Submitted by CIHR
Déposé par les IRSC

J Cardiopulm Rehabil Prev. Author manuscript; available in PMC 2010 August 25.

Published in final edited form as:
J Cardiopulm Rehabil Prev. 2009 ; 29(3): 183–187. doi:10.1097/HCR.0b013e3181a3333c.

Barriers to Cardiac Rehabilitation:

DOES AGE MAKE A DIFFERENCE?

Dr Sherry L. Grace, PhD, **Ms Shamila Shanmugasegaram, BSc**, **Ms Shannon Gravely-Witte, MSc**, **Ms Janette Brual, MSc**, **Dr Neville Suskin, MBChB**, and **Dr Donna E. Stewart, MD**
York University, Toronto (Dr Grace and Mss Shanmugasegaram and Gravely-Witte); Queens University, Kingston (Ms Brual); University Health Network, Toronto, and University of Toronto, Toronto (Drs Grace and Stewart); London Health Sciences Center and University of Western Ontario, London (Dr Suskin), Ontario, Canada

Abstract

PURPOSE—To quantitatively investigate age differences in barriers to cardiac rehabilitation (CR) enrollment and participation.

METHODS—Cardiac outpatients (N = 1,273, mean age = 65.9 ± 11.2) completed a mailed survey to discern barriers to CR enrollment and participation. Both enrollees and nonenrollees were asked to rate 18 CR barriers on a 5-point Likert scale.

RESULTS—Of the respondents, 535 (43%) reported participating in CR at 1 of 40 sites, with younger patients being more likely to participate ($P = .002$). Older age was positively related to total CR barriers ($P < .001$). Older patients more strongly endorsed the following CR barriers: already exercising at home ($P = .001$), confidence in ability to self-manage their condition ($P = .003$), perception of exercise as tiring or painful ($P = .001$), not knowing about CR ($P = .001$), lack of physician encouragement ($P < .001$), comorbidities ($P < .001$), and perception that CR would not improve their health ($P < .001$).

CONCLUSION—Given that the benefits of CR are achieved in older patients as well as the young, interventions to overcome these modifiable barriers to enrollment and participation are needed.

Keywords

age; barriers; cardiac rehabilitation

While the burden increases with age, coronary artery disease (CAD) is the leading cause of morbidity and mortality in the developed world. Cardiac rehabilitation (CR) successfully addresses cardiac risk and has been shown to reduce mortality by 25%.[1] Although the inclusion of older patients in randomized controlled trials has been limited, studies of CR outcomes have generally revealed benefits following participation, regardless of patient age.[2–4]

Corresponding Author: Sherry L. Grace, PhD, Bethune 368, York University, 4700 Keele St, Toronto, Ontario, Canada M3J 1P3, sgrace@yorku.ca.

Despite its proven benefits and need, older patients are significantly less likely to be referred to CR.[4,5] Moreover, in the United States and Canada, where this study was conducted,[6] only 15% to 30% of eligible patients participate in CR, with the rate for older patients being much lower.[7] For instance, in a population-based study, MI patients 70 years or older were 77% less likely to participate in CR than those younger than 60 independent of other characteristics.[8] This is despite the fact that clinical practice guidelines recommend patients participate in CR regardless of age,[1] and that older patients adhere well to CR once they are enrolled.[9]

Except for referral failure, the reasons why older patients are missing from CR programs are not well known. This is disconcerting, given that the burden of CAD increases with age, the aging demographic, improving survival rates, and the consequent temporal increase in the number of elderly patients participating in CR.[10] While there have been descriptive studies of older patient barriers to CR participation,[11] there is a dearth of controlled quantitative studies of age differences in CR barriers. The purpose of the current multisite study was to evaluate age differences in barriers to CR utilization.

METHODS

This study presents a secondary analysis of data from a prospective study of outpatients of cardiologists.[12] Upon receiving ethics approval from participating institutions, a sample of nonpediatric cardiologists from major centers in the Windsor to Ottawa corridor of Ontario, Canada, was generated through a physician registry, Canadian Medical Directory Online (www.mdselect.com). Ninety-seven consenting cardiologists were visited by a research assistant to extract a sample of approximately 20 each of their recent CAD outpatients (N = 2,486). With informed consent from patients, basic clinical data were recorded from their charts, and they were mailed a self-report survey assessing sociodemographic characteristics. As per the larger study protocol, 9 months later participants were mailed a second follow-up survey assessing self-reported CR utilization and barriers.

Participants

Outpatients with CAD (N = 1,497) consented to participate (430 women [28.7%]; mean age = 65.9 ± 11.2; age range, 32–104; 72% response rate) at the start of the study. This represents a mean of 15.4 ± 2.2 patients per cardiologist. Coronary artery disease diagnosis was confirmed from patient charts of detailed history, focused physical examination, diagnostic electrocardiogram changes, and/or troponin levels above the 99th percentile of normal. Patients who had undergone percutaneous coronary interventions or acute coronary bypass (ACB) or received a diagnosis of heart failure or arrhythmia were also eligible. Reasons for ineligibility (n = 406) based on the larger study were lack of English language proficiency (n = 145; 35.7%), incorrect contact information (n = 86; 21.2%), no CAD diagnosis (n = 37; 9.1%), expired (n = 34; 8.4%), orthopedic, neuromuscular, cognitive or vision impairment (n = 33; 8.1%), non-recent index event or treatment (n = 18; 4.4%), ineligibility for CR based on Canadian guidelines[1] (n = 6; 1.5%), previous attendance at CR (n = 5; 1.2%), non-affective psychiatric disorders (n = 3, 0.7%), and other reasons (n = 39; 9.6%).

Measures

Sociodemographic variables were assessed in the baseline patient survey. Clinical data including previous clinical events, disease severity, and risk factors were extracted from outpatient charts.

In the 9-month follow-up patient survey, respondents were asked whether or not they were referred and participated in CR (yes/no), and the percentage of prescribed sessions they attended.

Dependent Variable

CR barriers were assessed through 18 investigator-generated items, which were developed on the basis of a review of the literature and pilot-tested.[13] Items assessed attitudinal, logistic, and health-system CR barriers (Table 1). Respondents were asked to rate the reasons for not attending CR or for missing sessions if they did attend; hence, the items were relevant to both CR enrollees and nonenrollees. Responses were made on a 5-point Likert-type scale from "strongly disagree" to "strongly agree," with higher scores indicating stronger agreement that a particular item was a barrier. The internal consistency was Cronbach's α = .9. A total mean score was computed.

Statistical Analyses

All analyses were conducted using SPSS 15.0. Sociodemographic and clinical differences in patients retained in the sample for the CR barriers survey versus those who were not retained were tested with χ^2 and analysis of variance as appropriate. Reliability analysis of the CR barrier items was conducted using the Cronbach alpha. Rates of CR referral and participation were examined, and *t* tests were performed to compare rates by age. The relationship between total CR barriers and CR participation was tested with a *t* test, and the relationship between total CR barriers and percentage of prescribed sessions attended among enrollees was tested using the Pearson correlation.

A dichotomous age variable was created on the basis of age in years (<65 or ≥65) to explore mean barrier scores by age. A descriptive examination of the CR barrier items was performed. The relationship between age and total and individual CR barriers were investigated using Pearson's correlations to optimize variability. Because of the potential for inflated error due to multiple comparisons, a more conservative *P* value cutoff of <.01 was applied.

RESULTS

Characteristics of the 1,273 patients retained for the CR barriers assessment 9 months later, compared with those of patients who were ineligible and declined, are shown in Table 2. The retention rate was 90.3%. Reasons for ineligibility were as follows: unable to reach/incorrect contact information (n = 37; 43%), expired (n = 24; 27.9%), new onset of an orthopedic, neuromuscular, cognitive, psychiatric or vision impairment (n = 6; 7%), and other reasons (n = 25; 27.2%) such as too ill to participate or moved out of the province/country.

Overall, 668 (53.4%) respondents reported referral to CR. Referred patients (64.7 ± 10.5) were significantly younger than those who were not referred to CR (67.1 ± 11.6; $t = -3.7$, $P < .001$). Five hundred thirty-five (43%) respondents participated in CR at 1 of 40 sites. Cardiac rehabilitation participants (64.9 ± 10.2) were significantly younger than nonparticipants (66.5 ± 11.7; $t = -2.6$, $P = .01$). Patients self-reported participating in 84.6 ± 25.7% of prescribed sessions, and this was not significantly related to age ($P = .1$). Total CR barriers were significantly related to participation ($P < .001$) and to percentage of sessions attended among enrollees ($P < .001$).

Age Differences in CR Barriers

Total CR barriers to enrollment and participation were significantly related to age, with older patients endorsing more barriers than younger patients (Table 1). The Pearson correlations revealed that older patients more strongly endorsed the following CR barriers: already exercising at home, confidence in ability to self-manage disease, perception of exercise as tiring or painful, not knowing about CR, lack of physician encouragement, perceptions that other patients do not attend CR, comorbidities, and perception that CR will not improve their health. Younger patients more strongly endorsed work responsibilities and time constraints as CR barriers than older patients, with a trend for family responsibilities.

DISCUSSION

Overall results from the current study confirm the age bias in CR referral and subsequently CR enrollment rates, with no difference in percentage of prescribed sessions completed by age once older patients are enrolled.[4,5,8,9] While previous research has established that older patients are significantly less likely to participate in CR,[4] this study tested and identified health system and patient-level reasons for this age disparity. Older patients had significantly greater CR barriers to enrollment and participation overall, although work responsibilities and time constraints represented unique barriers to younger patients.

Older cardiac patients were less likely to be aware of CR.[11] In a descriptive study of older adult views of CR through focus groups, the authors suggested that older patients do not have an accurate understanding of what to expect in CR. This is likely related to the finding that lack of physician encouragement was also more often a CR barrier for older cardiac patients. Strength of physician referral was reported as the key factor in deciding to participate in CR.[11] Indeed, in the current study, older patients were significantly less likely to be referred to CR. Physicians should be encouraged to prescribe CR to elderly patients following coronary events and procedures,[10] provide written information about CR, and actively encourage patient participation.

Also disconcerting was that older patients were more likely to perceive that CR would not improve their health and that they could self-manage their condition. Perhaps older patients come to expect to develop and cope with chronic conditions, whereas younger patients who develop CAD prematurely may be more inclined to actively address their excess risk. Evidence of the benefits of CR for older patients is growing, and the multifactorial benefits of participation should be conveyed to older patients.

The experience of pain and fatigue when exercising was a greater CR barrier for older than younger CAD patients. This was also found in the descriptive study of older patients, where men reported fear of physical pain with exercise.[11] Clearly there is a need to consider older patients' lower exercise capacity and greater comorbidities[3] when discussing and providing them with an exercise prescription. Cardiovascular benefits are accrued through accumulation of short bouts of activity, from lower-intensity activities such as walking, as well as lifestyle activities more generally.

A related finding demonstrated that older patients were significantly more likely to report their health as a CR barrier. Similar results were found in a study of female patients with ACB.[14] Older patients more often suffer from comorbidities such as diabetes, angina, and heart failure, which can all serve as deterrents to exercise in CR programs due to pain, shortness of breath, limited mobility, and disability. Recommendation of exercise modes and intensities that consider patient comorbidities should be more widely practiced.

Older patients were more likely to endorse a home exercise routine as a CR barrier, although this was the most strongly endorsed CR barrier for both older and younger patients. Indeed, previous research has shown that availability of personal exercise equipment and belief one can carry out CR recommendations at home[15] are related to lower CR utilization. However, the benefits of CR participation including comprehensive risk reduction and multidisciplinary support for heart-healthy behavior changes should be stressed to promote greater uptake among patients who exercise at home. Moreover, participation in CR does not preclude home exercise, indeed it is encouraged. While cardiac patients may be highly motivated to change their behavior immediately following a cardiac event, this decays over time.

Younger patient barriers to CR participation were related to work responsibilities and time constraints. This is due to the fact that younger patients are more likely to be working, with older patients more often retired. For particularly young cardiac patients, issues of career advancement and finances may conflict with time to dedicate to CR. Provision of evening and weekend CR classes may overcome this barrier. There was also a trend toward family responsibilities as a greater barrier for younger participants. This was also reported in a study of female ACB patients, where childcare was cited as a significant barrier to CR participation.[14]

Caution is warranted when interpreting these results, mainly due to measurement issues and generalizability. First, because there is no psychometrically validated scale of CR barriers, investigator-generated items were administered. However, these items had been pilot-tested, were based on a review of the literature, and showed high internal reliability. Future research is required to test and validate a CR barriers measure. Second, characteristics of the retained sample were different from those of patients who were lost to follow-up, exclusive of age. Replication is warranted to ensure generalizability. Third, when examining age differences in CR barrier items, 18 comparisons were made, and this introduces the potential for inflated error rates. However, a conservative P value of $<.01$ was applied to mitigate against this potential limitation. Finally, because of the nature of the study design, causal conclusions cannot be drawn.

In conclusion, older cardiac patients have a greater burden of CR barriers overall, and the nature of their CR barriers differs from those of younger patients. These include experience of exercise as tiring or painful, lack of CR awareness, and comorbidities. Future research to test means to overcome these barriers is needed.

Acknowledgments

This research was supported by Canadian Institutes of Health Research (CIHR) grant MOP-74431, and Dr Grace is also supported by CIHR salary award MSH-80489. In addition, Ms Shanmugasegaram and Ms Gravely-Witte are supported in their graduate studies by CIHR, and Ms Brual by the Heart and Stroke Foundation of Ontario.

References

1. Canadian Association of Cardiac Rehabilitation. Canadian Guidelines for Cardiac Rehabilitation and Cardiovascular Disease Prevention: Enhancing the Science, Refining the Art. Winnipeg, Manitoba: Canadian Association of Cardiac Rehabilitation; 2004.
2. Dolansky MA, Moore SM. Effects of cardiac rehabilitation on the recovery outcomes of older adults after coronary artery bypass surgery. J Cardiopulm Rebabil. 2004; 24:236–244.
3. Lavie CJ, Milani RV, Littman AB. Benefits of cardiac rehabilitation and exercise training in secondary coronary prevention in the elderly. J Am Coll Cardiol. 1993; 22:678–683. [PubMed: 8354798]
4. Pasquali SK, Alexander KP, Peterson ED. Cardiac rehabilitation in the elderly. Am Heart J. 2001; 142:748–755. [PubMed: 11685158]
5. Ades PA, Waldmann ML, McCann W, et al. Predictors of cardiac rehabilitation in older coronary patients. Arch Intern Med. 1992; 12:1033–1035.
6. Grace SL, Abbey SE, Shnek ZM, Irvine J, Franche RL, Stewart DE. Cardiac rehabilitation, II: referral and participation. Gen Hasp Psycbiatry. 2002; 24:127–134.
7. Cooper AF, Jackson G, Weinman J, Home R. Factors associated with cardiac rehabilitation attendance: a systematic review of the literature. Clin Rebabil. 2002; 16:541–552.
8. Witt BJ, Jacobsen SJ, Weston SA, et al. Cardiac rehabilitation after myocardial infarction in the community. J Am Coll Cardiol. 2004; 44:988–996. [PubMed: 15337208]
9. Oldridge NB, Rogowski B, Gottlieb M. Use of outpatient cardiac rehabilitation services: factors associated with attendance. J Cardiopulm Rebabil. 1992; 12:25–31.
10. Ferrara N, Corbi G, Bosimini E, et al. Cardiac rehabilitation in the elderly: patient selection and outcomes. Am J Geriatr Cardiol. 2006; 15:22–27. [PubMed: 16415643]
11. Dolansky MA, Moore SM, Visovsky C. Older adults' views of cardiac rehabilitation program: is it time to reinvent? J Gerontol Nurs. 2006; 32:37–44.
12. Grace SL, Gravely-Witte S, Brual J, et al. Contribution of patient and physician factors to CR referral: a prospective multi-level study. Nat Clin Pract Cardiovasc Med. 2008; 5:653–662. [PubMed: 18542104]
13. Grace SL, Evindar A, Kung TN, Scholey PE, Stewart DE. Automatic referral to cardiac rehabilitation. Med Care. 2004; 42:661–669. [PubMed: 15213491]
14. Plach SK. Women and cardiac rehabilitation after heart surgery: patterns of referral and adherence. Rebabil Nurs. 2002; 27:104–109.
15. Mak YM, Chan WK, Yue CS. Barriers to participation in a phase II cardiac rehabilitation programme. Hong Kong Med J. 2005; 11:472–475. [PubMed: 16340024]

Table 1

PEARSON'S CORRELATIONS OF THE ASSOCIATION BETWEEN CARDIAC REHABILITATION ENROLLMENT AND PARTICIPATION BARRIERS AND AGE

Barrier	<65 y (*n* = 575)	Mean (SD) ≥65 y (*n* = 698)	Total (*N* = 1,273)	*r*(*P*)
1. I already exercise at home	2.8 ± 1.4	3.1 ± 1.4	3.0 ± 1.4	.1 (.001)
2. I already exercise in my community	2.5 ± 1.4	2.5 ± 1.3	2.5 ± 1.3	.01 (.8)
3. I don't need cardiac rehabilitation	2.4 ± 1.4	2.4 ± 1.3	2.4 ± 1.4	.02 (.6)
4. I am confident I can manage my heart problem on my own	2.3 ± 1.2	2.5 ± 1.2	2.4 ± 1.2	.10 (.003)
5. I find exercise tiring or painful	2.3 ± 1.3	2.6 ± 1.3	2.4 ± 1.3	.1 (.001)
6. My heart condition is not that serious	2.3 ± 1.3	2.5 ± 1.3	2.4 ± 1.3	.09 (.01)
7. I didn't know about cardiac rehabilitation	2.2 ± 1.4	2.4 ± 1.4	2.3 ± 1.4	.1 (.001)
8. My doctor doesn't encourage me to attend	2.1 ± 1.3	2.4 ± 1.3	2.3 ± 1.3	.1 (<.001)
9. Distance	2.2 ± 1.4	2.3 ± 1.3	2.3±1.4	.05 (.3)
10. Many people with heart problems don't go to cardiac rehabilitation, and they are fine	2.1 ± 1.1	2.3 ± 1.1	2.2 ± 1.1	.2 (<.001)
11. Other health problems prevent me from going	2.0 ± 1.2	2.3 ± 1.3	2.2 ± 1.3	.2 (<.001)
12. Work responsibilities	2.4 ± 1.4	1.9 ± 1.1	2.1 ± 1.3	−.2(<.001)
13. Transportation problems	2.1 ± 1.3	2.1 ± 1.3	2.1 ± 1.3	.03 (.5)
14. Family responsibilities	2.1 ± 1.3	2.0 ± 1.1	2.1 ± 1.2	−.1 (.01)
15. Time constraints	2.1 ± 1.3	1.9 ± 1.1	2.0 ± 1.2	−.1 (<.001)
16. Cost	1.9 ± 1.2	1.9 ± 1.1	1.9 ± 1.2	.04 (.35)
17. It won't improve my health	1.8 ± .9	2.0 ± 1.1	1.9 ± 1.0	.1 (<.001)
18. The illness of a close relative or other caregiving responsibilities	1.8 ± .9	1.9 ± 1.0	1.8 ± 1.0	.08 (<.05)
Total barriers score	2.4 ± 1.0	2.6 ± 1.0	2.5 ± 1.0	.1 (<.001)

Table 2

CHARACTERISTICS OF PARTICIPATING, INELIGIBLE, AND DECLINING OUTPATIENTS AT 9-MONTH FOLLOW-UP ASSESSMENT (*N* = 1,497)

	Retained participants				
Characteristics[a]	**<65 y (*n* = 575)**	**≥65 y (*n* = 698)**	**Total (*n* = 1,273)**	**Ineligibles (*n* = 92)**	**Declined (*n* = 132)**
Age, mean ± SD	56.0 ± 6.8	74.3 ± 6.1[b]	65.9 ± 11.2	64.8 ± 13.3	63.5 ± 12.4
Female gender, *n* (%)	141 (24.5)	221 (31.7)[c]	360 (28.5)	26 (28.3)	43 (30.3)
BMI,[d] mean ± SD	28.5 ± 6.0[b]	26.8 ± 4.7	27.5 ± 5.4	27.8 ± 5.8	27.6± 5.7
Married,[d] *n* (%)	425 (74.3)	489 (70.7)	907 (72.4)[e]	54 (59.3)	83 (59.7)
Minority ethnocultural background,[d] *n* (%)	82 (14.3)	92 (13.2)	173 (13.7)[f]	21 (23.1)	38 (26.8)
Education, >high school[d] *n* (%)	173 (61.3)[c]	162 (50.0)	666 (53.6)	40 (44.4)	72 (52.2)
Family income, ≥Can $50,000[d] *n* (%)	223 (41.6)[b]	374 (60.0)	556 (48.4)[e]	27 (31.8)	45 (37.8)
Work status,[d] full of part time, *n* (%)	320 (55.9)[b]	88 (12.7)	408 (32.3)	28 (31.1)	52 (39.4)
Systolic BP mmHg, mean ± SD	127.6 ± 18.6	133.9 ± 19.0[b]	131.2 ± 19.2	135.1 ± 21.1	130.1 ± 19.7
Diastolic BP mmHg, mean ± SD	75.4 ± 10.2[c]	73.8 ± 10.2	74.5 ± 10.2	77.3 ± 12.9[g]	73.1 ± 10.5
Cholesterol/ HDL ratio, mean ± SD	3.9 ± 1.8[c]	3.5 ± 1.1	3.7 ± 1.5	4.1 ± 1.5	3.6 ± 1.3
HDL mmol/L, mean ± SD	1.2 ±.4	1.3 ±.4	1.2 ±.4	1.1 ±.3	1.2 ±.3
LDL mmol/L, mean ± SD	2.4 ±.9	2.3 ± 1.0	2.3 ± 9	2.1 ± 1.0	2.5 ± 9
NYHA Class II–IV, *n* (%)	38 (6.6)	44 (6.3)	82 (6.4)	5 (5.4)	6 (4.5)
CCS angina class 2–4, *n* (%)	105 (18.3)	157 (22.5)[c]	262 (20.6)[g]	7 (7.6)	25 (18.9)
Multivessel disease, > 1 vessel, *n* (%)	167 (29.0)	199 (28.5)[h]	365 (28.7)	25 (27.2)	34 (25.8)
Duke Activity Status Index,[d] mean ± SD	42.3 ± 15.1 [b]	33.2 ± 15.2	37.1 ± 15.8[f]	28.8 ± 18.9	34.8 ± 16.3
Current or previous MI, *n* (%)	272 (47.3)	308 (44.1)	580 (45.6)	45 (48.9)	64 (48.5)
Current or previous PCI, *n* (%)	288 (50.1)	298 (42.7)	586 (46.0)	39 (42.4)	55 (41.7)
Current or previous ACB, *n* (%)	152 (26.4)	234 (33.5)	386 (30.3)	21 (22.8)	33 (25.0)
Current or previous HF, *n* (%)	64 (11.1)	114 (16.3)[h]	178 (14.0)	19 (20.7)	24 (18.2)
Current or previous arrhythmia, *n* (%)	103 (17.9)	173 (24.8)[h]	276 (21.7)	26 (28.3)	30 (22.7)
Current or previous valve repair/replacement, *n* (%)	63 (11.0)	133 (19.1)	196 (15.4)	13 (14.1)	27 (20.5)

Abbreviations: ACB, acute coronary bypass; BMI, body mass index; BP, blood pressure; CCS, Canadian Cardiovascular Society; HDL, high-density lipoprotein; HF, heart failure; LDL, low-density lipoprotein; MI, myocardial infarction; NYHA, New York Heart Association; PCI, percutaneous coronary intervention.

[a]Percentages take into account missing data for some variables.

[b] $P < .001$, significant difference by age.

[c] $P < .01$, significant difference by age.

[d]Presents self-report data. All other data elements extracted from patient charts.

[e] $P < .01$,significant different between participants, ineligibles, and decliners.

[f] $P < .001$, significant difference between participants, ineligibles, and decliners.

[g] $P < .05$, significant difference between participants, ineligibles, and decliners.

[h] $P < .05$, significant difference by age.