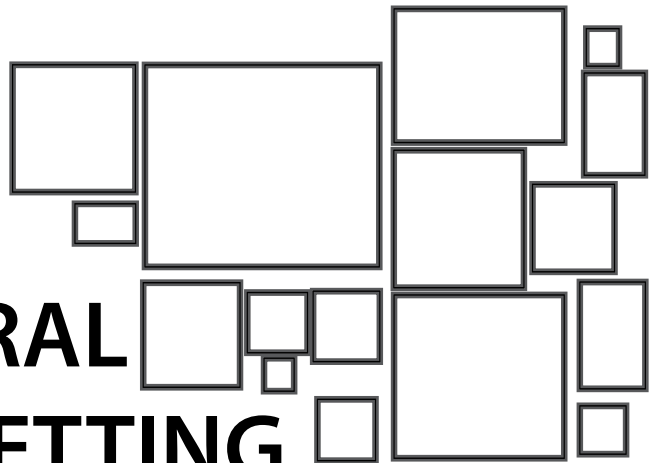


PROCEDURAL

SETTING





PROCEDURAL SETTINGS

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Summary

1. In 2015–2016, there was an increased number of PCIs reported for STEMI/NSTEMI/UA compared to 2013–2014.
2. For STEMI, the number of primary PCI (PPCI) and pharmacoinvasive PCI were also increased.
3. There were further increases in PCI performed via radial approach (66.3%) compared to the previous cohort.
4. There was an increase in the usage of ticagrelor (25.5%) in the catheterisation laboratory compared to 2013–2014 cohort.
5. There was an increase in radiation exposure to the patient compared to the 2013–2014 cohort. However, only 50% of data was available.

This chapter discusses the procedural details and treatment received by patients who underwent PCI from 2015–2016.

From 2015–2016, a total number of 21,538 PCI procedures were reported in 18 centres across Malaysia. The number of procedures reported increased significantly over the years with 15,514 PCIs reported during 2013–2014.

For PCI status, 70.3% were performed in elective setting and about 30% in the ACS setting. There has been an increase in the number of STEMI PCI compared to the 2013–2014 cohort. (19% vs 17.1%). [Table 3.1]

For STEMI PCI, there has been a marked increase in the number of PPCI and pharmacoinvasive PCI compared to the 2013–2014 cohort (40.4% vs 33.7% and 8.9% vs 5.0%). [Table 3.1]

Procedural access

In 2015–2016, the number of PCIs performed via radial access increased compared to the 2013–2014 cohort (66.3% vs 57.0%). [Table 3.1]

Majority of the PCIs were done with 6Fr guiding catheter (94.3%), followed by 7Fr guiding catheter (5.2%). [Table 3.1]

Closure devices were used in about 11% of procedures. However, there was an increased usage in angioseal device (4.3%) in 2015–2016 as compared to 2.6% in 2013–2014. [Table 3.1]

Extent of CAD

About two thirds of patients who went for PCI in this cohort had a single vessel disease (66.6%). This was similar to the 2013–2014 cohort (65%). [Table 3.1] 2.7% of PCIs were left main stem and 1.3% were graft PCI. [Table 3.1]

***PCI procedure***

The median fluoroscopy dose was higher compared to the previous cohort (2549.5 mGy vs 1792.0 mGy). About 50% of the fluoroscopy time and dose exposure were not recorded. [Table 3.1] The volume of contrast use in 2015–2016 was similar to the previous cohort at about 150 ml. [Table 3.1]

Treatment of patients undergoing PCI

There was an increase in the number of PPCI in this cohort compared to the 2013–2014 cohort. The number of patients who underwent PCI after thrombolysis were lower compared to the 2013–2014 cohort (34.0% vs 42.2%). [Table 3.1]

The usage of GP2b3a blocker remained low (2.3% vs 3.8%) compared to the 2013–2014 cohort. [Table 3.1] 96.6% of anticoagulation during PCI was IV unfractionated heparin. [Table 3.1]

Antiplatelets

About 99% of patients were given aspirin prior to PCI. There was a decreased use of clopidogrel compared to the previous cohort (80.8% vs 90.8%). This was reflected by the increased usage of ticagrelor (25.7% [2015–2016] vs 11.6% [2013–2014]). [Table 3.1]



Table 3.1 PCI status of patients who underwent procedures, NCD-PCI Registry, 2013–2016

Year	2013 – 2014	2015	2016	2015 – 2016
Total no. of procedures	15,514	10,397	11,141	21,538
Characteristics of PCI procedures				
PCI status, No. (%)				
Elective	11,488 (74.0)	7,275 (70.0)	7,865 (70.6)	15,140 (70.3)
NSTEMI/UA	1,372 (8.8)	1,136 (10.9)	1,169 (10.5)	2,305 (10.7)
STEMI	2,654 (17.1)	1,986 (19.1)	2,107 (18.9)	4,093 (19.0)
Elective, No. (%)	N = 11,488	N = 7,275	N = 7,865	N = 15,140
Staged PCI	3,451 (30.3)	2,452 (34.2)	2,537 (32.5)	4,989 (33.3)
Ad hoc	7,956 (69.7)	4,720 (65.8)	5,272 (67.5)	9,992 (66.7)
Not available	81	103	56	159
NSTEMI/UA, No. (%)	N = 1,372	N = 1,136	N = 1,169	N = 2,305
Urgent	446 (32.8)	286 (25.5)	272 (23.4)	558 (24.5)
Non-urgent	912 (67.2)	834 (74.5)	888 (76.6)	1,722 (75.5)
Not available	14	16	9	25
STEMI, No. (%)	N = 2,654	N = 1,986	N = 2,107	N = 4,093
Rescue	844 (32.2)	433 (22.0)	367 (17.6)	800 (19.7)
Primary	884 (33.7)	793 (40.3)	845 (40.4)	1,638 (40.4)
Facilitated	68 (2.6)	65 (3.3)	127 (6.1)	192 (4.7)
Delayed routine PCI	447 (17.1)	274 (13.9)	319 (15.3)	593 (14.6)
Delayed selective PCI	246 (9.4)	238 (12.1)	237 (11.3)	475 (11.7)
Pharmacoinvasive	131 (5.0)	167 (8.5)	194 (9.3)	361 (8.9)
Not available	25	14	18	32
Missing	9	2	0	2
#Percutaneous entry, No. (%)				
Brachial	114 (0.7)	61 (0.6)	76 (0.7)	137 (0.6)
Radial	8,846 (57.0)	6,637 (63.8)	7,639 (68.6)	14,276 (66.3)
Femoral	7,120 (45.9)	4,301 (41.4)	4,044 (36.3)	8,345 (38.7)
Total no. of lesions	19,329	13,048	13,921	26,969
^S French size type				
Guiding catheter	18,747 (97.8)	12,488 (95.8)	12,889 (92.7)	25,377 (94.2)
Guiding sheath	422 (2.2)	548 (4.2)	1,019 (7.3)	1,567 (5.8)
Not available	62	12	12	24
Missing	98	0	1	1



Year	2013 – 2014	2015	2016	2015 – 2016
Total no. of procedures	15,514	10,397	11,141	21,538
^French size (guiding catheter), No. (%)	N = 18,747	N = 12,488	N = 12,889	N = 25,377
4	35 (0.2)	12 (0.1)	18 (0.1)	30 (0.1)
5	35 (0.2)	17 (0.1)	13 (0.1)	30 (0.1)
6	17,227 (92.1)	11,650 (93.3)	12,284 (95.3)	23,934 (94.3)
7	1,382 (7.4)	780 (6.2)	543 (4.2)	1,323 (5.2)
8	21 (0.1)	15 (0.1)	29 (0.2)	44 (0.2)
Others	12 (0.1)	12 (0.1)	0 (0.0)	12 (0.0)
Not available	35	1	2	3
Missing	0	1	0	1
^French size (sheath), No. (%)	N = 422	N = 548	N = 1,019	N = 1,567
4	0 (0.0)	1 (0.2)	1 (0.1)	2 (0.1)
5	0 (0.0)	0 (0.0)	1 (0.1)	1 (0.1)
6	374 (88.6)	479 (87.4)	959 (94.1)	1,438 (91.8)
7	45 (10.7)	68 (12.4)	57 (5.6)	125 (8.0)
8	3 (0.7)	0 (0.0)	1 (0.1)	1 (0.1)
Closure device, No. (%)				
No	12,531 (86.1)	7,460 (78.2)	8,824 (86.8)	16,284 (82.6)
Seal	383 (2.6)	420 (4.4)	433 (4.3)	853 (4.3)
Suture	960 (6.6)	683 (7.2)	483 (4.8)	1,166 (5.9)
Exoseal	145 (1.0)	71 (0.7)	64 (0.6)	135 (0.7)
Others	534 (3.7)	909 (9.5)	360 (3.5)	1,269 (6.4)
Not available	150	99	59	158
Missing	811	755	918	1,673
*Extent of coronary disease, No. (%)				
Single vessel disease	9,984 (65.0)	6,969 (67.0)	7,367 (66.1)	14,336 (66.6)
Multiple vessel disease	4,711 (30.7)	2,981 (28.7)	3,344 (30.0)	6,325 (29.4)
Left main/LMS	470 (3.1)	299 (2.9)	284 (2.5)	583 (2.7)
Graft	198 (1.3)	145 (1.4)	145 (1.3)	290 (1.3)
Not available	151	3	1	4
Fluoroscopy time, min				
N	13,488	9,244	10,081	19,325
Mean (SD)	19.3 (16.7)	19.1 (15.0)	20.0 (15.8)	19.6 (15.4)
Median (Min – Max)	14.5 (2.0 – 175.0)	14.9 (1.0 – 152.0)	15.5 (1.0 – 180.0)	15.2 (1.0 – 180.0)
Not available, No. (%)	1,265 (8.2)	679 (6.5)	535 (4.8)	1,214 (5.6)
Missing, No. (%)	761 (4.9)	474 (4.6)	525 (4.7)	999 (4.6)



Year	2013 – 2014	2015	2016	2015 – 2016
Total no. of procedures	15,514	10,397	11,141	21,538
Fluoroscopy total dose, mGy				
N	7,729	5,382	5,082	10,464
Mean (SD)	61950.7 (1084474.1)	52658.6 (221744.9)	73487.8 (230270.5)	62774.6 (226154.6)
Median (Min – Max)	1792.0 (0 – 9010000.0)	2153.5 (0 – 11607915.0)	3321.0 (0 – 9576939.0)	2549.5 (0 – 11607915.0)
Not available, No. (%)	5,359 (34.5)	3,701 (35.6)	4,223 (37.9)	7,924 (36.8)
Missing, No. (%)	2,426 (15.6)	1,314 (12.6)	1,836 (16.5)	3,150 (14.6)
Contrast volume, ml				
N	13,431	9,386	10,119	19,505
Mean (SD)	162.8 (68.9)	159.3 (66.2)	158.6 (65.6)	159.0 (65.9)
Median (Min – Max)	150.0 (16.0 – 500.0)	150.0 (20.0 – 500.0)	150.0 (15.0 – 500.0)	150.0 (15.0 – 500.0)
Not available, No. (%)	1,078 (6.9)	486 (4.7)	456 (4.1)	942 (4.4)
Missing, No. (%)	1,005 (6.5)	525 (5.0)	566 (5.1)	1,091 (5.1)
Thrombolytics prior to PCI procedure in ACS STEMI, No. (%)				
Total no. of procedures among ACS STEMI patients	N = 3,115	N = 2,351	N = 2,537	N = 4,888
Yes	1,313 (42.2)	815 (34.7)	848 (33.4)	1,663 (34.0)
No	1,802 (57.8)	1,536 (65.3)	1,689 (66.6)	3,225 (66.0)
Duration of thrombolytics given prior to PCI procedure in ACS STEMI, No. (%)	N = 1,313	N = 815	N = 848	N = 1,663
<3 hours	135 (12.9)	115 (17.9)	111 (14.9)	226 (16.3)
3 – 6 hours	202 (19.4)	137 (21.3)	148 (19.9)	285 (20.5)
6 – 12 hours	172 (16.5)	113 (17.6)	109 (14.7)	222 (16.0)
12 – 24 hours	505 (48.4)	267 (41.5)	122 (16.4)	389 (28.0)
>24 hours	29 (2.8)	11 (1.7)	254 (34.1)	265 (19.1)
Not available	125	105	25	130
Missing	145	67	79	146
Medication				
Iib/IIIa blockade, No. (%)				
Yes	585 (3.8)	271 (2.6)	234 (2.1)	505 (2.3)
No	14,929 (96.2)	10,126 (97.4)	10,907 (97.9)	21,033 (97.7)
Iib/IIIa blockade given status, No. (%)	N = 585	N = 271	N = 234	N = 505
Prior	214 (41.5)	78 (33.2)	69 (31.9)	147 (32.6)
After	45 (8.7)	26 (11.1)	22 (10.2)	48 (10.6)
During	257 (49.8)	131 (55.7)	125 (57.9)	256 (56.8)
Not available	1	0	0	0
Missing	68	36	18	54



Year	2013 – 2014	2015	2016	2015 – 2016
Total no. of procedures	15,514	10,397	11,141	21,538
Heparin, No. (%)				
Yes	14,829 (95.6)	10,043 (96.6)	10,762 (96.6)	20,805 (96.6)
No	685 (4.4)	354 (3.4)	379 (3.4)	733 (3.4)
Heparin given status, No. (%)	N = 14,829	N = 10,043	N = 10,762	N = 20,805
Prior	6,566 (45.4)	3,994 (40.7)	4,906 (46.6)	8,900 (43.8)
After	7 (0.0)	2 (0.0)	3 (0.0)	5 (0.0)
During	7,886 (54.5)	5,813 (59.3)	5,620 (53.4)	11,433 (56.2)
Not available	17	10	8	18
Missing	353	224	225	449
LMWH, No. (%)				
Yes	524 (3.4)	310 (3.0)	275 (2.5)	585 (2.7)
No	14,990 (96.6)	10,087 (97.0)	10,866 (97.5)	20,953 (97.3)
LMWH given status, No. (%)	N = 524	N = 310	N = 275	N = 585
Prior	449 (91.8)	274 (94.5)	238 (91.9)	512 (93.3)
After	20 (4.1)	8 (2.8)	12 (4.6)	20 (3.6)
During	20 (4.1)	8 (2.8)	9 (3.5)	17 (3.1)
Not available	1	2	1	3
Missing	34	18	15	33
Ticlopidine, No. (%)				
Yes	158 (1.0)	49 (0.5)	50 (0.4)	99 (0.5)
No	15,356 (99.0)	10,348 (99.5)	11,091 (99.6)	21,439 (99.5)
Ticlopidine given status, No. (%)	N = 158	N = 49	N = 50	N = 99
Prior	146 (97.3)	44 (97.8)	46 (100.0)	90 (98.9)
After	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)
During	3 (2.0)	1 (2.2)	0 (0.0)	1 (1.1)
Not available	0	0	0	0
Missing	8	4	4	8
Aspirin, No. (%)				
Yes	14,993 (96.6)	9,732 (93.6)	10,170 (91.3)	19,902 (92.4)
No	521 (3.4)	665 (6.4)	971 (8.7)	1,636 (7.6)
Aspirin given status, No. (%)	N = 14,993	N = 9,732	N = 10,170	N = 19,902
Prior	14,438 (98.9)	9,345 (98.7)	9,637 (99.0)	18,982 (98.9)
After	63 (0.4)	54 (0.6)	31 (0.3)	85 (0.4)
During	94 (0.6)	68 (0.7)	66 (0.7)	134 (0.7)
Not available	9	5	11	16
Missing	389	260	425	685



Year	2013 – 2014	2015	2016	2015 – 2016
Total no. of procedures	15,514	10,397	11,141	21,538
Clopidogrel, No. (%)				
Yes	14,079 (90.8)	8,510 (81.9)	8,895 (79.8)	17,405 (80.8)
No	1,435 (9.2)	1,887 (18.1)	2,246 (20.2)	4,133 (19.2)
Clopidogrel given status, No. (%)	N = 14,079	N = 8,510	N = 8,895	N = 17,405
Prior	13,193 (94.6)	7,955 (94.1)	8,425 (97.5)	16,380 (95.8)
After	47 (0.3)	48 (0.6)	37 (0.4)	85 (0.5)
During	699 (5.0)	453 (5.4)	175 (2.0)	628 (3.7)
Not available	14	9	12	21
Missing	126	45	246	291
Duration of clopidogrel given prior to PCI procedure, hours, No. (%)	N = 13,193	N = 7,955	N = 8,425	N = 16,380
<6	3,651 (29.8)	2,211 (30.6)	1,799 (23.1)	4,010 (26.7)
6 – 24	3,139 (25.6)	2,343 (32.4)	3,163 (40.7)	5,506 (36.7)
>24 – 72	1,252 (10.2)	1,012 (14.0)	802 (10.3)	1,814 (12.1)
>72	4,202 (34.3)	1,663 (23.0)	2,011 (25.9)	3,674 (24.5)
Not available	284	167	133	300
Missing	665	559	517	1,076
First starting dose, mg, No. (%)	N = 14,079	N = 8,510	N = 8,895	N = 17,405
75	6,444 (53.1)	4,027 (57.8)	4,544 (59.0)	8,571 (58.4)
300	4,473 (36.9)	2,319 (33.3)	2,581 (33.5)	4,900 (33.4)
600	1,215 (10.0)	617 (8.9)	578 (7.5)	1,195 (8.1)
≥1200	1 (0.0)	1 (0.0)	1 (0.0)	2 (0.0)
Not available	488	253	164	417
Missing	1,458	1,293	1,027	2,320
**Clopidogrel dose of ACS STEMI patient, mg, No. (%)				
Total no. of PCI procedures among ACS STEMI patients who are taking clopidogrel	N = 2,682	N = 1,769	N = 1,898	N = 3,667
75	559 (25.8)	425 (30.8)	400 (25.7)	825 (28.1)
300	1,312 (60.5)	779 (56.4)	1,036 (66.7)	1,815 (61.8)
600	297 (13.7)	178 (12.9)	118 (7.6)	296 (10.1)
≥1200	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Not available	75	40	36	76
Missing	439	347	308	655



Year	2013 – 2014	2015	2016	2015 – 2016
Total no. of procedures	15,514	10,397	11,141	21,538
Fondaparinux, No. (%)				
Yes	1,396 (9.0)	980 (9.4)	1,092 (9.8)	2,072 (9.6)
No	14,069 (91.0)	9,417 (90.6)	10,049 (90.2)	19,466 (90.4)
Missing	49	0	0	0
Fondaparinux given status, No. (%)	N = 1,396	N = 980	N = 1,092	N = 2,072
Prior	1,211 (90.6)	862 (93.3)	945 (94.1)	1,807 (93.7)
After	112 (8.4)	55 (6.0)	54 (5.4)	109 (5.7)
During	13 (1.0)	7 (0.8)	5 (0.5)	12 (0.6)
Not available	2	4	1	5
Missing	58	52	87	139
Prasugrel, No. (%)				
Yes	67 (0.5)	52 (0.5)	47 (0.4)	99 (0.5)
No	14,056 (99.5)	10,345 (99.5)	11,094 (99.6)	21,439 (99.5)
Missing	1,391	0	0	0
Prasugrel given status, No. (%)	N = 67	N = 52	N = 47	N = 99
Prior	48 (80.0)	38 (80.9)	28 (68.3)	66 (75.0)
After	4 (6.7)	3 (6.4)	5 (12.2)	8 (9.1)
During	8 (13.3)	6 (12.8)	8 (19.5)	14 (15.9)
Missing	7	5	6	11
Ticagrelor, No. (%)				
Yes	1,632 (11.6)	2,403 (23.1)	3,122 (28.0)	5,525 (25.7)
No	12,491 (88.4)	7,994 (76.9)	8,019 (72.0)	16,013 (74.3)
Missing	1,391	0	0	0
Ticagrelor given status, No. (%)	N = 1,632	N = 2,403	N = 3,122	N = 5,525
Prior	1,244 (82.1)	1,506 (66.6)	2,220 (74.7)	3,726 (71.2)
After	45 (3.0)	61 (2.7)	80 (2.7)	141 (2.7)
During	226 (14.9)	695 (30.7)	672 (22.6)	1,367 (26.1)
Not available	1	1	1	2
Missing	116	140	149	289



Year	2013 – 2014	2015	2016	2015 – 2016
Total no. of procedures	15,514	10,397	11,141	21,538
Planned duration of clopidogrel/ticlopidine, month, No. (%)				
1	1,293 (8.9)	446 (4.7)	326 (3.2)	772 (4.0)
3	532 (3.7)	255 (2.7)	181 (1.8)	436 (2.2)
6	748 (5.1)	302 (3.2)	232 (2.3)	534 (2.7)
12	11,841 (81.3)	8,313 (88.1)	9,253 (91.8)	17,566 (90.0)
>12	153 (1.1)	124 (1.3)	88 (0.9)	212 (1.1)
Not available	660	624	639	1,263
Missing	287	333	422	755

#Patients are allowed to be in more than one type of category.

\$French size type was not available in the old CRF. In the old CRF, information was only collected for French size for guiding catheter.

^French size is reported by number of lesions instead of number of procedures. In the old CRF, French size was reported under section 6 cath lab visit, no 6b, whereas in the new CRF, it was reported under section 7 PCI proc details, no 11.

*In the old CRF, patients were allowed to be presented in different categories. In the new CRF, patients were included in a unique category. Single vessel disease is for patients with single vessel disease information (old CRF)/patients with only one information of either LAD, LCx or RCA.

Multiple vessel disease is for patients with multiple vessel disease information (old CRF)/patients with more than one information of LAD, LCx or RCA.

Left main stem (LMS) is for patients with information on LMS (LMS alone or in combination with LAD, LCx, RCA or single vessel disease).

Graft is for patients with information on graft (graft alone or in combination with LAD, LCx, RCA, single vessel disease, multiple vessel disease or LMS).

**Only applicable to STEMI patients who are taking clopidogrel.



Table 3.2 Duration of thienopyridine in patients who underwent PCI, NCVD-PCI Registry, 2013–2016

Year	Planned duration of clopidogrel/ticlopidine (months)	#Intracoronary devices used		
		Balloon only/POBA	Drug eluting stent	Bare metal stent
		No. (%)	No. (%)	No. (%)
2013-2014	1	339 (14.6)	180 (1.4)	884 (38.3)
	3	122 (5.3)	95 (0.8)	225 (9.7)
	6	132 (5.7)	327 (2.6)	168 (7.3)
	12	1,685 (72.8)	11,794 (94.2)	1,019 (44.1)
	>12	38 (1.6)	129 (1.0)	13 (0.6)
	Not available	135	246	87
	Missing	41	200	48
	Total	2,492	12,971	2,444
2015	1	168 (8.6)	151 (1.8)	240 (38.0)
	3	65 (3.3)	45 (0.5)	80 (12.7)
	6	74 (3.8)	155 (1.9)	25 (4.0)
	12	1,628 (83.3)	7,805 (94.5)	283 (44.8)
	>12	19 (1.0)	104 (1.3)	4 (0.6)
	Not available	101	385	20
	Missing	34	267	29
	Total	2,089	8,912	681
2016	1	112 (6.4)	98 (1.0)	125 (40.1)
	3	38 (2.2)	63 (0.7)	20 (6.4)
	6	54 (3.1)	139 (1.5)	13 (4.2)
	12	1,524 (87.7)	9,086 (96.0)	153 (49.0)
	>12	9 (0.5)	83 (0.9)	1 (0.3)
	Not available	88	388	10
	Missing	39	318	16
	Total	1,864	10,175	338
2015-2016	1	280 (7.6)	249 (1.4)	365 (38.7)
	3	103 (2.8)	108 (0.6)	100 (10.6)
	6	128 (3.5)	294 (1.7)	38 (4.0)
	12	3,152 (85.4)	16,891 (95.3)	436 (46.2)
	>12	28 (0.8)	187 (1.1)	5 (0.5)
	Not available	189	773	30
	Missing	73	585	45
	Total	3,953	19,087	1,019

*Patients are allowed to be in more than one type of category.



Table 3.3 Access site of patients who underwent procedures, by PCI status, NCVD-PCI Registry, 2013–2016

Year	#Percutaneous entry	PCI status		
		Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2013-2014	Brachial	78 (0.7)	13 (0.9)	23 (0.8)
	Radial	6,916 (57.9)	782 (55.1)	1,148 (42.4)
	Femoral	4,959 (41.5)	624 (44.0)	1,537 (56.8)
2015	Brachial	40 (0.5)	4 (0.3)	17 (0.8)
	Radial	4,756 (61.4)	720 (61.3)	1,161 (55.7)
	Femoral	2,944 (38.0)	451 (38.4)	906 (43.5)
2016	Brachial	47 (0.6)	9 (0.7)	20 (0.9)
	Radial	5,433 (65.1)	806 (65.6)	1,400 (64.0)
	Femoral	2,862 (34.3)	413 (33.6)	769 (35.1)
2015-2016	Brachial	87 (0.5)	13 (0.5)	37 (0.9)
	Radial	10,189 (63.4)	1,526 (63.5)	2,561 (59.9)
	Femoral	5,806 (36.1)	864 (36.0)	1,675 (39.2)

[#]Patients are allowed to be in more than one type of category.