COMMENTARY

# Will Increasing Referral to Cardiac Rehabilitation Improve Participation?

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Exercise-based cardiac rehabilitation (CR) programs have been a part of the secondary prevention landscape for more than 50 years. Multiple controlled trials and meta-analyses have confirmed its proven benefits with regard to mortality and, to a lesser extent, morbidity.[1–5] Due to the strong evidence supporting its role in secondary prevention, CR is recognized as a class I recommendation.[6] Despite the clear benefit of this treatment strategy, CR continues to be vastly underutilized. Most published reports document referral rates of approximately 20%. Impressive referral rates from the American Heart Association's (AHA's) ''Get with the Guidelines'' (GWTG) initiative show that slightly more than half of eligible patients are referred to CR. Yet, this improved referral rate still trails other secondary prevention interventions such as cardioprotective prescriptions at hospital discharge.[7–12]

Although referral rates remain a relevant issue, equally concerning are participation rates of patients referred. Many published analyses of participation show a drop-off from referral to enrollment by more than 50%.[9,13,14] An extensive Medicare analysis showed that approximately 19% of eligible patients actually participate in CR programs.[15] Previous studies that examined the barriers to CR utilization have predominately focused on patient, physician, and health system characteristics that predict referral, including age, sex, race, comorbidities, qualifying diagnosis, specialty of physician, and type of insurance.[14,16–26] These reports identify areas where referral could be improved; however, they do not provide solutions to the utilization problem.

## DETERMINANTS AND RATES OF REFERRAL

During the past decade, the patient-based characteristics of referral to CR have remained largely unchanged.[27] Several studies have identified the characteristics of patients, providers, and health care systems that affect referral to CR. Patient characteristics influencing referral rates include age, sex, race, educational level, and marital status. At-risk groups receiving suboptimal guideline-based care include the elderly, women, minorities, and persons with limited or no family or social support.[11,12,22,28–31]

Provider and health system level characteristics affecting referral of eligible patients to CR include specialty, qualifying diagnosis, accessibility of CR facility, automatic referral system, and insurance status.[15,28,32] Specialists and subspecialists appear more likely to refer patients to CR than primary care physicians or general practitioners, and all physician groups are more likely to refer patients with acute coronary syndrome, percutaneous coronary intervention (PCI), and coronary artery bypass grafting (CABG) than stable angina. Further, physicians are more likely to refer patients when a CR facility is affiliated with the discharging hospital.[11]

Of the patients referred to CR, referral rates vary widely. In a systematic review of the literature examining this issue, only two of 10 studies reported a referral rate >50%, with the remainder ranging from 9% to 41%.[12] A 56% referral rate was reported for eligible patients in the AHA's GWTG analysis. This was described as a ''best-case scenario,'' as those hospitals participating in the GWTG initiative had excellent adherence rates to other guideline-based recommendations, such as prescribed medications at hospital discharge. Despite the overall improvement seen in the GWTG initiative, there was a wide range of referral, with nearly 35% of participating hospitals referring <1 of 5 eligible patients and approximately 20% of hospitals referring >4 of five eligible patients.[11] These data demonstrate considerable intrafacility variation in

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referral patterns among hospitals most attuned to the guideline-based recommendation for CR.

## ENROLLMENT MATTERS

Most efforts to improve participation in CR have examined ways to increase referral since patients cannot enroll in CR if they are not referred. However, improving referral is only part of the solution. Several studies have examined enrollment rates and nearly all demonstrate lack of follow-through from referral to enrollment.[8,18,19,30,33] In an analysis of the managed care setting, Roblin and colleagues[14] reported that >50% of patients referred to CR did not enroll.

A comprehensive analysis of participation in CR was conducted in 267,427 Medicare recipients by Suaya and colleagues.[15] Although there was no assessment of conversion of referral to participation, several themes emerged regarding participation that were similar to those identified for referral. Among these were age, sex, race, Medicaid and Medicare vs Medicare alone, and indication. In this analysis, CABG patients were 43% more likely to participate in CR compared with patients who underwent PCI. Furthermore, elective CABG patients were more than twice as likely to participate in CR compared with patients who had an acute myocardial infarction (MI). In a 2008 analysis of a single GWTG institution, Mazzini and colleagues[13] reported a 55% referral rate for 714 eligible patients with an acute MI but only a 19% enrollment rate—a drop-off of more than 65%. Although this represented a significant improvement in referral, it highlights how increasing referral does not invariably translate into enrollment and participation.

Despite the poor referral and enrollment rates reported in multiple studies, there are reports that participation is increasing. The 2005 Behavioral Risk Factor Surveillance System (BRFSS) reported a 34.7% participation rate in outpatient CR among survivors of acute MI in 21 states and the District of Columbia. Participation in CR for patients younger than 50 was less than for older participants, 25.3% vs 35.5% to 37.0% (adjusted odds ratio [OR], 1.6; 95% confidence interval [CI], 1.2–2.2). This is in contrast to some studies identifying older age as a barrier to referral.[15,32] Furthermore, the BRFSS demonstrated that increased levels of education correlated with increased participation in CR. Compared with patients with less than a high school education, patients with some college education had an adjusted OR of 1.8 and those with a college education or higher had an adjusted OR of 2.1. Participation was nearly 2 times more likely for men than women (adjusted OR, 1.8; 95% CI, 1.5–2.1).[32] This pattern may be attributed, at least in part, to greater spousal support for men than women.[34–36] In addition, women face sex-specific barriers that may account for their lower participation rates. These traditionally include maintaining the home and caring for children, an older spouse, and/or family member. Women are also more likely to live alone and are less likely to own and drive a vehicle.[37] When women do participate, their baseline physiologic and psychological profiles differ from men. For instance, women who enter CR are generally older and have a higher prevalence of traditional coronary risk factors, comorbidities, and more advanced cardiovascular disease than men. Women also tend to have more anxiety and depression, lower self-efficacy, increased symptoms, and lower exercise tolerance.[37–41]

## IMPROVING UTILIZATION

Numerous studies have examined how to improve utilization of CR. Most investigations compared automatic referral vs usual referral since the former should improve utilization. Automatic referral involves a computer-generated referral via an electronic medical system based on an approved indication. Usual referral describes historical referral at the discretion of the physician. Universally, autoreferral appears to vastly improve referral rates.[18,23,25,33,42] A Canadian, retrospective, cross-sectional analysis demonstrated a 93% referral rate using automatic electronic referral for patients referred to the CR center closest to their home.[43]

Usual referral at the discretion of physicians may play a major role in the underutilization of CR as it relies on a subjective assessment of a patient's ability to participate and the physician's often limited knowledge of CR program benefits. Furthermore, not all approved indications and conditions are referred at the same rate. The qualifying diagnoses most likely to lead to referral are in descending order: acute ST-segment elevation MI, CABG, and PCI.[44] Although these patient subsets encompass a large proportion of eligible patients, it indicates a potential physician bias, as patients with stable angina lag in referral rates compared with those undergoing revascularization procedures and infers that patients who have not been revascularized would be less likely to benefit. The latter may be related to the provincial misconception that CR is simply exercise with electrocardiographic monitoring. An automatic electronic referral system may negate this disparity among patients with approved diagnoses.

The AHA's GWTG initiative and several other small cohort studies demonstrate that concerted efforts to increase CR referral rates can be successful, particularly when automatic referral is implemented. However, even the highest referral rates may not translate to increased enrollment unless equally concerted efforts are made to maximize enrollment and participation.[13] There is evidence that enrollment and participation in CR programs depends not only on referral but also on reinforcement through patient-targeted information designed to encourage and motivate patients as well as allied

health liaisons who provide personal encouragement with research-based counseling techniques (eg, Prochaska's readiness to change and motivational interviewing). Compared with automatic referral alone, combining discussions with allied health professionals with automatic referral results in the highest enrollment rates.[23,45] In one study examining 364 patients discharged after acute MI or CABG, the implementation of an automatic referral system combined with an established, nurse-based recruiting strategy improved CR participation from 47% to 53% ($P<.01$).[45]

Beswick and colleagues[9] conducted an extensive review of the literature to better understand what has been done to improve enrollment, adherence, and compliance with CR. In two of the three randomized trials examining participation, patients received liaison reinforcement in the form of at-home visits and telephone calls after hospital discharge or reinforcement and encouragement before discharge. In both trials, a statistically significant difference was observed in the intervention group. The other randomized trial used letters based on the theory of planned behavior to reinforce and encourage attendance at outpatient CR. This trial also demonstrated a statistically significant difference in attendance between intervention and control groups.[42,46] In two of three nonrandomized trials included in the same review, a statistically significant difference in attendance at CR was observed. Of these two trials, one used lay volunteers to perform weekly home visits to encourage participation. The other provided a pamphlet prior to discharge to encourage and motivate patients to attend CR following an MI. The third study, which yielded statistically insignificant results, used a prompt for outpatient CR in the critical discharge pathway.[22]

Combining efforts that drive referral with those designed to provide motivational support to participate may have the greatest impact. These efforts can be further augmented if the counseling and educational information includes both patients and spouses. By including spouses, significant others, or caregivers, it provides the opportunity to create and maintain positive attitudes that support participation and adherence.[47]

## IMPLICATIONS FOR THE CLINICIAN

As advanced diagnostic and therapeutic techniques have led to improved survival, it is imperative that patients actively participate in the treatment of their disease to enhance their long-term survival and quality of life. Secondary prevention programs help reduce hospitalizations, recurrent MI, and cardiovascular mortality. As part of an overall secondary prevention program, CR provides the means to help put patients' disease and its management into perspective—a key determinant of compliance to guideline-based recommendations.[21,32,48] CR reduces recurrent cardiac events and need for coronary revascularization and and improves quality of life. In Medicare patients, CR is associated with a decrease in overall mortality.[15] This is accomplished through integrating a physician-guided medication regimen, dietary and psychosocial counseling, and prescribed physical activity, which facilitates cardiovascular risk reduction. Furthermore, the exercise and lifestyle components of CR complement prescribed medications in reducing mortality and morbidity.[21,48]

With nearly 900,000 people experiencing an acute MI annually in the United States, it is critical that those who survive understand the benefits of risk factor modification and the associated research-based treatment interventions.[49] Lifestyle modification and pharmacotherapies appear to provide independent and additive benefits.[48] Comprehensive efforts at secondary prevention relate to blood pressure control, dyslipidemia, smoking cessation, cardiorespiratory fitness/physical activity, and diabetes management. CR provides the necessary tools to reinforce and augment these efforts by focusing patients on risk reduction, healthy lifestyles, psychological well-being, and serial surveillance, which collectively reduce secondary events, morbidity, and mortality and improve clinical outcomes and quality of life.[44,50]

Referral of patients following hospitalization for an acute cardiac event, coronary revascularization procedure, or stable angina should be automatic and approach 100%. Without a concerted effort to maximize referral and enrollment, participation in CR programs will continue at their current levels, trailing other secondary prevention guideline therapies. Because CR can reduce health care expenditures for recurrent events, unnecessary hospitalizations, home care, and the need for coronary revascularization, increasing referrals and enrollment should be considered a first-line strategy in reducing health care costs nationally.[21]

Referral that leads to enrollment has to be addressed. Multiple studies demonstrate that CR referral rates and enrollment vary widely among physician practices and medical centers.[8,14,26] Bridging the gap between referral and enrollment can have an immediate impact on CR utilization rates, and this appears to be most effectively done when automatic referral is complemented with patient education and serial counseling efforts. Gravely-Witte and colleagues[23] demonstrated that an automatic referral system combined with discussions with allied health professionals regarding the benefits of CR provided the most favorable impact regarding enrollment and participation. It is time to put this finding into practice.

## CONCLUSIONS

Although much work has been done to improve referral rates to CR, current enrollment and

participation rates may be stagnant. Efforts focusing on referral and enrollment should be implemented to drive utilization. Future randomized clinical trials may serve to clarify the most effective strategies for maximizing referral and participation in CR. The challenge for physicians and allied health professionals is to enroll increasing numbers of patients at an earlier stage of their disease. This can be accomplished through home-based or group CR programs that are designed to circumvent or attenuate barriers to participation and adherence, so that many more individuals may realize the benefits that secondary prevention can provide.

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## References


1 Oldridge NB, Guyatt G, Fischer ME, et al. Cardiac rehabilitation after myocardial infarction. Combined experience of randomized clinical trials. *JAMA*. 1988;260(7): 945–950.

2 Jolliffe JA, Rees K, Taylor RS, et al. Exercise-based rehabilitation for coronary heart disease. *Cochrane Database Syst Rev*. 2001;1:CD001800.

3 Taylor RS, Brown A, Ebrahim S, et al. Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. *Am J Med*. 2004;116:682–692.

4 Clark AM, Hartling L, Vandermeer B, et al. Meta-analysis: secondary prevention programs for patients with coronary artery disease. *Ann Intern Med*. 2005;143:659–672.

5 Suaya JA, Stason WB, Ades PA, et al. Cardiac rehabilitation and survival in older coronary patients. *J Am Coll Cardiol*. 2009;54(1):25–33.

6 Thomas RJ, King M, Lui K, et al. AACVPR/ACC/AHA 2007 performance measures on cardiac rehabilitation for referral to and delivery of cardiac rehabilitation/secondary prevention services endorsed by the American College of Chest Physicians, American College of Sports Medicine, American Physical Therapy Association, Canadian Association of Cardiac Rehabilitation, European Association for Cardiovascular Prevention and Rehabilitation, Inter-American Heart Foundation, National Association of Clinical Nurse Specialists, Preventive Cardiovascular Nurses Association, and the Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2007;50(14):1400–1433.

7 Ades PA, Waldmann ML, Polk DM, et al. Referral patterns and exercise response in the rehabilitation of female coronary patients aged > 62 years. *Am J Cardiol*. 1992;69(17):1422–1425.

8 Barber K, Strommel M, Kroll J, et al. Cardiac rehabilitation for community-based patients with myocardial infarction: factors predicting discharge recommendation and participation. *J Clin Epidemiol*. 2001;54(10):1025–1030.

9 Beswick AD, Rees K, West RR, et al. Improving uptake and adherence in cardiac rehabilitation: literature review. *J Adv Nurs*. 2005;49(5):538–555.

10 Bittner V, Sanderson B, Breland J, et al. Referral patterns to a university-based cardiac rehabilitation program. *Am J Cardiol*. 1999;83(2):252–255.

11 Brown TM, Hernandez A, Bittner V, et al. Predictors of cardiac rehabilitation referral in coronary artery disease patients findings from the American Heart Association's Get With The Guidelines Program. *J Am Coll Cardiol*. 2009;54(6):515–521.

12 Cortes O, Arthur HM. Determinants of referral to cardiac rehabilitation programs in patients with coronary artery disease: a systematic review. *Am Heart J*. 2006;151(2): 249–256.

13 Mazzini MJ, Stevens GR, Whalen D, et al. Effect of an American Heart Association Get With the Guidelines Program-based clinical pathway on referral and enrollment into cardiac rehabilitation after acute myocardial infarction. *Am J Cardiol*. 2008;101(8):1084–1087.

14 Roblin D, Diseker RA, Orenstein D, et al. Delivery of outpatient cardiac rehabilitation in a managed care organization. *J Cardiopulm Rehabil*. 2004;24(3):157–164.

15 Suaya JA, Shepard DS, Normand S-L, et al. Use of cardiac rehabilitation by Medicare beneficiaries after myocardial infarction or coronary bypass surgery. *Circulation*. 2007; 116(15):1653–1662.

16 Witt BJ, Jacobsen SJ, Weston SA, et al. Cardiac rehabilitation after myocardial infarction in the community. *J Am Coll Cardiol*. 2004;44(5):988–996.

17 Williams MA, Ades PA, Hamm LF, et al. Clinical evidence for a health benefit from cardiac rehabilitation: an update. *Am Heart J*. 2006;152(5):835–841.

18 Smith KM, Harkness K, Arthur HM. Predicting cardiac rehabilitation enrollment: the role of automatic physician referral. *Eur J Cardiovasc Prev Rehabil*. 2006;13(1): 60–66.

19 Pell J, Pell A, Morrison C, et al. Retrospective study of influence of deprivation on uptake of cardiac rehabilitation. *BMJ*. 1996;313(7052):267–268.

20 Lamm G, Dorossiev DL. World Health Organization collaborative study on rehabilitation and comprehensive secondary prevention of patients after acute myocardial infarction. *Adv Cardiol*. 1978;24:179–186.

21 Wenger NK. Current status of cardiac rehabilitation. *J Am Coll Cardiol*. 2008;51(17):1619–1631.

22 Mochari H, Lee JR, Kligfield P, et al. Ethnic differences in barriers and referral to cardiac rehabilitation among women hospitalized with coronary heart disease. *Prev Cardiol*. 2006;9:8–13.

23 Gravely-Witte S, Leung YW, Nariani R, et al. Effects of cardiac rehabilitation referral strategies on referral and enrollment rates. *Nat Rev Cardiol*. 2010;7(2):87–96.

24 Grace SL, Gravely-Witte S, Brual J, et al. Contribution of patient and physician factors to cardiac rehabilitation referral: a prospective multilevel study. *Nat Clin Pract Cardiovasc Med*. 2008;5(10):653–662.

25 Grace SL, Evindar A, Kung T, et al. Increasing access to cardiac rehabilitation: automatic referral to the program nearest home. *J Cardiopulm Rehabil*. 2004;24(3):171–174.

26 Grace SL, Abbey SE, Shnek ZM. Cardiac rehabilitation II: referral and participation. *Gen Hosp Psychiatry*. 2002; 24(3):127–134.

27 Thomas R. Cardiac rehabilitation/secondary prevention programs: a raft for the rapids: why have we missed the boat? *Circulation*. 2007;116(5):1644–1646.

28 Cottin Y, Cambou JP, Casillas JM, et al. Specific profile and referral bias of rehabilitated patients after an acute coronary syndrome. *J Cardiopulm Rehabil*. 2004;24(1): 38–44.

29 Hammill BG, Curtis LH, Schulman KA, et al. Relationship between cardiac rehabilitation and long-term risks of death and myocardial infarction among elderly Medicare beneficiaries. *Circulation*. 2010;121(1):63–70.

30 Blackburn GG, Foody JM, Spencer DL, et al. Cardiac rehabilitation participation patterns in a large, tertiary care center: evidence for selection bias. *J Cardiopulm Rehabil*. 2000;20(3):189–195.

31 Jackson L, Leclerc J, Erksine Y, et al. Getting the most out of cardiac rehabilitation: a review of referral and adherence predictors. *Heart*. 2005;91(1):10–14.

32 Centers for Disease Control and Prevention (CDC). Receipt of Outpatient Cardiac Rehabilitation Among Heart Attack Survivors—United States, 2005. *MMWR Morb Mortal Wkly Rep*. 2008;57(4):89–94.

33 Grace SL, Scholey P, Suskin N, et al. A prospective comparison of cardiac rehabilitation enrollment following

automatic vs. usual referral. *J Rehabil Med.* 2007;39(3): 239–245.
34 Caulin-Glaser T, Blum M, Schmeizl R, et al. Gender differences in referral to cardiac rehabilitation programs after revascularization. *J Cardiopulm Rehabil.* 2001;21(1): 24–30.
35 Allen JK, Scott LB, Stewart KJ, et al. Disparities in women's referral to and enrollment in outpatient cardiac rehabilitation. *J Gen Intern Med.* 2004;19(7):747–753.
36 Gupta R, Sanderson BK, Bittner V. Outcomes at one-year follow-up of women and men with coronary artery disease discharged from cardiac rehabilitation: what benefits are maintained? *J Cardiopulm Rehabil Prev.* 2007;27(1): 11–18.
37 Cannistra LB, Balady GJ, O'Malley CJ, et al. Comparison of the clinical profile and outcome of women and men in cardiac rehabilitation. *Am J Cardiol.* 1992;69(16):1274–1279.
38 Richardson LA, Buckenmeyer PJ, Bauman BD, et al. Contemporary cardiac rehabilitation: patient characteristics and temporal trends over the past decade. *J Cardiopulm Rehabil.* 2000;20(1):57–64.
39 Thomas RJ, Miller NH, Lamendola C, et al. National Survey on Gender Differences in Cardiac Rehabilitation Programs. Patient characteristics and enrollment patterns. *J Cardiopulm Rehabil.* 1996;16(6):402–412.
40 Lavie CJ, Thomas RJ, Squires RW, et al. Exercise training and cardiac rehabilitation in primary and secondary prevention of coronary heart disease. *Mayo Clin Proc.* 2009;84(4):373–383.
41 Hamilton GA, Seidman RN. A comparison of the recovery period for women and men after an acute myocardial infarction. *Heart Lung.* 1993;22(4):308–315.
42 Wyer SJ, Earll L, Joseph S, et al. Increasing attendance at a cardiac rehabilitation programme: an intervention study using the Theory of Planned Behaviour. *Coronary Health Care.* 2001;5(3):154–159.
43 Grace SL, Evindar A, Kung T, et al. Automatic referral to cardiac rehabilitation. *Med Care.* 2004;42(7):661–669.
44 Balady GJ, Williams MA, Ades PA, et al. Core components of cardiac rehabilitation/secondary prevention programs: 2007 update: a scientific statement from the American Heart Association Exercise, Cardiac Rehabilitation, and Prevention Committee, the Council on Clinical Cardiology; the Councils on Cardiovascular Nursing, Epidemiology and Prevention, and Nutrition, Physical Activity, and Metabolism; and the American Association of Cardiovascular and Pulmonary Rehabilitation. *Circulation.* 2007;115(20):2675–2682.
45 Mueller E, Savage PD, Schneider DJ, et al. Effect of a computerized referral at hospital discharge on cardiac rehabilitation participation rates. *J Cardiopulm Rehabil Prev.* 2009;29(6):365–369.
46 Jolly K, Bradely F, Sharp S. Randomised controlled trial of follow up care in general practice of patients with myocardial infarction and angina: final results of the Southampton heart integrated care project (SHIP). *BMJ.* 1999;318(7185):706–711.
47 Heinzelmann F, Bagley RW. Response to physical activity programs and their effects on health behavior. *Public Health Rep.* 1970;85(10):905–911.
48 Franklin BA, Kahn JK, Gordon NF, et al. A cardioprotective "Polypill"? Independent and additive benefits of lifestyle modification. *Am J Cardiol.* 2004;94(2):162–166.
49 Rosamond W, Flegal K, Furie K, et al. Heart disease and stroke statistics—2008 update, a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation.* 2008;117(4):e25–e146.
50 Leon AS, Franklin BA, Costa F, et al. Cardiac rehabilitation and secondary prevention of coronary heart disease: an American Heart Association scientific statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity), in collaboration with the American Association of Cardiovascular and Pulmonary Rehabilitation. *Circulation.* 2005;111(3):369–376.