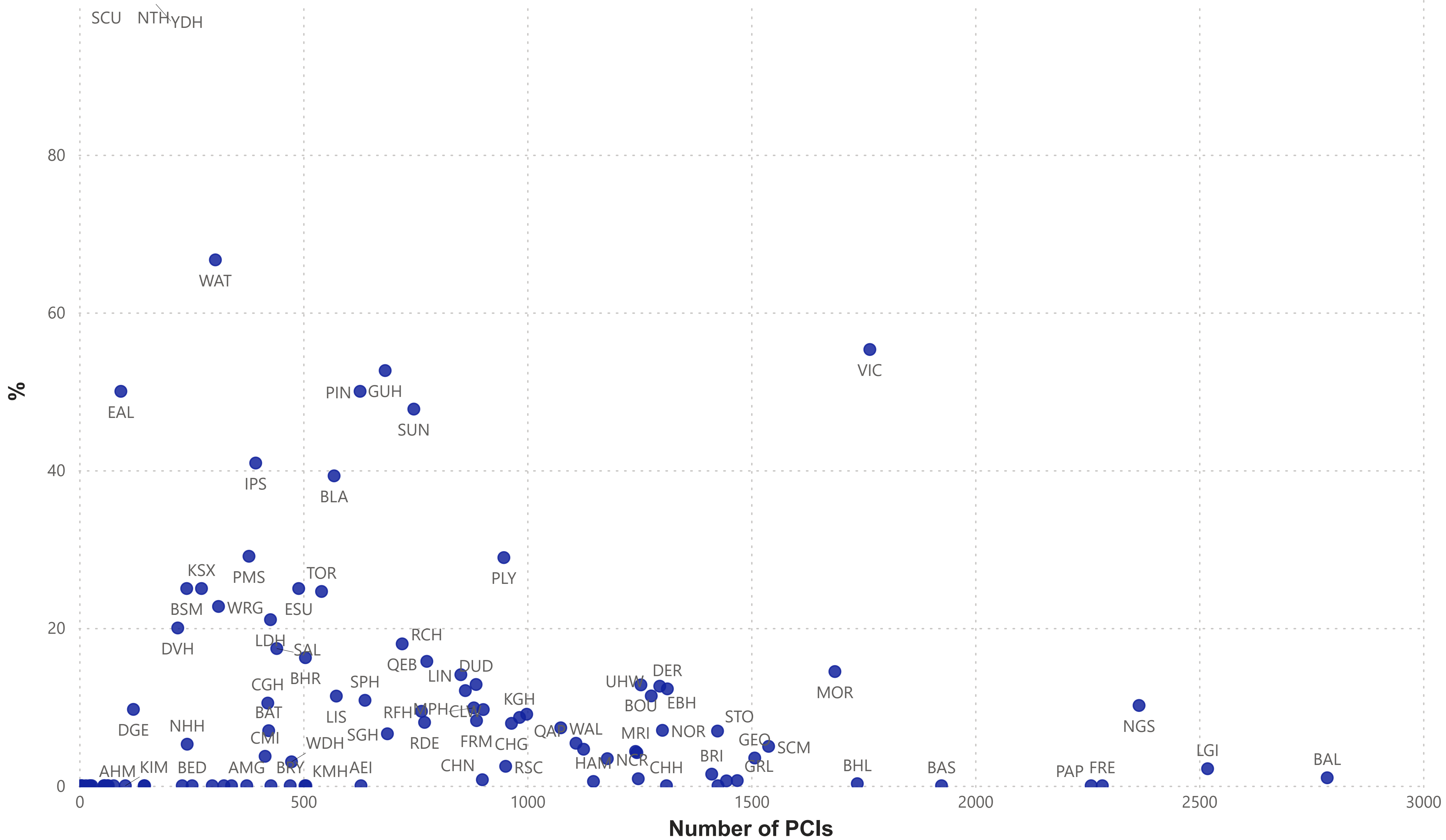
% self presenting in 2022/23

- Self presenters
 - BCIS live data
- Dataset definition
 - 'Arrival at PCI centre' = 'Call for Help'
- 2019/20 (pre-pandemic) v 2022/23

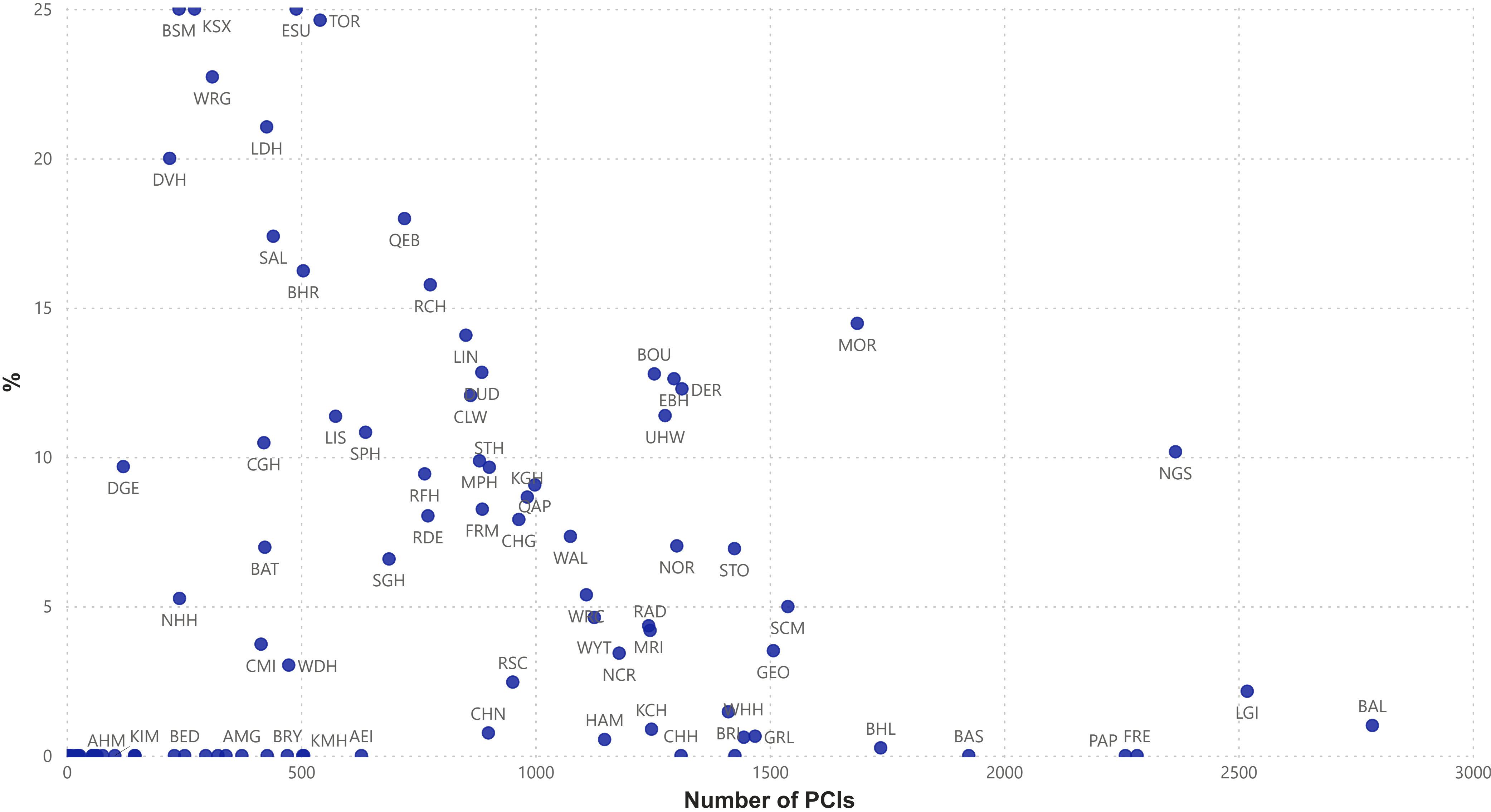
	2019/20	2022/23
Total Primary PCI	21,797	21,318
% Self Presenting	3.98%	8.13%

PPCI Self-presentation

% self presenting in 2022/23

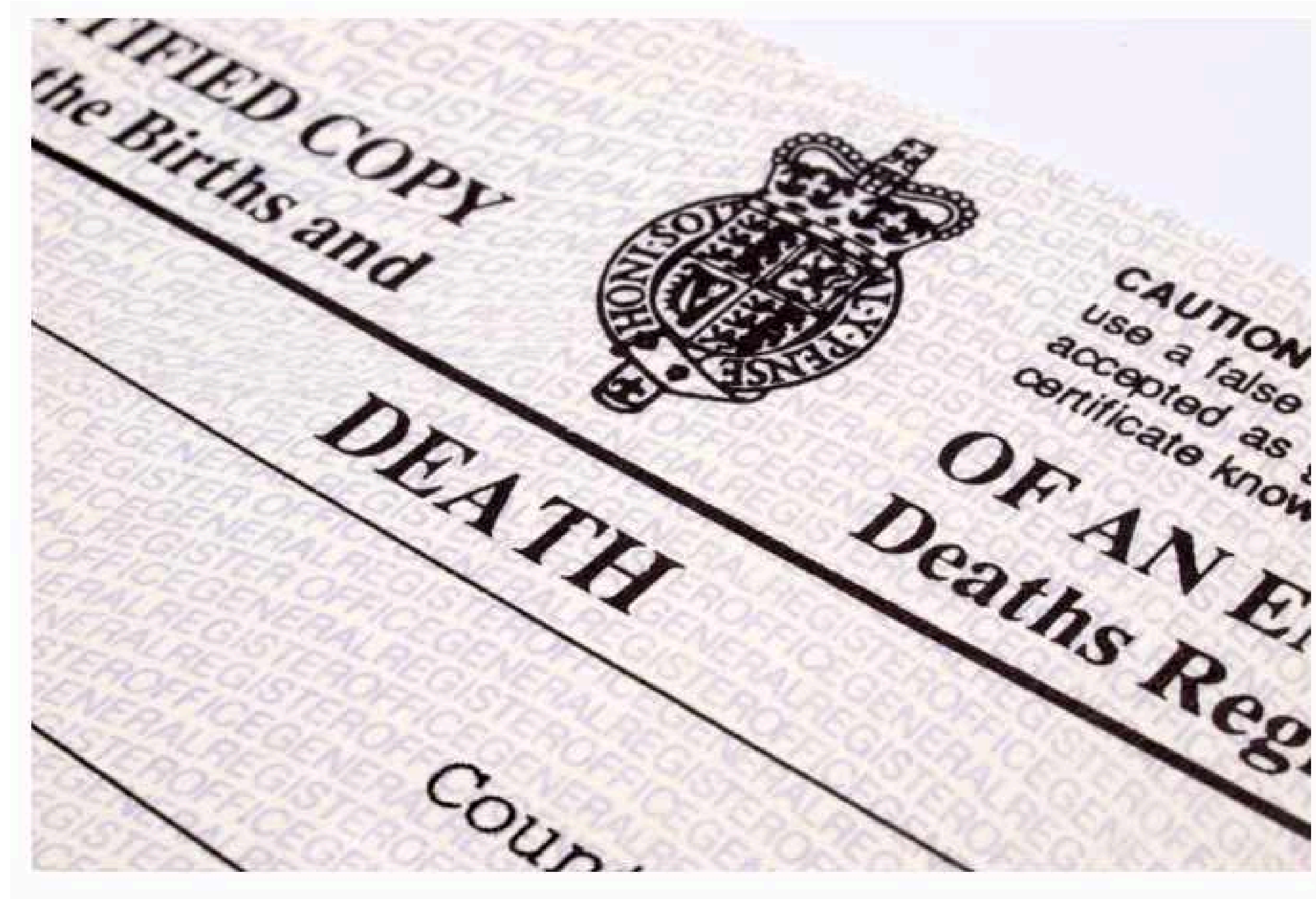


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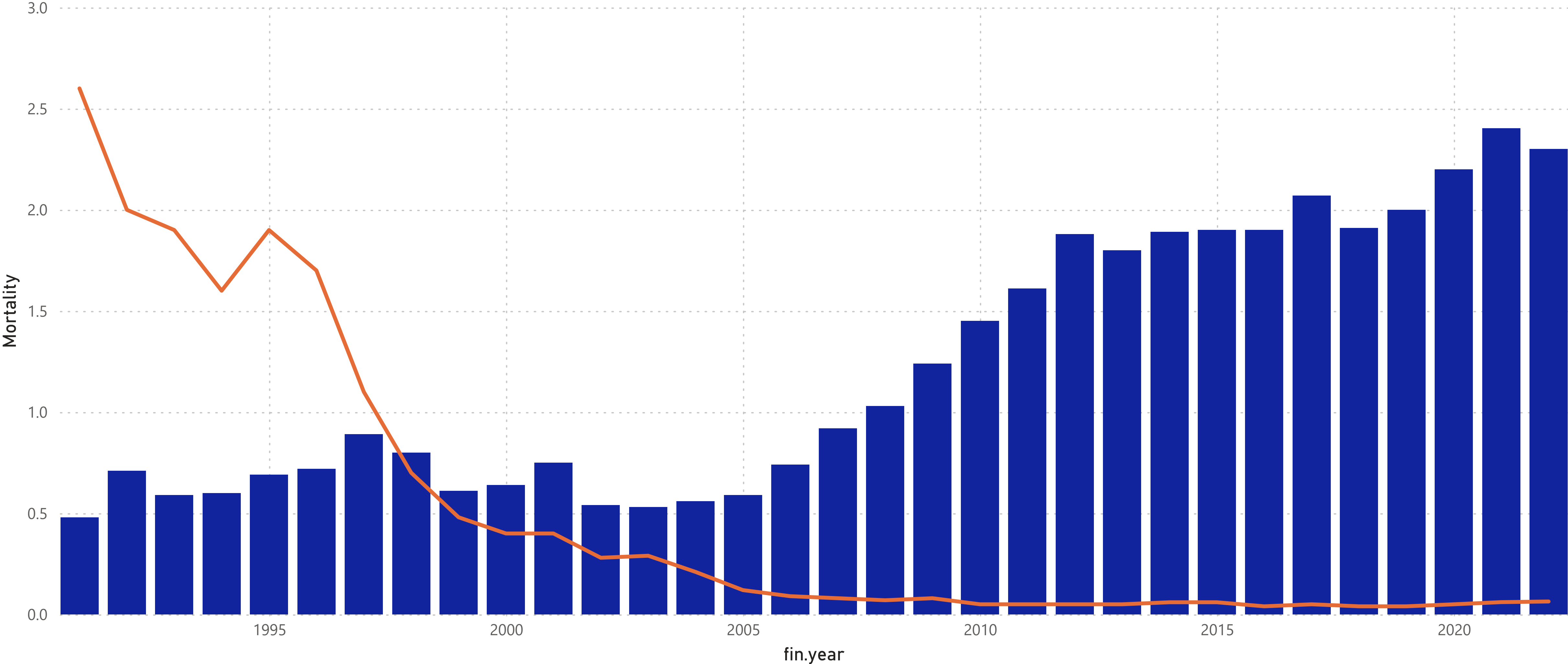


Adverse outcomes



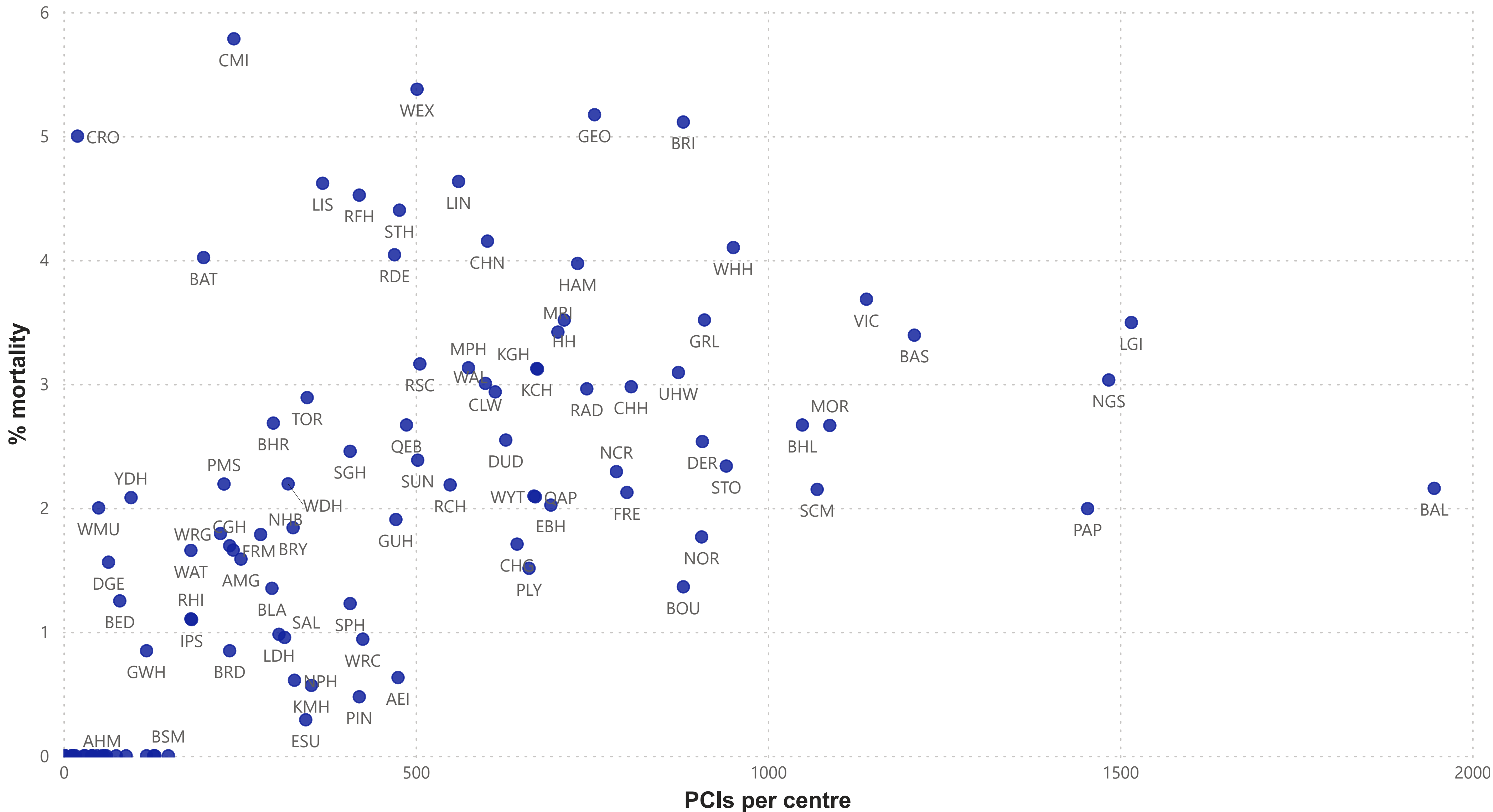
Data Extract
10-11-2023

● Mortality ● Em surgery



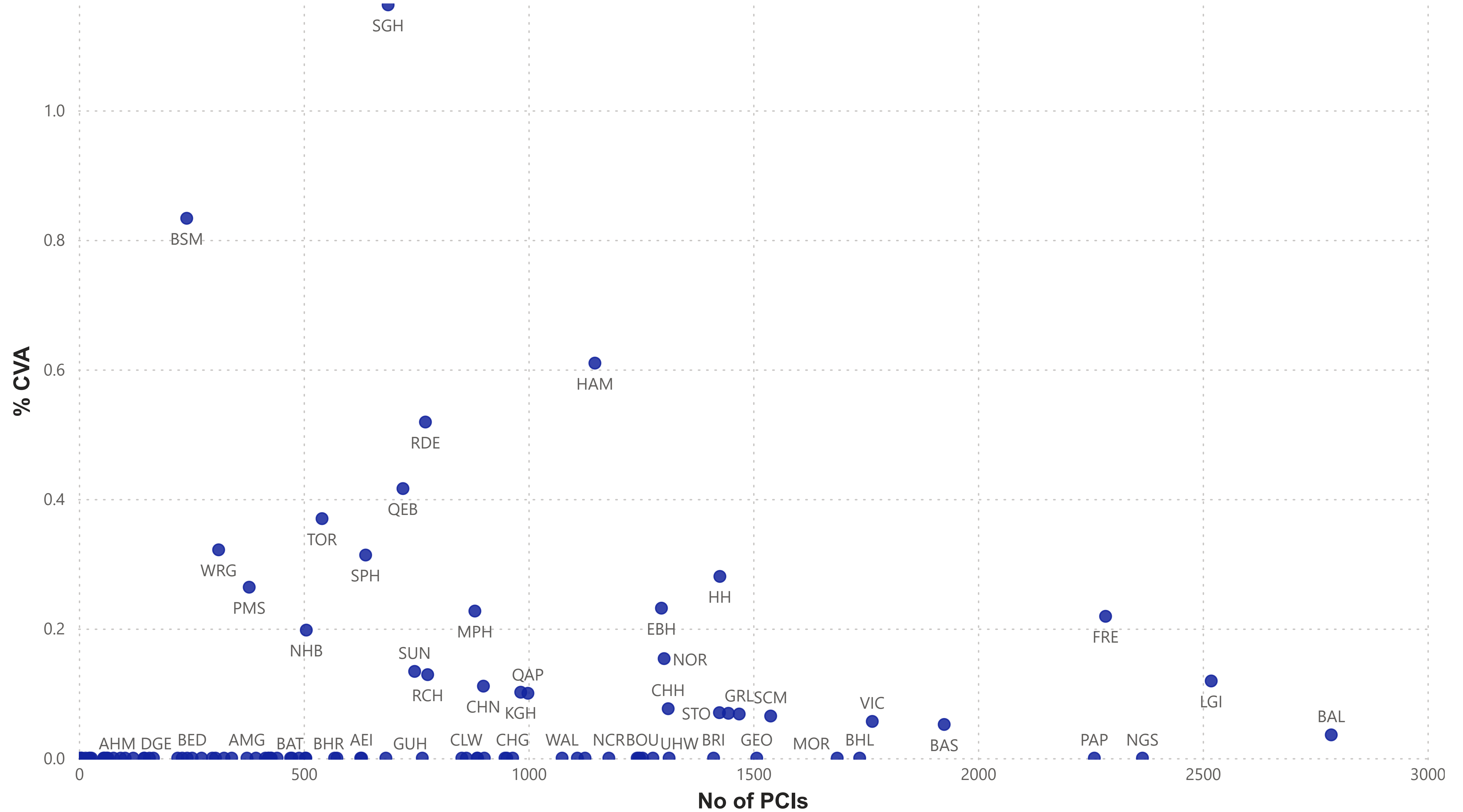
Adverse Outcomes

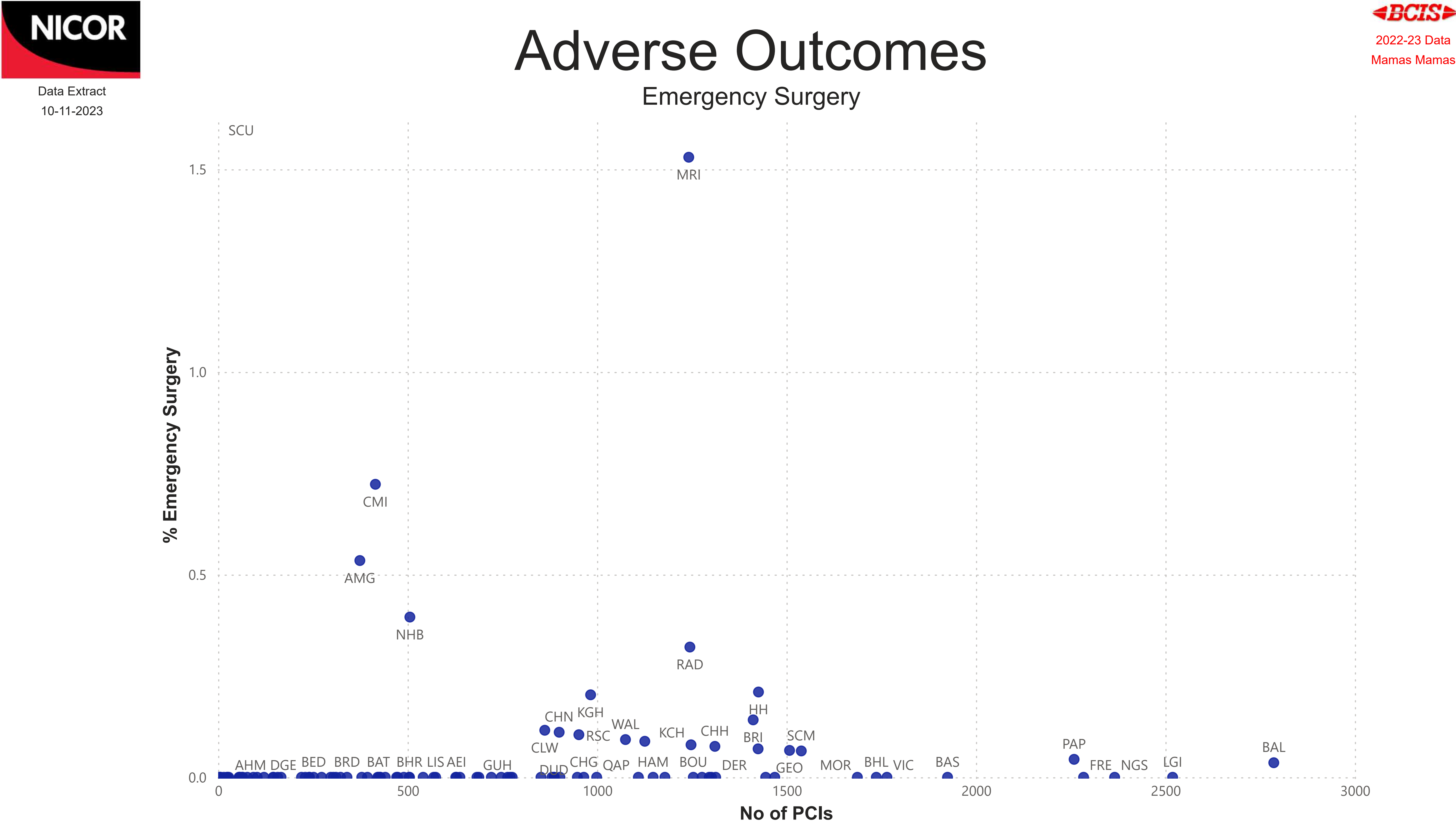
30-day Mortality



Adverse Outcomes

CVA







Data Extract
10-11-2023

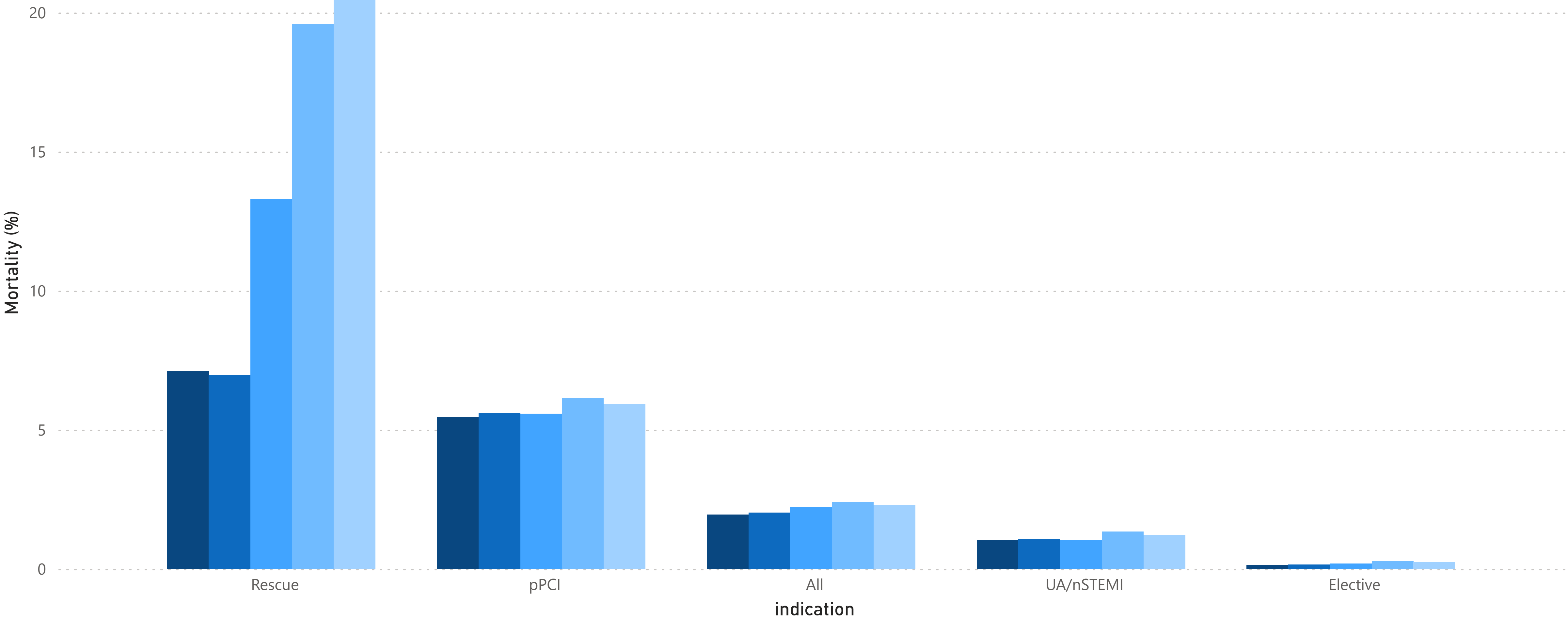


2022-23 Data
Mamas Mamas

Mortality (30-day)

By Syndrome

fin.year ● 2018 ● 2019 ● 2020 ● 2021 ● 2022





The Good



- . Intravascular imaging 24% overall
- . 74% imaging in left main cases
- . Still some work in centres with <50% utilization in LMS



The Bad



- .Ticagrelor or prasugrel used in <40% of STEMI cases in many centres
- .Only 3% Prasugrel use in NSTEMI despite EXC class 2A LOE b recommendation over Ticagrelor in 2020.



The Ugly



- .CT time for IHT are unacceptable. Only 1/3 <150 mins
- .Patients being placed at harm.
- .Need to open discussion re thrombolysis for delayed transfers re STEMI.
- .Priority 1 discussions re STEMI transfers nationally with ambulance service.



The Future

- .Individual operator reporting - Assessment of risk score (COVID, Calibration drift)
- .Centre level reporting
- .Linkage to HES relatively late this year. Next year will present
- .30-day readmission data by centre. Quality metric



Acknowledgements



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(NICOR Project
Manager)



Jane Kerr
(NICOR Project
Co-Ordinator)



Sarah Moore
(Millbrook)



Peter Ludman