

## Measure #0642 Tables and Figures Contents

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## 2.1 Attach Logic Model

### Table 1

Summary: Referrals for cardiac rehabilitation/secondary prevention programs continue to be underutilized for those patients for whom these services would improve their quality of life, decrease complications and death, and reduce unnecessary costs to the patient and system (Dibben, 2021). Hospitals that participate in the NCDR registries and report on this measure and/or conduct quality

improvement activities such as convening multidisciplinary teams or implementing standardized protocols and health information technology solutions (Adusumalli, 2021; Whitlier, 2024) can improve referral rates and ultimately drive higher quality and better patient outcomes.

Inputs	Activities	Outputs	Outcomes & Impact
<p>Quality improvement activities such as multidisciplinary teams, clinician and staff education based on clinical recommendations, and tracking of performance against a dashboard</p> <p>Tools and technology integration such as hospital protocols and automated order sets in the electronic health record system (EHRs)</p> <p>Patient education materials</p>	<p>Implementation of quality improvement activities and tools and technology integration</p> <p>Delivery of patient education materials</p>	<p>Cardiac rehabilitation/secondary prevention program referral rates</p> <p>Use of technology/tools, depending on individual hospital implementation needs (e.g., rates of automated order sets)</p> <p>Number of patient education materials distributed</p>	<p><u>Short-term</u></p> <p>Increased rates of cardiac rehabilitation referrals in patients with a qualifying event</p> <p>Increased clinician and patient awareness and attention to referrals</p> <p>Ability of the facility to track interventions and progress on referral rates</p> <p><u>Intermediate-term</u></p> <p>Improved clinician documentation and use of tools and technology (e.g., automated order sets)</p> <p>Increased adherence to cardiac referral by patients following hospital discharge</p> <p>Improved tracking on progress to addressing this important gap in care by the facility and NCDR registries</p> <p><u>Long-term</u></p> <p>Reductions in complications (e.g., recurrent MI) and mortality</p> <p>Improved quality of life and function</p> <p>Decrease in unnecessary costs</p>

Table 2

Feedback Mechanisms
<p>Data analysis and performance reports produced by the facility and/or NCDR registries</p> <p>Quality improvement activities and reporting of progress on outputs to clinicians and staff</p> <p>Patient satisfaction surveys</p>
Assumptions
<p>Systems have access to high-quality EHRs data and computational resources to support the capture and analysis of cardiac rehabilitation referral and that these programs are readily available to patients within the geographic area.</p> <p>Feedback on performance of this measure will increase referral rates and ultimately improve patient outcomes and quality of life.</p>
External Factors

Availability of cardiac rehabilitation/secondary prevention programs may vary depending on where the patient lives and receives care.

Policies and clinician attitudes regarding measures could affect the outcomes identified above.

## 2.4 Performance Gap

**Table 3: Distribution of Performance Scores (CathPCI Registry)**

CathPCI Registry: Below depicts a distribution of hospital performance scores (using 2023-2024 data) into deciles.

	Min	Decile1	Decile2	Decile3	Decile4	Decile5	Decile6	Decile7	Decile8	Decile9	Decile10	Max
Referral Rate (Min)		0.000	0.194	0.602	0.790	0.881	0.923	0.951	0.972	0.986	0.996	
Referral Rate (Max)		0.192	0.601	0.789	0.880	0.923	0.951	0.972	0.986	0.996	1.000	
Referral Rate (Mean)	0.0	0.055	0.420	0.707	0.843	0.905	0.938	0.962	0.979	0.991	1.000	1.0
N (Hospitals)		163	164	164	163	164	164	163	162	166	164	
N (Patients)		51720	58443	66184	62653	74909	68328	72913	70806	70259	53229	

**Table 4: Distribution of Performance Scores (CPMI Registry)**

CPMI Registry: Below depicts a distribution of hospital performance scores (using 2023-2024 data) into deciles.

	Min	Decile1	Decile2	Decile3	Decile4	Decile5	Decile6	Decile7	Decile8	Decile9	Decile10	Max
Referral Rate (Min)		0	0.655	0.808	0.874	0.912	0.931	0.955	0.972	0.986	1	
Referral Rate (Max)		0.653	0.805	0.872	0.911	0.931	0.955	0.971	0.986	0.998	1	
Referral Rate (Mean)	0.0	0.429	0.728	0.842	0.894	0.922	0.943	0.964	0.979	0.99	1	1.0
N (Hospitals)		58	58	59	58	59	58	58	59	47	70	
N (Patients)		9297	9354	10666	13339	11470	12549	12260	12363	12346	9540	

## 3.1 Contributions Toward Advancing Health Equity

**Table 5: Differences in Referral Rates (CathPCI Registry)**

Differences in cardiac rehabilitation referral rates the CathPCI registry.

	Total	Cardiac Rehab Referral		Std Diff, %
	n = 649444	Yes n = 521658	No n = 127786	
Age, years	67.6 ± 11.6	67.5 ± 11.6	67.9 ± 11.5	3.2
Male sex	451348 (69.5%)	361772 (69.4%)	89576 (70.1%)	1.6

	Total	Cardiac Rehab Referral		Std Diff, %
	n = 649444	Yes n = 521658	No n = 127786	
Race				14.9
Caucasian	533901 (86.1%)	433842 (86.9%)	100059 (83.1%)	
Black	55780 (9.0%)	44538 (8.9%)	11242 (9.3%)	
Asian	25058 (4.0%)	17152 (3.4%)	7906 (6.6%)	
Other Race	5191 (0.8%)	3985 (0.8%)	1206 (1.0%)	
Missing	29514	22141	737	
Insurance type				8.7
Private Insurance	185462 (28.6%)	149780 (28.7%)	35682 (27.9%)	
Medicare	336831 (51.9%)	272448 (52.2%)	64383 (50.4%)	
Medicaid	85360 (13.1%)	65505 (12.6%)	19855 (15.5%)	
Other Insurance	19997 (3.1%)	16056 (3.1%)	3941 (3.1%)	
No Insurance	21794 (3.4%)	17869 (3.4%)	3925 (3.1%)	

**Table 6: Differences in Referral Rates (CPMI Registry)**

Differences in cardiac rehabilitation referral rates the CPMI registry.

	Total	Cardiac Rehab Referral		Std Diff, %
	n = 113184	Yes n = 100095	No n = 13089	
Age, years	65.4 ± 12.7	65.2 ± 12.6	67.3 ± 13.7	15.9
Male sex	76129 (67.3%)	68203 (68.1%)	7926 (60.6%)	15.9
Race				12.0
Caucasian	92379 (84.7%)	82098 (85.1%)	10281 (81.6%)	
Black	12375 (11.3%)	10503 (10.9%)	1872 (14.9%)	
Asian	3004 (2.8%)	2697 (2.8%)	307 (2.4%)	
Other Race	1290 (1.2%)	1157 (1.2%)	133 (1.1%)	
Missing	4136	3640	496	
Insurance type				16.8
Private Insurance	34292 (30.3%)	30997 (31.0%)	3295 (25.2%)	
Medicare	51767 (45.7%)	45239 (45.2%)	6528 (49.9%)	
Medicaid	14713 (13.0%)	12641 (12.6%)	2072 (15.8%)	
Other Insurance	4688 (4.1%)	4233 (4.2%)	455 (3.5%)	
No Insurance	7724 (6.8%)	6985 (7.0%)	739 (5.6%)	

### 5.1.4 Characteristics of Units of the Eligible Population

The tables below (table 7 and 8) describe characteristics of the patients.

**Table 7. Characteristics of CathPCI registry patient data**

	Total	Cardiac Rehab Referral	
	n = 649444	Yes n = 521658	No n = 127786
Age, years	67.6 ± 11.6	67.5 ± 11.6	67.9 ± 11.5
Male sex	451348 (69.5%)	361772 (69.4%)	89576 (70.1%)

	Total	Cardiac Rehab Referral	
	n = 649444	Yes n = 521658	No n = 127786
Race			
Caucasian	533901 (86.1%)	433842 (86.9%)	100059 (83.1%)
Black	55780 (9.0%)	44538 (8.9%)	11242 (9.3%)
Asian	25058 (4.0%)	17152 (3.4%)	7906 (6.6%)
Other Race	5191 (0.8%)	3985 (0.8%)	1206 (1.0%)
Missing	29514	22141	737
Insurance type			
Private Insurance	185462 (28.6%)	149780 (28.7%)	35682 (27.9%)
Medicare	336831 (51.9%)	272448 (52.2%)	64383 (50.4%)
Medicaid	85360 (13.1%)	65505 (12.6%)	19855 (15.5%)
Other Insurance	19997 (3.1%)	16056 (3.1%)	3941 (3.1%)
No Insurance	21794 (3.4%)	17869 (3.4%)	3925 (3.1%)
Hypertension	557611 (85.9%)	446441 (85.6%)	111170 (87.0%)
Missing	24	17	7
Dyslipidemia	537161 (82.7%)	430554 (82.5%)	106607 (83.4%)
Missing	24	17	7
Current Recent Smoker	361798 (55.7%)	293471 (56.3%)	68327 (53.5%)
Cerebrovascular Disease	100355 (15.5%)	80591 (15.4%)	19764 (15.5%)
Missing	24	17	7
Peripheral Arterial Disease	73715 (11.4%)	58257 (11.2%)	15458 (12.1%)
Missing	24	17	7
Prior MI	180333 (27.8%)	145078 (27.8%)	35255 (27.6%)
Missing	24	17	7
Prior PCI	253963 (39.1%)	201571 (38.6%)	52392 (41.0%)
Missing	1		1
Prior CABG	86606 (13.3%)	69428 (13.3%)	17178 (13.4%)
Missing	1		1
Chronic Lung Disease	100482 (15.5%)	81781 (15.7%)	18701 (14.6%)
Missing	24	17	7
Diabetes Mellitus	272982 (42.0%)	217294 (41.7%)	55688 (43.6%)
Missing	24	17	7
BMI	29.9 ± 7.3	30.0 ± 7.4	29.6 ± 7.1
Missing	2394	1931	463
Current Dialysis	20597 (3.2%)	15744 (3.0%)	4853 (3.8%)
Missing	1		1
Indication for PCI			
3073 Stable Angina	61016 (9.4%)	48998 (9.4%)	12018 (9.4%)
3137 Primary PCI for Acute STEMI	90927 (14.0%)	76892 (14.7%)	14035 (11.0%)
3138 STEMI - Stable (<12 hours from symptom onset)	657 (0.1%)	537 (0.1%)	120 (0.1%)
3139 STEMI - Stable (>12 hours from symptom onset)	1260 (0.2%)	1023 (0.2%)	237 (0.2%)
3140 STEMI - Unstable (>12 hours from symptom onset)	3270 (0.5%)	2707 (0.5%)	563 (0.4%)
3141 STEMI - (After successful lytics)	1555 (0.2%)	1380 (0.3%)	175 (0.1%)
3142 STEMI - Rescue (After unsuccessful lytics)	2130 (0.3%)	1948 (0.4%)	182 (0.1%)
3143 NSTEMI - ACS	229601 (35.4%)	185948 (35.7%)	43653 (34.2%)
3144 Coronary Artery Disease (without ischemic symptoms)	37794 (5.8%)	29057 (5.6%)	8737 (6.8%)
3145 New onset angina	52131 (8.0%)	40750 (7.8%)	11381 (8.9%)
3719 Other PCI Indication	168852 (26.0%)	132245 (25.4%)	36607 (28.7%)
Missing	251	173	78
PCI status: elective	282411 (43.5%)	222630 (42.7%)	59781 (46.8%)
PCI status: urgent	261241 (40.2%)	209542 (40.2%)	51699 (40.5%)

	Total	Cardiac Rehab Referral	
	n = 649444	Yes n = 521658	No n = 127786
PCI status emergent	104699 (16.1%)	88604 (17.0%)	16095 (12.6%)
PCI status: salvage	888 (0.1%)	724 (0.1%)	164 (0.1%)

Table 8. Characteristics of CPMI registry patient data

	Total	Cardiac Rehab Referral	
	n = 113184	Yes n = 100095	No n = 13089
Age, years	65.4 ± 12.7	65.2 ± 12.6	67.3 ± 13.7
Male sex	76129 (67.3%)	68203 (68.1%)	7926 (60.6%)
Race			
Caucasian	92379 (84.7%)	82098 (85.1%)	10281 (81.6%)
Black	12375 (11.3%)	10503 (10.9%)	1872 (14.9%)
Asian	3004 (2.8%)	2697 (2.8%)	307 (2.4%)
Other Race	1290 (1.2%)	1157 (1.2%)	133 (1.1%)
Missing	4136	3640	496
Insurance type			
Private Insurance	34292 (30.3%)	30997 (31.0%)	3295 (25.2%)
Medicare	51767 (45.7%)	45239 (45.2%)	6528 (49.9%)
Medicaid	14713 (13.0%)	12641 (12.6%)	2072 (15.8%)
Other Insurance	4688 (4.1%)	4233 (4.2%)	455 (3.5%)
No Insurance	7724 (6.8%)	6985 (7.0%)	739 (5.6%)
Cerebrovascular Disease			
1	13302 (11.8%)	11390 (11.4%)	1912 (14.6%)
0	99882 (88.2%)	88705 (88.6%)	11177 (85.4%)
Diabetes			
1	43303 (38.3%)	37735 (37.7%)	5568 (42.5%)
0	69881 (61.7%)	62360 (62.3%)	7521 (57.5%)
History of HF			
1	16791 (14.8%)	13953 (13.9%)	2838 (21.7%)
0	96393 (85.2%)	86142 (86.1%)	10251 (78.3%)
Dialysis			
1	3109 (2.7%)	2550 (2.5%)	559 (4.3%)
0	110075 (97.3%)	97545 (97.5%)	12530 (95.7%)
Hypertension			
1	86976 (76.8%)	76346 (76.3%)	10630 (81.2%)
0	26208 (23.2%)	23749 (23.7%)	2459 (18.8%)
Atrial Flutter			
1	1113 (1.0%)	940 (0.9%)	173 (1.3%)
0	112071 (99.0%)	99155 (99.1%)	12916 (98.7%)
Atrial Fibrillation			
1	11398 (10.1%)	9610 (9.6%)	1788 (13.7%)
0	101786 (89.9%)	90485 (90.4%)	11301 (86.3%)
Cancer			
1	4428 (3.9%)	3893 (3.9%)	535 (4.1%)
0	108756 (96.1%)	96202 (96.1%)	12554 (95.9%)

	Total	Cardiac Rehab Referral	
	n = 113184	Yes n = 100095	No n = 13089
Dyslipidemia 1 0	73200 (64.7%) 39984 (35.3%)	64588 (64.5%) 35507 (35.5%)	8612 (65.8%) 4477 (34.2%)
History of MI 1 0	23657 (20.9%) 89527 (79.1%)	20461 (20.4%) 79634 (79.6%)	3196 (24.4%) 9893 (75.6%)
Prior PAD 1 0	8028 (7.1%) 105156 (92.9%)	6760 (6.8%) 93335 (93.2%)	1268 (9.7%) 11821 (90.3%)
Prior PCI 1 0	29361 (25.9%) 83823 (74.1%)	25624 (25.6%) 74471 (74.4%)	3737 (28.6%) 9352 (71.4%)
Prior CABG 1 0	11503 (10.2%) 101681 (89.8%)	9519 (9.5%) 90576 (90.5%)	1984 (15.2%) 11105 (84.8%)
MI type NSTEMI STEMI	72691 (64.2%) 40493 (35.8%)	61984 (61.9%) 38111 (38.1%)	10707 (81.8%) 2382 (18.2%)

### 5.2.3 Reliability Testing Results

Table 8. Signal-to-noise ratio results from CathPCI Registry

	Overall	Min	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	Max
Reliability	0.995	0.906	0.974	0.991	0.995	0.997	0.998	0.999	0.999	1.00	1.000	1.000	1.000
Mean Performance Score	0.780		0.055	0.420	0.707	0.843	0.905	0.938	0.962	0.979	0.991	1.000	
N of Entities			163	164	164	163	164	164	163	164	157	171	
N of Persons / Encounters / Episodes			15748	31703	48905	62328	71389	75952	90307	99357	108906	44849	

Table 9. Signal-to-noise ratio results from CPMI Registry

	Overall	Min	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	Max
Reliability	0.975	0.739	0.891	0.946	0.966	0.978	0.986	0.99	0.993	0.996	0.999	1.000	1.00
Mean Performance Score	0.870		0.429	0.728	0.842	0.894	0.922	0.943	0.964	0.979	0.99	1.000	
N of Entities			58	58	59	58	59	58	58	59	46	71	
N of Persons / Encounters / Episodes			3359	6407	9022	9912	12250	13725	15093	15653	17962	9801	

5.3.4 Validity Testing Results

Table 10. Identification of Statistically Significant & Meaningful Differences in Performance (CathPCI Registry)

	Min	Decile1	Decile2	Decile3	Decile4	Decile5	Decile6	Decile7	Decile8	Decile9	Decile10	Max
Referral Rate (Mean)	0.0	0.055	0.420	0.707	0.843	0.905	0.938	0.962	0.979	0.991	1.000	1.0
N (Hospitals)		163	164	164	163	164	164	163	162	166	164	
N (Patients)		51720	58443	66184	62653	74909	68328	72913	70806	70259	53229	

Table 11. Identification of Statistically Significant & Meaningful Differences in Performance (CPMI Registry)

	Min	Decile1	Decile2	Decile3	Decile4	Decile5	Decile6	Decile7	Decile8	Decile9	Decile10	Max
Referral Rate (Mean)	0.0	0.429	0.728	0.842	0.894	0.922	0.943	0.964	0.979	0.99	1	1.0
N (Hospitals)		58	58	59	58	59	58	58	59	47	70	
N (Patients)		9297	9354	10666	13339	11470	12549	12260	12363	12346	9540	

6.2.4 Progress on Improvement

Figure 1. (CathPCI Registry)

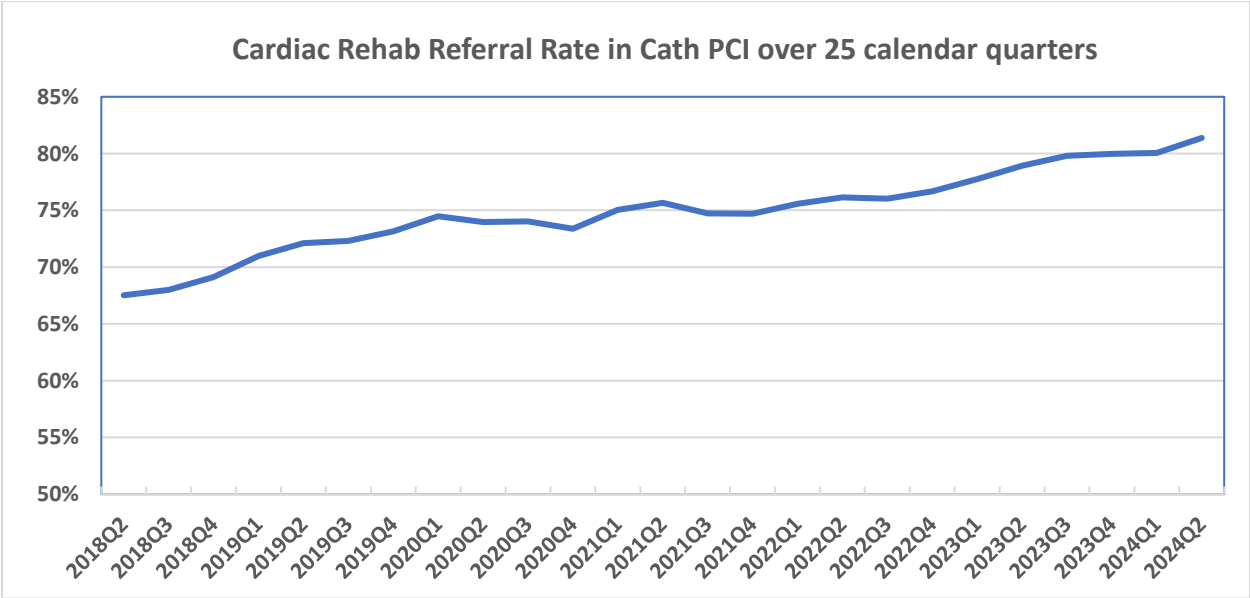




Figure 2. (CPMI Registry)

