Table CRE—1/2/3: Data Elements for Cardiac Rehabilitation

Data Elements	Administrative
Measurement year	✓
Data collection methodology (Administrative)	✓
Eligible population	*For each age stratification and total*
Number of required exclusions	*Each rate, for each age stratification and total*
Numerator events by administrative data	*Each rate, for each age stratification and total*
Numerator events by supplemental data	*Each rate, for each age stratification and total*
Reported rate	*Each rate, for each age stratification and total*

Cardiac Rehabilitation (CRE)
Measure Workup

Topic Overview

Importance and Prevalence

Heart disease is the leading cause of death in the United States. By some estimates, by 2030 more than 40% of Americans will have a form of heart/cardiovascular disease (Heidenreich et al., 2011). According to CDC estimates, 30 million (12%) of American adults had heart disease in 2018 (CDC, 2017a). Key risk factors include high blood pressure, high cholesterol, diabetes and obesity. Behaviors such as unhealthy diet, physical inactivity, alcohol use and tobacco use can also place patients at higher risk for developing heart disease (CDC, 2015).

Heart disease encompasses several cardiac conditions that can lead to decreased heart function (AHA, 2017). It may lead to increased risk for certain events such as myocardial infarction (MI), or for certain procedures such as percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG), heart transplant and heart valve repair/replacement. In 2014, there were an estimated 805,000 MIs, 480,000 PCIs, 371,000 CABGs and 156,000 heart valve repairs/replacements. In 2017, heart transplants reached a record high: 3,244 (Benjamin et al., 2019).

National efforts to reduce cardiovascular disease are underway by the Million Hearts® initiative and others. This initiative was established by the U.S. Department of Health and Human Services and is co-led by the Centers for Disease Control and Prevention (CDC) and the Centers for Medicare & Medicaid Services (CMS) in collaboration with 120 private and public sector official partners. Million Hearts® was launched in 2012 with the goal of preventing 1 million heart attacks and strokes within 5 years. A progress update revealed that approximately 115 thousand cardiovascular events were prevented in the first two years of the initiative, and an estimated half million cardiovascular events were prevented by 2017. The initiative set new goals for 2022 to continue implementation efforts, increase participation to more than 70% and reach its goal of 1 million events prevented (CDC, 2017b).

Supporting Evidence for Cardiac Rehabilitation

Cardiac rehabilitation (CR) is a medical program that aims to help patients regain cardiovascular health and heart function after a cardiac-related event. Most commonly delivered in outpatient settings, CR programs provide exercise training, healthy lifestyle education and stress counseling (AHA, 2016). The comprehensive components of CR promote physical and psychological recovery, reduce cardiovascular risk and mortality and prevent secondary cardiac events (Ades et al., 2017). Additional improvements such as exercise tolerance, medical regimen compliance and smoking cessation have also been associated with participation (O'Gara et al., 2013).

The American College of Cardiology and American Heart Association (ACC/AHA) recommend CR for patients who have experienced MI, CABG, PCI, coronary revascularization or coronary artery and other atherosclerotic vascular disease. Participation in CR can decrease recurrent cardiac-related events, reduce mortality by more than 12% reduce hospitalizations by 20%–30% and improve quality of life (Thomas et al., 2018).

Financial importance and cost-effectiveness	Heart disease is the leading diagnosis for direct U.S. health expenditures. In 2014–2015, the average direct cost for heart disease in the U.S. totaled approximately $109.4 billion annually; indirect costs added approximately $109.3 billion. At a total of $218.7 billion in direct and indirect costs, heart disease accounted for 88% of all cardiovascular disease and stroke expenditures. (Benjamin et al., 2019)

CR is associated with decreased hospitalizations and health system costs. Compared with usual care, CR cost-effectiveness ratios range from $1,065 to $71,755 per quality-adjusted life year (Shields et al., 2018). Per person, cardiac rehabilitation saves approximately $4,950 to $9,200 per year of life saved (Edwards et al., 2017).

Safety considerations and contraindications

CR is a secondary prevention program for improving cardiovascular health. While it is considered safe for most patients, there are safety concerns to consider before referral and throughout rehabilitation. The patient's health care team should evaluate the patient's medical history and conduct a physical examination prior to CR referral, to assess appropriateness. There is also a small risk of injury (e.g. strained muscles or sprains) or cardiovascular complications. According to the 2014 AHA/ACC guidelines, older patients (75 years and older) can experience the same benefits of CR as younger patients.

Initiation and Adherence

Following a qualifying cardiac event, time to initiation is an important factor of adherence, completion and outcomes. Referral for CR can be provided as early as pre-discharge or at the first follow-up visit (Smith et al., 2011). Depending on the patient's condition and previous functional status, physical activity can begin immediately after discharge with daily walking; aerobic training can begin within 1–2 weeks and resistance training can begin within 2–4 weeks (Amsterdam et al., 2014). All factors considered, the ACC defines CR initiation as one or more CR sessions within 21 days of the qualifying cardiac event (Ritchey et al., 2019).

There is a strong dose-response relationship for CR: Attending more sessions is linked with improved outcomes. A national study of Medicare beneficiaries found that mortality rates at 5 years after discharge for a qualifying cardiac event or condition were 8% lower for patients who attended CR than for patients who did not. When comparing CR attendees, patients who attended 25 or more sessions were 3% less likely to die than patients who attended 24 or fewer sessions (Suaya et al., 2009). An additional Medicare beneficiary sample found that patients who attended 36 sessions of CR had a lower risk of death than patients who attended 1, 12 and 24 sessions by 47%–58%, 22%–29% and 14%–18%, respectively (Hammill et al., 2010). The recommended dose of 36 sessions and 25 sessions has been shown to be meaningful. Both thresholds are associated with improved survival rates and decreased cardiac risk factors (CDC, 2018).

Health care disparities

Heart disease has significant disparities and many studies have shown both demographic and geographic disparities associated with CR. Participation in CR programs is lower for older patients, women, racial minorities, rural patients and patients with low socio-economic status. White patients are more likely to be referred for CR than Black, Hispanic and Asian patients by 20%, 36%, and 50%, respectively (Li et al., 2018). A recent study based on Medicare claims and the AHA Coronary Artery Disease registry found that females were 12% less likely than males to be referred for CR.

A study based on the Behavioral Risk Factor Surveillance System (BRFSS) found that women of lower income and of ethnic and racial minorities were less likely to be referred for CR services (Patel et al., 2019). For patients that are referred, research has demonstrated that poor physician endorsement, actual or perceived, is the most influential factor for low CR utilization (Tsui et al., 2012).

Geographic burden directly impacts CR participation. A narrative review identified rurality and travel distance/time as significant barriers to initiation. Of the studies reviewed, 55% found that rurality has a significant negative relationship with CR participation and 60% found that travel distance/time has a significant negative relationship with CR participation (Leung et al., 2010).

Gaps in care

Despite the Class IA recommendation and stated benefits, CR is historically underused, with participation ranging from 19%–34% nationally, with geographic variances (Ades et al., 2017). A recent study of Medicare A and B claims found that of more than 366,000 eligible beneficiaries, fewer than 24% participated in CR (Ritchey, et al, 2019). Another study that examined CR participation found that approximately 16% of CR eligible Medicare beneficiaries attended CR sessions. The highest regional participation was observed in the West North Central region (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota), where approximately 34% of the eligible beneficiaries attended sessions. The lowest regional participation was observed in the Pacific region (Alaska, California, Hawaii, Oregon, Washington) where approximately 10% of the eligible beneficiaries attended CR sessions (Beatty et al., 2018). Other studies have shown that participation in CR is lowest in the South (Ades et at., 2017).

The ACC found that, among eligible Medicare beneficiaries, only 24% participated in CR. Of those beneficiaries, only 24% initiated within the 21-day threshold, and only 27% completed the recommended dose of 36 sessions. Clear gaps in care were also observed. Males had greater participation, initiation, and completion rates than women by 10%, 3% and 2%. Hispanic patients had the lowest participation rate (13%), Asian patients had the lowest initiation rate (17%) and Hispanic patients had the lowest completion rate (24%). The greatest participation and completion rates (55% and 30%) were reported for patients who had a CABG procedure (Ritchey et al., 2019).

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Specific Guideline Recommendations

Clinical Practice Guidelines: Cardiac Rehabilitation after Qualifying Event

Organization, Year	Guideline	Recommendation	Grade
AHA/ACC, 2014	Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes	All eligible patients with NSTE-ACS should be referred to a comprehensive cardiovascular rehabilitation program either before hospital discharge or during the first outpatient visit.	Class I, Level of Evidence: B
ACCF/AHA, 2013	Guideline for the Management of Patients With ST-Elevation Myocardial Infarction	Exercise-based cardiac rehabilitation/secondary prevention programs are recommended for patients with STEMI	Class I, Level of Evidence: B
AHA/ACCF, 2011	Secondary Prevention and Risk Reduction Therapy for Patients With Coronary Artery and Other Atherosclerotic Vascular Disease	All eligible patients with ACS or whose status is immediately post coronary artery bypass surgery or post-PCI should be referred to a comprehensive outpatient cardiovascular rehabilitation program either prior to hospital discharge or during the first follow-up office visit	Class I, Level of Evidence: A
		All eligible outpatients with the diagnosis of • ACS, coronary artery bypass surgery or PCI. • Chronic angina. • Peripheral artery disease… within the past year should be referred to a comprehensive outpatient cardiovascular rehabilitation program.	• Class I, Level of Evidence: A • Class I, Level of Evidence: B • Class I, Level of Evidence: A
AHA, 2011	Effectiveness-Based Guidelines for the Prevention of Cardiovascular Disease in Women	A comprehensive CVD risk-reduction regimen such as cardiovascular or stroke rehabilitation or a physician-guided home- or community-based exercise training program should be recommended to women with a recent: • Acute coronary syndrome or coronary revascularization, new-onset or chronic angina, recent cerebrovascular event, peripheral arterial disease. • Or current/prior symptoms of heart failure and an LVEF 35%.	• Class I; Level of Evidence A • Class I; Level of Evidence B
ACCF/AHA, 2011	Guideline for Coronary Artery Bypass Graft Surgery	Cardiac rehabilitation is recommended for all eligible patients after CABG	Class I, Level of Evidence: A
ACCF/AHA/ SCAI, 2011	Guideline for Percutaneous Coronary Intervention	Medically supervised exercise programs (cardiac rehabilitation) should be recommended to patients after PCI, particularly for moderate- to high-risk patients for whom supervised exercise training is warranted.	Class I; Level of Evidence: A

Grading System Key

Grading System Key: ACC/AHA Classification of Recommendations and Levels of Evidence

		Size of Treatment Effect			
		CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	CLASS IIa *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/ administer treatment	CLASS IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	CLASS III *No Benefit* *or* CLASS III *Harm*
Strength of Recommendation	LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	• Recommendation that procedure or treatment is useful/effective • Sufficient evidence from multiple randomized trials or meta-analyses	• Recommendation in favor of treatment or procedure being useful/effective • Some conflicting evidence from multiple randomized trials or meta-analyses	• Recommendation's usefulness/efficacy less well established • Greater conflicting evidence from multiple randomized trials or meta-analyses	• Recommendation that procedure or treatment is not useful/effective and may be harmful • Sufficient evidence from multiple randomized trials or meta-analyses
	LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	• Recommendation that procedure or treatment is useful/effective • Evidence from single randomized trial or nonrandomized studies	• Recommendation in favor of treatment or procedure being useful/effective • Some conflicting evidence from single randomized trial or nonrandomized studies	• Recommendation's usefulness/efficacy less well established • Greater conflicting evidence from single randomized trial or nonrandomized studies	• Recommendation that procedure or treatment is not useful/effective and may be harmful • Evidence from single randomized trial or nonrandomized studies
	LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	• Recommendation that procedure or treatment is useful/effective • Only expert opinion, case studies, or standard of care	• Recommendation in favor of treatment or procedure being useful/effective • Only diverging expert opinion, case studies, or standard of care	• Recommendation's usefulness/efficacy less well established • Only diverging expert opinion, case studies, or standard of care	• Recommendation that procedure or treatment is not useful/effective and may be harmful • Only expert opinion, case studies, or standard of care

A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Although randomized trials are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

*Data available from clinical trials or registries about the usefulness/efficacy in different subpopulations, such as sex, age, history of diabetes, history of prior myocardial infarction, history of heart failure, and prior aspirin use.

†For comparative effectiveness recommendations (Class I and IIa; Level of Evidence A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

Grading System Key: AHA—Effectiveness-Based Guidelines for the Prevention of Cardiovascular Disease in Women

Classification and Level of Evidence	Strength of Recommendation
Classification	
Class I	Intervention is useful and effective
Class IIa	Weight of evidence/opinion is in favor of usefulness/efficacy
Class IIb	Usefulness/efficacy is less well established by evidence/opinion
Class III	Procedure/test not helpful or treatment has no proven benefit Procedure/test excess cost without benefit or harmful or treatment harmful to patients
Level of Evidence	
A	Sufficient evidence from multiple randomized trials
B	Limited evidence from single randomized trial or other nonrandomized studies
C	Based on expert opinion, case studies, or standard of care