

Predictors of Cardiac Rehabilitation Participation: Opportunities to Increase Enrollment

Sherrie Khadanga MD¹, Patrick Savage MS¹, Diann E. Gaalema PhD^{2,3}, Philip A. Ades, MD^{1,2}

Division of Cardiology, University of Vermont College of Medicine, Burlington, VT, USA¹, Vermont Center on Behavior and Health², Department of Psychiatry³, University of Vermont, Burlington, VT

INTRODUCTION

- Cardiac Rehabilitation (CR) plays a key role in secondary prevention (prevention of the recurrence of coronary events) and has been shown to reduce mortality and morbidity and improve quality of life, exercise capacity, and physical function.
- While the benefits of CR have been clearly established, participation rates remain quite low, ranging from 19-34%.¹⁻³
- There is conflicting data regarding which factors impact CR enrollment, participation, and outcomes.⁴⁻⁶

PURPOSE

To assess the demographic, medical, and psychosocial factors that influence CR participation.

STUDY DESIGN

- This was a prospective observational study conducted at UVM medical center
- Male and female patients hospitalized for an acute cardiac event (myocardial infarction, percutaneous coronary intervention, heart failure with reduced ejection fraction ($\leq 35\%$) or coronary bypass and heart valve surgery) were approached for participation.

METHODS

- Patients enrolled in the study completed a series of assessments during hospitalization
- We then followed patients to determine their participation and adherence.
- Statistical methods included logistic regression analysis, chi square, and non-paired t-tests.
- The following variables were included in the analyses: age, sex, diagnosis, smoking status, education level, referral via electronic medical record, depression score, anxiety score and strength of physician recommendation.
- A p value of <0.05 was used to determine significance

RESULTS

Table 1: Correlates for CR Participation

Univariate Analysis	Odds ratio (95% CI)	p value
Electronic referral	8.79 (4.18-18.45)	< .001
Surgical Diagnosis	5.95 (2.44-14.50)	< .001
Non/Former smoker	2.86 (1.38-5.92)	< .001
Ejection fraction >50%	2.56 (1.56-4.20)	.001
\geq College level education	1.71 (1.07-2.75)	.03
Strength of physician recommendation	1.68 (1.34-2.11)	< .001
Male Sex	1.67 (1.01-2.72)	.05
Medical Outcomes short form-36	1.01 (1.00-1.02)	.03
Duke social support index	1.01 (1.00-1.12)	.04
Multivariate Analysis	Odds ratio (95% CI)	p value
Electronic referral	7.05 (2.57-19.21)	< .001
Surgical Diagnosis	4.01 (1.23-13.34)	.02
Non/Former smoker	3.19 (1.17-8.66)	.02
Male Sex	2.12 (1.01-4.79)	.05
\geq College level education	1.43 (.70-1.02)	.32
Strength of physician recommendation	1.40 (1.01-1.89)	.02
Duke social support index	1.08 (.98-1.19)	.12
Medical Outcomes short form-36	1.01 (.99-1.02)	.32

- Of the 294 individuals (31% female), 175 (60%) participated in cardiac rehabilitation of whom 128 (63%) were male with a mean age of 68.2 ± 12.3 years.

DISCUSSION

- Electronic referral, surgical diagnosis, non/former smoker and strength of physician recommendation were independent predictors for CR participation
- No significant differences were seen in participation by measures of anxiety, depression or executive function. Males with electronic referral to CR, high school education or higher, ejection fraction $>50\%$, and a strong physician recommendation were the most likely cohort to participate in cardiac rehabilitation (89%). Patients who were not referred to cardiac rehabilitation were the least likely to attend (20%).
- Self reported major barriers included lack of interest (23%) and transportation issues (22%)

CONCLUSION

- Use of Electronic referral increases CR participation
- Direct, affirmative physician recommendation increases participation
- Lower education and smoking are associated with reduced enrollment in cardiac rehab
- Depression and anxiety symptomology do not influence cardiac rehab participation

ACKNOWLEDGEMENTS

This research was supported by Center of Biomedical Research Excellence award P20GM103644 from the National Institute of General Medical Sciences.

REFERENCES:

- Balady GJ, Ades PA, Bittner VA, et al: Referral, Enrollment, and Delivery of Cardiac Rehabilitation/Secondary Prevention Programs at Clinical Centers and Beyond: A Presidential Advisory from the American Heart Association. *Circulation*. 2011;124:2951-2960.
- Supervía M., Medina-Inojosa J.R., Yeung C., Lopez-Jimenez F., Squires R.W., Pérez-Terzic C.M., Brewer L.C., Leth S.E., Thomas R.J. Cardiac Rehabilitation for Women: A Systematic Review of Barriers and Solutions. *Mayo Clin Proc*. 2017.
- Sanderson BK, Shewchuk RM, Bittner V. Cardiac Rehabilitation and Women: What keeps them away? *J Cardiopulm Rehabil Prev*. 2010;30(1):12-21.
- Beckie TM, Mendonca MA, Fletcher GF, Schocken DD, Evans ME, et al. Examining the Challenges of Recruiting Women Into a Cardiac Rehabilitation Clinical Trial. *J Cardiopulm Rehabil Prev*. 2009;29(1):13-23.
- Pasquali, SK, Alexander KP, Peterson ED. Cardiac rehabilitation in the elderly. *Am Heart J*. 2001;142:748-755.
- Ades PA, Waldmann ML, McCann WJ, Weaver SO. Predictors of cardiac rehabilitation participation in older coronary patients. *Arch Intern Med*. 1992;152(5):1033-1035.