

SUPPLEMENTAL MATERIAL

Tracking Cardiac Rehabilitation Participation and Completion among Medicare Beneficiaries to Inform the Efforts of a National Initiative

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Supplemental Methods

Medicare fee-for-service beneficiaries without a primary qualifying event were considered cardiac rehabilitation- (CR) eligible if they had documented current stable angina pectoris (angina) or stable, chronic heart failure (heart failure) during 2016 (referred to collectively as “secondary qualifying events”). The procedures outlined below were used to identify CR-eligible beneficiaries based on having one of the secondary qualifying events and to establish the index date for beginning to assess the CR-related measures described in the main paper. Beneficiaries could be identified as being CR-eligible based on both secondary qualifying event types; therefore, the totals are not mutually exclusive.

Defining and measuring cardiac rehabilitation use for beneficiaries with stable angina.

Angina was defined as having a specified International Classification of Disease, Tenth Revision, Clinical Modification (ICD-10-CM) diagnosis code (any location) on ≥ 2 outpatient claims (See Supplemental Table). The eligibility date started on the date of the first angina-related claim identified.

Defining and measuring cardiac rehabilitation use for beneficiaries with heart failure.

Heart failure was defined in two ways in an attempt to capture beneficiaries who met Medicare’s clinical criteria for being eligible to received CR services: have a left ventricular ejection fraction $\leq 35\%$ and New York Heart Association functional class II to IV with no recent (≤ 6 weeks) or planned (≤ 6 months) major cardiovascular disease (CVD)-related hospitalizations/procedures.¹

First, *diagnosis-based heart failure* was defined as having a specified ICD-10-CM code (any location) on ≥ 2 outpatient claims for chronic systolic heart failure or chronic systolic/diastolic heart failure (Supplemental Table). First, a 6 week lookback from the date of the first outpatient heart failure encounter was conducted to see if a CVD-related inpatient hospitalization occurred, defined as a primary or second listed ICD-10-CM diagnosis code of I00-I78. If no CVD hospitalization occurred, we started the CR measurement period immediately from the day of the first heart failure-related outpatient encounter. If one did occur, we started the CR measurement period once CR use began or 6 weeks after discharge from the CVD-related hospitalization (whichever occurred first). If another CVD-related hospitalization occurred

during the 6 weeks after discharge, we repeated the process until a 6-week window without a CVD-related hospitalization occurred or CR was initiated. If the calendar year ended without the CR initiation assessment period beginning, the final 6-week assessment was continued into the following year, but no additional 6-week window assessments were performed in the new year. If an assessment for CR initiation could not be performed because the patient had another CVD hospitalization during that final 6-week assessment that continued into the new calendar year, that beneficiary was removed from the CR eligible population count. If no CVD hospitalization occurred, we started the CR measurement period immediately from the day of the first heart failure-related outpatient encounter. If the beneficiary first had an *inpatient* claim in any place with one of the two heart failure indication codes, we started the CR measurement period once CR use began or 6 weeks after the discharge from that hospitalization even if it extended into the following year (whichever occurred first), unless a CVD-related hospitalization (first or second listed diagnosis ICD-10 code I00-I78) occurred during that 6-week period. If a CVD-related hospitalization did occur, we followed the process specified above.

Second, *procedure-based heart failure* was defined as having a specified ICD-10-CM procedure code during any inpatient encounter or Current Procedural Terminology (CPT) code in an inpatient or outpatient encounter for either insertion of an implantable ventricular assist device (VAD) or bi-ventricular pacemaker (BiV pacer). We started the CR measurement period once CR use began or 6 weeks after the procedure date (whichever occurred first), unless a CVD-related hospitalization (first or second listed diagnosis ICD-10 code I00-I78) occurred during that 6-week period. If a CVD-related hospitalization did occur, we followed the process specified above.

Supplemental Table. Diagnosis and Procedural Codes* Used to Identify Cardiac Rehabilitation-qualifying Events

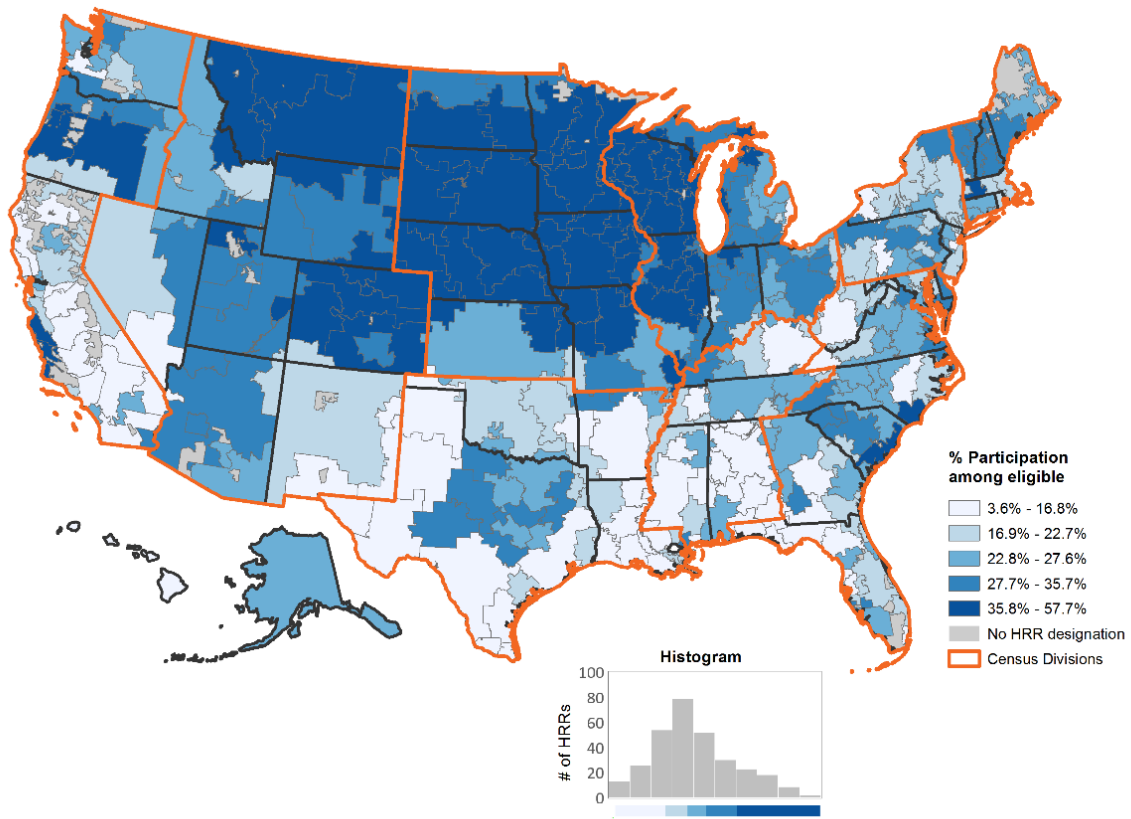
Primary Cardiac Rehabilitation Qualifying Event Surveillance	
Acute Myocardial Infarction	
ICD-10-CM Diagnosis Codes	
I21.0, I21.01, I21.02, I21.09 , I21.1, I21.11, I21.19, I21.2, I21.21, I21.29, I21.3, I21.4, I21.9, I21.A1 [†] , I21.A9 [†] , I22.0, I22.1, I22.2, I22.8, I22.9	
Coronary artery bypass surgery (CABG)	
ICD-10-CM Procedural Codes	CPT Codes
0210X, 0211X, 0212X, 0213X	33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33530, 33533, 33534, 33535, 33536, 33572, 35600, S2205, S2206, S2207, S2208, S2209
Valve Repair/Replacement Procedures	
ICD-10-CM Procedural Codes (includes all codes with these as the first four identifiers)	CPT Codes
027F, 027G, 027H, 027J, 02CF, 02CG, 02CH, 02CJ, 02NF, 02NG, 02NH, 02NJ, 02QF, 02QG, 02QH, 02QJ, 02RF, 02RG, 02RH, 02RJ, 02TH, 02VG, 02UF, 02UG, 02UH, 02UJ	33361-33417, 33418-33430, 33460-33468, 33470-33478
Percutaneous transluminal coronary angioplasty (PTCA) or coronary stenting	
ICD-10-CM Procedural Codes	CPT Codes
02703ZZ, 02704ZZ, 02713ZZ, 02714ZZ, 02723ZZ, 02724ZZ, 02733ZZ, 02734ZZ, 3E07017, 3E070PZ, 3E07317, 3E073PZ, 02700ZZ, 02710ZZ, 02720ZZ, 02730ZZ, 02C00ZZ, 02C10ZZ, 02C20ZZ, 02C30ZZ, 02C03ZZ, 02C04ZZ, 02C13ZZ, 02C14ZZ, 02C23ZZ, 02C24ZZ, 02C33ZZ, 02C34ZZ	92920, 92921, 92924, 92925, 92928, 92929, 92933, 92934, 92937, 92938, 92941, 92943, 92944, 92973, 92974
Heart or heart-lung transplant	
ICD-10-CM Procedural Codes	CPT Codes
02YA0Z0, 02YA0Z1, 02YA0Z2, 0BYM0Z0, 0BYM0Z1, 0BYM0Z2, 02YA0Z0 , 02YA0Z1, 02YA0Z2, 02RK0JZ, 02RL0JZ, 02WA0JZ, 02WA0JZ	33945, 33927, 33928, 0051T, 0052T, 0053T
Secondary Cardiac Rehabilitation Qualifying Event Surveillance	
Current stable angina pectoris	
ICD-10-CM Diagnosis Codes	
I20.1, I20.8, I20.9	
Stable*, chronic heart failure (LVEF ≤35% and NYHA class II to IV)	
ICD-10-CM Diagnosis Codes	
I50.22, I50.42, I50.82 [†]	
Procedures related to chronic heart failure management	
Implantable (intracorporeal) ventricular assist device insertion	
ICD-10-CM Procedure Codes	CPT Codes
02HA0QZ	33979
Bi-ventricular pacemaker insertion	
ICD-10-CM Procedure Codes	CPT Codes
0JH609Z, 0JH639Z, 0JH809Z, 0JH839Z, 0JH607Z, 0JH637Z, 0JH807Z, 0JH837Z	33224, 33225

Stable defined as no recent (≤6 weeks) or planned (≤6 months) major cardiovascular hospitalizations/ procedures)

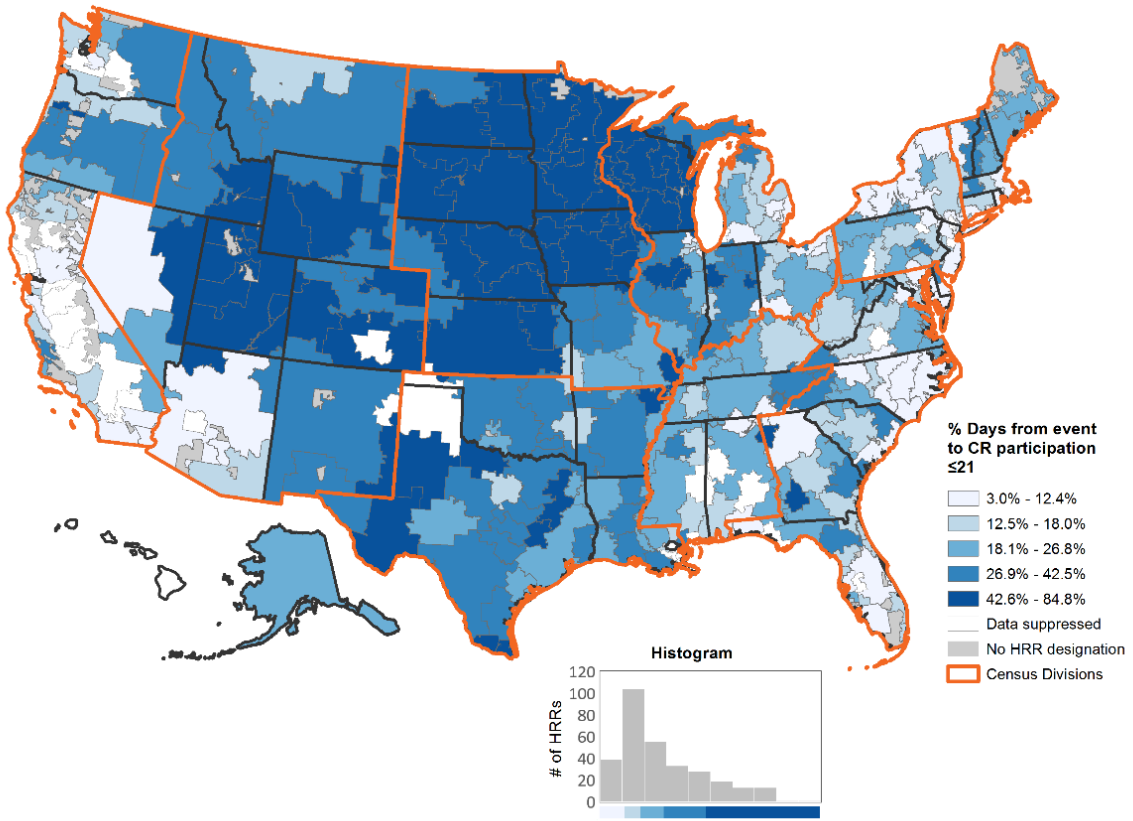
[†]Effective Oct. 1, 2017

Supplemental Figure. Unadjusted cardiac rehabilitation participation (a), timely initiation (b) and completion (c) rates among Medicare Fee-for-service beneficiaries, by hospital referral region and US Census Division, 2016–2017

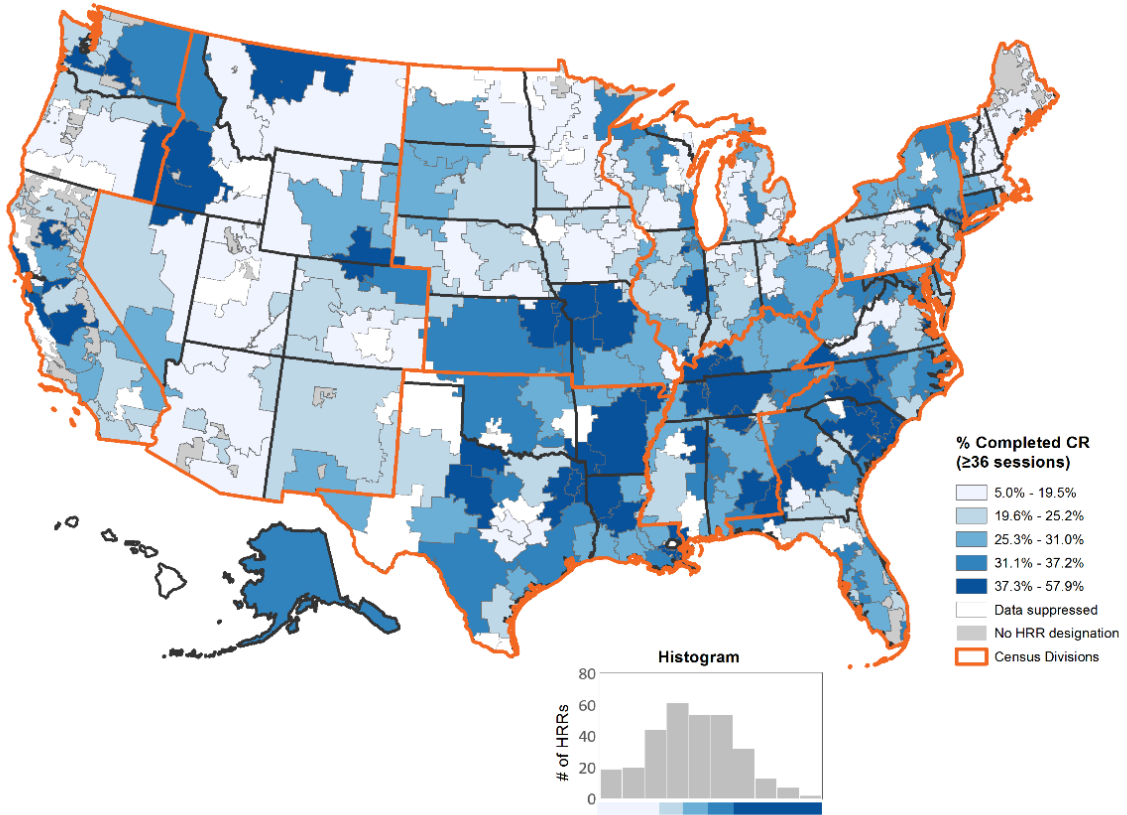
a. Participation (≥ 1 session attended)



b. Timely initiation (initiated within 21 days of event)



c. Completion (attended ≥ 36 sessions)



Supplemental References

1. Centers for Medicare and Medicaid Services. Decision Memo for Cardiac Rehabilitation Programs - Chronic Heart Failure. CAG-00437N. <https://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=270>. Published Feb 18, 2014. Accessed November 11, 2019.