ORIGINAL RESEARCH

Is Cardiac Rehabilitation Exercise Feasible for People with Mild Cognitive Impairment?

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ABSTRACT

Background

Exercise is a promising strategy to prevent dementia, but no clinically supervised exercise program is widely available to people with mild cognitive impairment (MCI). The objective was to survey health professionals to assess the feasibility of using cardiac rehabilitation exercise programs for MCI populations.

Methods

We distributed surveys to: 1) health professionals working in cardiac rehabilitation exercise programs (36/72 responded); and 2) physicians who treat MCI (22/32 responded). Questions addressed clinician and clinic characteristics and feasibility of referring and accommodating people with MCI.

Results

Most cardiac rehabilitation exercise programs currently treat people with MCI (61.1%). Nearly all were willing and able to accept people with MCI and comorbid vascular risk (91.7%), though only a minority could accept MCI without vascular risk (16.7%). Although most physicians recommend exercise to people with MCI (63.6%), few referred patients with MCI to programs or people to guide exercise (27.3%). However, all physicians (100%) would refer patients with MCI to a cardiac rehabilitation exercise program.

Conclusions

Our study supports cardiac rehabilitation exercise programs as a feasible model of exercise for patients with MCI with vascular risk. Patients with and without vascular risk could likely be accommodated if program mandates were expanded.

Key words: mild cognitive impairment, exercise, exercise therapy, referral and consultation, cardiac rehabilitation

INTRODUCTION

The number of Canadians with dementia is projected to more than double over the next 25 years and the number of people worldwide is expected to triple over the same time period,[(1)] driven primarily by more people living to ages when dementia is common. There is currently no disease modifying agent or cure for dementia.[(2)] As a result, it is essential to identify preventative approaches, including lifestyle and psychosocial strategies, to implement among people at high risk of dementia.[(3)] One group at high risk of dementia is people with mild cognitive impairment (MCI), who are at high risk of both Alzheimer's disease and vascular dementia.[(4-6)]

Exercise is an established model of care for cardio- and cerebrovascular disease.[(7)] Now organizations such as the Alzheimer's Society of Canada recognize exercise as a promising strategy to prevent dementia.[(8)] Physical inactivity may be attributable for over 20% of dementia cases in North America.[(9)] Although no randomized controlled trials (RCTs) have followed exercise interventions long enough to detect difference in dementia incidence, convergent evidence from prospective cohort studies, clinical trials, and animal models supports exercise as an intervention to improve cognitive function among older adults with and without cognitive impairment.[(10)] Exercise yields additional benefits to physical function and mood,[(7,11-13)] which may delay functional dependence and, thus, dementia diagnosis among people with MCI. However, people with MCI often have deficits in memory, apathy, or anxiety that may make it difficult to participate in community

exercise programs.[14] In addition, comorbid vascular risk or cardiovascular events are common,[15] which may warrant clinical supervision of exercise.

Despite these associated benefits, there is no exercise program that is widely available to people with MCI in Canada. The cardiac rehabilitation exercise program, which is a standard part of care following cardiac events, such as myocardial infarction, angioplasty, or surgery, is an established model of exercise delivery that could benefit people with MCI. The cardiac rehabilitation exercise program generally includes a progressive aerobic and strength training program that closely aligns with best evidence for exercise as dementia prevention; that is, 150 minutes per week of moderate aerobic exercise and twice per week strength training programs.[16] Although there are other clinical exercise programs targeted to seniors in Canada, such as seniors day programs, these programs often include insufficient exercise volume and intensity to meet the guidelines for dementia prevention.

Many people with a primary diagnosis of MCI are currently eligible for the cardiac rehabilitation exercise program because of co-morbid vascular risk factors. Furthermore, studies show that over 50% of cardiac rehabilitation patients and myocardial infarction survivors have some form of cognitive impairment,[17,18] indicating that the cardiac rehabilitation exercise program is feasible for those with mild symptoms of cognitive impairment. With the exception of medically related dropout, those with impaired cognitive function have similar adherence to a cardiac rehabilitation exercise program to those with normal cognition.[19] The objective of this study was to survey health professionals who work in cardiac rehabilitation exercise programs and physicians who treat MCI to assess the feasibility of using cardiac rehabilitation exercise programs as a therapy for MCI.

METHODS

Study Design

This was a cross-sectional survey study to assess the feasibility of using cardiac rehabilitation exercise as an intervention for people with MCI. Participants received one of two surveys (Appendix A and B), depending on participant group: 1) health professionals delivering cardiac rehabilitation exercise programs in Canada; or 2) physicians treating people with MCI at memory clinics in Canada. Identification of potential participants is described below. Surveys were emailed and collected between May and December 2013. This study received ethical approval from the University of Waterloo Office of Research Ethics.

Participants

Cardiac Rehabilitation Exercise Programs

Potential participants were identified through the clinic lists on the Canadian Cardiac Rehabilitation Registry or the Cardiac Health Foundation of Canada websites. Clinics were contacted if an e-mail address was provided in the clinic information. Additional programs were identified by using the following search terms in a Web search (Google): “Cardiac Rehabilitation” and “Canada”. Each potential participant was emailed a link to the online survey (Survey Monkey®) and a PDF attachment of the survey and could respond by either option. Of the 84 cardiac rehabilitation programs with e-mail addresses that were identified, 12 e-mail addresses were invalid, leaving 72 programs that were contacted and invited to participate via email. From these programs, 36 people completed the cardiac rehabilitation exercise program survey.

Memory Clinics

Potential participants were identified through a Web search (Google) using the following terms: (“Memory Clinic” OR “dementia clinic” OR “cognitive impairment” OR “Alzheimer’s Clinic”) AND “Canada”. Additional known physicians in memory clinics in Kitchener, ON, Hamilton, ON, Toronto, ON, and Halifax, NS were also contacted. Most potential participants were e-mailed a link to the appropriate online survey and a PDF attachment of the survey and could respond through either option. Local physicians received a paper copy of the questionnaire for convenience and returned the surveys to a drop box in a central reception area. A total of 32 physicians in memory clinics were identified and invited to participate in the survey. Of these, 22 physicians responded to the survey.

Surveys

Cardiac Rehabilitation Exercise Program

The Cardiac Rehabilitation Exercise Program survey (Appendix A) was designed to assess whether it is feasible for cardiac rehabilitation exercise programs to accept people with a primary diagnosis of MCI who either have or do not have vascular risk factors. Clinic (province) and respondent characteristics (profession, years in practice) were collected. Questions also assessed whether programs were currently accepting patients with a diagnosis or symptoms of MCI and whether they were willing to accept patients with MCI who did or did not have traditional vascular risk factors.

Memory Clinic Survey

The Memory Clinic Survey (Appendix B) was designed to determine if physicians who treat MCI are willing to refer patients with MCI to a cardiac rehabilitation exercise program. Clinic (setting: community or hospital) and respondent characteristics (specialty, years in practice) were assessed. In addition, the survey addressed whether physicians were aware that cardiac rehabilitation exercise programs often accept people with MCI who have co-morbid vascular risk factors. Additional questions targeted their current clinical practice regarding exercise (assessment, recommendations, referral).

Statistical Analyses

Frequency of responses (n, %) were determined for each question. The association between respondent characteristics and practices and answers indicating the feasibility of cardiac rehabilitation exercise program as an intervention for MCI was examined using either a chi-square test or a Fisher's exact test (categorical outcomes) and either a Wilcoxon rank-sum test or a Kruskal-Wallis test (continuous outcomes), as appropriate. For the Cardiac Rehabilitation Exercise Program survey, the main outcomes indicating feasibility were: 1) whether the program currently accepted patients with MCI with traditional vascular risk factors into the cardiac rehabilitation exercise program; and 2) willingness to accept patients with MCI without traditional vascular risk factors into the cardiac rehabilitation exercise program. For the Memory Clinic survey, the main outcomes indicating feasibility were: 1) whether they currently recommend exercise to patients with MCI; 2) awareness of whether cardiac rehabilitation exercise programs accepted patients with vascular risk factors but no cardiac outcomes; and 3) the portion of MCI patients they would refer to cardiac rehabilitation exercise. All analyses were completed using SPSS v.22 (SPSS Inc.).

RESULTS

Cardiac Rehabilitation Exercise Survey

The majority of respondents were based in clinics in either Ontario (28.6%) or New Brunswick (25.7%), with other respondents from six additional provinces (Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Quebec, Saskatchewan). Most respondents reported less than 20 years in practice (80.5%). There was an even distribution of professions across physiotherapists (22.2%), kinesiologists (22.2%), exercise physiologists (22.2%), and nurses (22.2%). Additional details are presented in Table 1.

A majority of respondents indicated that they treated patients diagnosed with MCI (61.1%), reporting that a mean of 10% of their patients had MCI. Even higher portions of respondents (88.9%) indicated that some of their patients had difficulty remembering or difficulty with attention or decision-making, and indicated that approximately 20% of patients had these problems. A large majority of respondents indicated that people with MCI and co-morbid vascular risk factors were either currently eligible (83.3%) or could be accepted into their program (91.7%). However, few clinics indicated that they would accept people with MCI who did not have traditional vascular risk factors, with only one person providing a reason (that their funding requires a coronary artery disease diagnosis). Additional detail is provided in Table 2. No respondent or clinic characteristics were associated with the likelihood of currently accepting patients with MCI and vascular risk factors into the program or with willingness to accept patients with MCI and no vascular risk factors into the program.

TABLE 1.
Respondent characteristics

Characteristic	*Response (%, n)*
Cardiac Rehabilitation Exercise Program Survey	
Years in Practice	
<10 years	36.1% (13)
10–20 years	44.4% (16)
>20 years	19.4% (7)
Occupation	
Physiotherapist	22.2% (8)
Exercise physiologist	22.2% (8)
Kinesiologist	22.2% (8)
Nurse	22.2% (8)
Other	11.1% (4)
Memory Clinic Survey	
Years in Practice	
<10 years	36.4% (8)
10–20 years	27.3% (6)
>20 years	36.4% (8)
Setting	
Hospital	31.8% (7)
Community	68.2% (15)
Specialty	
Family practice	59.1% (13)
Neurology	27.3% (6)
Other	13.6% (3)

Memory Clinic Survey

Most respondents practiced in a community setting (68.2%) and were general practitioners (59.1%) (family practice). Respondents were diverse in terms of years of practice with an approximately even number practicing for greater than 20 years (36.4%), 10–20 years (27.3%), and less than 10 years (36.4%). Additional detail is provided in Table 1.

Slightly more than half of respondents (59.1%) currently ask their patients with MCI about exercise habits, and a slightly greater number recommend exercise to their patients with MCI (63.6%). Additional detail regarding exercise assessment and referral practices is provided in Table 3. Of the minority who indicate that they refer their patients with MCI to another program or person for exercise support, a variety of places were listed including physiotherapists, cardiac rehabilitation, seniors' day programs, and community exercise programs (YMCA, Curves, personal trainers).

Of the respondents, only 50% were aware that many cardiac rehabilitation programs accept people who have

significant vascular risk factors but no cardiac event. Most respondents indicated that they would be willing to refer a majority of their patients with MCI to an exercise program that specifically provided support to patients with MCI, and all indicated that they would be willing to refer eligible patients with MCI to a cardiac rehabilitation exercise program. Respondents further indicated that they would refer a median of 85% of their patients with MCI to a cardiac rehabilitation

TABLE 2.

Responses from the Cardiac Rehabilitation Exercise Program Questionnaire regarding current and potential inclusion of people with MCI in cardiac rehabilitation exercise programs

Question	*Yes % (n) or Median (IQR)*
Routinely treat people with MCI?	61.1% (22)
Portion of patients with MCI?	10% (2.5%–22.5%)
Have patients with difficulty remembering things?	94.4% (34)
Portion with difficulty remembering things?	10% (5%–18.7%)
Have patients with trouble focusing attention or making decisions?	88.9% (32)
Portion with trouble focusing attention or making decisions?	10% (5%–20%)
Are people with MCI and significant vascular risk factors currently eligible for your program?	83.3% (30)
Would your program be willing and able to accept people with MCI and vascular risk factors into your program?	91.7% (33)
Would your program be willing and able to accept people with MCI who do not have vascular risk factors into your program?	16.7% (6)

TABLE 3.

Responses from the Memory Clinic Questionnaire regarding current exercise practices and potential referral of people with MCI to a cardiac rehabilitation exercise program

Question	*Yes % (n) or Median (IQR)*
Do you ask patients with MCI about exercise habits?	59.1% (13)
Do you routinely recommend exercise to your patients with MCI?	63.6% (15)
Do you provide specific exercise advice to your patients with MCI regarding:	
Frequency	59.1% (13)
Duration	54.5% (12)
Intensity	40.9% (9)
Do you refer your patient to another person/program for exercise support?	27.3% (6)
If there was an person or program that specifically provided exercise support to people with MCI, what portion of patients would you refer?	75% (40%–95%)
Are you aware that many cardiac rehabilitation exercise programs accept patients with vascular risk factors (but no cardiac outcome)?	50.0% (11)
Would you refer patients with MCI who meet current referral criteria to a cardiac rehabilitation exercise program?	100.0% (22)
If the referral criteria were expanded to include all people with MCI who can safely exercise, what portion of your patients would you refer?	85% (73.7−100%)

exercise program if the criteria were expanded to include all people with MCI. Additional details regarding potential referral of patients with MCI to a cardiac rehabilitation exercise program are included in Table 3.

Respondents who practiced in a hospital were more likely to recommend exercise to their patients with MCI than those who practiced in the community (100.0% vs. 50.0%, χ^2 = 5.867, p = .02). There was also a trend for more hospital-based respondents to be aware that many cardiac rehabilitation exercise programs accept patients with vascular risk factors but no cardiac diagnosis (85.7% vs. 33.3%, χ^2 = 5.238, p = .06). Related, specialists were more likely to recommend exercise than family physicians (100.0% vs. 38.5%, χ^2 = 8.703, p = .01) and there was a trend for more specialists to be aware that some cardiac rehabilitation exercise programs accepted people with vascular risk factors but no cardiac diagnosis (77.8% vs. 30.8%, χ^2 = 4.701, p = .06). Years of practice was not associated with either of these outcomes (p > .98) and none of the physician or clinic characteristics were associated with the portion of their patients with MCI that they would refer to a cardiac rehabilitation exercise program if all patients with MCI who were safe to exercise were eligible for the program (p > .44).

DISCUSSION

Our surveys of health professionals in cardiac rehabilitation exercise programs and physicians in memory clinics indicate that cardiac rehabilitation exercise programs may be a feasible and accessible exercise program for people with MCI with co-morbid vascular risk factors. All treating physicians were willing to refer to, and most programs were willing to accept, people with MCI and vascular risk factors into cardiac rehabilitation exercise programs. Optimistically, our results also indicate that health professionals are willing to collaborate across traditional specialties for patient care.

People with MCI are at high risk for dementia and may be an appropriate target for interventions for dementia prevention, such as exercise.[4-6,20,21] However, symptoms of MCI such memory problems, anxiety, and apathy may make community exercise more difficult.[14] Consequently, clinically supervised exercise programs, such cardiac rehabilitation exercise programs, may be more suitable for this group. While variation exists, cardiac rehabilitation exercise programs typically include progressive aerobic and resistance training, which is in line with best evidence in dementia prevention, unlike the exercise included in typical seniors day programs.[16] While some cardiac rehabilitation exercise programs only accept patients with a coronary artery disease diagnosis, many accept patients with vascular risk factors that put them at risk for a vascular event, such as hypertension, dyslipidemia, smoking, and diabetes, which are also common among people with MCI and puts people at risk for dementia.[22,13] Our survey indicated that just over 60% of cardiac rehabilitation exercise programs already treat people with MCI and over 90% treat patients with some cognitive dysfunction. Although respondents indicated only a small portion of patients had MCI or cognitive dysfunction, a previous study found that over 50% of people in cardiac rehabilitation have cognitive dysfunction,[17] indicating that MCI may be under-diagnosed and under-recognized in Canadian cardiac rehabilitation exercise programs.

A recent study indicated that nearly 70% of Canadian family physicians gave verbal advice to patients regarding exercise.[23] The results of our survey were in line with this national average, with approximately two-thirds of physicians indicating that they recommended exercise to their patients. However, fewer physicians gave specific recommendations regarding exercise duration, frequency, and intensity. Despite the lack of specific exercise prescription, only a minority currently referred their patients with MCI to people or programs for exercise that might offer guidance, possibly due to a lack of programs specifically targeting MCI. Yet, all respondents indicated they would be willing to refer patients with MCI to a cardiac rehabilitation exercise program, with all but one respondent indicating that they would refer at least 50% of their patients. Indicating that this may be feasible, the vast majority of cardiac rehabilitation exercise program respondents indeed indicate a willingness to accept these patients, as long as they have co-morbid vascular risk factors.

Although only a minority of cardiac rehabilitation exercise programs indicated that the program could currently accept patients with MCI without co-morbid vascular risk, it seems reasonable that this group could be accommodated with expansion of program funding mandates. Only minimal adaptations are likely required for patients with MCI, such as relaying scheduling and at-home exercise prescriptions to the care partner, which are likely already in place. Consequently, with expansion of program mandate and funding, it seems likely that all patients with MCI who are appropriate to exercise could be accommodated within cardiac rehabilitation exercise programs.

Limitations and Strengths

This study was the first study of its kind to inquire about the feasibility of using cardiac rehabilitation as an interventional tool for MCI, with two health professional groups providing input. The response rate was also high, greater than 50%, for both surveys. However, the data quality is limited by reliance on self-reports. In addition, since surveys were anonymous without the specific clinic reported, it was not possible to determine whether respondents may have been clustered from certain clinics.

CONCLUSIONS

The inclusion of patients with MCI into an established, nationally-offered exercise program—cardiac rehabilitation

exercise—appears to be a feasible method to maintain or improve function and quality of life and potentially improve or stabilize cognitive function in patients with MCI. Physicians in memory clinics are willing to refer at least half of their MCI patients to cardiac rehabilitation exercise programs, and most cardiac rehabilitation programs are willing to receive patients with MCI who have vascular risk factors. A longitudinal trial is suggested to further test the effects of cardiac rehabilitation exercise programs on function, quality of life, and cognitive function among people with MCI.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare that no conflicts of interest exist.

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APPENDICES

Appendix A. Cardiac Rehabilitation Exercise Survey

Mild cognitive impairment (MCI) causes minor problems with cognitive functions such as memory, attention, or decision making. It is not severe enough to interfere with daily function. Exercise may improve physical and cognitive function in people with MCI but there are few organized exercise programs available to people with MCI. We are interested in how many people with MCI are currently eligible for or treated through cardiac rehabilitation exercise programs.

Province/Territory of Cardiac Rehabilitation Program: Please select

Occupation:
- ○ Cardiologist
- ○ Physiotherapist
- ○ Kinesiologist
- ○ Exercise Physiologist
- ○ General Practitioner
- ○ Other _____

Years in practice:
- ○ <10 years
- ○ 10-20 years
- ○ >20 years

Do you currently treat cardiac patients with a diagnosis of MCI or dementia?
○ Yes ○ No **If Yes**, what portion of your patients does this occur in? _____%

Do some of your patients have difficulty remembering things (e.g. appointments, exercises, names)?
○ Yes ○ No **If Yes**, what portion of your patients does this occur in? _____%

Do some of your patients have trouble focusing their attention or making decisions?
○ Yes ○ No **If Yes**, what portion of your patients does this occur in? _____%

Many people with MCI have vascular risk factors and are at high risk for heart attacks and strokes. Are people with MCI and significant vascular risk factors currently eligible for your cardiac rehabilitation exercise program?
○ Yes ○ No

Would your program be able/willing to accept people with MCI and vascular risk factors into your program?
○ Yes ○ No

If "Yes," would your program be able/willing to accept people with MCI who don't currently have vascular risk factors into your program?
○ Yes ○ No

If "No," why not?
- ○ Outside our mandate
- ○ Do not have training to treat people with MCI
- ○ People with MCI are unlikely to benefit
- ○ Other, please explain _____

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Appendix B. Memory Clinic Survey

Though exercise may benefit people with mild cognitive impairment (MCI), there are few exercise programs available to people with MCI. We would like to find out more about current referral strategies in order to develop an exercise program for people with MCI.

Clinic Setting: ○ Hospital ○ Community

Specialty: ○ Neurologist ○ Psychiatrist ○ Geriatrician ○ Family Practice ○ Other _____

Years in practice: ○ <10 years ○ 10-20 years ○ >20 years

Do you routinely see patients with MCI? ○ Yes, continue below. ○ No, survey complete.

Do you routinely ask your patients with MCI about their exercise habits? ○ Yes ○ No

Do you routinely recommend exercise to your patients with MCI? ○ Yes ○ No

Do you provide specific exercise advice to your patients with MCI regarding:

Frequency of exercise: ○ Yes ○ No

Duration of exercise: ○ Yes ○ No

Intensity of exercise: ○ Yes ○ No

Do you refer your patients to another person/program for exercise support? ○ Yes ○ No

If YES, who or where do you refer your patients? Check all that apply.

○ A medical professional in our clinic, please specify type _____
○ A medical professional outside of our clinic, please specify type _____
○ A program within the health system, please specify _____
○ A community program, please specify _____
○ Other, please specify _____

If there was a person/program that specifically provided exercise support to people with MCI, what portion of your patients would you refer to this program? _____%

Are you aware that many cardiac rehabilitation exercise programs accept patients with vascular risk factors (but no cardiac outcome) into their program? ○ Yes ○ No

Would you be willing to refer patients with MCI who meet current referral criteria for the cardiac rehabilitation exercise program? ○ Yes ○ No

If the criteria for referral were expanded to include all people with MCI who can safely exercise, what portion of your patients would you refer? _____%

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