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Participation in Cardiac Rehabilitation among Patients with Heart Failure

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Abstract

Objectives—We sought to determine: a) the proportion of patients with heart failure (HF) who participated in cardiac rehabilitation (CR); and b) patient characteristics associated with participation.

Background—CR is linked to reduced mortality and morbidity including improvements in cardiorespiratory fitness, psychosocial state, and quality of life in patients with HF. However, little is known about CR utilization among patients with HF.

Methods—A retrospective study was conducted using national data from the Centers for Medicare & Medicaid Services and the Veterans Health Administration (VA). We used primary discharge ICD-9 codes to identify patients hospitalized for HF from 2007–2011 then identified CR participation using CPT codes from claims data. Multivariate logistic regression was used to identify patient characteristics associated with CR participation.

Results—There were 66,710 Veterans and 243,208 Medicare beneficiaries hospitalized for HF and 1,554 (2.3%) and 6,280 (2.6%), respectively, who attended one or more sessions of outpatient CR. Among Medicare beneficiaries, men were more likely than women to participate in CR (3.7% vs. 1.8%; $p<0.001$), but there was no gender difference among Veterans (2.3% vs. 2.8%; $p=0.40$). Characteristics associated with participation in CR among both groups included younger age, white race, and history of ischemic heart disease.

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Conclusions—Very few HF patients participated in CR with lower rates among those who were older, non-white, and female with a history of depression or other chronic medical conditions. Since Medicare has recently introduced coverage for CR in patients with systolic HF, we must increase efforts to improve CR participation, especially among these vulnerable groups.

Keywords

cardiovascular disease; Medicare; Veterans; exercise

A focus of heart failure (HF) management is to reduce symptoms and improve exercise capacity. Exercise-based cardiac rehabilitation (CR) is a comprehensive secondary prevention program involving exercise training, risk factor modification, education, and counseling to reduce the burden of the effects of cardiovascular illness.[1,2] CR participation is associated with reduced morbidity and mortality as well as improvement of quality of life, symptoms and functional capacity.[3–6] Clinical guidelines on HF management include exercise training and CR as a Class I recommendation.[7]

Despite these recommendations, CR is still vastly underutilized in the United States.[3,7–11] One major barrier to referral of CR included lack of insurance coverage for HF.[12] However, in February 2014, Centers for Medicare & Medicaid Services (CMS) introduced coverage of CR for patients with HF.[13] As a result of these recent policy changes, more patients with HF are expected to enroll in CR.

Few studies have evaluated the proportion of patients with HF who participate in CR. A recent study of U.S. hospitals in the Get With the Guidelines database showed a 10.4% *referral* rate to CR for patients with HF prior to the CMS approval,[14] but the *participation* rate in CR is unknown. The Veterans Health Administration (VA) has provided CR services for Veterans with HF independent of CMS approval, which makes it a unique population to study CR use without the potential barrier of insurance coverage. By analyzing both VA and Medicare data in this retrospective study, we sought to determine: 1) the proportion of patients with HF who participated in CR during a 5-year period; and 2) significant patient factors associated with participation vs. non-participation.

Methods

Study Design and Data Collection

A retrospective study was conducted using national data from two separate data sources: VA Healthcare System and the Medicare claim files. Patients were identified using a random sample of Medicare beneficiaries from a 5% sample of Medicare claims and VA hospital discharge records through CMS and VA datasets. We identified unique patients who were discharged from inpatient medical facilities with a diagnosis of HF from 1/1/2007 – 12/31/11. Primary ICD-9 codes were used to define HF. Patients were excluded if death occurred within 30 days of hospitalization. We extracted data on comorbidities that appeared once in inpatient data or twice in outpatient data.

We defined CR participation as one or more CR sessions within 12 months after hospitalization for HF. The number of unique patients who participated in CR programs was obtained using outpatient files with CPT codes for CR.

Data Analysis

We compared sociodemographic characteristics and comorbidities of CR participants and non-participants for both VA and CMS data. Characteristics of patients who participated in CR were compared to those who did not participate in CR using t-tests or Wilcoxon rank-sum tests for continuous variables and chi-square analyses for dichotomous or categorical variables. A multivariable logistic regression was used to determine factors independently associated with CR participation. Variables that were significantly associated with CR participation at an *a priori* significance level of $p<0.05$ were entered into a multivariable model. SAS version 9.3 (SAS Institute Inc., Cary, NC) was used for all analyses.

Results

During the five-year period, 66,710 Veterans were hospitalized for HF. Only 1,554 (2.3%) attended at least one session of outpatient CR. Among Medicare beneficiaries, 243,208 were hospitalized for HF with 6,208 (2.6%) participating in at least one session of outpatient CR (Figure 1). For Medicare beneficiaries, CR participation increased from 1.3 to 3.1%, while participation rates remained relatively flat among Veterans in the same time period (2.0 to 2.1%).

After adjusting for sociodemographic and comorbid differences, men were more likely than women to participate in CR among Medicare beneficiaries [odds ratio (OR) 1.57; CI 1.49–1.65; P<0.0001], but there was no difference among Veterans (Table 1). Younger age and white race were both associated with greater participation. Among Veterans, being married and higher income were associated with greater participation. Ischemic heart disease and hyperlipidemia were significant predictors of CR participation in both groups (OR 7.51, CI 6.53–8.62; P<0.0001). Chronic conditions including diabetes, cerebrovascular disease, chronic obstructive pulmonary disease, chronic kidney disease, and depression were also associated with less participation in CR.

Discussion

Participation in one or more sessions of outpatient CR was extremely low at 2.3% among Veterans and 2.6% among Medicare beneficiaries who were hospitalized for HF between 2007–2011. Although these rates were expect to be low, new strategies must be developed to increase CR participation in the HF population since coverage for CR for HF has been introduced. A major reason for underutilization of CR is likely the requirement for HF with reduced ejection fraction (HFrEF), although more than half of patients with HF have preserved ejection fraction (HFpEF) with comparable morbidity and mortality outcomes.[15] It is informative that participation was extremely low for Veterans with HF where reimbursement was not a factor. This result supports the fact that there are other significant contributing factors to lack of CR referral and participation.

Compared with the recent findings of a 10.4% referral rate for patients after hospitalization for HF to CR,[14] our study included three times as many patients and more importantly, the former study investigated *referral* to CR whereas our study evaluated CR participation. Clearly both efforts to increase referral and participation need improvement and require further investigation after the CMS approval in 2014.

In addition to the major historical barrier of insurance coverage for patients with HF, the reasons for low utilization of CR are multifactorial such as transportation issues, lack of physician referral, fear of exercise and injury, etc.[16–18] Since CR has traditionally been for patients with IHD and cardiac surgery, patients with HF are less likely to be prescribed CR. Many misconceptions of the potential harm of exercise causing ventricular remodeling hindered the CR referral.[18] Access to transportation and geographic distance to CR programs is a major barrier as nearly 24% of VA enrollees are from rural areas[19] and 76% of VA enrolled Veterans live over one hour from a VA CR center. Also, only stable patients with HFrEF are currently considered eligible for CR.

The gender difference we found in Medicare beneficiaries with HF is consistent with trends that have been established over the past decade about CR referral, enrollment, and adherence.[20–22] Although women may have greater morbidity and mortality in the short term period following HF hospitalization,[23] they are significantly less likely than men to access CR.[24] Barriers to CR participation that women have reported include perceiving exercise as tiring or painful, transportation, family responsibilities, and comorbidities (e.g., musculoskeletal issues).[25]

We found less CR participation in Medicare patients with comorbidities (e.g., COPD, chronic kidney disease, diabetes, etc.). We speculate the reasons for less participation are multifactorial such as frailty, intolerance to exercise, depression, etc. More attention is needed in these high risk patients who would benefit from cardiopulmonary and cardiovascular improvement as well as self-care education and social support.

This study has several strengths and limitations that should be considered when interpreting the results. First, the most significant strength of this study is our presentation of CR participation rates, not referral rates. Second, this study includes a national sample of both Medicare and Veteran patients. All of the VA facilities were included; therefore, the potential variation in CR participation across medical facilities was accounted for with its own unique characteristics such as different patient populations and delivery of health care services. The most important limitation to consider is that these analyses reflect patients who received CR after being hospitalized with HF and not from an outpatient database. It is more common for patients to be referred for CR from an inpatient hospitalization[14]; therefore, we do not believe the lack of outpatient sources was significant. Also, since these patients were referred prior to HF approval, it is unclear if ejection fraction would have been a factor. Veterans with dual coverage who may have attended a non-VA CR program may not have been identified. However, this number is small and probably would not significantly change our results. Finally, we did not include musculoskeletal conditions as comorbidities in our analysis although they have been known to be a barrier for CR among women.[25]

Conclusion

We found that CR was vastly underutilized among patients hospitalized for HF over a 5-year period among both VA and CMS beneficiaries. Because these data were prior to the CMS amendment to include CR as a benefit for patients with HF, we expected to find low participation rates. However, the similar rates between Medicare and VA patients where CR for patients with HF has been a covered benefit was surprising. This suggests that insurance coverage of CR for patients with HF is not the major factor for low participation. Instead, we found that less CR participation is associated with having comorbidities. Data from this study provide a basis for establishing goals to improve clinical care of patients with HF that include addressing the burden of comorbidities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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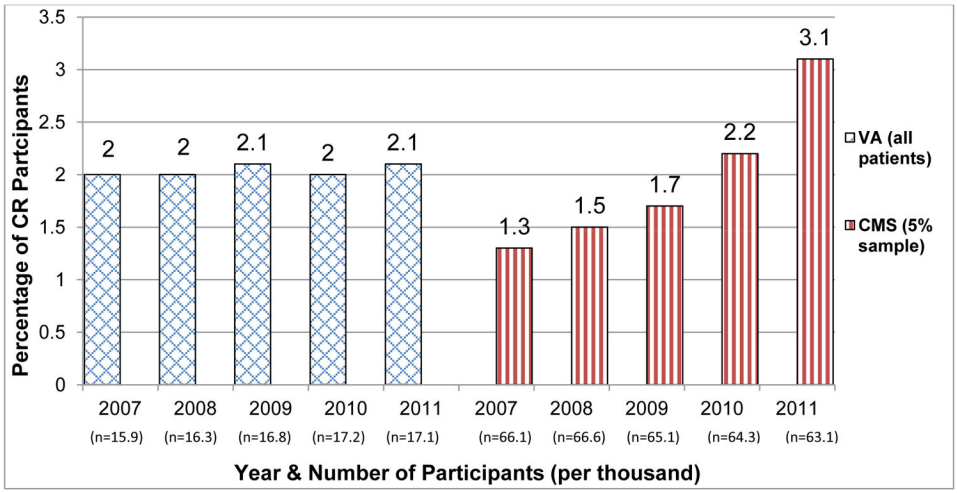

Figure 1. Percent of participation in VA (N=66,710) vs. CMS (N=243,208) cardiac rehabilitation from 2007–2011

*Of the total unique number of VA patients discharged with HF over 5 years, 2.3% participated in CR. In Medicare recipients, 2.6% participated in CR.

Table 1

Factors independently associated with participation in cardiac rehabilitation among Veterans and patients with Medicare with heart failure

		VA (N=66,710)		CMS (N=243,208)	
		Odds Ratio (95% CI)	**P-value**	**Odds Ratio (95% CI)**	**P-value**
Age at discharge (per 10-year increase)		0.73 (0.70–0.78)	<0.0001	0.71 (0.69 – 0.72)	<0.0001
Gender	Female	1.0	--	1.0 (reference)	--
	Male	0.83 (0.58–1.20)	0.32	1.57 (1.49–1.65)	<0.0001
Race	White	1.0 (reference)	--	1.0 (reference)	--
	Black	0.88 (0.77–1.01)	0.07	0.36 (0.33–0.40)	<0.0001
	Asian/PI/AI *	1.10 (0.73–1.66)	0.65	0.45 (0.37–0.54)	<0.0001
	Hispanic	0.66 (0.49–0.89)	0.01	0.20 (0.15–0.28)	<0.0001
	Unknown	0.61 (0.48–0.77)	0.00	0.40 (0.17–0.99)	0.05
Marital status	Other	1.0 (reference)	--	N/A	--
	Unknown/Missing	1.21 (0.85–1.72)	0.28	N/A	--
	Married	1.17 (1.05–1.31)	0.00	N/A	--
Income	0–9,000	1.0 (reference)	--	N/A	--
	9,000–33,000	0.88 (0.78–1.01)	0.06	N/A	--
	>33,000	1.22 (1.04–1.43)	0.02	N/A	--
Hypertension		1.14 (0.95–1.37)	0.15	1.15 (0.97–1.35)	0.10
Ischemic heart disease		2.72 (2.35–3.15)	<0.0001	7.51 (6.53–8.62)	<0.0001
Hyperlipidemia		1.65 (1.45–1.89)	<0.0001	5.05 (4.52–5.63)	<0.0001
Diabetes		0.94 (0.84–1.05)	0.29	0.78 (0.74–0.82)	<0.0001
Cerebrovascular disease		0.87 (0.75–1.00)	0.05	0.74 (0.69–0.79)	<0.0001
Peripheral vascular disease		1.00 (0.88–1.12)	0.93	1.02 (0.97–1.08)	0.37
Chronic obstructive pulmonary disease		0.88 (0.79–1.98)	0.02	0.63 (0.60–0.67)	<0.0001
Chronic kidney disease		0.96 (0.86–1.07)	0.42	0.89 (0.84–0.93)	<0.0001
Depression		1.10 (0.98–1.24)	0.18	0.72 (0.68–0.77)	<0.0001

* Asian/Pacific Islander/American Indian