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Analysis of a Cardiac Rehabilitation Program in a Rural Manitoban City

Abstract

According to the most recent publication on Heart Disease by the Public Heath Agency of Canada, Heart Disease is one of the leading causes of death for Canadians; second only to cancer.[1] Not only does it cause extensive mortality, it is a significant cause of morbidity, with 2.4 million Canadians above the age of 20 living with diagnosed heart disease, making up 8.5% of Canadian adults.[1] As there are so many Canadians living with heart disease, and as the risk of death increases with disease and symptom progression, the study of heart disease and its management has the potential to benefit many Canadians. Heart disease is managed through medical surveillance and treatment alongside lifestyle modifications to diet, exercise and other risk factors (such as smoking and diabetes). Medically, physicians can manage medications and surveillance tests for heart disease, however the lifestyle factors which influence heart disease are largely up to the individual. This paper discusses a Cardiac Rehabilitation program which integrates understanding of medical and lifestyle management of heart disease. A brief analysis is done on the current progress of the program, which is still very new. Finally, suggestions are made for further research.

About Cardiac Rehab

Cardiac Rehabilitation (CR) has formally been conducted in Canada according to guidelines produced by the Canadian Association for Cardiac Rehabilitation (CACR) since the first guideline publication in 1999. Since then, there have been 2 updated editions of the guidelines, with the most current edition having been published in 2009. The formal definition of CR according to the 3rd edition of the guidelines is:

> "The enhancement and maintenance of cardiovascular health through individualized programs designed to optimize physical, psychological, social, vocational, and emotional status. This process includes the facilitation and delivery of secondary prevention through risk factor identification and modification in an effort to prevent disease progression and the recurrence of cardiac events"[2]

The approach taken in CR is patient-centred and focuses on interdisciplinary care facilitating the patients' own active participation and education in cardiac health. As per the definition, care is multifactorial, taking into consideration not only physical health but also the many social, financial, and emotional factors which affect it. It also focuses on risk factors for heart disease and modification of those which are modifiable (smoking, physical inactivity, diet, alcohol consumption, Psychosocial factors, obesity, dyslipidemia, hypertension, and diabetes mellitus). Education surrounding non-modifiable risk factors (age, sex, and genetic predisposition) is also included.

Another educational focus is on cardiac disease itself, and helping participants understand the disease processes which are affecting them. Teaching is done on the lab tests that are ordered to monitor their condition, as well as the medications used to treat them. The goal of disease education is to allow CR participants to better understand their health and to play an active role in the medical management; working with all members of the health care team.

See Appendix 1 for the full list of Core Components of Cardiac Rehab)

Cardiac Rehabilitation in Portage la Prairie, MB

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Portage la Prairie is a small city in Manitoba with a population of approximately 12,950 people.[3] The average age of the population is 40.5years, and 18.6 % of the population is 65 years old or older.[3] It is a predominantly Caucasian population (62.9%), but also has significant Indigenous (32.0%), Filipino (2.0%), and South Asian (1.6%) populations, with all other minorities contributing to less than 1.5% of the population.[3] It is approximately 85 km west of Winnipeg, MB.

The Cardiac Rehabilitation (CR) program in portage la Prairie is a fairly new program, with the first round of participants starting the program in January 2019. Since then, there have been 2 six-week cycles of education-based teaching on heart disease and risk factor management. The team involved in CR includes a Cardiac Nurse Educator, Kinesiologist, Dietician, and a Social Worker. There are two two-hour-long sessions per week (12 sessions total); one in-class educational session, and one exercise session at a local fitness and recreational session

Individuals are eligible for this program if they have: heart disease, angina, atrial fibrillation, peripheral artery disease, heart failure, have had a myocardial infarction, or have had heart surgery (including angioplasty and valve replacement). Eligible candidates receive a referral to the program from their family/attending physician, which is then reviewed by the CR team. From here, potential candidates are interviewed through the initial Intake process, which screens for suitability for the program. As a part of this assessment, every participant undergoes an exercise stress test to determine safety to exercise.

From here, approved candidates are risk stratified based on symptoms, characteristics of disease, comorbid medical and psychiatric conditions, and functional capacity.

Then, participants are cleared to participate in the rehabilitation program. At all exercise classes, there is a nurse present to asses vitals and initiate emergency response if needed. There are also entrance and exit fitness assessments done by a kinesiologist for all participants.

One unique aspect of the program in Portage la Prairie is that the funding comes from the Regional health Authority. There are no costs to the participant, except for membership at the community fitness centre, which can be paid as a full membership or a $3 drop in fee per exercise session ($18 total).

Study Design/Methods

This analysis consists of two survey-based sections and an analysis of fitness test data taken before and after completing the cardiac rehab program.

The first survey-based section is an entrance and mid-cycle survey completed by participants of the third cycle of CR in Portage la Prairie. The survey was created based on the Updated Core Components of Cardiac rehab outlined in the most recent version of the Canadian Guidelines for Cardiac Rehabilitation and Cardiovascular Disease prevention (See Appendix A). This anonymous survey was administered on paper at the first day of the cycle (August 13, 2019) and the end of the third week (August 29th)

The second survey-based portion is a retrospective survey administered to participants in the past 2 cycles of cardiac rehab, which ran from March 25-May 2, 2019 and May 6-June 13, 2019 respectively. This survey was largely the same as the survey administered to the 3rd cycle of participants, however it was given in one part, and asked for feedback regarding how participants felt about CR after having completed the full cycle. Of the 15 total past participants, 10 were successfully reached by phone and agreed to complete the online survey. Of these 10, 4 have completed the survey. (See Appendix B for copy of Survey).

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Lastly, data from the first two cycles were analyzed to determine the effect that cardiac rehab had on physical fitness. This data was taken from the pre and post rehabilitation fitness assessments conducted by the kinesiologist on the CR health care provider team. Due to the extensive amount of data collected, this study will focus only on five measurements taken; aerobic capacity (6-minute walking test) strength (30 second chair stand and 30 second arm curl) and Flexibility (back scratch test Left and Right arm). These categories were chosen as they are identified as the Core Components of exercise training in the guidelines. Participants in the first two cycles of CR were contacted by phone to gain consent to obtain their fitness test records (5 of 15 could not be reached by phone, and the remaining 10 gave verbal consent over the phone)

Data

Part 1: Pre and Post surveys

Data pending.

Part 2: Retrospective Surveys

Table 1: Demographics of respondents.

Category	Percent of Respondents
Age	
55-59 years	25%
60-64 years	25%
65-69 years	25%
75-79 years	25%
Cycle 2 (May 6-June 13, 2019)	100%
Male	50%
Cardiac Diagnosis	
MI	25%
Angina	25%
Coronary Artery Stent Placement	50%
Coronary Artery Bypass Surgery	25%
Comorbid Conditions	
Hypertension	50%
High Cholesterol	50%
Type II Diabetes	25%
Smoking History	
Smokes, or has smoked in the past	75%
First Degree Relative with Heart Disease	50%

Pre vs Post Cardiac Rehabilitation Self Management

The following questions were asked regarding disease management behaviors and understanding. Respondents ranked their responses on a 5 point scale from "strongly disagree" to "strongly agree".

1. I feel I understand my cardiac diagnosis.

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25% of respondents reported improvement from "agree" to "strongly agrees". For those who did not, they initially responded either "agree" or "strongly agree"

2. I feel I understand the medications and tests used to treat my condition.

    50% of respondents reported improvement; with 25% from "disagree" to "strongly agree". Of those who did not report improvement, they initially ranked either "agree' or "strongly agree"

3. I feel I can make informed decisions regarding my health.
    50% of respondents reported improvement; with 25% from "neutral" to "strongly agree". Of those who did not report improvement, they initially ranked either "agree' or "strongly agree"

4. I know about resources in my community that can help me with management of my condition.
    100% of respondents reported improvement; before CR 75% of respondents ranked either "strongly disagree" or disagree". After CR, 75% of respondents ranked either "agree" or "strongly agree", with the remaining 25% ranking "neutral"

5. I feel comfortable talking to my doctors, nurses, kinesiologist, and other members of the healthcare team about my concerns.
    75% of respondents reported improvement; 50% ranking "neutral" before CR and either "agree" or "strongly agree" post CR. Those who did not report improvement initially ranked "agree".

6. I feel I can set attainable goals for my own health.
    50% reported improvement, from ranking "agree" to "strongly agree". Those who reported no change initially ranked "agree".

7. I feel I know what is best for my own body and my own health
    25% of respondents reported improvement from "agree" to "strongly agree". Those who did not report improvement initially ranked "agree".

Exercise Habits
Prior to beginning CR, 75% of respondents exercised at least once per week, and 25% did not exercise at all. after completing CR, 50% exercised more than once per week and the other 50% exercised regularly, but less than once per week. Before CR all participants rated their confidence in creating their won exercise regimen as either "not at al confident" or "somewhat confident". After completing CR, 75% of respondents were either "confident" or "very confident", with the remaining respondent being "somewhat confident". 100% of respondents felt CR improved their understanding of how to be active in daily life, and 50% of respondents felt they felt more physically fit after completing CR.

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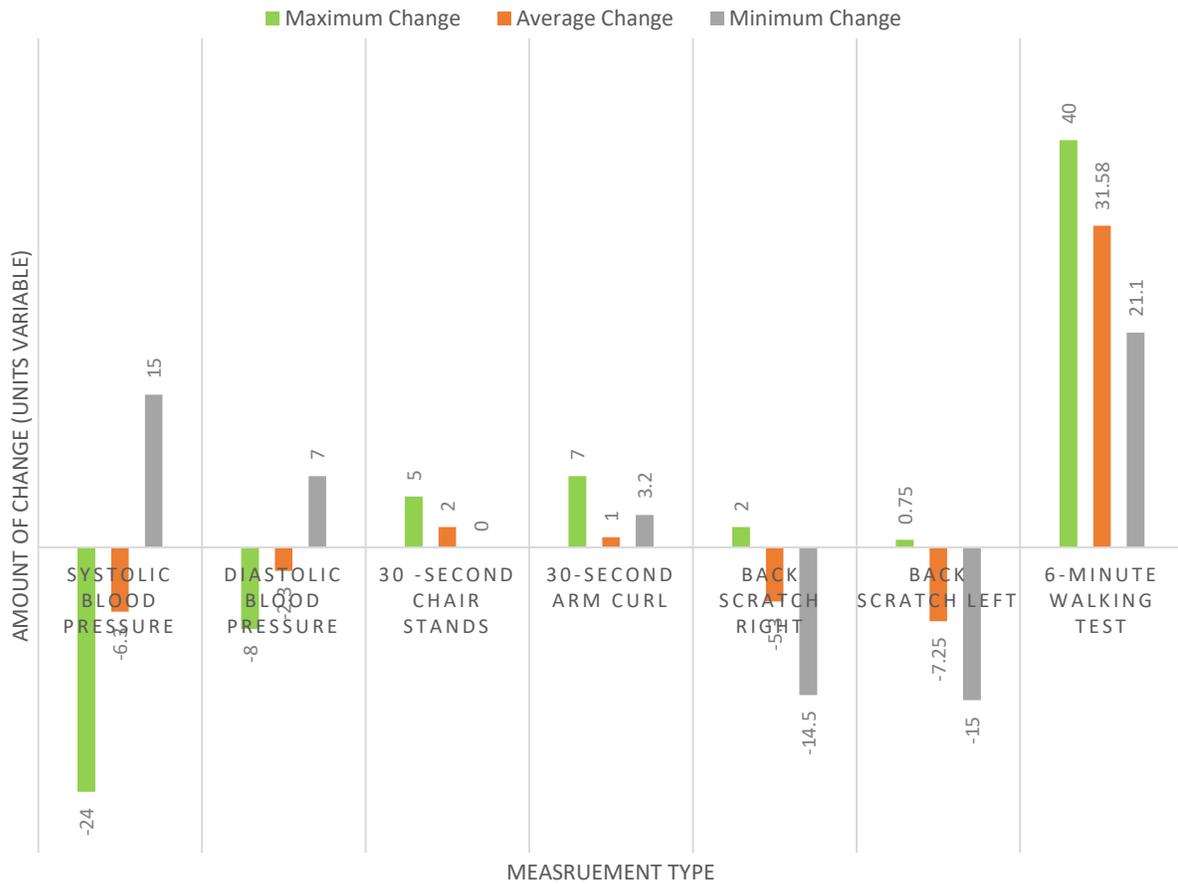Class of 2021

Part 3: Fitness Assessments

Figure 1. Change in fitness test measurements before and after CR. Units are as follows: Systolic and Diastolic Blood pressure (mmHg), 30 second chair stand and 30-second arm curl (repetitions), Back scratch tests (cm) and 6-Minute walking test (m). See Appendix C for a description of all exercises.

More data pending

Discussion

Considering the data from the surveys and fitness tests, it seems that CR has been successful so far in helping participants with the areas that they need the most help in. In the cases where respondents did not report any change to their rankings, they initially felt competent in the area in question (For example, they already felt they understood their cardiac condition). This type of response does not necessarily indicate that they did not obtain any information in these areas during CR, but rather their confidence remained similar. The areas that showed the most improvement from respondents were: knowledge for community resources (100% of respondents reported improvement), and comfort talking to health care professionals about their concerns (75% of respondents reported improvement). Areas that showed the least amount of improvement were understanding of cardiac diagnosis and confidence in knowing what is best for one's own body (25% of respondents reported change for both areas). It may be helpful to look into these areas further while conducting CR, and what

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can be done to increase this response. Potentially this could include an opportunity for individual participants to ask questions one-on-one with a knowledgeable health care provider (Nurse educator or Physician). This could take some of the stress from asking questions in a group setting, and may be less intimidating than asking participants' regular primary care providers. As the program grows in Portage la Prairie, however, this may be difficult as the volume of individuals per cycle will increase, putting greater strain on the CR team.

The results from fitness testing shows some improvement in most areas, with the exception of flexibility. Blood pressure went down (with the exception of one individual) an average of 6.3 mmHg for systolic and 2.3 mmHg for diastolic blood pressure. There was some improvement for the strength measurements (30 second chair stand and 30 second arm curl) improving an average of 2 and 3.2 repetitions, respectively. Flexibility on average decreased (and decreased for most participants) by -5.3 cm and -7.25 cm on the back-scratch test (R and L, respectively). This could potentially be due to increased strength training with insufficient flexibility training, muscle stiffness, or other unknown factors. The aerobic test (6-minute walk test) showed improvement across all participants, with and average of 31.58 m improvement in distance. Therefore, it seems that CR fitness is doing well to increase aerobic fitness and strength, but may wish to focus more on flexibility in the future.

In addition, the surveys asked about participants' insight into their own physical fitness. In their own responses, 100% of participants felt that they felt more confident in how to exercise and 50% felt that they already felt more physically fit after having completed CR. This may be due to the amount of time it takes to build physical fitness and the gradual increase in ability. Day-to day changes are small, so it may be difficult for participants to gauge their own progress without seeing exact numbers in the fitness tests. In addition, not enough time may have passed for much improvement to bee seen for some. The fact that participants feel able to plan exercise routines for themselves and that 100% of respondents said they were exercising on a regular basis is promising, and indicates that CR has enabled participants to continue to exercise and be active after the program has finished.

Limitations

This study, although promising, has some significant limitations. The most notable limitation is the small sample size. As cardiac rehabilitation is a relatively new program in Portage la Prairie, there is a very limited number of past participants (15) and thus there is only a limited amount of data available. Furthermore, some individuals were not able to be reached by phone (no confidential message box, listed phone out of service, etc.). Thus, there were limited response to surveys.

Also regarding the surveys, the fact that the surveys were conducted online may have influenced the number of individuals able to respond to surveys. Although all participants were asked if they would be comfortable with completing an online survey, there is a certain amount of computer literacy that is required. This also may have contributed to the small number of respondents to the surveys.

Another important limitation in this study is selection bias. The sample of individuals participating in CR, and furthermore those who were willing to participate in the survey, may not be a representative sample of all individuals with heart disease in Portage la Prairie who have gone through CR. Individuals who decide to participate in CR are likely more motivated to undertake lifestyle modification. Therefore, there may be some confounding factors associated with the interpretation of the success of CR utilizing a survey.

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Conclusions

Although initial data in this report is promising (especially in the areas of participant confidence in self-management, aerobic fitness and strength), it will be important to continue monitoring the progress made in CR as more data becomes available. There are significant limitations to the interpretation and generalizability of the data collected here, however there are areas of improvement suggested for education in heart disease and for flexibility training.

Topics for Further Research

Further research on this topic could be improved by comparing individuals participating in CR with a similar group of individuals who do not.

Grace et al. (2016) discuss the additional challenges faced by CR participants in the context of low socioeconomic status (SES) and low resource settings. Some of these concerns regard cost of the CR program, unsafe neighborhoods for exercise, and lack of access to nutritional food.[4] It would be beneficial to identify which barriers exist for potential CR participants in Portage la Prairie in order to make CR more accessible to all.

A brief overview of demographic information for Portage la Prairie is given in this report for context, however, it will me important in the future to assess whether the population of CR attendees are representative of the population of those with heart disease in Portage la Prairie. If there are differences found, an investigation into potential discrepancies could be useful to make CR more effective in the future.

One result of the surveys obtained was that three out of four respondents had more than a year between the time of cardiac diagnosis and beginning CR. Ideally, as per the guidelines, referral to the CR program should be done in-hospital and should be opt-out rather than opt-in.[2] It should be considered that as the CR program is new to Portage la Prairie, there will be a catch-up period in referring individuals who have pre-existing cardiac diagnoses. An analysis of this data is not included in this report, but would be useful for improving the referral/recruitment process in the future.

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Appendix A: Updated Core Components of Cardiac Rehabilitation
Taken from CACR Guidelines 3rd Ed. (Table 11-1)

Core Component	Component Elements
Systematic Patient Referral Process	• Automated referral • Negative option (must decline rather than request cardiac rehabilitation)
Patient Assessments	• History and physical examination • Risk stratification • Exercise stress testing • Risk factor assessment • Psychosocial assessment • Nutritional assessment
Health Behavior Interventions and Risk Factor Modification:	• Nutritional Counselling • Lipid management • Hypertension management • Smoking cessation • Weight management • Diabetes management • Adherence to appropriate pharmacotherapy • Psychosocial management • Physical activity counselling
Adaptations of program models to improve accessibility especially for underserved populations	• Home-based exercise, program supervised • Home-based exercises with web-based, program supervised • Hybrid programs, both home and program-based exercise
Development of self-management techniques based around individualized assessment, problem-solving, goal-setting, and follow up	• Problem solving. Patients should learn how to define their disease-related problems and how to generate practical solutions to daily problems faced as a result of chronic illness • Decision-making. Cardiac Rehabilitation counsellors should assist patients in acquiring the necessary health-related information sufficient to enable effective decision-making about health-retaliated problems and changes in their disease condition • Resource utilization. Patients should be assisted in finding and utilizing multiple resources, many of which may be commonplace or community-based. • Partnership formation. Patients should learn how to form productive partnerships with health care providers such as physicians, nurses and cardiac rehabilitation councillors. This will enhance patients' abilities to report changes in their disease condition while facilitation informed decisions regarding their disease treatment. • Action planning. It is vitally important for patients themselves to take action in solution implementation and the development of self-efficacy. This may involve making an action plan or goal-setting, typically very short-term and specific, which is realistic or achievable and that evokes a reasonably high feeling of confidence that it can be accomplished. This skill is similar to the SMART (Specific, measurable, attainable, realistic and Time-defined) goal-setting plan. • Self-tailoring. Patients should be encouraged to self-tailor health-enhancing programmes or activities such as exercise or dietary change, based upon those previously defined skills.
Exercise Training	• Aerobic training • Strength (resistance) training • Flexibility training
Leisure Time Activities	• Daily, moderate physical exertion in sustainable and enjoyable activities • Step counting with pedometers
Outcomes Assessment Programs and Performance Measures	• Clinical outcomes • Health outcomes • Educational outcomes • Behavioural outcomes

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	• Service outcomes
Continuous Quality Improvement Programs	• Quality can be improved by eliminating defects in the process and adding features that better meet patients' needs or preferences • The patient is central to every process and processes are improve to meet the patients' needs reliable and efficiently • The main source of quality defects is problems in the process. Preventing defects in the process saves resources. • Focus on the most important processes to improve-use statistical thinking and tools to identify desired performance levels, measure current performance, interpret it and take action when necessary • Involve every worker in quality improvement. Use new structures such as temps and quality councils to advise and plan quality improvement strategies. • Set high standards for performance; go for being the best
Continuous Professional Development Programs	• Identify formal and informal continuous learning processes that update relevant knowledge, skills and attitudes. • Maintain professional continuing education credits • Obtain ACLS certification and re-certification • Obtain CPR certification and re-certification • Engage in: Employee mentorship of students and other professionals, Journal Club In-services, ACSM/CSEP certification , annual professional society meetings

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Appendix B: Cardiac Rehabilitation Survey

Entrance Survey:
To be completed BEFORE BEGINNING Cardiac Rehabilitation

Hello and thank you for taking time to complete this survey regarding your participation in the Cardiac Rehabilitation program in Portage la Prairie, MB.

Results from this survey will be used to analyze the program's outcomes and to improve the program in years to come.

The information submitted in this survey is anonymous and will in no way impact the healthcare you receive.

If you have any questions, please call Laurel Trimble at the Portage Clinic and ask to leave a message for Paige van der Zweep. Thank you for your time; your input is greatly appreciated!

Section 1: Demographic Information

1. Age:
2. Sex: M   F
3. What is your cardiac diagnosis (Why were you referred to Cardiac Rehabilitation?). Check all that apply.
    o   Myocardial Infarction (Heart Attack)
    o   Angina
    o   Coronary Artery Stent Placement
    o   Heart Valve Replacement
    o   Coronary Artery Bypass Surgery
    o   Implanted Pacemaker/Defibrillator
    o   Other (Please Specify):

4. When were you diagnosed with your cardiac condition?
    o   2 weeks or less before being referred to Cardiac Rehabilitation.
    o   2 weeks to 1 month before being referred to Cardiac Rehabilitation.
    o   1 month to 6 months before being referred to Cardiac Rehabilitation.
    o   6 months to 1 year before being referred to Cardiac Rehabilitation.
    o   More than 1 year before being referred to Cardiac Rehabilitation.

Section 2: Other Medical Conditions and Risk Factors:

5. Please check all conditions you have been diagnosed with:
    o   Hypertension (High Blood Pressure)
    o   High Cholesterol
    o   Type 1 Diabetes
    o   Type 2 Diabetes
    o   Depression

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- o Anxiety
- o Other (Please Specify)
6. Do you smoke?
    - o Yes
    - o No, but have smoked in the past
    - o Never smoked
7. If you smoke or have ever smoked: How much did you smoke at the most?
    - o Less that 0.5 packs per day (<10 cigarettes)
    - o 0.5-1 pack per day (10-20 cigarettes)
    - o 1-1.5 packs per day (21-30 cigarettes)
    - o 1.5-2 packs per day (31-40 cigarettes)
    - o 2-3 packs per day (41-60 cigarettes)
    - o More than 3 packs per day (>60 cigarettes)
8. If you smoke or have ever smoked: How long have/did you smoke for:
9. Do you have a first degree relative (Parent, sibling or child) with heart disease? If so, which heart condition do they have?

Section 3 Current Disease Management:

Please answer as how these statements apply to you currently:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel I understand my cardiac diagnosis.					
I feel I understand the medications/tests used to treat my condition.					
I feel I can make informed decisions regarding my health.					
I know about resources in my community that could help me with my condition and its management.					
I feel comfortable talking to my doctors, nurses, kinesiologist, an other members of the health care team about my concerns.					
I feel I have a say in the treatment of my condition					
I feel I can set attainable goals for my own health.					
I feel I know what is best for my own body and my own health.					

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Section 4: Exercise Habits

10. Do you currently exercise?
    - o   Yes, multiple times per week.
    - o   Yes, once per week.
    - o   Yes, less than once per week.
    - o   No, I do not exercise.
11. What kind of exercise do you do?

12. How confident do you feel in creating an exercise plan suited to your own preferences and health?
    - o   Not at all Confident
    - o   Somewhat confident
    - o   Confident
    - o   Very confident

Section 5: Leisure Time Activities:

13. What activities do you do in your leisure time?

14. Do you exercise or do active hobbies in your spare time?
    - o   Yes
    - o   No
15. If yes, please specify:

16. Do you track daily steps with a pedometer, phone or other device?
    - o   Yes
    - o   No

Section 6: Outcomes

17. What do you hope to gain from Cardiac Rehabilitation?

18. Please feel free to leave other comments or concerns.

STOP: **Rest of survey to be completed after Cardiac Rehabilitation**

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Exit Survey:
To be completed AFTER COMPLETING Cardiac Rehabilitation

Section 1: Current Disease Management:

Please answer as how these statements apply to you currently:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel I understand my cardiac diagnosis.					
I feel I understand the medications/tests used to treat my condition.					
I feel I can make informed decisions regarding my health.					
I know about resources in my community that could help me with my condition and its management.					
I feel comfortable talking to my doctors, nurses, kinesiologist, an other members of the health care team about my concerns.					
I feel I have a say in the treatment of my condition					
I feel I can set attainable goals for my own health.					
I feel I know what is best fro my own body and my own health.					

Section 2: Exercise Habits

1. Do you currently exercise?
    - o   Yes, multiple times per week.
    - o   Yes, once per week.
    - o   Yes, less than once per week.
    - o   No, I do not exercise.
2. What kind of exercise do you do?

3. How confident do you feel in creating an exercise plan suited to your own preferences and health?
    - o   Not at all Confident
    - o   Somewhat confident
    - o   Confident
    - o   Very confident

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Section 3: Leisure Time Activities:

4. What activities do you do in your leisure time?

5. Do you exercise or do active hobbies in your spare time?
   o Yes
   o No
6. If yes, please specify:

7. Do you track daily steps with a pedometer, phone or other device?
   o Yes
   o No

Section 4: Outcomes

8. Do you feel Cardiac rehabilitation has improved your understanding of your condition? Describe:

9. Do you feel Cardiac Rehabilitation had improved your understanding of exercising and how to be active daily? Describe:

10. Have you noticed a difference in your physical fitness since completing Cardiac Rehabilitation? Describe:

11. Do you feel you have made sustainable changes in your health behaviour since completing Cardiac Rehabilitation? Describe:

12. Please feel free to leave other comments or concerns.

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Appendix C: Description of Fitness Assessment Tests
Taken from "Fitness of Older Adults"[5]

- 30-second Chair Stand
  - Number of full stands that can be completed in 30 seconds with arms folded across chest.
- 30-second Arm curl
  - Number of bicep curls that can be completed in 30 seconds holding a hand weight of 5 lbs (2.27 kg) for women; 8 lbs (3.63 kg) for men.
- Back Scratch Test
  - With one hand reaching over the shoulder and one up the middle of the back, the number of inches (cm) between extended middle fingers (+ if fingers overlap, - if fingers do not touch)
- 6-minute Walk Test
  - Number of yards/meters that can be walked in 6 minutes around a 50-yard (45.7 meter) course. (5 yds = 4.57 meters)