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Rates of Enrollment for Men and Women Referred to Outpatient Cardiac Rehabilitation

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Abstract

Objective—Outpatient cardiac rehabilitation (CR) services are underutilized. Fewer women participate in CR than men. It is unclear if women referred to CR enroll at the same rate as men. The purpose of this study was to compare enrollment rates of men and women who were referred to CR.

Methods—A retrospective medical record review was performed for selected variables for all adult patients who resided in Olmsted County, Minnesota, were hospitalized from January 2005 through July 2007 and were referred to a CR program. Enrollment in CR was defined as attendance at 1 or more CR sessions.

Results—Four hundred fifty patients referred to CR were identified. Two hundred eighty-six patients (64%) enrolled in CR. Rates of enrollment for men and women were similar (65% versus 62%, *P*=.54). Patients of either gender who did not enroll were older, less educated, less often married, more likely to smoke, more likely to be diabetic, and less likely to have had cardiac surgery. Enrollment of women with or without comorbidities was similar (62% versus 61%, *P*=.87), while enrollment of men with comorbidities was lower than for men without comorbidities (52% versus 75%, *P*<.01).

Conclusion—In our CR program, enrollment rates for men and women, once referred, are similar. Enrollment rates are lower for older patients of both genders and for men with comorbidities. Lower utilization of CR by women than by men does not appear to be due to a gender difference in enrollment rates after a referral is made.

Keywords

Outpatient cardiac rehabilitation; enrollment rates for men and women

There is growing and compelling evidence that participation in outpatient cardiac rehabilitation (CR) improves patient survival.[1-3] According to clinical practice guidelines and current performance measures, CR programs are an essential component in the care of patients with coronary heart disease.[4,5] However, CR services are underutilized in the United States with a participation rate of only 19% for Medicare beneficiaries.[6] The elderly, nonwhites, patients with comorbidities, low socioeconomic status, the unemployed, single patients. and women are significantly less likely to participate.[6-9]

Participation in CR is particularly low for women as compared with men (14% versus 22%).[6] Women are less likely to be referred to outpatient CR than men.[7,8] Women, after referral, may be less likely to enroll in CR than men.[7] Multiple reasons for underutilization

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of CR by women have been reported, including barriers related to older age, less likelihood of being married contributing to inadequate social support, and less encouragement from healthcare providers to utilize CR.[7,9] Women generally experience their first cardiac event and subsequently enroll in CR at an older age than what is observed in men.[10] Some authors have questioned whether or not women perceive that CR programs effectively meet their needs.[11] While these factors may be associated with the lower CR participation rate for women, it is unclear if they are associated with a lower likelihood of enrollment in CR by women. Specifically, it is unclear if women who are referred to CR eventually enroll at the same rate as do men. The purpose of this study was to compare, after referral from two hospitals at an academic medical center, the actual enrollment rates of men and women in an affiliated CR program.

Methods

The project was approved by the Institutional Review Board at our institution. In accordance with state law, data from individual patient medical records were obtained only from patients who provided written authorization for participation in medical record-based research (approximately 95% of patients at our institution). A retrospective medical record review was performed by one of the authors for selected clinical and sociodemographic variables for all adult patients who resided in Olmsted County, Minnesota, who were hospitalized from January 2005 through July 2007 and who were referred to our outpatient CR program. The 2006 population of Olmsted County, Minnesota was 137,521, 90% of whom were non-Hispanic whites.

Referral process

Ours is the only CR program in Olmsted County, is located in a multispecialty outpatient clinic building, and is fully integrated with the 2 hospitals in our health-care system. Electronic referral to outpatient CR is available in the hospitals by way of an order set. A recent study from our institution estimated the referral rate after myocardial infarction to be 74%.[12] After receiving a referral, a representative from the CR program visits each patient in the hospitals to answer questions and provide an appointment for the first rehabilitation session within 1-2 weeks after hospital discharge. There is no waiting list for starting CR. The day before the first CR session, patients receive a phone call reminder from a member of the CR staff. All patients had a qualifying Medicare diagnosis for participation in CR: acute myocardial infarction, stable angina pectoris, coronary artery bypass surgery, and after March 22, 2006 we included the expanded Medicare diagnoses of percutaneous coronary intervention, heart valve repair or replacement, and heart transplantation.

Measures

Data were retrieved from the patient electronic medical records (EMR) using the documentation of diagnoses, past medical history, and selected clinical variables by attending physicians and standard patient questionnaires. Data were recorded in a separate electronic spreadsheet for analysis. Clinical variables of interest included obesity (body mass index, BMI, ≥ 30 kg/m^2), tobacco use (self-report from standard patient questionnaire), cardiovascular diagnosis and selected comorbid conditions (yes/no): diabetes mellitus, end-stage renal disease, chronic obstructive pulmonary disease, peripheral arterial disease, chronic systolic heart failure (left ventricular ejection fraction <40%), and stroke. Sociodemographic variables included age, gender, educational attainment, marital status, and employment status. Referral to CR was determined from the EMR. Enrollment in outpatient CR was defined as attendance at 1 or more CR sessions.

Data Analysis

Statistical analysis was conducted using JMP (version 7.0.1, SAS Institute, Inc., Cary, NC). Clinical and demographic variables were compared between the sexes using Student's t-test for continuous variables and the χ^2 test (or Fisher's exact test) for categorical variables. Gender was the primary variable of interest and was assessed for its association with enrollment in CR as well as with potential confounders using logistic regression. A subsequent multivariate logistic regression model for enrollment in CR was constructed for all variables that were significant (or approached significance) from the univariate analysis with the exception of gender which was retained in the multivariate model regardless of the univariate result. A *P* value of ≤.05 was considered statistically significant.

Results

A total of 450 patients (299 men, 151 women) with an appropriate Medicare diagnosis and referral to CR were identified. Characteristics of the patients are presented in Table 1. Compared with men, the women were older and less likely to be married. The frequency of referral diagnoses was similar with the exception of stable angina, which was more common in women.

Enrollment rates in cardiac rehabilitation

Two hundred eighty-six patients (64%) enrolled in CR. The rates of enrollment for men and women who were referred to CR were similar (65% versus 62%, *P*=.54). For patients who enrolled in CR, women were older (66±12 years versus 62±12 years, P<0.01), less often married (62% versus 74%, P<0.01), more often widowed (32% versus 4%, P<0.01), less likely to be employed (22% versus 38%, *P*<.01), and more likely to be diabetic (33% versus 21%, *P*<.04) than were men.

Patient characteristics associated with nonenrollment

For the entire cohort, nonenrollees were older (70 ± 13 years versus 64 ± 12 years, *P*<.01), less likely to have had posthigh school education (14% versus 29%, *P*<.01), less frequently married (62% versus 74%, *P*=.03), more likely to smoke (27% versus 16%, *P*<.01), less frequently obese (34% versus 45%, P=.03), more likely to be diabetic (36% versus 25%, *P*=.01) and less likely to have had cardiothoracic surgery (25% versus 37%, *P*<.01). Unemployment rates were similar for patients who either did or did not enroll (23% versus 22%, *P*=1.0).

Predictors of non-enrollment

When all factors associated with CR enrollment in the univariate logistic regression model (Table 2) at *P*<.10 were entered into the multivariate model, 6 factors emerged as independent predictors of nonenrollment (Table 3): increasing age, less education, current smoking, BMI <30 kg/m^2, diabetes mellitus, and a noncardiothoracic surgery diagnosis. Female gender was not a significant predictor of nonenrollment.

Comorbidities

Of the 450 patients, 218 had 1 or more comorbid conditions (48% of the cohort, Table 1). The frequency of the various comorbidities was similar for men and women. Sixty-five patients had multiple comorbidities (14% of the cohort): 2 comorbidities in 49 patients, 3 comorbidities in 14 patients, and 4 comorbidities in 2 patients. For the entire cohort, enrollment in CR was lower for patients with comorbidities than for those without comorbidities (56% versus 71%, *P*<.01). Enrollment was lower for those with multiple comorbidities compared to patients with a single comorbidity (45% versus 61%, *P*=.03).

Enrollment of women with or without comorbidities was similar (62% versus 61%, *P*=.87), while enrollment of men with comorbidities was lower than for men without comorbidities (52% versus 75%, *P*<.01).

Discussion

The major finding of this study was that for patients who were referred to outpatient CR, enrollment rates were similar for men and women (65% and 62%, respectively). Our enrollment rates were lower than the 85% enrollment rate in a large cohort including both genders referred to CR in Canada, reported by Grace et al.[13] We communicated with Dr. Grace concerning our findings, and she graciously calculated the enrollment rate in CR after referral for men and women in her cohort and it was also similar (84% for men, 88% for women, *P*=.25).[14] Allen et al also reported a very favorable enrollment rate (80%) for women referred to cardiac rehabilitation, albeit in a small sample of 44 patients.[15]

Among those referred, enrollment rates in CR in the current study and in the studies of Grace et al[14] and Allen et al[15] may be higher than average. Mazzini et al[16] studied a diverse population in a large US city and found that an intervention designed to increase the referral rate to CR (American Heart Association *Get with the Guidelines*-based clinical pathway) resulted in an increased referral rate, but did not affect enrollment (34%). The authors did not compare referral and enrollment rates for men versus women. Female gender was associated with a lower enrollment rate, however. A similar enrollment rate for women after referral (34%) was recently reported by Sanderson et al.[17] Roblin et al[18] studied the referral and enrollment rates for CR in a large cohort of patients in a managed care organization. For patients with a referral, the enrollment rate was only 29%.

We found that enrollees in our CR program were younger, more highly educated, and more frequently had cardiac surgery than patients who did not enroll. This is similar to the data reported by Suaya et al[6] for a large group of Medicare beneficiaries, although these investigators did not report referral rates into CR. Similar to the results of a national survey from 1996,[9] in our contemporary CR program female enrollees were older and less likely to be married than were male enrollees.

Suaya et al[6] reported that Medicare patients, men and women combined, with comorbid conditions were less likely to participate in CR than their healthier counterparts. The present study was similar in that we found that for men with comorbidities, enrollment was lower than for men free of comorbid conditions. However, for women the presence of comorbidities did not affect enrollment. Suaya et al[6] did not report differences in comorbidities in men versus women.

In the present study, only 34% of the patients who enrolled in CR were women (151 women, 450 total enrollees), similar to the reports by Thomas et al[9] (33%) and Grace et al[13] (37%). While fewer women may have cardiac events that qualify them for CR, it appears that women are not referred to CR with the same frequency as are men[7,8] despite the finding that the benefits of CR are similar for men and women.[19] In a large cohort of patients with coronary heart disease, Grace et al[20] found that the referral rate to cardiac rehabilitation was 67% for men and 48% for women.

Insufficient provider knowledge and misperceptions of CR, as well as the lack of extrinsic motivation may influence their decision to not refer women.[21] A system-based approach that includes an automatic referral for all adult patients with an appropriate diagnosis has been suggested as one way to improve referral to CR programs.[21,22] Designation of CR as a quality indicator and performance measure, with reimbursement linked to compliance, has also been advocated.[22] Grace et al[20] have reported that while barriers to enrollment and

participation in CR are many and differ for the sexes, women do not have more perceived barriers than do men. However, Sanderson et al[17] identified an extremely powerful barrier to participation of women, “my doctor didn't think I really need it.” Recent data from our institution demonstrated that patients lack knowledge of the components of CR.[12] An extensive national education campaign on the benefits of CR, directed at both health-care providers and patients, has been advocated.[23]

Our study has important limitations. The study design was a retrospective review of electronic medical records, with some missing data, from a single center. We did not determine the number of patients who attended the first rehabilitation session and were not cleared to participate or did not attend thereafter. The population from which this study was based was primarily composed of non-Hispanic whites with relatively high educational levels and our community population is modest. The present results may not be transferable to other geographic locations with larger, more diverse populations and other healthcare institutions.

Conclusions

Results of our study demonstrate that CR enrollment rates for men and women, once referred, are similar. Enrollment rates are lower for older patients of both genders, the less educated, smokers, diabetics, patients without cardiothoracic surgery, and for men with comorbid conditions. Lower utilization of CR by women than by men does not appear to be related to a gender difference in enrollment rates after a referral is made. Further research focusing on patient, provider and medical system-based barriers for women to participate in CR is needed.

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Table 1
Sociodemographic and clinical characteristics of the patients[a]

Characteristic	Overall (N=450)	Men n=299 (66)	Women n=151 (34)	P *b*
Age, y (M±SD)	66±13	64±13	69±12	<.01
Referral Diagnoses				
PCI/Myocardial infarction	262 (58.2)	182 (60.9)	80 (53.0)	.13
Stable angina	33 (7.3)	15 (5.0)	18 (11.9)	.01
Cardiac surgery				
CABG	139 (30.9)	94 (31.4)	45 (29.8)	.75
Heart valve repair	14 (3.1)	7 (2.3)	7 (4.6)	.25
Heart transplant	2 (0.04)	1 (0.03)	1 (0.03)	1.0
Educational Achievement				.14
<12 years	211 (51.8)	135 (49.3)	76 (42.9)	
≥12 years	196 (48.2)	139 (50.7)	57 (42.9)	
Marital Status				<.01
Married	310 (69.5)	237 (76.5)	73 (49.0)	
Not married	136 (30.5)	60 (20.2)	76 (51.0)	
Employment Status				.81
Employed or retired	338 (77.7)	228 (78.1)	110 (76.9)	
Not employed[c]	97 (22.2)	64 (21.9)	33 (23.1)	
Smoking Status				.61
Non-smoker/former smoker	347 (79.6)	231 (78.8)	116 (81.1)	
Current smoker	89 (20.4)	62 (21.1)	27 (18.9)	
Body mass index				.10
<30 kg/m^2	230 (59.0)	147 (56.1)	83 (64.8)	
≥30 kg/m^2	160 (41.0)	115 (43.9)	45 (35.2)	
Comorbidities				
Diabetes	130 (28.9)	79 (26.4)	51 (33.8)	.10
COPD	39 (8.7)	28 (9.4)	11 (7.3)	.60
CHF	65 (14.4)	46 (15.4)	19 (12.6)	.48
PAD	33 (7.3)	23 (7.7)	10 (6.6)	.85
Stroke	22 (4.9)	12 (4.0)	10 (6.6)	.25
ESRD	12 (2.7)	11 (3.7)	1 (0.6)	.07
Any comorbidity	218 (48.4)	141 (47.2)	77 (51.0)	.48

[a] n (% of total) unless otherwise indicated. Complete data were not available for all variables. With the exception of body mass index (available for 390 patients, 87% of all patients), all other variables were collected on at least 90% of the cohort.

[b] Comparisons between men and women

[c] Patients of employment age (<65 years) and not working

Abbreviations: PCI, percutaneous coronary intervention; CABG, coronary artery bypass grafting; COPD, chronic obstructive pulmonary disease; CHF, chronic heart failure; PAD, peripheral arterial disease; ESRD, endstage renal disease

Table 2

Univariate predictors of failure to enroll in outpatient cardiac rehabilitation after referral.

Predictors	Odds ratio	95% CI	P
Female gender	**1.14**	**0.76, 1.70**	**.54**
Age (per year increase)	1.04	1.03, 1.06	<.01
≥12 years of education	0.41	0.27, 0.62	<.01
Not married	1.76	1.16, 2.66	<.01
Current smoker	1.92	1.20, 1.62	<.01
BMI ≥30 kg/m^2	0.62	0.40, 0.95	<.03
Diabetes	1.69	1.21, 2.57	<.01
Nonsurgical diagnosis	1.79	1.79, 2.75	<.01

BMI, body mass index

Table 3

Independent predictors of failure to enroll in outpatient cardiac rehabilitation after referral.

Predictors	Odds ratio	95% CI	P
Female gender	**0.69**	**0.39, 1.21**	**.20**
Age (per year increase)	1.06	1.03, 1.08	<.01
≥12 years of education	0.56	0.38, 0.93	.03
Current smoker	3.38	1.76, 6.62	<.01
BMI ≥30 kg/m^2	0.54	0.31, 0.92	.03
Diabetes	2.69	1.52, 4.82	<.01
Nonsurgical diagnosis	2.15	1.27, 3.72	.01

BMI, body mass index