Clinical and sociodemographic correlates of referral for cardiac rehabilitation following cardiac revascularization in Ontario

Scott Brady, MSc [a], Dan Purdham, PhD [b], Paul Oh, MD [a,c], Sherry Grace, PhD [a,c,d,*]

[a] University of Toronto, Toronto, Canada
[b] GlaxoSmithKline Inc., Toronto, Canada
[c] GoodLife Center of Excellence in Cardiovascular Rehabilitation Medicine, University Health Network, Toronto, Canada
[d] York University, Toronto, Canada

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ABSTRACT

Objectives: Describe rates of, and examine factors affecting, referral to cardiac rehabilitation (CR) following revascularization in Ontario.
Background: CR reduces mortality following cardiac revascularization, but is largely underutilized, partly due to poor referral rates.
Methods: In this retrospective study, the sample consisted of all CR-indicated patients who underwent revascularization at the Cardiac Care Network of Ontario hospitals between October 2011 through March 2012. Referral rates were described, and multivariate analyses performed to identify disparities.
Results: Of the 3739 patients included, 51.8% were referred to CR. Patients aged ≥85 or requiring a translator, and patients with hyperlipidemia, heart failure, or comorbid pulmonary, renal or peripheral vascular disease, were significantly less likely to be referred. Patients with a history of smoking or myocardial infarction, or who underwent coronary artery bypass graft surgery, were significantly more likely.
Conclusions: A national policy statement recommends 85% referral of indicated patients to CR, a target currently missed by almost 35%.

Introduction

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality worldwide.[1] While revascularization – the augmentation of blood flow to a body part – will improve myocardial perfusion, it is important to promote cardiovascular health to optimize patient long-term health outcomes. Therefore, guidelines for percutaneous coronary intervention[2] (PCI) and coronary artery bypass graft (CABG) surgery,[3] the two primary modalities of cardiac revascularization, recommend referral to cardiac rehabilitation (CR) following the procedures.

CR is a comprehensive chronic disease management program designed to enhance and maintain cardiovascular health through the delivery of individualized, but integrated inter-professional care. As such, CR plays a key role in the secondary prevention of CVD following revascularization.[4] Through participation in CR programs, patients gain access to additional medical assessment, tailored exercise training, heart-health education, and CVD risk factor management strategies. Through exercise, medication adherence, smoking cessation, improved nutrition and mental health, CR offers a longer-term approach to managing CVD following revascularization.[5,6] Indeed, evidence demonstrates that the delivery of CR following revascularization is associated with significantly lower mortality and morbidity.[7–9] CR participation is also related to improved continuity of care, better patient functional capacity, risk reduction, greater psychosocial well-being,[10] the adoption of physical activity among other heart-healthy behaviors, and improved inter-provider communication, all in a cost-effective manner.[11]

Despite its benefits, use of CR programs by eligible patients is conservatively estimated to be approximately 30% in high-income countries,[12–14] and even lower in low-to-middle-income countries.[15] Enrollment rates in Canada are not known, with the most

comprehensive understanding of usage rates being from the province of Ontario in 2001 (22%).[16] In addition to this low overall utilization, certain patient groups, such as women, smokers,[17] older patients and those with limited English-language proficiency may be less likely to access CR, despite arguably greater need and demonstrated benefit.[18] Conversely, variation has also been observed by procedure, with patients being more likely to attend CR following CABG when compared to PCI.[19]

The under-utilization of CR is a result of multiple factors influenced by all levels of healthcare, from the patients to the system itself. However, patients who do not enroll in CR programs most often cite the lack of referral to a program as the primary reason for their failure to participate.[20,21] In North America, the "typical" method of referral to CR depends on a physician initiating a referral discussion, then completing and transmitting an institution-specific CR referral form,[22] although many institutions are adopting systematic referral strategies such as inclusion of referral on discharge order sets or clinical pathways.[23] Previous studies have found referral rates ranging from 28% to 60%,[18,24,25] well below multiple national guidelines that recommend referral rates of at least 85% of eligible patients.[6,26]

Moreover, inconsistencies have been noted in physician referral patterns that may lead to inequality in access to CR as reflected in the disparities outlined above.[18,24,27–29] Certain patient groups, such as women, older patients and those with limited English-language proficiency may be less likely to receive a referral to CR, despite arguably greater need and demonstrated benefit.[18] On the other hand, younger patients, those who are male, or those who have insurance coverage, have been demonstrated to be at increased likelihood of receiving a referral.[18,24,29] Variation has also been observed by procedure, with patients being more likely to be referred to, as well as attend, CR following CABG when compared to PCI.[18,19,29] Furthermore, certain comorbid illnesses, such as heart failure, diabetes, and renal, peripheral vascular, and chronic obstructive pulmonary disease have all been shown to be associated with decreased referral to CR.[18,24] Evidence with respect to cardiac risk factors is less clear. A diagnosis of hyperlipidemia or a history of smoking have both been consistently linked to increased referral, while data for patients who have a history of myocardial infarction or a diagnosis of hypertension have been contradictory.[18,24,29]

Given the benefits of CR, referral is recommended in national guidelines for the management of CVD post-revascularization.[2,3,6,11] Referral is a performance measure in the United States, which has led to some recent population-based reports of CR referral rates.[18,24] However, few studies have investigated referral to CR within Canada, and those that have focused on single centers or regions.[25] Thus, the objectives of this study were to: (1) describe rates of CR referral post-revascularization in Ontario, and (2) describe the association between sociodemographic and clinical factors and referral to CR.

Methods

Design & data source

This study was retrospective in design. Administrative data were obtained from a database maintained by the Cardiac Care Network of Ontario (CCN). The database contains information for patients undergoing various cardiac procedures at each of the CCN's eighteen member hospitals in Ontario, each of which provide advanced cardiac services (minimum requirement to be a CCN member hospital is the ability to perform diagnostic cardiac catheterization). Within the CCN database is stored, for each patient, demographic information, the type of procedure underwent, health status indicators, comorbidities, and procedural outcomes. At each CCN institution, a Regional Cardiac Care Coordinator, who is trained to ensure standardized data entry, is responsible for collecting patient data on a standardized form. The gathered data are provided to a data clerk, who then enters the data into the database.

In October of 2011, the CCN added a variable to their forms for the purpose of tracking patient referral to CR. Within the form is recorded each patient's referral status (yes/no). For this study, this variable was used to identify patients who had been referred to CR, and to calculate each hospital's performance at referring patients.

Ethics approval was obtained from the University of Toronto and York University's research boards, and the data access request was approved by the CCN.

Population

The sample was comprised of all CR-indicated patients who underwent revascularization, via either PCI or CABG, at the CCN member hospitals from October 2011 through March 2012. PCI and CABG surgery patients were considered for this study, as guidelines recommend the use of CR following these procedures.[2,3] Those patients who died before discharge were excluded.

Measures

Patient sex, age, whether they required an interpreter, their clinical characteristics (i.e., comorbidities, risk factors, cardiac history), the revascularization procedure they underwent (PCI versus CABG), and whether or not they were referred to CR (yes/no) were extracted from the administrative database. The latter was the dependent variable. All requested variables were selected from those defined in the CCN data dictionary, and all available fields describing clinical characteristics were requested.

Statistical analysis

Analysis of the dataset was performed using the software package SPSS version 19. Univariate analysis was performed to describe the clinical and sociodemographic characteristics of the patients, and to determine the proportion of patients referred to CR. Bivariate analysis was then used to describe differences in CR referral with respect to the sociodemographic and clinical characteristics outlined above. Patient sex, age, translator requirement, procedure type, comorbidities (renal disease, diabetes, peripheral vascular disease, and chronic obstructive pulmonary disease), cardiac history (heart failure and history of myocardial infarction), and cardiac risk factors (hyperlipidemia, hypertension, history of smoking, and BMI) were all included in the bivariate analysis. All variables were categorical, and as such two-tailed, chi-square testing was done. A p value of less than 0.05 was considered statistically significant.

Finally, a binary logistic regression model was used to identify the clinical and sociodemographic characteristics related to CR referral. The covariates used to generate the model were all those listed above, with the exception of BMI. It was not included because BMI data was missing for 678 (18.1%) patients, and as such would have greatly decreased the sample size used in the regression.